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Teaching Business Analytics during the COVID-19 Pandemic: A Tale of Two Courses

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Abstract:

We describe our experience in teaching two different levels of undergraduate business analytics courses during the coronavirus disease of 2019 (COVID-19) pandemic. In particular, we focus on two challenges that arose during the shift to emergency remote teaching: 1) engaging students and 2) teaching students how to use software. We discuss our efforts to mitigate the effects of these problems and highlight the differences in implementing our strategies in a general-education (i.e., required for business majors) course versus an upper-level elective. Finally, we discuss lessons learned and recommendations for other educators regardless of their teaching modality.

Keywords: Pedagogy, Learning, Analytics.

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1 Introduction

The coronavirus disease of 2019 (COVID-19) pandemic has driven an unprecedented move to remote learning that has spanned all education levels. Some researchers have termed the move emergency remote teaching (ERT) due to the rapid change from face-to-face to online teaching and learning (Hodges, Moore, Lockee, Trust, & Bond, 2020). Online learning does not represent a novel concept, and one can find a rich literature on the subject that ranges from studies that discuss best practices for structuring student engagement with respect to synchronous and asynchronous learning (Hrntinski, 2008) to studies that analyze learning management systems (LMS) (Rhode, Richter, Gowen, Miller, & Wills, 2017).

The pandemic forced educators into online teaching without time to neither familiarize themselves with the literature nor refine their online pedagogy. Even so, reflecting on our experience since March, 2020, presents a valuable opportunity to improve courses for the next academic year and beyond regardless of the teaching modality.

As two business analytics faculty members, we present the challenges we saw and the practices we developed through two courses. We meant to instruct both classes in face-to-face mode, but we abruptly had to move them online. The courses we discuss here are both undergraduate classes in which students extensively use Microsoft Excel and program in R. The first course, which the first author teaches, is a general-education requirement for all undergraduate business majors called Analytics III: Business Modeling and Analytics (which we refer to as Analytics III henceforth). Students complete all coursework in Excel. During the ERT period, the first author taught the course in two sections with about 30 students in each section. The second course, which the second author teaches, is an upper-division elective called Topics: Sports Analytics (which we refer to as Sports Analytics henceforth). Students complete all coursework in R and RStudio. Similar to Analytics III, the second author taught the course in two sections during the ERT period with about 25 students in each section.

We found that, while we both incorporated similar tools and practices to overcome online teaching and learning challenges, we implemented them differently. We attribute these differences to the hierarchy between instructor and students, which is often more pronounced in a general-education course than in an upper-division elective. Courses with a significant hierarchical gap follow a much more guided and scaffolded structure than courses with a narrower gap. Scaffolding learning structures refer to intentional, potentially interim systems that help students learn (Lee & Hannafin, 2016; Vygotsky, 1978). Adhering to this concept, the general-education course had more scaffolds in its design than the upper-division elective, such as introductory Excel examples and basic programming assignments.

In this paper, we examine two specific difficulties that arose in the courses during the ERT period due to the COVID-19 pandemic: 1) engaging students and 2) teaching students how to use software. We detail these challenges and our respective solutions in Section 2. We also contrast the strategies that the first author used in the general-education course versus the strategies that the second author used in the upper-level elective course. Finally, we highlight the lessons we learned and our recommendations for other educators in Section 3.

2 Challenges and Solutions

Although students and faculty face unique challenges each academic term, the stay-at-home orders that governments have issued in response to the COVID-19 pandemic present their own set of problems in education. Here, we address issues specific to both our discipline and the academy at large. We first identify our two problem categories and accompanying solution practices. We summarize the challenges and solutions that we used in each course in Table 1 at the end of the paper.

2.1 Challenge One: Engaging Students

2.1.1 Background

For this exposition, problems related to student engagement encompass any situation where online learning impedes student engagement. We classify student engagement for classes on campus as either in-class engagement (e.g., answering questions or participating in group work during class) or out-of-class engagement (e.g., attending office hours) (Krause, 2005). We believe engagement generally falls under a broader category we refer to as classroom community building, which falls in line with the “social presence” model (Anderson, Rourke, Garrison, & Archer, 1999) that emphasizes students’ social

engagement in a classroom as an important aspect of teaching and learning. Educators who instruct any online class should focus on building this community as an initial goal (Gonzalez, 2020). With the move to online learning, encouraging student engagement became a difficult hurdle.

During the ERT period, we worried students would neither engage with one another nor with us outside bi-weekly, synchronous Zoom (video-conferencing software) sessions. When teaching on campus, we provide office hours that students can use to meet with us. From experience, we know students use that time to clarify things they do not understand and connect with us personally. Without in-person office hours, we surmised that students would feel uncomfortable having a one-on-one video conference with their instructor and would resort to email, a generally less personal contact method. The prospect of solely connecting with students via email, Canvas (our learning management system (LMS)) tools, or Zoom seemed to imply a bleak and impersonal term. Out-of-class engagement maximizes learning. Indeed, research points to increased achievement for more engaged students (Kuh, 2009; McClenney, Marti, & Adkins, 2006). As we moved to online teaching, we needed to stimulate engagement to ensure high levels of learning.

2.1.2 Solution

We encouraged student engagement early and often via three avenues: 1) online surveys to check in and connect with students, 2) small groups during synchronous meetings, and 3) messaging software to communicate with students individually and as a class unit.

We used Canvas and Google Forms (questionnaire platform) to solicit feedback at various points during the courses. With these surveys, we could acknowledge the difficult circumstances students faced and ask for input on the direction of our courses. As an example, the first author asked Analytics III students the following questions after the first day of class: We have made it through our first class! ...Specifically, is there anything you are worried about regarding online learning? Do you have any extenuating circumstances you wish me to know about?". This survey built community straightaway and led several students to ask questions that the first author immediately addressed.

In Sports Analytics, one survey focused on using Twitch (Web-based live-streaming platform) as a supplement to poorly attended Zoom-hosted office hours. Every respondent answered "yes" or "maybe" to the question: "Would it be worthwhile to set aside an hour of weekly office hours to watch your instructor stream programming demos on Twitch?". We found that students appreciated this outreach based on comments in the initial survey and the end-of-class student evaluations. The literature supports the benefits that such outreach can provide (Darby & Lang, 2019).

In both courses, we used surveys to kindle community. However, we used them in strategically different ways. In the general-education course, Analytics III, surveys provided additional information that the first author used to make decisions regarding the course's trajectory. These surveys made sure students' knew that the first author heard their voices and helped them feel comfortable reaching out to their instructor. Course changes that resulted from such student requests include sharing project examples from past years and amending assignment formats and due dates. Conversely, in Sports Analytics, surveys empowered students as co-owners in determining the course's direction. That is, in the upper-division course, the second author treated students as peers and requested they shoulder some responsibility for their learning. The literature supports the benefits that such student-directed learning can provide (Stiggins, 2008).

To further combat the student engagement problem, we used small groups during synchronous class sessions. The "breakout room" functionality embedded in Zoom allows one to create small groups. In Analytics III, the first author used breakout rooms during synchronous meetings so students could work on exercises they then turned in for daily participation credit. Students felt more comfortable asking the professor and group members questions in the smaller setting, which encouraged deeper personal connections. In Sports Analytics, the second author also used breakout rooms, which allowed students to work jointly, if they wished, on homework/lab exercises that they had to hand in at a later date. In both classes, the small groups encouraged collaboration, a high-impact practice that the literature has shown to improve student learning, tenacity, and satisfaction (Kuh, Watson, Rhodes, Penny Light, & Chen, 2016).

Although we implemented small groups in both courses, we did so for different reasons. In Analytics III, the first author implemented small groups to provide prescribed, structured time for students to work together on a common task (namely, an Excel spreadsheet due for credit at the end of the meeting time). In Sports Analytics, the second author implemented small groups as an optional opportunity for students to engage in peer collaboration while completing work due at a later date. The small difference in how we used breakout rooms points to our conviction that students in lower-division courses should have more directed learning while students in upper-division classes should have space to develop ownership over their learning.

The final solution we implemented concerned instant messaging software. We believed Slack and Teams, applications that allow instant communication, file sharing, and so on, would stimulate student engagement during and outside synchronous class interactions. We also thought they would facilitate communication as a class group (in “channels”) and individually (direct messaging). We found these tools streamlined our ability to share student work in that we could post screenshots of in-class activities (e.g., online examples of graphs of time-series data, individual results from experimenting with an online regression applet) to an “in-class” channel.

In both classes, we also used Slack/Teams for course announcements. We sent announcements in a separate channel so students could receive quick updates and respond with questions that the entire class saw. Evidence shows students prefer such shorter messaging tools such as these ones over email (Straumsheim, 2016), and our students took advantage of them.

In Analytics III, students had to post on Slack for in-class exercises and sometimes for homework. They also used Slack to send direct messages to the instructor with questions about course content. Slack served as a convenient tool that increased and streamlined engagement. In addition to direct messaging, students in Sports Analytics used Teams to share original thoughts and to discuss course content. The students in this upper-level class engaged without an incentive and, thus, displayed organic interactions and feelings of course ownership.

2.2 Challenge Two: Software

2.2.1 Background

Problems associated with learning to use software have particular relevance in courses that heavily rely on analytical tools such as Excel and R but apply to courses that use any software. When teaching Analytics III and Sports Analytics in person, we devote much class time to teaching and demonstrating how to use software. In a face-to-face class, we generally project our computer displays to a large screen so students see exactly how we interact with the software, which allows them to follow along on their laptops. It does not, however, translate well to the online environment.

Attempting to mimic the face-to-face experience, we shared our screens on Zoom. However, many students faced a dilemma: they could either watch us program and sacrifice their ability to follow along on their own computers, they could sacrifice their ability to watch us and try to follow along by listening, or they could try their best to partition both the screenshare and their software on the screen. While this problem would not affect students with two (or wide) monitors, not all students have them.

This problem additionally manifests when assisting students with seemingly simple software questions. Example questions we faced concerned installing/updating an R package, downloading files, and filtering values in Excel. In a face-to-face setting, we can move around the classroom to observe a student working and provide specialized answers that may only apply to that student. Online classes make this straightforward task much more difficult.

2.2.2 Solution

To remedy this problem, we recorded short asynchronous videos. We mainly structured each video according to the following criteria: 1) they had to run from four to eight minutes (often shorter in Analytics III), 2) we had to introduce each distinct task in a single video (though a video could feature multiple, previously learned tasks), and 3) we could only minimally edit the videos principally to show that errors inevitably occur in programming. We cannot underestimate the third criterion’s importance. We received multiple comments from our students saying they appreciated that we make mistakes too. Additionally, if we do make a programming mistake, it provides an opportunity to demonstrate our debugging strategies.

In both classes, the videos were key components, yet they served different needs. In Analytics III, the videos served as supplemental material to the core of what the first author presented during class meetings. The recordings exclusively demonstrated Excel functions and tasks. In Sports Analytics, the videos effectively served as the primary lecture material. They included software demonstrations, programming exercises, and presentations. The lower-level course provided the asynchronous material as an easily consumed reference that complemented class time. In the upper-division elective, the videos encouraged individual learning and allowed class time to become a place for discussion among students and the instructor. Students had an overwhelmingly positive response to the short videos. In their end-of-course evaluations, they pointed out these videos as part of what they most appreciated about the courses.

3 Discussion

The ERT transition due to the coronavirus pandemic forced faculty into a new form of pedagogy. In our experiences teaching two analytics courses that rely heavily on software, we faced both challenges unique to such topics and challenges that any educator might expect. Engaging students and teaching them to use software represented two notable issues we encountered and overcame. To summarize our solutions, we synthesize three main takeaways.

Build class community: we recommend interacting with students early and often. Whether through surveys or instant messaging tools, building classroom community represents an important step toward positively influencing student engagement (Darby & Lang, 2019). Educators should focus on building community as a top priority no matter the teaching modality.

Create asynchronous material in micro-sized units: we advocate recording short videos to demonstrate techniques and concepts that students can then view in their own time. We will certainly implement this practice in the future no matter the teaching format. We will reuse material we created this quarter in the future.

Be as flexible as possible while meeting learning outcomes: we urge educators to remain flexible to confront whatever situations arise. The second author used asynchronous videos in Sports Analytics largely due to student input. In Analytics III, the first author adjusted due dates for students who faced extenuating circumstances. To keep up with rapid external changes both in students' lives and in the world, we had to be willing to change our pedagogical habits to ensure students met our learning objectives. Such flexibility is valuable in education no matter the instructional form.

That we implemented our solutions differently across different course levels matters. Our experience indicates the implementation depends on a gap between students and their professor in the classroom hierarchy. In the general-education course, which featured a wide hierarchical gap (i.e., the class followed a guided, scaffolded learning structure), the first author followed strategies that involved some notion of welcoming or care beyond typical expectations. The first author surveyed students on the first day of class to ask for their concerns about the upcoming semester and decided to use Slack/Teams to provide students with a more comfortable means to contact him. On the other hand, in upper-division course, which featured a narrow hierarchical gap, the second author gave students the space to better develop ownership over the class. In substantive terms, the author gave students the responsibility to learn core concepts using pre-recorded videos or Slack/Teams as a collaborative tool in which to share knowledge among themselves. We summarize these differences in Table 1 (next page).

3.1.1 Concluding Remarks

Our institution has begun adopting a Hyflex instructional model (Beatty, 2014) for the next academic term to give students the ability to participate in courses in-person, online, or both. In a similar vein, Harvard announced that it will teach all classes for the 2020-2021 academic year online. More schools will surely follow. The pandemic will affect teaching for the foreseeable future as higher education incorporates more online and blended learning (Darby, 2020). Teachers must make pedagogical changes to overcome both novel and long-standing obstacles during this disruption. We believe our solutions will improve our own teaching regardless of whether we teach online or in person. We hope they do so for others.

Table 1. Differences in Implementing the Proposed Solutions between Lower-level General-education Courses and Upper-level Elective Courses

Problem	Solution	Analytics III (more pronounced hierarchy)	Sports Analytics (less pronounced hierarchy)
Student engagement	Surveys	Gather information so instructor can make decisions regarding course trajectory; acknowledge student circumstances and show pronounced care.	Invite students to direct the course's trajectory; foster course ownership.
	Small group interaction	Require synchronous engagement time to jointly complete a mandatory task.	Provide optional synchronous engagement time for collaboration on coursework due in the future.
	Messaging software	Engage students more efficiently and communicate with them in a space they are comfortable and familiar with.	Engender a collaborative environment where students share and discuss content of interest to them; encourage students to take ownership over their own learning.
Software	Micro-sized asynchronous material	Provide additional resources for students to reference as needed.	Require students to engage with asynchronous content and complete tasks to stimulate responsibility for individual learning.
General	Flexibility	Make clear the instructor's desire to meet students in their current circumstances; change due dates and assignments on a case-by-case basis.	Display trust in student opinions regarding course; change entire course structure in response.

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