Transitioning University Courses Online in Response to COVID-19

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Abstract

As the world reeled from the realization that a pandemic of a magnitude not seen in a century was upon us, and that physical distancing to reduce the speed of transmission was going to necessitate suspension of regular classes, university faculty members scrambled to convert their planned lectures from in-person to online formats. This article describes one faculty member's experiences using a flipped classroom approach in a virtual teaching environment. The arrival of COVID-19 fractured the school year and put some students' graduation in jeopardy. From a hasty search of literature on the process of teaching and evaluating in an online environment, to a selection of hardware and software to provide students with an optimal learning environment while ensuring the security and validity of online evaluation, this article will highlight some of the successes and pitfalls of a rapid transition to online instruction and evaluation. Although there is a body of literature on the process and efficacy of online teaching, the constantly evolving nature of technology not only continues to produce new online instruction tools, but also tools that can be used by students to circumvent most cheating prevention measures put in place.

Introduction

In the final three weeks of the university Winter 2020 term, the world was gripped by a viral pandemic the impact of which had not been seen in modern times. In Canada, university classes were suspended and virtually all teaching shifted online. The cause of the pandemic started as a novel pneumonia infection and is now referred to as COVID-19 (a novel coronavirus first discovered in 2019), an infection caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). This crisis presented a unique opportunity to experiment with online instruction and evaluation with a group of students who had already received 75% of the course in a traditional classroom format and were then required to complete the course in an online format.

COVID-19 is a pneumonia infection caused by the SARS-CoV-2 virus, the seventh coronavirus to infect humans (Andersen et al., 2020). It is similar to the family of corona viruses that includes Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS), which are infections primarily of the respiratory system. COVID-19 infections and the SARS-CoV-2 virus are directly related, leading to some confusion in the literature (M. de la Roche, personal communication, May 8, 2020). The pneumonia infection caused by this virus "is a newly recognized illness that has spread rapidly…and…the clinical spectrum…ranges from mild to critically ill" (Yang et al., 2020, p. 475). The reason for the concern around this virus is that it is a *novel* virus, meaning it has never been previously identified in humans. As such, humans have no natural immunity to this illness and therefore, globally everyone is susceptible. Furthermore, it is more easily transmitted from human to human than previous novel viruses. With no known treatment or natural immunity, COVID-19 quickly spread around the world, and was ultimately declared a pandemic by the World Health Organization on March 11, 2020 (M. de la Roche, personal communication, May 8, 2020). This global pandemic has resulted in health and social impacts across the globe including Canadian universities.

This paper reports on the unanticipated compulsory move to an online format in required final year courses in the undergraduate Bachelor of Kinesiology program at the University of Winnipeg. As the pandemic hit, I was teaching two fourth-year university courses. One entirely paper-driven and taught through Microsoft PowerPoint enhanced lectures, the other a more complex flipped classroom course structure using PowerPoint, online tests, a group presentation, an in-class test, and a final paper. Using details from both courses, I am sharing the experimental choices used to complete the courses and highlighting some of the flaws in online evaluation that emerged.

It has been suggested that "delivery method does not significantly affect student learning outcomes on either basic or complex assignments" (DiRienzo & Lilly, 2014, p. 9), and that "e-testing will eventually replace conventional testing procedures, thus becoming the main assessment activity at universities" (Fageeh, 2015, p. 43). However, much of that evidence is based on student feedback on their perceptions of online learning vs. face-to-face instruction (Butt, 2014; Chen et al., 2017; Dixson, 2010; Graham et al., 2017). There is a dearth of empirical evidence that students actually gain and retain knowledge better through a virtual learning environment.

The evolution of teaching methods is not new. More than quarter of a century ago, King (1993) advocated for a move away from instructors being the "sage on stage", stating: "such a view is outdated and will not be effective for the twenty-first century, when individuals will be expected to think for themselves, pose and solve complex problems, and generally produce knowledge rather than reproduce it" (p. 30). She advocates for instructors taking on the role of "guide on the side" while conceding:

> such a change can entail a considerable shift in roles for the professor, who must move away from being the one who has all the answers and does most of the talking toward being a facilitator who orchestrates the context, provides resources, and poses questions to stimulate students to think up their own answers. (King, 1993, p. 30)

We are now well into the twenty-first century and the current situation is finally forcing many instructors to accept this enhanced role.

Literature Review

With the sudden requirement to convert to online delivery over a weekend, my immediate response was to conduct a literature review of existing practices in online education. As this article is primarily a review of literature and existing aggregate information, ethical approval was not required for this undertaking.

In order to conduct the review of literature, relevant databases related to post-secondary education were identified and searched using the following keywords/phrases: flipped classroom; online teaching practices; online assessment and evaluation. The search included a number of web pages as well as eight electronic databases and a search engine: Academic Search Premier, Ebook Central, EBSCOhost, ERIC, JSTOR, ProQuest, PsycInfo, Teacher Reference Centre, and Google Scholar. The Boolean operators used were ("flip* classroom" OR "invert* learning" OR "online testing" OR "online evaluation" OR "online assessment) AND ("online education" OR "online teaching practices") for the database search. For Google Scholar, the Boolean operators were comparable variants of TITLE-ABSTR-KEY ("flip* classroom" OR "online" OR "inverted classroom*" OR "online instruction" OR "online teaching"). All searches were limited to peer-reviewed scholarly sources. Studies reported in languages other than English were omitted from this review. Due to the recent advent of virtual instruction, no date restrictions were used. Once a list of sources was produced, relevant articles and unpublished doctoral dissertations were identified and retrieved from the library (including the use of inter-library loan). This literature search was conducted and completed in the middle of March 2020. The references of the included sources were examined to identify additional relevant studies.

The search strategy was designed with the help of a university librarian using all of the information collected and supplemented by information contained in current education textbooks. All of the literature found regarding online teaching, online evaluation, and best practices for flipped classrooms was then evaluated for inclusion in this article based on relevance to the topic and adherence to contemporary standards of practice.

Converting to Teaching Online

Transitioning an in-person course to an online format can provide challenges for both instructors and students. Martin et al. (2019) suggest that:

> [F]aculty can be resistant to the adoption of online courses because of a number of perceived barriers, including perceived barriers to student success in online classes, uncertainty about their image as online instructors, technical support needs, and their desire for reasonable workload and manageable class enrollments in online classes. (p. 34)

This resistance, coupled with a notable need for technical equipment to provide students with an optimal learning experience, and limited opportunities to procure such equipment, seems to have caused additional stress for some faculty members while initially attempting to convert face-to-face courses to an online format.

In my personal experience, teaching online was a relatively seamless transition due to the fact that many of the necessary resources were readily available. Martin et al. (2019) "reviewed extant literature and chose to organize [their] body of work into three broad areas: online course design, online course assessment and evaluation, and online course facilitation" (p. 35). This provided the foundation for my process of transitioning my two in-progress courses to an online delivery format.

Resources

Teaching online has hardware and software requirements beyond what is used for in-person teaching, especially when it is being conducted off-campus. The university provided most of the required resources, but some training was required for new resources as well as additional training on existing platforms for features not previously in use.

University-based resources. The university provides all the standard university-based access to technology such as access to the internet, email, online library databases, as well as the necessary resources and support to access and use the online proprietary virtual learning environment Desire2Learn (D2L). Previously, the University had procured and trained faculty on the use of WebCT, but had transitioned to the new platform when Blackboard Learning System acquired WebCT. Much of the training previously provided for faculty members for WebCT was eminently transferable to D2L. The University also purchased numerous licenses to the ZOOM video conferencing platform and provided two training sessions on navigating the platform.

Instructor-based resources. Moving online also required significant use of instructor-based resources. The Dell computers supplied by the university do not include the microphones or web cameras necessary to add voice-over to PowerPoint or for the use of ZOOM. Based on the recommendation of a tech services support person, I purchased a Blue Yeti Nano microphone as well as a Logitech StreamCam webcam to provide the best possible online experience for students. In addition, although support for the use of iClickers on campus had been discontinued, some faculty members continued to use them to improve student engagement, to perform formative assessments of student understanding, and to adjust instruction appropriately. I had been using a university supplied set of iClickers and posing questions sprinkled throughout my PowerPoint presentations which helped me to assess if the students were understanding the material and for students to see if they were keeping up with their cohort. Although it was not possible in the short timeframe, I would have liked to incorporate a student response system that would interface with the online D2L platform. Such a program would require students to remotely acquire the necessary app to use this feature, but would then allow me as an instructor to gauge student understanding and attentiveness to online lectures. This would be in keeping with Gilboy et al.'s (2014) recommendation for enhancing student engagement.

Online Instruction

Online instruction presented several challenges. One of the most substantial was my inability to speak directly to students, to gauge their reactions, and adjust my teaching to their needs. By utilizing some of the technology provided by the university, I was able to mitigate many of the issues I faced in the initial stages of online instruction. Gilboy et al. (2014) presented strategies for enhancing student engagement in a flipped classroom environment. Their suggestions both for preparation of the online content and for increasing student engagement with the online portions of a flipped classroom proved invaluable. There appears to be a limit on the attention span of students when learning in an online environment. Based on the findings of Amick et al. (2017), ZOOM lectures and PowerPoint shows should be limited to less than 50 minutes although Gilboy et al. (2014) suggest 10- to 15-minute online modules were better received by the students.

Batchelor (2011) found that three spheres emerged from her research, which encapsulated the overarching concerns related to moving to an online teaching environment. The sociosphere explores the interconnectivity of the three parties that must work in harmony if the online learning experience is to flourish; the instructor, the student, and the human capital behind the technology to connect the first two. The technosphere looks at the two-way interaction between innovative instructors and software developers in creating appropriate online learning environments. Finally, the ecosphere looks beyond the specific virtual classroom to consider the impact of moving to a virtual learning environment on the institution, the responsiveness of the administration to significant change, and the overall impact on various other roles within the institution.

In the process of moving my own courses online, in consideration of the sociosphere, I tried to remain cognisant of the various entities outside my personal bubble, exacerbated by physical isolation, in recognizing the impact on others. The shift has certainly caused additional struggles for students, but has also created an additional burden for the personnel in technology services, as well as people working in student services, and the registrar's office. The Technosphere has been ever-present in the struggle to rationalize the responsibility for technology requirements between the instructor and the institution. The ecosphere has caused me to look beyond simply my interaction with my students and my struggles to acquire timely support from technical services, to envision the broader impact of this sudden change on myriad other personnel within the university.

Voiceover on PowerPoint Slides

Continuing the lectures by simply adding voice to PowerPoint slides and uploading them to D2L as PowerPoint Shows (.ppsx) seemed like a quick and simple solution to delivering the lecture, but it unfortunately, eliminated the student-instructor interaction considered of great value in social science courses that lend themselves to discussion-based activities.

I was able to include some interaction by utilizing the *Discussions*, *Chat*, and *Groups* options in the Communication area of D2L. *Discussions* were used to present material for students to ruminate about on their own. *Chat* was used to connect the students and the instructor, in real-time, to allow for discussions about a topic of interest to some students. *Groups* was used to

connect students to work on group projects with instructor oversight but limited instructor interaction.

Increasing the Use of D2L Features

In the past, the D2L system simply provided me, as an instructor, with the opportunity to post the course syllabus electronically to avoid handing it out in the first class. In addition, I was able to provide students with copies of my PowerPoint presentations and to disseminate marks to students. Over the past decade this has saved a significant amount of paper. However, until my transition to online instruction, I had not used the *Discussions*, *Chat*, and *Groups* options. These D2L tools were particularly valuable in the transition of my courses.

Discussions allowed students to interact with each other while discussing a topic presented online by the instructor. I monitored *Discussions* sporadically mostly to ensure that students were interacting with each other appropriately and that the platform was not being used in a way that contravened the respectful working and learning environment as mandated by the University. Occasionally, I would intervene to clarify a concept if it appeared that the students using *Discussions* had misunderstood something.

Chat enabled me to interact with students in real-time, similar to texting. I noticed using this medium that students tended to use many of the short forms used in texting to speed up the interaction. Although useful for connecting with students to answer questions in an expedient manner, I became concerned that it impacted students' ability to communicate grammatically in English.

Findlay-Thompson and Mombourquette (2014) report that "students in the smaller-class format reported a preference for working in teams and achieved significantly better academic grades with the new course format" (p. 65). Groups meant that I could restrict interaction to a small group of students working on a specific project. This was particularly effective for my course that involved three-member group presentations. It provided each group with a platform where they could interact with each other as well as the instructor and prepare and store information while not sharing it with the rest of the class. I also expanded on the use of *Quizzes*, part of the D2L *Assessments* feature, to accommodate additional evaluation that would have been completed in class.

Using Flipped Classroom Concepts

Based on the recommendations made by Findlay-Thompson and Mombourquette (2014), I had already begun using some flipped classroom (Bergmann & Sams, 2012) concepts in my traditional classroom, which made the online transition relatively straightforward. Thai et al. (2017) also provided a useful procedure of best practices for transitioning from traditional learning to blended learning (a hybrid of online and in-person instruction) to e-learning that included flipped classroom concepts that I was able to use to adapt my courses to a fully online format. In one of my courses, I have students read a dozen seminal works in the discipline, as preparation for classroom discussion regarding the concepts. This is much more effective in terms of preparing students to apply the material in the real world rather than simply telling them what the article

entails in preparation for a memorization-based examination. To ensure each student had read the article by the beginning of class, they had to complete a ten-minute, ten-question multiple-choice quiz on the main concepts presented in the article. Using the *Quizzes* feature under *Assessments* in D2L it was quite simple to create a randomized quiz, use the same 10 multiple-choice questions for every student, and limit the access time to 10 minutes.

Online Evaluation

Although online teaching seemed to have a fairly smooth transition, conducting evaluation in terms of tests and examinations was another story. Evaluating online is fraught with potential security and, therefore, validity issues. A quick scan of faculty members raised concerns about exam security and a scan of current undergraduate and some graduate students highlighted some innovative ways students can get around many of the existing security features.

Online Testing

Online testing is purported to have myriad advantages over previous systems including those using bubble jet sheets for electronic marking by reducing the use of paper. Although their focus was on employment testing, Gibby et al. (2009) took a panoramic view of online testing and suggests that the benefits far outweigh the pitfalls. In a later article, Sarrayrih and Ilyas (2013) highlight the two main areas of concern when administering online examinations. The first is the challenge of determining personal identity. The second is the challenge of ensuring there is no unauthorized interference from other users, either negative or positive. D2L safeguards appear to have adequately addressed these two issues, but ingenious students take pride in finding ways to exploit the software to their advantage.

The online quiz process included in D2L can provide students with their grades as soon as the test is completed. Questions can be created in a number of formats: true/false, fill-in-the-blank, label-the-diagram, multiple-choice, short-, and long (essay)-answer, although the last two question formats cannot be auto-graded and have to be read and evaluated by a marker.

D2L allows instructors to set specific timelines for tests similar to proctored examinations but provides the advantage for students of flexible start times. I chose to give students any 2-hour block in 24 hours to provide flexibility for students who felt more comfortable writing an exam outside a prescribed start time. This meant that students could start the exam any time after midnight and before 10:00 PM the following evening. *Shuffling* (a nice D2L feature) was used to randomize the order at both section and question level, and the letter associated with the correct answer for the multiple-choice questions was also randomized to limit the students' ability to collude with others. Although I restricted the ability to use the right-click to screenshot or print the questions, this feature does not work specifically on Apple computers (the most common laptop in use by Canadian university students). There was also no way to prevent students from using their smartphones to collude in groups in an attempt to circumvent the shuffling and randomization.

Ercole et al. (2002) developed a system to guard against collusion of students that involves "a combination of 'spatial', 'temporal' and 'statistical' data to screen for collusion. Which of these three types of data discriminates best depends on the detailed nature of the collusion" (p. 171). However, collusion is being increasingly made simpler with the proliferation of apps that allow real-time audio-visual interactions between students while writing exams. Virtually all social networking and communication apps now include a video-chat feature. Ercole et al. (2002) go on to suggest that students could circumvent some of the measures "had the students been aware that such measurements were being made" (p. 171), and therefore need to be kept unaware of the exam security measures being used. This raises a similar ethical dilemma to the one I faced about removing access to the course content on D2L during examinations without informing students. Informing students that material will be removed to encourage them to study could simply lead to a mass downloading of material to be viewed on a secondary device. This is an unethical practice because it disadvantages students with limited access to computer hardware and honest students who do not utilize the course material during the examination. Some students may download content in order to access it offline, but those who do not are then being compromised. However, not informing students of the procedures to detect collusion may lead to entrapment. In the case of plagiarism, we inform students that we are using software to screen for plagiarism in an attempt to discourage the practice, so when a student is caught, they have been amply informed. I believe the same should be true for collusion screening.

Paper Grading

Without a stack of hard copy paper written assignments, that are normally graded using a pen and rubric, paper grading proved to be an interesting challenge. Students were able to turn in electronic versions of their papers through the D2L platform regardless of the program they used to create them. The plan had been to grade these papers using the *track changes* feature in Microsoft Word. Unfortunately, students today use a variety of word processing packages including, such as Open Office, Apple Pages, and Google Docs, to name a few, that I was not able to edit using Word. Additionally, some students decided to upload their papers as .pdf files giving no indication as to the word processing package used. I determined that the best course of action was to convert all submissions to .pdf files and edit them using the free Adobe Acrobat Reader (AAR) software. This was somewhat more time consuming and, in the future, I would have all students simply submit their assignments as a .pdf file.

The actual grading of the papers was not significantly different than before except for a noticeable additional eye strain, somewhat mitigated by blue blocker lenses, from reading on a screen for hours at a time. Comments were added to the papers electronically using the *add sticky note* feature in AAR.

Discussion

The actual shift to online delivery was far less painful than most faculty members anticipated, and the general acceptance amongst students was quite positive. For students whose marks increased,

there was virtually no push back. For students whose marks decreased, some tried to use the switch to online as an excuse for not performing up to expectations. I was able to monitor such criteria provided by D2L in terms of frequency of access by students, which did not appear to be significantly different after the shift to online than before.

The most significant concern was the substantial improvement of some students. When comparing student assignment and test performance from the 75% before the move to online against the 25% of the course completed online. 27% of the class had a greater than 20% improvement between the pre-online and post-online tests. Watson and Sottile (2010) found that "32.7% admitted to cheating in an online class" (para. 15). Over the past 10 cohorts, improvement throughout the term between the first evaluation and the final marks has averaged somewhere between 3-5%, which has been attributed to the students becoming familiar with the style of questions created by the instructor, therefore improving their study technique. These evaluations have historically been open book, but the online environment seems to have involved access to more information than simply the provided course materials. Collaboration with classmates, coupled with the ability to surf the internet for answers, seems to have played a significant role in grade inflation.

Conclusion

The COVID-19 pandemic, and the subsequent suspension of face-to-face classes, has forced us into an unanticipated experiment with various forms of non-traditional university course delivery. Moving online in an emergency demonstrated the resiliency of most faculty members who exceeded even their own expectations of their ability to switch to a non-traditional instructional format. Creating videos and/or adding audio to PowerPoint presentations did not prove to be significantly more arduous than preparing for a conventional lecture.

Many instructors already use electronic submission of papers. Having access to electronic versions of student submissions greatly simplifies selecting passages to be searched for plagiarism, or to find references to verify accurate citations. Marking e-papers will take a little getting used to, but if new faculty start this way, I believe they will find they are equally comfortable marking electronically. Another significant advantage is retaining a copy of the graded paper for discussion purposes. This eliminates lost papers and painful discussions over grades assigned with a lack of evidence.

Having listened to the concerns of faculty regarding the security issues related to online examination and engaged in discussion with some of my current undergraduate and graduate students, I have compiled a number of issues yet to be addressed by technology or in the literature. In addition to the collusion concerns addressed by Ercole et al. (2002) noted previously. Ullah (2016), Ullah et al. (2016), and Ullah et al. (2019) have written extensively on the various security implications related to online examination. Ullah (2016), investigated security threats to online examinations and assessed the usability of profile-based and/or challenge-based questions to authenticate student identity. Profile-based questions use personal information stored by the university (date of birth, student number, parents' first names, etc.). An example of their challenge-

based authentication involved image recall in which students were asked to select their favorite image based on three options that had been presented to them earlier in the term. These authentication procedures can be nullified if the student is present with the impersonator. The challenge option may produce a false negative if the student fails to remember their image selection. Ullah et al. (2019) evaluated the usability of the challenge questions designed by Ullah (2016). They concluded; "The findings are not sufficient to determine the student's ability of sharing personal information.…Further research is warranted to understand individual's ability of sharing information with an impersonator in an online examination context" (p. 37).

Ullah et al. (2016), identifies impersonation and abetting as two of the major issues that need to be addressed. They developed a threat classification matrix to help instructors navigate the myriad options students may use to cheat in online examinations and to understand the intricate cross-connections among the options. Students may cheat by using live experts impersonating them during the examination, by impersonating someone else such as a teaching-assistant/tutor in order to access test questions/answers, or simply by using unauthorized sources such as the internet. Not only can third parties provide assistance in the same location (friends, siblings, parents, experts, etc.) but can also interact from anywhere in the world through a secondary device including remote desktop sharing. Students may also collude in an attempt to answer questions as a group. This can be done in-person, but during this time of physical distancing, creative students have utilized technology to connect in real-time and share questions and answers. Although not providing solutions, this article at least makes instructors aware of potential threats.

Online testing and examinations provide a significant concern for honest assessment of student ability. The socioeconomic status of students has always been a factor in university success.

> Firstly, it has been argued that this type of teaching methodology could create a greater chasm between high-income and low-income students so it is only effective with a specific student population base. Secondly, not everyone has access to the internet especially in rural areas (Findlay-Thompson & Mombourquette, 2014, p. 66).

This disadvantage has been mitigated by most universities with advanced library support systems and computer labs open to students. Unfortunately, the closure of universities has exacerbated the issue for the most vulnerable students and widened the gap that we have worked so hard to close.

Following the pandemic, much of what has been learned can be used to permanently migrate some courses to a fully online format or simply make greater use of technology in teaching and evaluation as a way to reduce the environmental impact of a university for courses that return to a conventional format. I have seen many opportunities to use additional features of learning platforms and develop my skills for teaching to an unseen audience. Research needs to continue to validate the success of online assessment to ensure students have actually gained knowledge rather than used technology to merely look it up. My concerns over evaluation have led to the development of questions that test understanding and application rather than simply memorization, echoing the sentiments of King (1993). This may be the most important lesson, about how

education should work, learned from the pandemic. Perhaps now we are ready for a seismic shift in how we educate future generations.

Acknowledgements

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