We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,300

Open access books available

172,000

International authors and editors

190M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities

WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com

New Updates in Online Learning

Nilesh Kumar Mitra

Abstract

During the COVID-19 pandemic, a rapid transformation happened overnight in the teaching-learning strategy in primary, secondary and tertiary education. All educators started using web-conferencing tools as principal element of online learning. However, in spite of health concerns among the pandemic situation, strong student preferences towards returning back to face-to-face or hybrid mode brought challenges to the effectiveness of online learning. Students cite many reasons for dropping out of online courses. Increased workload and poor organization of remote learning have been found to be the principal reason for the students' dissatisfaction. The orientation of online learning needs alignment towards the principle of course design along with the flexibility to attain the instructional goals, objectives, and outcomes. Sophisticated technology often makes online and even hybrid course design to change track from well-designed pedagogy leading to loss of functional relevance for the students. Instructors should be flexible and employ multiple strategies to improve online learning experiences in both asynchronous and synchronous learning environment. Studies have proved that using the best practice of the alignment of learning outcome, online learning activities and repeated online knowledge-checks foster student motivation towards the completion of online courses.

Keywords: online education, instructional design, engagement in online learning, asynchronous online learning, synchronous online learning

1. Introduction

Online education has been growing continuously for the last two decades. With the reduction of budgets and shrinking spaces, many Universities continue to use online education as a long-term strategy to handle increasing student enrolment. Compared to 3.2 million students enrolled in at least one fully online course during fall semester 2005, in fall 2019, 7.3 million students enrolled in at least one distance education course in the USA. Since the days of 1840, when Sir Isaac Pitman introduced teaching shorthand through the post, distance learning became available through television in 1965 with the first Open University in England broadcasting the lectures through BBC. However, today crossing the borders of postal services and television broadcasting, the advent of newer technology and web-based connectivity has turned remote learning into agile and flexible virtual classrooms [1, 2].

Analysis of the status of online learning in different parts of the world indicates a strong presence of country-level factors. A close look at the globalization of online education explains its dependence on bridging the digital divide, accommodation

of various languages, standardized curriculum across different countries and use of universal technology platforms. A shift from the agricultural or industrial economy to the digital economy, automation of jobs requiring lower grades of skills and impending need of lowering infrastructure costs have led the government administration and higher education institutions to make major structural changes [3].

After an initial peak in the enrolment of the students in the online courses, US Universities have been experiencing the burden of increased faculty training costs, lack of appropriateness of teaching of all subjects in the online mode and increased cost of technological updates. Some students are concerned about the reduced quality of instruction and increased cognitive load of mastering new technology. Among the developing countries, Indian Universities have established themselves as major drivers of online or blended education with people using online education reaching 9.6 million in 2021. Comparatively lower cost of online education, appreciable growth in internet and mobile devices penetration and escalating demand of working professionals have helped the growth of online education in India. Among the other Asian countries, the Chinese online education market has developed exponentially due to government support and a national curriculum. Universities have been providing lessons via satellite to thousands of remote schools and broadband internet connections have reached remote corners of the country. Challenges in the growth of online learning in the Middle East have been described due to the lack of educational resources in the Arabic language and low public esteem for online education. The Open University of Australia in collaboration with other leading Universities have become the national leader in online education. However, the lack of high bandwidth connectivity in remote locations has been reported as a principal factor preventing the growth of online learning. In contrast to other countries of the world, mobile-based learning has reached significant growth in Africa despite the lack of significant increase of information technology capacity [4–8].

2. COVID-19 pandemic and online learning

During the COVID-19 pandemic, schools and higher education institutes chose to temporarily cease face-to-face classes and remote learning was promoted by the administration. By the end of April 2020, 186 countries implemented nationwide closures. Schools for more than 168 million children were completely closed for face-to-face classes [9]. Behind the black cloud, there is always a promise for bright sun rays. To cope with the extraordinary situation, countries with centuries of lecture-based teaching and related institutional biases were forced to pursue creative approaches on relatively short notice. Various strategies were used to deliver remote learning (**Figure 1**).

During the crisis period, a large amount of online teaching started in various formats and many interfaces were used to deliver the content. From primary to tertiary education, the institutions attempted to develop an expectation that the students should take responsibility for their own learning. Often the teachers put an increased emphasis on compliance with the technical needs and requirements at the expense of the student-centeredness and engagement. These changes had a significant impact on the students' learning system. Both synchronous and asynchronous online learning from the Learning Management System (LMS) are accessed by the students, using the internet via smartphones, iPads, laptops, or desktops. Most of the students in the developing countries rely on the computer and free internet in the schools due to the existing socio-economic conditions. Students and instructors with

Figure 1.
Strategies used in online learning during COVID-19 pandemic.

poor internet connections in their residences were denied continuous access to the resources. Provision of the technological devices posed challenges to parents, institutions, Government, and non-governmental organizations. The appearance of family members and pets during the online teaching and learning caused a distraction to the attention of online learning participants. Students experienced more workloads as appropriate assessments were not introduced to match the level of coverage of the syllabus and the delivery of the lessons [10]. A study conducted in Poland in April 2020, among 2408 teenagers, found that half of the surveyed adolescents felt an increase in the requirements imposed by the teachers. About one-third of the teenagers opined about poor organization of remote learning at the schools and observed problems in consulting the teacher when they had problems in understanding the material [11]. A qualitative study was held with 79 faculty from 19 countries using Polarity Approach for Continuity and Transformation (PACT). The faculties worked in small groups to determine the pros and cons of face-to-face and distance learning. The warning signs identified in distance learning for continuous monitoring included dissatisfaction of students with faculty engagement, mentorship programs showing lack of significant engagement, failure of one-third of students to submit timely assignments and decrease in mean scores of formative assessments among 30% of the students. A reduction of 10% score in Objective Structured Clinical Examination (OSCE) stations on topics taught online was also observed [12].

3. Instructional design to improve engagement in online learning

With the studies reporting disengagement of the students in the online learning, educational institutions should plan to design appropriate learning activities and improve the learning environments. e-Learning Engagement Design (ELED) is a framework which can be added as common step in instructional design models to incorporate best practices for student engagement in online learning (**Figure 2**) [13].

Figure 2.
Instructional design framework for increasing engagement [13].

Instructional design tasks start with identifying instructional needs of the learner and constructing a learner profile with all strategic information related to the learner. An analysis of the learning environment and the components of the online instruction along with the learner profile would enable the instructor and instructional designer to find out the problem in the instruction and the performance problem. The second phase starts with analyzing the instructional objectives and instructional goals which the students need to achieve to demonstrate their understanding. The third phase of the ELED framework is where most design and development tasks are performed. Both active and passive online learning activities should be investigated to plan strategic changes to improve levels of interaction and engagement. However, the most critical component in the student engagement is the role of the facilitator and how the online facilitation in different learning activities are carried out. Media selection is also a key task in the design process. The selection of the media for online student engagement requires consideration of interaction between the learners and the technology and, the role played by the media elements in the learner-learner, learner-course material and learner-instructor interactions. Formative assessment integrated with each type of online instruction helps to identify learner misunderstandings, misconceptions and mistakes and should be closely associated with the quality of feedback to be provided to the students. The fourth and final phase ends with the analysis of the summative assessment activities covering both learning and instructional effectiveness. Investigation of the alignment between the learning outcomes, online learning activities and tools of the summative assessment would indicate the gaps in the administration of the suitable online learning activities. To improve the student engagement in the online learning, engagement indicators of the academic challenge (i.e., learning strategies, reflective learning, higher order thinking), learning with peers (i.e., collaborative learning, group discussions), faculty experience of the student (i.e., teaching practices, student-faculty interaction) and campus environment (i.e., supportive campus environment, quality of interactions) should be investigated. Apart from the planning of strategic changes in the online instruction, administrators should also plan for developing the overall learning environment.

4. Engagement in online learning

4.1 Creating effective interaction using CCAF model

Traditionally interactivity in the teaching-learning process has been described in 4 levels.

- Passive (images, non-interactive video, or audio).
- Limited participation (animation, test questions, drag and drop interactions, clickable menus).
- Moderate interactions (simulations, branching scenarios, gamifications).
- Full immersion (learners control the interaction e.g., virtual reality, augmented reality).

In the CCAF (Context, Challenge, Activity, Feedback) model of e-learning design, the intention and outcome of the learning focus on creating immersion, even if the context is simple. Context (C) provides a real-world environment where the results of the challenge (C) can seem to be real. Activity (A) provided by the gesture represents actions to be taken in the real world in the form of meaningful behavior. Feedback (F) provided allows the learner to reflect on intrinsic components of learning based on the context (**Figure 3**) [14]. The components of CCAF guide the structuring of the learning events and should not be confused with learning phases.

4.2 Structuring learning interactions in ‘Flow Channel’

Learning experiences in the modules contain increasingly newer information. If the learning experiences are structured in an uphill channel and the equilibrium

Figure 3.
CCAF model of instructional design [14].

between the learner's ability and the learning challenge is not considered in designing the modules in either fully online or blended learning, the experience would be exhausting for the learner. When the challenge is too easy compared to the ability, it does not motivate the learner. On the other end, the challenge being too hard compared to the ability brings frustrating experience. A challenge of a new learning experience that is 'slightly hard' brings a sense of motivation to complete the learning task. The principle of 'Flow channel' brings a balance between challenge and satisfaction (**Figure 4**).

Figure 4.
Flow channel allows balance between the ability and challenge.

4.3 Tips on student engagement in asynchronous online learning

Creating a learning environment in online learning is a challenging task. The following examples of the application of the principles of online pedagogy [15–17] would help plan asynchronous online teaching sessions in the discussion boards of the Learning Management System (LMS) or Google group emails or blogs (**Table 1**).

4.4 Tips on student engagement in synchronous online learning

4.4.1 Cognitive presence in online teaching can be improved using the following principles

- **Gain attention**
Gain attention by a case-scenario or a short video and ask questions to stimulate inquiry. Compared to the face-to-face lecture, the strategy to prepare the students for online lecture should differ and should be planned earlier by posting a small number of quizzes for the students to self-assess along with a short video reviewing the topic of the lecture.
- **Learning outcomes**
Describe the goal by making clear statements on learning outcomes. Many a time, the outcomes from F2F teaching sessions are copied into online synchronous sessions without any alterations leading to increase in the cognitive load of the students. Choose the outcomes, which can be best delivered using the principle of microlearning (to keep the resources manageable) in the asynchronous learning resources (PDF/Video/links to web pages) component

Principle	Strategy
Student-directed learning	Chapter discussion by the students: Students are asked to start discussions by asking a critical thinking question from resources included in the lesson.
	<i>Students as facilitators</i> : Students to create a link to a website with summary of information and ask questions.
	<i>Peer assistance</i> : When a student has difficulty in completing a complex task, another student explains the concept in detail to him or her.
	<i>Students grading their own assignments</i> : Using a rubric students mark their own assignment and then suggest their grade to the instructor.
Student-student and student-teacher interaction	<i>Case study analysis</i> : Following a rubric of discussion, students discuss the case. Think-aloud triad can be used for the group interaction. The explainer will analyze the case, the questioner will challenge the explainer and the recorder will record. At the end, the recorder will make the presentation available in the discussion board.
	<i>Collaborative research paper</i> : Students to write a research paper with a review of literature from web-based journal articles. The paper can be submitted after including the comments /additional ideas from the other students.
	<i>Research proposal by a team of students</i> : A team of students work collaboratively to create background information, research questions and experimental design. The completed proposal is submitted to a ‘reviewer panel’ consisting of another team of students.
Strive for presence (Community of inquiry)	The ‘Community of Inquiry’ framework is a process model of online learning which propagates a constructivist theory explaining online educational experience arising from the interaction of social, cognitive, and teaching presence [16]. Online environment inhibits self-expression due to absence of appearance. Opportunity for inter-personal interaction can be enhanced by opening ‘Bulletin board’ or ‘Private chat rooms’ in the LMS. Inherent distance between the student and instructor infects the communication. In ‘cognitive presence’ interaction, while providing feedback, the instructor should use a tone of intimacy and immediacy rather than a detached note. ‘Teaching presence’ can be enhanced by encouraging, acknowledging, and reinforcing student discussions and creating a learning environment.
Role-play Simulations	<i>Preparation, Presentation and Analysis</i> : Students feel greater freedom to express themselves during the role-play in online environment relieved of the stage fright. A small group (4 or 5 students) is assigned a story to enact. Once the time comes for the ‘virtual curtains up’, a forum is opened, where the actors articulate with each other in serial order in the voice of their characters. The rest of the class participate as audience. In the final phase, student performers answer the questions from the rest of the class [17]. The role-play in the online environment stimulates creativity in the student-performers to compensate for the lack of visual and auditory cues of the physical act.

Table 1.
Strategies for student engagement in asynchronous learning [15].

of the module page in the LMS. A timely reminder in the chat box of the web-conferencing tool in a non-intimidating tone is often helpful in guiding the student learning.

- Prior knowledge
Link the outcomes with the prior knowledge.
- Chunking of contents
Explore the contents by chunking the contents into short segments under outcome 1, outcome 2, outcome 3 ... by explanation of the concepts using examples, metaphors, and asking student experience.

- **Scenarios or Examples**
Integrate the concepts under different outcomes by the scenarios or examples which can connect the outcomes.
- **Voice as a tool**
Some instructors find the concepts of ‘using the voice as a tool of engagement’ and ‘marrying the number of outcomes with duration of the session’ useful in delivering the online lecture. Using emotive words, varying the speaking rates and volumes and use of verbal signposts are often helpful.
- **Interactive tools**
Elicit performance by using interactive tools like ‘Poll Everywhere’, ‘Kahoot’, ‘Slido’, ‘Kahoot’, ‘Quizizz’ and ‘Mentimeter’.
- **Summarization**
Summarize the key concepts of the topic and let the students know about the arrangement of the question-and-answer session (chat-box/forum/discussion board).

4.4.2 Teaching presence in online teaching can be improved using the following principles

- **Lecture plan:**
 - Heading and Sub-Headings, division into segments (with maximum time for each segment)
 - Text-based content in each slide, font size, number of diagrams in each slide, choice of diagram and its clarity, clear explanation (Instructor should plan the text, narration, and images in the presentation with suitable application of Mayer’s cognitive theory of multimedia learning (**Figure 5**) [18].

Figure 5.
Application of Mayer’s cognitive theory of multimedia learning in presentation [18].

- Audio-visual components: pre-planned, simple to explain (not more than 50–60 seconds in one image), should facilitate change in sensory channel of the students
- Non-verbal aids:
Pause, silence, hesitations, change of vocal quality like increasing tone to emphasize and then decreasing tone to continue, gesture/facial expression
- Common errors:
Too quick speaking, failure to pause, explaining too much at one time, inaudible voice, not able to pitch the voice at comfortable level, not emphasizing key-points, use of long text without flow-chart/images/bullet points, not maintaining the timing to be given to sub-headings or parts of the lecture.
- Digital whiteboard:
Use of digital whiteboard: an online whiteboard is used so that both the lecturer and students can write on the whiteboard and both sides can see it. Apart from sketches and calculations, video, audio can be displayed and used inside the whiteboard. Notes from the class can be digitized, saved, and shared with the students.

4.4.3 Social presence in online teaching can be improved using the following principles

- Trusting environment:
Both teacher & students enter the online session few minutes before session so that icebreaking can be initiated by the teacher. In case of lack of attention from the students, the teacher should change the strategy and think about easier examples to explain the concept.
- Verbal feedback
Teacher should consider students' verbal feedback (no student responds, or students respond with inadequate explanation) for improvement in the teaching session.
- Blended learning:
 - F2F driver: A struggling student is given online remedial assignment through the LMS, following the online teaching session.
 - ROTATIONS: In a station rotation model, students are organized into groups in the break-out rooms within the web-conferencing platform for the group work during the online session. These groups can be fixed (remain the same each day) or dynamic (change related to student skills/needs).
 - FLEX: Blending online teaching session with traditional teaching methods. The assignments are completed by the students independently. Students work at their own pace through a predetermined set of material.

- Presence and social media:
A teacher should have a virtual office to meet the students in online teaching-learning environment. Using social media, educators can have an opportunity to help students and blur the lines between informal and formal learning. The following social media can be used:
 - Twitter
 - Facebook
 - WhatsApp group
 - Google Hangout
 - Instagram
- Collaboration:
Following online teaching session, teacher should create the sense of a learning community using appropriate platforms/tools e.g., forum in LMS and/or web-conferencing platform chat room
 - Frequent peer to peer communication (encourage students' interaction)
 - Be present as faculty to maintain student communication
 - Use video mode in synchronous activities to enhance the human connection

5. Conclusion

During the pandemic situation, online teaching-learning was initiated using various formats and many types of interfaces were used to deliver the content. A new-norm of online education is being delivered in the hybrid mode in many institutes, with a fraction of the students attending F2F being present in the campus and the remaining students attending online. Both online learning administered through the LMS in blended mode and hybrid learning have been accepted in most of the parts of the world to deal with the pandemic and to continue with the academic progress of the students. Educators need to meet the needs of the diverse learners and design the online learning experiences towards promoting a learning environment which should encourage engagement, promote interaction, motivate learners, and above all should facilitate learning both on campus and off-campus. Preparing web-based learning resources and administering online synchronous and asynchronous teaching require a great time and use of substantial resources. Educational institutes should invest on a sustainable information technology infrastructure that can support both the online resources and web-conferencing tools. The administrators should plan the budget for maintenance of cloud-based IT servers along with a stable LMS, suitable set of technological products, e-learning tools and a team of instructional designers, multi-media designers, content developers and web application programmer to run the online learning infrastructure. However, without a planned faculty development exercise aiming at educating the faculty in online learning pedagogy, instructional

design skills and design of online learning activities, presence of technology alone will not ensure effective and engaging online learning capable of attaining the educational goals.

Acknowledgements

The author would like to acknowledge the motivation from Professor Vishna Devi Nadarajah and Professor Er Hui Meng of the Teaching and Learning Department of International Medical University, Malaysia in writing this book chapter.

Conflict of interest

The authors declare no conflict of interest.

Author details

Nilesh Kumar Mitra
Learning Resources Division, International Medical University, Kuala Lumpur,
Malaysia

*Address all correspondence to: nileshkumar@imu.edu.my

IntechOpen

© 2022 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

References

- [1] Fast Facts: Distance learning, Institute of Education Science, National Centre for Education Statistics. 2021. Available from: <https://nces.ed.gov/fastfacts/display.asp?id=80>
- [2] Archibald D, Worsley S. The father of distance learning. *TechTrends*. 2019;**63**(2):100-101. DOI: 10.1007/s11528-019-00373-7
- [3] Palvia S, Kumar P, Kumar A, Verma S. Exploring themes, trends, and frameworks: A meta-analysis of online business education research. *AMCIS Proceedings*. 2017;**16**
- [4] Palvia S, Aeron P, Gupta P, Mahapatra D, Parida R, Rosner R, et al. Online education: Worldwide status, challenges, trends, and implications. *Journal of Global Information Technology Management*. 2018;**21**(4):233-241. DOI: 10.1080/1097198X.2018.1542262
- [5] Popovich CJ, Neel RE. Characteristics of distance education programs at accredited business schools. *The American Journal of Distance Education*. 2005;**19**(4):229-240. DOI: 10.1207/s15389286ajde1904_4
- [6] KPMG & Google. Online Education in India. 2017. Available from: <https://assets.kpmg.com/content/dam/kpmg/in/pdf/2017/05/Online-Education-in-India-2021.pdf>
- [7] Mirza AA, Al-Abdulkareem M. Models of e-learning adopted in the Middle East. *Applied computing and informatics*. 2011;**9**(2):83-93. DOI: 10.1016/j.aci.2011.05.001
- [8] Hillier M. Bridging the digital divide with off-line e-learning. *Distance Education*. 2018;**39**(1):110-121. DOI: 10.1080/01587919.2017.1418627
- [9] Press Release: COVID-19: Schools for more than 168 Million Children Globally Have Been Completely Closed for Almost a Full Year, Says UNICEF, UNICEF for every child 75. 2021. Available from: <https://www.unicef.org/press-releases/schools-more-168-million-children-globally-have-been-completely-closed>
- [10] Chand AA, Lal PP, Chand KK. Remote learning and online teaching in Fiji during COVID-19: The challenges and opportunities. *International Journal of Surgery*. 2021;**92**:106019. DOI: 10.1016/j.ijssu.2021.106019
- [11] Korzycka M, Bójko M, Radiukiewicz K, Dzielska A, Nałęcz H, Kleszczewska D, et al. Demographic analysis of difficulties related to remote education in Poland from the perspective of adolescents during the COVID-19 pandemic. *Annals of Agricultural and Environmental Medicine*. 2021;**28**(1):149-157. DOI: 10.26444/aaem/133100
- [12] Ahmed SA, Hegazy NN, Malak HW, Kayser WC, Elrafie NM, Hassanien M, et al. Model for utilizing distance learning post COVID-19 using (PACT)TM a cross sectional qualitative study. *BMC Medical Education*. 2020;**20**(1):1-3. DOI: 10.1186/s12909-020-02311-1
- [13] Czerkowski BC, Lyman EW. An instructional design framework for fostering student engagement in online learning environments. *TechTrends*. 2016;**60**(6):532-539. DOI: 10.1007/s11528-016-0110-z
- [14] Allen WM. Seven simple success strategies, In Michael Allen's guide to

e-Learning: Building interactive. In: Fun, and Effective Learning Programs for Any Company. 2nd ed. New Jersey: John Wiley & Sons; 2016. pp. 95-107.
DOI: 10.1002/9781119176268.ch7

[15] Pelz B. (My) three principles of effective online pedagogy. *Journal of Asynchronous Learning Networks*. 2010;14(1):103-116. DOI: 10.24059/olj.v8i3.1819

[16] Garrison DR, Anderson T, Archer W. Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*. 1999;2(2-3):87-105.
DOI: 10.1016/S1096-7516(00)00016-6

[17] Bender T. Role playing in online education: A teaching tool to enhance student engagement and sustained learning. *Innovate: Journal of Online Education*. 2005;1(4):5

[18] Mayer RE, Moreno R. A cognitive theory of multimedia learning: Implications for design principles. *Journal of Educational Psychology*. 1998;91(2):358-368