# Development Roadmap for Launching Online Education: A Case Study of an Online Graduate Certificate Course

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***Abstract*— The advancement of technology is rapidly changing teaching and learning practices in institutions globally. The recent outbreak of COVID-19 has fueled a significant growth of the market demand for online education, compelling institutions to focus their attention on the delivery of effective online education. This paper reviews the benefits and challenges of online education and proposes a framework for launching new online courses that can optimize production costs, assure delivery quality, and extend learner access. Applying this framework, a case study of an online graduate certificate course, Industry 4.0, is presented. The proposed framework can act as a benchmark for the introduction of online courses in the disciplines of business management, social sciences, art, and engineering.**

***Keywords—Online learning, MOOC, Virtual classroom, Online course development, Business and Management***

## I. INTRODUCTION

For many institutions, various learning management systems (LMS) such as Blackboard and Canvas are commonly used as an online education platform for delivering course materials and managing assessment items, to supplement the teaching and learning in a physical classroom. Although the online platform provides several features, most functions may not be fully utilized. The recent COVID-19 pandemic has significantly impacted education operations worldwide and led to the closures of many institutions due to the requirement for social distancing. More information may be found in [5] for a reference. In order not to discontinue the student learning process, many institutions have shifted to distance learning using virtual classroom tools such as Microsoft Teams, Zoom or WebEx. To prevent interruptions to operations due to unexpected outbreak of diseases, more and more institutions are recognizing the importance of establishing reliable online education platforms for teaching and learning purposes.

The online education platform is an integrative and collaborative environment that employs information communication technology (ICT) tools to facilitate the delivery of teaching and learning activities. Major categories of online education platform utilizing different types of technological components include the Face-to-Face classroom, blended learning, flipped classroom, virtual classroom, and Massive Open Online Courses (MOOCs). In online education, participants consider themselves as learners rather than students [3], especially those in part-time or vocational modes.

In a face-to-face environment, the instructor has close interaction with the learners within a physical classroom; while in a virtual classroom, synchronous interactions are made possible via the use of web conference tools (i.e., Google Hangouts, GoToMeeting, Zoom, and Microsoft Teams) as participants are located in different locations. A blended classroom combines online learning, which uses teaching materials such as videos and texts for learners' self-study, and face-to-face (F2F) classroom, where learners have in-depth discussions with the instructor after viewing their online lectures. In a flipped online classroom, such F2F contact sessions are conducted in the virtual classroom.

Unlike the F2F/virtual/flipped classrooms, the Massive Open Online Course (MOOC) allows for massive learners. The first MOOC was delivered in 2008 [2]. These days, MOOCs are commonly accessible for free by anyone with an internet connection, although there is a small charge for learners who require certificates of completion for the courses (i.e., Coursera, EdX). A narrative review of MOOCS can be found in [1]. As seen in Table I, the major differences between F2F/virtual/flipped classrooms and MOOC are summarized.

TABLE I. DIFFERENCES BETWEEN F2F/VIRTUAL CLASSROOM AND MOOC

| | F2F/ Virtual/Flipped Classrooms | MOOC |
|---|---|---|
| Purpose of learning | Degree accreditated | • Certificates<br>• Vocational learning<br>• Skills upgrade |
| Key role for operation | Instructor-led | Facilitated and student-centered |
| Target group | Students with formal registration | Public, international learners |
| Operational cost | High | Low |
| Course fee | Relatively expensive | • Almost free or<br>• Lower fee |
| Size | Small to medium | Very large |
| Study mode | • Real time (for contact sessions)<br>• Class-paced | • Any time<br>• Self-paced |
| Delivery platform | Single platform adopted by institution | Multiple platforms hosted by various third parties |
| Assessment | Strict assessments including assignments and/or examinations | Automated graded assessments such as MCQs |
| Interaction | • High chance<br>• Instructor interacts with students in-class or via web conference tools | • Little chance<br>• Discussion boards or communities of practice, wikis |

The objective of this paper is to present the benefits and challenges of online education, and recommend guidelines which can help transform a face-to-face classroom into different forms of online education. The rest of the paper is

organized as follows. The benefits and challenges of online education are illustrated in Sections II and III. The roadmap for launching an online course is presented in Section IV. Section V illustrates a case study of how an online course (i.e., BUS554 Industry 4.0) from a fully online Graduate Certificate in Management program can be converted from a face-to-face environment to a MOOC. Finally, the conclusion is presented in Section V.

## II. BENEFITS OF ONLINE EDUCATION ADOPTION

The benefits of online education adoption for institutions and learners are presented below.

### A. Institutions

*1) Generating more income*

Online education can be easily accessible by learners from different parts of the world, especially via the delivery of MOOCs. A well-planned series of stackable short courses resulting in the award of a graduate certificate can appeal to a wide variety of learners who wish to upgrade their skills and prepare for their desired job roles.

*2) Reducing operational costs*

Since the online content can be reused and built on, there is potential for economies of scale in terms of course development. In addition, as instructors and learners are in virtual locations, the demand for physical campus facilities such as classrooms and car park spaces are greatly lessened, contributing to environmental sustainability, and allowing for large student enrollments and scalability.

*3) Promoting knowledge sharing environment*

Class materials can be stored in a central database for efficient content sharing and management. MOOCs can be promoted across different faculties and schools, giving rise to cross-disciplinary skills, knowledge, as well as emerging and relevant courses. The facilitation of a well-developed online course can be easily replicated via the LMS by another colleague in the event of any last-minute faculty changes or emergencies.

*4) Promoting telecommuting*

Online education has paved the way for telecommuting, and instructors can work from home, leading to improved work-life balance and enhanced job motivation, satisfaction, and employee retention. The additional time savings from commuting can be used for experimenting new and innovative teaching pedagogies, leading to quality educational outcomes.

*5) Enhancing teaching quality*

Modern technology can enhance teaching quality via the use of interactive, collaborative, and innovative tools in teaching and learning. Such tools, often incorporating animation, automation, and gamification (i.e., leaderboards, mobile apps, and online games), can increase learner engagement while meeting the learning needs of students with different thinking (i.e., reflective, creative, practical, and conceptual) and learning styles (i.e., visual, auditory, kinesthetics, and environmental).

*6) Accessing new markets*

While different modes of online education can cater to the different needs of learners, the delivery of online education (i.e., MOOC) can reach a large number of learners from different parts of the world, anywhere, anytime, 24/7, and on-demand.

*7) Strengthen institutional branding*

Alongside the increased access to international markets during the promotion and publicity of the online courses, the brand and reputation of the institution can be enhanced when the online courses are delivered in an effective and engagement manner, leading to additional sources of income for the institution when the learner enrolls in further courses to stack towards a certificate program.

*8) Practice social distancing*

Due to outbreak of the COVID-19 pandemic, social distancing can be practiced during campus lockdown, without halting access to education. Indeed, the virtual classroom is an ideal solution for learners to continue their studies with minimal disruptions.

### B. Learners

*1) Convenience*

Learners can access the online materials anytime and anywhere and learn at their own pace and schedule.

*2) Learning cost*

Learners pay a lower fee for some online courses such as MOOCS, as universities can offer such courses in a cost-effective way.

## III. CHALLENGES OF ONLINE EDUCATION ADOPTION

Although online education presents vast benefits, there exists various challenges for the institution and learners, as seen in the following.

### A. Institutions

*1) Competition*

Online education has advanced past the growth stage, and competition is intensified on several fronts (i.e., product, price, and promotion), as there are many undifferentiated courses offered by renowned institutions at very attractive prices.

*2) Copyright and ownership*

As an instructor moves from one institution to another, there may be some copyright and authorship issues, especially when the content bears the face of the instructor (i.e., recorded videos). In some cases, the content author and/or developer might subject their creation to certain creative commons restrictions, with the license holder retaining full copyright and ownership.

*3) Increased workload for instructors*

On some occasions, online grading can be more time consuming, as some instructors might find the task of grading on digital scripts less efficient compared to pen-and-paper scripts. Moreover, in online discussion boards, rather than providing verbal feedback, instructors need to type out written feedback, which can be time demanding and onerous, especially when several discussion boards are used simultaneously in a large class setting. In addition, moving a course from a F2F to an online environment requires a lot of effort and time, especially in the planning stage of the course development process.

*4) Resistance from instructors*

When transforming from F2F education to online education, instructors might resist changes. For example, they may feel uncomfortable that their classes are recorded, or a senior faculty might fear the use of technology due to unfamiliarity of the course production process. Other instructors may feel that they are creating content for free, as the institution can reuse their content without paying them any royalty fee. This may lead to increased job frustration, dissatisfaction, and turnover.

### *B. Learners*

*1) Lack of recognition*

In general, online education may not be as widely recognized as F2F education. For example, some of the MOOCs are non-accredited, and learners might end up wasting their time if their online certificates are not recognized by their prospective employers.

*2) Reduced social interaction*

There is a reduced opportunity for social interactions in most virtual classrooms, as learners have little opportunity for sustained interaction with the other learners or the instructor, except for the short sessions of breakout rooms or online chats during the virtual class. Further, the asynchronous discussion boards or wikis may not be effective for social interactions and relationship building in an online setting.

*3) Intensive study workload*

In an online setting, learners are normally required to go through a plethora of audio, video, and written materials in order to complete the required assignments. The overall workload and short study period may be more intensified as compared to conventional classes. Eventually, online education can be fairly challenging and may be less effective for such learners, who might likely withdraw from the course.

*4) Need for self-directed and independent learning*

In F2F or blended learning, learners need to adhere to the fixed and regular class schedules where they get to meet their instructors to clarify any queries about the online lectures. If the learners do not peruse the online lectures before attending the F2F classes, they will most likely not benefit from the sessions. Further, although learners can learn at their own pace, some online courses have stipulated deadlines for various assignments. Without self-discipline and good time management skills, students may fail to submit their assignments and miss out on the course completion requirements. To be a successful online learner, one needs to be self-directed and independent.

## IV. ROADMAP FOR ONLINE COURSE IMPLEMENTATION

After examining the benefits and challenges of online education, a proposed roadmap for online course implementation, consisting of four phases and seven stages, is presented in this section.

### *A. Phases of deliverables*

The proposed roadmap is suitable for any institution with plans to develop a new course to impart relevant skills and knowledge to meet the current and future demands of the industry. As a start, it is important to identify the different groups of learners in different phases, taking into consideration the cost effectiveness of the various educational mode (Table II).

TABLE II. LAUNCHING THE COURSE FOR DIFFERENT TARGET GROUPS IN DIFFERENT PHASES

| Phase | Target group | Educational Modes | Credentials |
|---|---|---|---|
| 1 | University students in the local area | -Face-to-face | Full-time Degree (acceditated) |
| 2 | Working adults in the local area | -Virtual Classroom<br>-Blended learning<br>-Flipped Classroom | Part-time Degree |
| 3 | abroad, international students | -Virtual Classroom<br>-Flipped Classroom | Online Degree |
| 4 | Abroad, public learners | -MOOC | Online Certificate |

In Phase 1, the course is delivered to full-time university students including international students in the local area with a conventional F2F teaching method. For each F2F class, the teaching activities are recorded for reuse, if required. When offering the course for the second time, the best recording of the recent sessions can be used, supported by student and course coordinator feedback. If the feedback is positive, the course can proceed to the next phase.

In Phase 2, the target participants are working adults in the local area reading a part-time degree. The course can be delivered using different modes, virtual, blended, or flipped. The instructor and learners can hold regular meetings over the duration of the course. During this phase, the online lectures can be recorded for reuse. As the online lectures in the virtual and F2F classrooms are recorded, both blended learning and flipped classroom can be implemented.

In Phase 3, the participants consist of abroad or international learners, reading an online degree. With the experiences gained in Phase 2, both virtual and flipped classrooms can be effectively used.

In Phase 4, the participants are mainly located abroad, and the learners are the public. In this phase, the course can be converted into a MOOC and hosted on websites such as EdX, Coursera, or Udemy to expand educational access to new and emerging global markets.

### *B. Stages of launching online education in the platform*

Based on the four major phases, the operationalization of an effective online education platform is detailed in seven stages presented as follows.

*1) Planning stage*

The planning stage involves a series of careful decision making, with each decision impacting the next. A general decision process for selection of a problem normally involves the following steps:

1. Establish a decision goal;
2. Design the selection criteria;
3. Search potential alternatives;
4. Evaluate the selected alternative with respect to the selection criteria; and
5. Make the decision.

The planning stage for online education involves:

1. Course selection

2. Content selection
3. Production selection
4. Platform selection

As a start, the institution should select a course that is suitable for various online learning modes. Once a course is selected, the next step is to decide on the content to be included for each session. In assessing the content for an online course, the course learning outcomes, schedule, and priorities needs to be reviewed. This includes an examination of the assessment items and how they can be designed to support the learning outcomes. At this point, the institution needs to be ready to change the design of the assessment based on the limitations of online education. Next, the institution needs to decide on the ICT tools for the course production, and finally, the choice of online learning platform to adopt.

As there is a wide variety of e-learning platform providers in the market, the selection of the most suitable e-learning platform is a critical decision for the institution due to its high investment and wide impact. Refer to [7], which presents a model for e-learning platform selection.

*2) Content production stage*

Content production involves an overall map of the various topics and sub-topics in the course. To increase content interactivity, illustrations such as visuals, timelines, and flow-charts can be included. Various learning checkpoints can be incorporated throughout the sub-topics to guide course progression. The adoption of open textbooks and open access articles are recommended instead of third-party textbooks due to the complicated creative license and copyright problems involved for online use. The incorporation of data analytics, predictive modelling, Artificial Intelligence (AI) chatbots, and AI marking assistants are optional at this stage.

*3) Video production stage*

Videos are created via class recordings during the F2F and virtual classrooms. A series of self-recorded videos of different presentation styles (i.e., lecture, newscaster, storytelling) can be created for the different sub-topics. These may be created from scratch or extracted and re-edited from the classroom recorded videos.

*4) Testing stage*

Once the content and videos are ready, fellow colleagues or prospective learners can be invited to review the relevance and quality of the materials and provide comments for further revision. An online course community can also be created to test courses, provide support, as well as share insights and best practices on technology and tools for online teaching.

*5) Deployment stage*

After the online course materials are fully tested in the production phase, the course can be deployed in the selected online education platform. At this stage, some form of planned marketing, promotion, or publicity for the courses and programs can help to excite student prospects and increase learner enrolment.

*6) Excution stage*

Once the online course commences, the online content, including the materials and assessments can be released to the learners via the online platform. At this stage, the role of the facilitator includes answering learners' queries, directing students to the relevant online resources, and grading the various assessments. Importantly, it is integral that the facilitator creates a social presence and encourages students to do the same. The facilitator should maintain a good balance of being an active leader and active observer. Ideally, the focus should be on active learning, using mix spurts of discussions, collaboration, video, and hands-on exercises with text and possibly brief video lectures.

*7) Continous improvement stage*

On completion of a course, learner feedback can be collected. At this final stage, the course content and assessment items may require further revisions. An Online Student Learning Analytics of the data generated from online the education platform can be conducted to assess and improve the quality of the online course. For example, survival analysis can be employed to analyze the student dropout rate and interpret the reasons behind these actions by applying sentiment analysis in the discussion boards. An example of educational sentiment analysis for discussion board has been presented in [6].

## V. A CASE STUDY OF AN ONLINE GRADUATE CERTIFICATE COURSE

To further illustrate the roadmap, a case study based on an online graduate certificate course is presented in this section. In 2019, the School of Business at the Singapore University of Social Sciences planned to introduce some courses for the Graduate Certificate in Management (GCMGT) program. Topics such as Industry 4.0, Leading through Digital Disruption, Future of Work, and Leadership and Service Innovation were forecasted by Skillsfuture, a national movement to provide Singaporeans with opportunities to develop their fullest potential throughout life, as emerging career pathways and skills required in various industries. According to the Skills Framework [4], an initiative developed for the Singapore workforce to promote skills mastery and lifelong learning, these topics lay the foundation for critical work functions, key tasks, skills, and competencies. Some of these topics have been developed and delivered for a face-to-face classroom setting as part of the Master of Business Administration program. The curriculum for the topics used in the F2F classroom have received exceedingly high recognition and satisfaction from the students due to its effectiveness in simulating students' learning interests and increasing student engagement.

Given the feedback, the school decided to launch a fully online GCMGT on the canvas LMS platform. BUS554 Industry 4.0 was selected as one of the courses in the GCMGT. The F2F course, Harnessing Technologies for Business Innovation, was converted into an online course to provide access to more learners. The course will be launched in January 2021.

However, due to the COVID-19 pandemic and the social distancing requirements, all F2F seminars are moved online and subsequently recorded in the virtual classroom setting. The videos are further edited for later reuse. Post-course learning analytics was conducted to analyze the learners' content usage, learning behaviors, as well as learner dropout rate. Based on student and faculty feedback, further improvements have been made to the F2F course for the launch of the fully online course (i.e., BUS554) in 2021.

After successfully testing and revising the content and videos for the online course, the course is published to the

LMS. The next phase of course development is to convert the online course into a MOOC, to be launched on Coursera. Given the potential marketing and promotion support that can be gained from the established MOOC platform provider, there will be opportunities for additional income when a satisfied learner enrolls in additional courses to stack towards the GCMGT program.

## VI. Conclusion

A course can be delivered in different online education modes to meet the various needs of learners. This paper reviews the benefits and challenges of online education, and recommends a framework for establishing an effective online education platform. Applying this framework, a case study of an online graduate certificate course, BUS554 Industry 4.0, is presented to further illustrate the roadmap.

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