Communications of the Association for Information Systems

Volume 48 Article 4

1-26-2021

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Recommended Citation

Gottipati, S., & Shankararaman, V. (2021). Rapid Transition of a Technical Course from Face-to-Face to Online. Communications of the Association for Information Systems, 48, pp-pp. https://doi.org/10.17705/1CAIS.04802

Communications of the Association for Information Systems

Research Article DOI: 10.17705/1CAIS.04802 ISSN: 1529-3181

Rapid Transition of a Technical Course from Face-to-Face to Online

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Abstract:

Just like most universities around the world, due to the coronavirus disease of 2019 (COVID-19) pandemic, senior management at Singapore Management University decided to move all courses to a virtual, online, synchronous mode and gave instructors a short notice period—one week—to make this transition. In this paper, we describe the challenges we faced, the practical solutions we adopted, and the lessons we learnt in rapidly transitioning a face-to-face master's degree course in text analytics and applications into a virtual, online, course format that could deliver a quality learning experience.

Keywords: Face-to-Face, Transition, Online, Synchronous, Technical, IS Course.

This manuscript underwent [editorial/peer] review. It was received 7/15/2020 and was with the authors for one month for one revisions. Mary Granger served as Associate Editor.

1 Course Details

The School of Information Systems at Singapore Management University (SMU) offers a course called Text Analytics & Applications in the Master of IT in Business (MITB) program. The key learning outcomes for students taking this course include obtaining knowledge about the role of text analytics in the industry, being able to explain how text analytic applications use natural language processing (NLP) techniques, gaining the ability to apply NLP, and solidly understanding how to use text-mining techniques to solve problems such as classification, extraction, analysis, and visualizations.

The course comprises 12 sessions over 14 weeks. Each session lasts for three hours (i.e., from 7:00 p.m. to 10:15 p.m.) with 15-minute breaks after each hour. In 2020, 54 students registered for the course. The course operated in face-to-face mode in the classroom for the first five weeks. However, beginning with week six, it moved to an online, virtual classroom, synchronous mode due to the coronavirus disease of 2019 (COVID-19). Our university supported our using WebEx for the online delivery and Desire to Learn (D2L) as a learning management system (LMS).

2 Key Challenges

The instructor faced several challenges in conducting online classes, such as:

1) Though the instructor had experience in delivering online one-off lecture sessions, she had never faced a situation in which she had to conduct seven continuous sessions in a virtual environment.
2) The instructor had no prior experience in preparing and delivering online exams. Hence, the instructor had to learn to use tools that supported proctoring methods for online exams (Sinjini & Gofman, 2016).
3) As the course's students comprised professionals who had paid a large fee to take the program, they expected quality.
4) The SMU pedagogy involves smaller classes with highly interactive sessions, which better suit face-to-face classroom delivery. The instructor found ensuring this interactivity through the virtual online mode a challenging task.
5) The course involved hands-on labs, which normally required a lot of hand holding by the instructor and the teaching assistant.

3 Best Practices Adopted

Since the instructor delivered the course every week, she had to take a trial-and-test approach and incrementally adapt the practice into each weekly iteration.

3.1 Best Practice 1: Enhance Interactions through the Chat Function

During the first week of the online delivery, the instructor made the assumption that, since the Cisco Webex tool supports one-to-one audio interaction, she could use it to interact with students. After using the tool in a presentation for a few minutes, the instructor decided to ask open questions to the class. As a result, the same students answered and asked questions, which did not help the instructor provide all students with an equal opportunity to participate. Additionally, the fact that the class used only audio for the discussions slowed down the process and, in some instances, created too much background noise.

In the subsequent weeks, the instructor decided to reduce the audio interactions and supplement them with the chat function that Webex provides. Students needed minimal training in using the chat function. Using the chat function helped to streamline the interaction (Bowler, 2009).

The instructor used the chat function in the following manner:

- The instructor covered a concept for about 30 minutes and then posted two or three questions for students to answer and discuss.
- The instructor gave the students five minutes to respond to the questions or post their own questions.
- Subsequently, the instructor went through the answers and discussed them with the students.

In this way, the chat helped the class to be more interactive without the need for multiple people to talk at the same time. However, it required the instructor to prepare some questions for discussion and also be efficient in going through the chat discussions. Additionally, the feature to save the chat provided the instructor with a record of who participated in the class discussion and input when awarding class-participation marks.

When the class required audio interaction, the instructor decided to streamline it via the "raise hand" functionality and cold calling.

3.2 Best Practice 2: Reorganize Labs for Online Delivery

The course adopted a design that included nine labs in which students used Python on Jupiter Notebook and various NLP and text-mining application programming interfaces (APIs). In the face-to-face sessions, the students had a lab sheet that they worked on during the session with the instructor and teaching assistant physically available to clarify and help them if they became stuck. By observing a student's computer screen, the instructor and assistant could immediately fix a problem on a student's machine. However, in the online virtual mode, they could not view every student's monitor. Thus, the instructor adapted the lab sessions for the online virtual mode as follows:

- The instructor covered a python concept and then students worked on a lab by applying this to a text-mining problem. The instructor provided students with a lab sheet that contained instructions.
- Any student who faced a problem in the lab could share a computer screen shot (JPEG file) or their computer screen with the instructor and teaching assistant, so they could both share the load for troubleshooting student work.
- Subsequently, the instructor and teaching assistant used breakout rooms where the teaching assistant could take one or more students to troubleshoot their code.

The above approach worked well when few students faced a problem. However, for more difficult labs with many students who required troubleshooting assistance, the class progress slowed down considerably, and some good students became bored. Additionally, due to network latency, sharing the screen took a significant amount of time and slowed the troubleshooting process.

3.3 Best Practice 3: Redesign Exam Format and Questions for Online Delivery

In the face-to-face classroom format, we designed the final exam to address the different levels of Bloom's taxonomy—from understanding to evaluating. The content requires students to design IT solutions and derive the mathematic formulae for a given scenario. Hence, when we converted the exam to an online format, we need to address three challenges. First, we needed to ensure the students did not plagiarize. Second, we had to allow students to draw diagrams and create mathematic formulae. Third, we had to make provisions should network disruptions occur. We address each challenge using the approaches that we show in Table 1.

Table 1. Approaches to Addressing the Challenges

Plagiarism	We divided the exam paper into two parts. We designed the first part to include multiple choice questions with a short timeline of 15 minutes. The short timeline ensured that we could detect any plagiarism using a Lockdown browser with the Respondus tool to monitor students live (Atoum, Chen, Liu, Hsu, & Liu, 2017). Additionally, we randomized the multiple choices questions by both questions and choices. The Lockdown browser does not allow for any change to the screen; hence, students could not use online search tools. We also used the Respondus monitor, an AI-based tool with facial-recognition features. The tool captures students' image. If a student looks sideways or down to use another device, the Respondus tool captures the image and raises a red flag for further investigation.
Math derivations and solution drawings	We designed the second part to include short answer-based questions with an answer template and stringent timeline of one hour and 45 minutes. We aligned the questions to levels in Bloom's taxonomy related to analyze, design, or create. We displayed questions on the LMS platform. Students could answer drawing questions by uploading a picture using their mobile phone.
Delays in starting the first part due to network or setting challenges.	During a trial run, we observed that some students had network issues related to browser settings when answering the quiz with Lockdown browser. Hence, we planned the exam with a 15-minute break in between the first and second parts to allow for any delay. The gap ensured all students started the second part simultaneously.

4 Lessons Learnt

4.1 Reduce Content Coverage

As a key observation from the online delivery sessions, the instructor noted a high level of participation in the class from the students. In fact, as a result, every class session extended by about 30 minutes on average. Though this extension meant students had to attend sessions until 10:30 p.m., the students did not seem that concerned and did not complain. When we further investigated this issue, we observed that the students usually spent 30 to 60 minutes travelling to and from the school. However, a key lesson to take away for the next iteration is to reduce the course content when delivering using a virtual online mode.

4.2 Allocate Sufficient Time to Learn the Technology Tools

Though the instructor had training in using Webex's and LMS tools' basic features, the instructor had to master the advanced features to deliver course content more effectively. Additionally, by doing research, the instructor also learnt that other supplementary tools, such as Wooclap, could help in enhancing interaction with students.

4.3 Be Prepared for Last Minute Glitches

During the face-to-face sessions, since the instructor did not rely heavily on the network or technology tools, the sessions, for the most part, ran smoothly. However, when delivering online synchronous sessions, something can always go wrong. For example, in a worst-case scenario, one might have to postpone an entire student presentation due to a network problem.

5 Student Feedback on the First Version of the Online Delivery of the Course

Before deciding on the plan before we next run the online course, we needed to review and understand the student feedback for the current run. Accordingly, we added four questions to the usual end-of-term teaching evaluation. We describe these questions and the insights we obtained from students' answers to them in this section.

5.1 Quantitative Feedback Summary

First, we asked students how difficult they found it to achieve the course's learning objectives via online delivery compared to face-to-face sessions. We found that approximately 76 percent responded that they found online delivery somewhat more difficult, more difficult, or much more difficult than face-to-face sessions. This result indicates that the online synchronous delivery does negatively impact the student effort needed to achieve course-learning objectives.

Second, we ask students how they perceived the course's overall online experience. Around 42 percent responded that it was good, very good, or excellent. Another 31 percent responded with neutral. This result indicates that students overall found the online experience favorable.

5.2 Qualitative Feedback

Third, we asked students about the online experience they liked or found effective. We categorized and summarized their various experiences into four categories, which we show in Table 2.

Table 2. Student Feedback about their Online Course Experience

General comments	Experience
Students found that they needed to concentrate intensely or else they missed out on understanding concepts covered.	Concentration
Online learning helped many students to participate more and raise questions in the class. The students saw the chat feature in Webex as a good medium to provide feedback for students' questions and urged them to think besides just listening to the instructor.	Interaction
Besides minor glitches, the audio and video was mostly clear.	Technology
Online learning helped students save time on travelling to school and learn from the comfort of their home.	Comfort

Fourth, we asked students for suggestions on how they would improve the course's online experience. We categorized and summarized their responses into four categories, which we show in Table 3

Table 3. Student Suggestions on How to Improve the Online Course Experience

Suggestions	Experience
Many students suggested that would have liked it if we recorded the session so that they could later access it to revise should they miss some parts due to network glitches or noise.	Concentration
Students suggested enhancing interaction by splitting the session into smaller groups so that everyone could have more time to participate and ask questions.	Interaction
Students suggested that the instructor establish rules of conduct for online sessions. For example, establishing a rule that states "all students are required to mute their microphones and only unmute it when they need to say something".	Rules of conduct
Students suggested we provide them with two screens that they could use together so that they could follow the instructor's monitor and perform hands-on lab work on their own device.	Labs

6 Plan for Online Delivery in the Second Run

Based on the instructor experience and student feedback gained from the first run, we show the changes that we implemented when we next delivered the course (from May to July, 2020).

Subsequently, we conducted the same quantitative and qualitative feedback evaluation. For the first question, we found only 48 percent of students responded that they found the online delivery somewhat more difficult, more difficult, or much more difficult than face-to-face sessions (i.e., 28% less than the first run). This result indicates that with, the changes we implemented, the online synchronous delivery did not adversely impact the effort that students needed to expend to achieve the course's learning objectives. For the second question, we found that around 93 percent of students responded that it was good, very good, or excellent (i.e., 51 percent more than the previous run). Another seven percent responded with neutral. This result indicates that, during the second iteration, students found the course's online experience favorable overall.

Table 4. Changes Implemented in the Second Run

Practices implemented	Issues addressed
We uploaded the recorded slides before the Webex session. We annotated slides using pencil marker during the Webex session. We prepared and shared session rules of class interactions with the students.	Enhance concentration. Enforce rules of conduct.
We prepared discussion forum thread questions before every class. We prepared the class activity sheets and uploaded them to the LMS before the class started. Students filled in the sheets and submitted them to the forum during the class. The instructor randomly chose four of five sheets to discuss the answers.	Enhance concentration. Increase interaction.
We redesigned the lab sequence to ensure the students gained python skills before applying them. We encouraged students to use multiple screens to follow the instructor. We used the chat tool in the lab sessions to help with questions. We made one teaching assistant (TA) available to answer students' questions in parallel. We also created breakout rooms where students struggling with the lab could work with a second TA.	Make labs easier to follow and do.
We reduced content by removing advanced concepts to a special pre-recorded session. Accordingly, in each session, we reduced the content covered.	Address the time overrun issue.
We used Webex features such as chat, record, screen share, presenter mode, and stats in every class session. We used LMS for the discussion forums, assignments, and announcements. We used Wooclap tool to enhance interactions.	Use additional features of the technology tools. Enhance interaction.

7 Concluding Remarks

Transitioning a master's degree course in text analytics and applications from a face-to-face, in-classroom delivery mode to a virtual, online mode constitutes a difficult task. However, using student feedback as a guide and by making incremental changes to the design and delivery, an instructor can deliver a good educational, online learning experience.

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