*Communication*

# Is Online Learning Ready to Replace Traditional Education? A Commentary

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**Abstract:** In recent years, online learning has become one of the most popular methods of educational delivery due to advances in technology, which has been made even more evident in the COVID-19 lockdown period. Online education has evolved into a distinct field of study within the educational system over the last few years. It is also important to note that parallel with the growth in this field, there has also been an increase in the number of scholarly journals that regularly publish research in this field, reflecting the importance of this field in the modern day.

In spite of the fact that online learning offers a wide range of educational options, from short courses to full-time degrees, as well as being accessible, flexible, environmentally friendly, and affordable, there are also certain challenges associated with this educational approach. These challenges include the lack of social interaction, technical errors, a lack of hands-on training, and difficulties in assessing students.

It is, therefore, imperative to ask the crucial question of whether online learning can replace traditional classroom learning or whether it can supplement it in hybrid models with it, as well as what factors and conditions are likely to determine this in the short- and long-term, as well as how it will be blended together in the future. The purpose of this commentary is to provide a brief summary of the current status of both learning models, as well as their pros and cons, in order to answer the question that was posed above.

**Keywords:** online learning; e-learning; hybrid learning; innovation; education

## 1. Introduction

Generally speaking, online learning, also referred to as e-learning or digital learning, among other names, is defined as the process of delivering, tracking and managing courses via web-based software (Mukhtar et al., 2020). In recent years, technology has enabled online learning to imitate traditional classroom communication activities, including the use of whiteboards, discussion groups, tests and surveys. In spite of this, online learning does not represent a unified process; it takes many forms and serves many purposes. Online learning may be conducted entirely online, or in a hybrid format—also known as blended learning—which combines both online learning materials and classroom interaction. In addition, it can be used to teach lessons, courses, or entire degrees. Despite the recent increase in online learning, however, several questions can be raised regarding the factors that contribute to its success or failure. These questions will determine whether online learning will become a substitute for traditional education, or a complementary method. Because of this, online learning has developed into a specialized area of inquiry that studies these factors (Bolliger & Halupa, 2018; Shelton et al., 2017; Yang et al., 2017), with a number of specialized journals available for people to share their experiences and outcomes. In the present commentary, I discuss the available data related to the

effectiveness of online learning, and the degree to which it will be able to replace traditional learning in the future.

## 2. Effectiveness of online learning

Recent developments in online learning have greatly enhanced the availability and development of online courses, making it more critical than ever to understand their effectiveness. A wide range of methods have been employed to assess the effectiveness of a variety of learning processes, including online learning. Several of these methods focus on students' perceptions of and satisfaction with the learning process, which result in their engagement with peers and instructors as well as low withdrawal rates, also known as retention. Other methods focus on learning outcomes and test scores (Nguyen, 2015). Effectiveness outcomes, in general, can be broadly categorized into three types: achievement, attitude and retention (Nguyen, 2015).

In light of the data, a variety of conclusions may be drawn regarding the learning outcomes of online versus traditional learning. In one regard, no significant differences between online and traditional learning appear, even when the technology was not as developed as it is now, as demonstrated in a meta-analysis by Bernard et al. (Bernard et al., 2004). In fact, the National Research Center for Distance Education and Technological Advancements (DETA) in the United States has developed an intriguing database named "No Significant Difference" (https://detaresearch.org/research-support/no-significant-difference/).   Currently, this database contains a total of 355 research projects, all of which report no significant differences in learning outcomes between the various educational delivery methods; questions may arise, however, as to how such a large number of studies and projects can reach the same conclusion, given the complexity of learning and its assessment. Contrary to DETA data, means et al. (Means et al., 2009) reviewed 45 studies using strict criteria, and concluded that students participating in online learning performed better than those participating in traditional formats, especially when blended learning was used.

In view of the foregoing considerations, it is critical to understand which aspects of online learning are more effective than traditional instruction. Typically, these include:

**Accessibility:** Online learning may be most effective delivery method, in that it is available to a wide range of students in a variety of educational and economic settings. It should also be noted that online learning provided the only means of sustaining education for many during the COVID-19 pandemic, wherein the conditions of lockdown and social isolation caused the greatest disruption of educational systems in reported history (UNESCO, 2020). Online learning also allows students from different countries and backgrounds to enroll and interact with each other and their instructors. In this regard, students from rural areas or low socioeconomic areas generally benefit most from online learning; however, it should be noted that the definition of low socioeconomic areas varies significantly between developed and developing nations. In the latter case, many students would have difficulty accessing online education due to their inability to afford the services required for online learning, such as access to the internet, electricity and devices.

**Affordability:** It is worth noting that several studies have warned about a growing gap between high school and college graduates (Dynarski & Scott-Clayton, 2013), as college tuition and student loans rise with scant progress being made to address the problems (Iuliano, 2020). Hence, online learning is very effective, as it offers cheaper education due to its lower tuition rates and other associated costs, such as travel and accommodations (Dhawan, 2020). Today, many of the world's leading universities offer online degrees, either directly or through massive open online courses (MOOCs), available through university portals or third-party platforms, such as Audacity, edX, Coursera, and others.

**Flexibility:** The flexibility of online learning is another aspect that contributes to its effectiveness. Most students who use online learning methods benefit from a flexible schedule that enables them to complete courses at their own pace. The course materials and lectures are typically accessible to students at any time and from anywhere. This

dynamic educational process encourages a greater retention rate, and makes education a lifelong pursuit.

**Innovation:** By definition, the quality of online learning outcomes is assured by the application of technology with respect to knowledge transfer and assessment (Carrera & Ramírez-Hernández, 2018). As a result, innovation has played a crucial role in its success, incorporating, for example, the use of smart phones and other digital devices as learning tools. Such innovative methods have enabled the facilitation of pedagogical processes and interactions analogous to those found in a traditional classroom (Carrera & Ramírez-Hernández, 2018). Innovation can also be related to educational programs. In this regard, an interesting collaboration was recently established between Zayed University in the United Arab Emirates and Minerva Project (Zayed University X Minerva: https://zuxminerva.com). The major aim of this initiative is to offer interdisciplinary degrees that combine multiple disciplines into a single educational experience that will be conducted by instructors and working environments from around the world, primarily online, in order to enhance real-world, problem-solving skills and work experiences. Similarly interesting is a concept referred to as the "Lecture-Free Classroom," which also uses innovative technology platforms (Shoufan, 2020). This method employs an online platform to design learning activities, and students use class time entirely to complete and reflect on them, with the instructor's role limited to assisting individual students or teams with questions. The use of such innovative approaches ensures both active learning and student engagement.

**Eco-friendly and green solutions:** A major advantage for online learning is that it contributes significantly to mankind's pursuit of eco-friendly and environmentally sustainable solutions. According to a study published by the Open University in the United Kingdom, online learning can significantly reduce energy consumption and emissions of carbon dioxide (Roy et al., 2004). Apart from this, using online platforms can also be a good way to reduce travel expenditures, thereby minimizing fuel and water consumption and lessening waste (especially paper), and contributing to more social responsibility.

### 3. Does online learning have the potential to replace traditional education?

In the last few years, online learning has opened up many new possibilities for students. It continues to complement traditional methods of education, but it is hard to predict whether it will replace traditional learning altogether. A possibility exists for online study to substitute for conventional study in special circumstances, such as natural disasters and epidemics. Additionally, learning can take place entirely online by students who are less likely to participate in conventional classes, such as those who are employed full time or are from low-to-middle-income countries. According to several reports, thousands of academic leaders endorse and are positively disposed toward online learning and its associated technologies as the future education choice for academic institutions and students (Allen & Seaman, 2014; Anderson, 2008).

In spite of the beneficial prospects that many educators feel online learning represents, it is difficult to conclude that this method can fully supplant traditional learning, due to the following factors:

**Social factors:** The fact that online education is now a more widely used practice and may replace traditional learning and courses in higher education (Gilbert, 2015) has led to concerns about the effect it will have on students' developing social skills, and how it will affect their ability to balance work, family and social responsibilities with their studies (Dhawan, 2020).

**Technology barriers:** Practical implementation of online learning may encounter technological barriers, including inadequate infrastructure, technical glitches and errors, and the lack of the skilled technical personnel (O'Doherty et al., 2018). For instance, a crucial component of online course effectiveness is providing immediate and effective feedback in a way that matches classroom methods (Gilbert, 2015). This is a strategic challenge.

**Bias:** Despite the fact that online courses are intended primarily to provide opportunities for high-quality learning, bias cannot be eliminated. The research by Hollands and Tirthali (2014) indicates that institutions use MOOCs to maximize their reach, boost their brand image, increase revenue, and utilize their data for further research and development efforts (Hollands & Tirthali, 2014).

**Other challenges:** Challenges in shifting to complete online models of teaching include two related issues: assessment methods, and lack of access to labs for hands-on training. Student assessment is a critical part of the learning process, and can be used to determine the students' progress as well as their achievement of learning objectives. It is a difficult and complex task that does not involve simply ensuring that learners can recall information. Several questions have been raised about students' engagement during online assessment tasks, and how we can ascertain whether these assessment outcomes realistically represent what the students have actually learned. Several strategies have been suggested for improving the quality of online assessment—especially in the direction of authentic assessment, which is based on demonstrations of ability to apply knowledge in real-life scenarios. A recent collection of 12 topics published by "Faculty Focus" makes many valuable suggestions for improving assessment methods and avoiding their common mistakes in online learning (Reports, 2021). According to certain studies, online learning is capable of providing hands-on skills training in some fields, such as software and multimedia (Wang, 2006), or of demonstrating life-science activities using online simulators (Costabile, 2020); however, online learning is mainly a text-based learning style, and in many fields such as engineering, medicine, and other life sciences, teaching hands-on skills by means of online teaching methods is currently unfeasible. This is a major limitation.

### 4. Conclusion

Given the weight of the available body of evidence, it appears that online learning is equally effective as traditional learning for students, and that it has a positive impact on the learning process. Since the digital world is growing exponentially, as suggested by the successful shift of media outlets, newspapers, and magazines to online formats, it is reasonable to conclude that online learning is on track to replace many traditional learning methods. At present, however, it does not appear that online learning is going to supplant traditional education in its entirety, at least not in the near future.

In order for online learning to succeed and grow, more research must be conducted to develop interactive and innovative learning environments which are similar or more effective than to those offered in traditional classrooms and labs, especially for majors/specialties which require practical training. In the foreseeable future, blended learning appears to be the most feasible and effective method of education, since students can benefit from the best of both worlds.

**Conflicts of Interest:** The authors declare no conflict of interest.

### References

Allen, I. E., & Seaman, J. (2014). Grade Change: Tracking Online Education in the United States. *Babson Survey Research Group*.

Anderson, T. (2008). *The theory and practice of online learning*. Athabasca University Press.

Bernard, R. M., Abrami, P. C., Lou, Y., Borokhovski, E., Wade, A., Wozney, L., Wallet, P. A., Fiset, M., & Huang, B. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of educational research, 74*(3), 379-439.

Bolliger, D. U., & Halupa, C. (2018). Online student perceptions of engagement, transactional distance, and outcomes. *Distance Education, 39*(3), 299-316.

Carrera, J., & Ramírez-Hernández, D. (2018). Innovative education in MOOC for sustainability: Learnings and motivations. *Sustainability, 10*(9), 2990.

Costabile, M. (2020). Using online simulations to teach biochemistry laboratory content during COVID-19. *Biochemistry and Molecular Biology Education, 48*(5), 509-510.

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems, 49*(1), 5-22.

Dynarski, S., & Scott-Clayton, J. (2013). Financial aid policy: Lessons from research.

Gilbert, B. (2015). Online learning revealing the benefits and challenges.

Hollands, F. M., & Tirthali, D. (2014). MOOCs: Expectations and reality. *Center for Benefit-Cost Studies of Education, Teachers College, Columbia University, 138*.

Iuliano, J. (2020). The Student Loan Bankruptcy Gap. *Duke LJ, 70*, 497.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies.

Mukhtar, K., Javed, K., Arooj, M., & Sethi, A. (2020). Advantages, Limitations and Recommendations for online learning during COVID-19 pandemic era. *Pakistan journal of medical sciences, 36*(COVID19-S4), S27.

Nguyen, T. (2015). The effectiveness of online learning: Beyond no significant difference and future horizons. *MERLOT Journal of Online Learning and Teaching, 11*(2), 309-319.

O'Doherty, D., Dromey, M., Lougheed, J., Hannigan, A., Last, J., & McGrath, D. (2018). Barriers and solutions to online learning in medical education–an integrative review. *BMC medical education, 18*(1), 1-11.

Reports, O. C. S. (2021). Assessing Online Learning: Strategies, Challenges and Opportunities. *Faculty Focus*. https://www.facultyfocus.com/wp-content/uploads/images/AssessingOnlineLearning-OC.pdf

Roy, R., Potter, S., & Yarrow, K. (2004). Towards sustainable higher education: environmental impacts of conventional campus, print-based and electronic/open learning systems.

Shelton, B. E., Hung, J.-L., & Lowenthal, P. R. (2017). Predicting student success by modeling student interaction in asynchronous online courses. *Distance Education, 38*(1), 59-69.

Shoufan, A. (2020). Lecture-free classroom: Fully active learning on moodle. *IEEE Transactions on Education, 63*(4), 314-321.

UNESCO. (2020). Education: From disruption to recovery. *UNESCO*.

Wang, S.-K. (2006). Learning hands-on skills in an online environment: the effectiveness of streaming demonstration animation. *Journal of Interactive Online Learning, 5*(1), 1-14.

Yang, D., Baldwin, S., & Snelson, C. (2017). Persistence factors revealed: Students' reflections on completing a fully online program. *Distance Education, 38*(1), 23-36.