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Abstract:

Just like most universities around the world, the senior management at Singapore Management University decided to move all courses to a virtual, online, synchronous mode, giving instructors a very short notice period—one week—to make this transition. In this paper, we describe the challenges, practical solutions adopted, and the lessons 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.

1 Course Details

Text Analytics and Applications is a Master's course offered by the School of Information Systems at Singapore Management University (SMU). 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 NLP techniques are used in text analytic applications; gaining the ability to apply NLP, and a solid understanding of how to use text mining techniques to solve problems, such as classification, extraction, analysis, and visualizations.

The course is made up of 12 sessions that are spread out over 14 weeks. Each session lasts for three hours, from 7:00 p.m. to 10:15 p.m., with 15-minute breaks provided after each hour. Fifty-four Master's degree students were registered for this course. The first five weeks of the course were conducted face-to-face in the classroom; beginning with week six, the course was moved to an online, virtual classroom, synchronous mode. The university supported the use of WebEx for the online delivery and Desire to Learn (D2L) as a learning management system (LMS).

2 Key Challenges

The following are some of the challenges faced by the instructor:

1. Though the instructor had experience in delivering online one-off lecture sessions, the instructor had never faced a situation where seven continuous sessions were conducted online 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. Students attending the course were professionals who had paid a large fee to register for the Master's program, so they expected a quality Master's program.
4. The SMU pedagogy involves smaller classes with highly interactive sessions, which are better suited to a face-to-face, classroom delivery. Ensuring this interactivity through the virtual online mode was 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 course was delivered every week, the instructor had to take a trial and test approach and incrementally adapt the practice into each weekly iterations.

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, this could be used for interacting with the students. After a few minutes of presentation, the instructor decided to ask open questions to the class. This resulted in the same students answering and asking questions, and did not help in providing equal opportunity to participate to all of the students. Additionally, the excessive use of audio for 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 provided in Webex. Students needed minimal training in the use of the chat function. Using the chat function helped to streamline the interaction (Bowler, 2009).

The chat function is used by the instructor in the following manner:

- The instructor covers a concept for about 30 minutes, and then posts two or three questions for students to answer and discuss.
- Students are given five minutes to respond to the questions or post their own questions.
- Following this, the instructor goes through the answers and has a discussion with the students.

In this way, the chat helps the class to be more interactive without the need for multiple people talking at the same time. However, it requires the instructor to prepare some questions for discussion and also be very efficient in going through the discussions that happen in the chat. Additionally, the feature to save the chat provides the instructor with a record of who participated in the class discussion, and then provides input when awarding class participation marks.

When audio interaction was essential, the instructor decided to streamline this through the use of the "raise hand" functionality and cold calling.

3.2 Best Practice 2: Re-Organize Labs for Online Delivery

The course has been designed to include nine labs that use Python programming language using Jupiter Notebook along with various NLP and text mining APIs. In the face-to-face sessions, the students were given 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 were able to immediately fix a problem on a student's machine. However, in the online virtual mode, it was difficult to view the computer screens of every student monitor. The lab sessions were, thus, adapted as follows for the online virtual mode:

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

The above approach worked well when very few students faced a problem. However, for more difficult labs with many students requiring troubleshooting assistance, the class progress slowed down considerably, with some good students becoming 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: Re-Design Exam Format and Questions for Online Delivery

In the face-to-face classroom format, the final exam is designed to address the different levels of Blooms taxonomy, from understanding to evaluating. The content requires the student to draw the designs of IT solutions and derive the mathematic formulae for a given scenario. Hence, when we converted the exam to an online format, three challenges needed to be addressed. First, we needed to ensure there is no plagiarism. Second, students had to be allowed to draw diagrams and also create mathematic formulae. Third, we had to make provisions should there be network delays. Each of these challenges was addressed using the approaches as shown in Table 1.

Table 1. Approaches to Addressing the Challenges

Plagiarism	The exam paper was divided into two parts. Part 1 was designed to include multiple-choice questions (MCQ) with a short timeline of 15 minutes. The short timeline ensured that any plagiarism could be detected using a Lockdown browser with the Respondus tool for live monitoring of the student (Atoum et al. 2017). Additionally, the MCQs are randomized by questions as well as the choices. The Lockdown browser does not allow for any change to the screen and, hence, students cannot use webs search tools. The Respondus monitor is an AI-based tool with facial recognition features. It captures the image of a student. If a student were to look sideways or down to use another device, the Respondus tool would capture the image and raise a red flag for further investigation.

Math derivations and solution drawings	Part 2 was designed to include short-answer-based questions with an answer template and stringent timeline of one hour and 45 minutes. The questions were aligned to the Blooms levels related to analyze, design, or create. Questions were displayed on the LMS platform. Students could answer drawing questions by uploading the picture using their mobile phone.
Delays in starting the Part 1 due to network or setting challenges.	During a trial run, it was observed that some students had network issues related to browser settings, when answering the quiz with Lockdown browser. Hence, the exam was planned with 15 minutes break in between Part 1 and Part 2 to allow for any delay. So, a gap of 15 minutes ensured all students started Part 2 simultaneously.

4 Lessons Learnt

4.1 Reduce Content Coverage

One of the key observations noted from the online delivery sessions is the significant high level of class participation from the students. This, in fact, led to every class session extending by an average of about 30 minutes. Though this meant that students had to attend sessions until 10:30 p.m., it is interesting to note that the students were not that concerned and did not complain. When this was further investigated, 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 the basic features of the Webex and LMS tools, the instructor has to master the advanced features to be more effective during the delivery. Additionally, by doing research, the instructor also learnt that other supplementary tools, such as Wooclap, could help in enhancing interaction with the 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, there is always something that can go wrong. For example, in a worst-case scenario, an entire student presentation might have to be postponed due to a network problem.

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

Before deciding on the plan for the next run of the online course, it was important to review and understand the student feedback for the current run. Four questions were added to the usual end-of-term teaching evaluation. The four questions and insights are described in the following section.

5.1 Quantitative Feedback Summary

Two questions connected to the online course delivery were included. The first question was related to the level of difficulty of achieving the learning objectives of the course through online delivery compared to face-to-face sessions. Approximately 76 percent responded that it was somewhat more difficult, more difficult, or much more difficult. This indicated that the online synchronous delivery does negatively impact the student effort needed to achieve the course learning objectives. The second question was related to the overall online experience of this course. Around 42 percent responded that it was good, very good, or excellent. Another 31 percent responded as neutral. This indicated the online experience of this course, overall, was favorable.

5.2 Qualitative Feedback

The first question is related to the aspects of the online experience that the students liked or found to be effective. We categorized and summarized the various experiences, obtained from the student feedback comments, into four categories as shown 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 be more participative and raise questions in the class. The chat feature in Webex was seen 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, over all, the audio and video was clear.	Technology
Online learning helped students save time on travelling to school, and they were preferred the comfort of their home.	Comfort

The second question is related to suggestions from students on how the online experience of this course could be improved. We categorized and summarized the student suggestions into four categories as shown in Table 3

Table 3. Student Suggestions on how to improve the Online Course Experience

Suggestions	Experience
A very popular suggestion was the provision for recording the session. The main reason was that it would help students go back and revise, should they miss some parts due to network glitches or noise.	Concentration
Enhance interaction by splitting the session into smaller groups so that everyone can have more time to participate and ask questions.	Interaction
Establish online etiquette rules before the start of a session. For example, muting the microphones, thus minimizing noise and intermittent distractions.	Rules of Conduct
Provide two screens to students to be used together so that the students can follow the instructor’s monitor and perform a hands-on lab 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, Table 4 shows the changes that were implemented in the next run of the course delivered May to July 2020.

Table 4. Changes Implemented in the Second Run

Practices Implemented	Issues Addressed
Uploaded the recorded slides before the Webex session. Annotated slides using pencil marker during the Webex session. Prepared and shared session rules with the students.	• Enhance concentration • Enforce rules of conduct
Prepared discussion forum thread questions before every class. Prepared the class activity sheets and uploaded to LMS before the class started. Students filled in the sheets and submitted them to the forum during the class. The instructor randomly chose 4 to 5 sheets to discuss the answers.	• Enhance concentration • Increase interaction
Re-designed the lab sequence to ensure the students gained python skills before applying them. Students were encouraged to use multiple screens to follow the instructor. The chat tool was used during the lab session to help with questions. One Teaching Assistant (TA) was available to answer students' questions in parallel. Created breakout rooms where students struggling with the lab could work with a second TA.	• Make labs easier to follow and do.
Reduced content by removing advanced concepts to a special pre-recorded session. In each session, the content covered was accordingly reduced.	• Address the time overrun issue
Used Webex features, such as chat, record, screen share, presenter mode, and stats, in every class session. Used LMS for the discussion forums, assignments, and announcements. Used Wooclap tool to enhance interactions.	• Use additional features of the technology tools • Enhance interaction

Subsequently, the same quantitative and qualitative feedback evaluation was conducted. It was quite impressive to note that with respect to the first question related to the level of difficulty of achieving the learning objectives, this time around, only 48 percent of students responded that it was somewhat more difficult, more difficult, or much more difficult. That is 28 percent less than the first run. This indicated that with the implemented changes, the online synchronous delivery did not adversely impact the students' efforts needed to achieve the learning objectives. The second question was related to the overall online experience of this course. Around 93 percent responded that it was good, very good, or excellent. This is a 51 percent increase compared to the previous run. Another 7 percent responded as neutral. This indicated that during the second iteration, the online experience of this course was overall very favorable.

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 is by no means an easy task. However, using student feedback as a guide to hone delivery, and by making incremental changes to the design and delivery, an instructor can deliver a good educational, virtual, online learning experience.

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