Jessica Schroeder
EDTC Masters Performance
#5 Action Research Project
April 2021

A Course Navigation Exploratory Case Study

Introduction

This action research project is an implementation of a curriculum project previously completed and is conducted as an exploratory case study wherein the possibilities of applying online learning environments for the implementation of sustainable education are explored. The research design follows industry-standard case study methodology protocols (Yin, 2003) and includes case identification and logic, evidence collection, analysis, and conlcusion.

The curriculum project previously completed details an instructional design project where course navigational structure was integrated into a long-standing asynchronous online learning environment. The previous iterations of the online learning environment used the learning management system as a file repository, leaving students searching for course content. This online learning environment structure also made it difficult for students to match up which course content should be coupled together for student learning. The ADDIE model of instructional design was used to make changes to the course and attempted to foster a learner-centered environment more in line with constructivist learning theory. After these changes were made to the course, the next iteration of the course ran. After the course had been completed, it was possible to extrapolate data from the learning management system that provided information and allowed connections to be made about how the changes implemented affected student engagement with the materials and overall student outcomes compared with two previous iterations of the course. Data show that average student page views doubled and sometimes tripled with the change to course navigation compared to previous iterations of the course, and average student final grades increased by ten percent from iteration to the next.

This data correlates with the most recent body of research which relates accessibility and usability of a course with improved student outcomes (Standards from the Quality Matters Higher Education Rubric, Sixth Edition).

The exploratory case study below focuses on how questions and fits the exploratory category as it does not require control over behavioral events and because the case study focuses on contemporary events instead of historical ones (Yin, 2014). Exploratory research is often done at the university level and is a typical precursor to a formal, large-scale research project.

Case Identification and Logic

This action research project has been designed as an exploratory case study and asks the following questions: (1) How does course navigation affect student engagement with course materials? (2) How are student outcomes affected by course navigation? The purpose of the exploratory case study is threefold. First, by making changes to course navigation, the case study attempts to show a research-based best practice to optimize student outcomes in virtual learning environments, notwithstanding the pandemic push to emergent virtual learning environments. Second, the exploratory case study attempts to provide instructional design guidance to course instructors who provide synchronous and asynchronous content to their students using a standardized learning management system (LMS). Third, the exploratory case study attempts to maintain or increase student retention rates by suggesting instructors provide a consistent course framework with which students are familiar and can easily interact to access course content.

The exploratory case study is defined as a recurring 5-week course at a local institution that runs at least twice (sometimes thrice) per year. The course is typically undertaken by fully matriculated undergraduates or non-matriculated students taking courses part-time through professional and continuing studies. The course has one prerequisite which is an introductory

course, and students are required to do basic arithmetic to be successful in the course. The target audience is fully engaged with this course asynchronously online.

This exploratory case study is a holistic single-case study that tracks student achievement over three iterations of the same course and builds two approaches to the benefits of course navigational ease for students to (a) influence student engagement with materials (measured through average weekly page views) and (b) influence student outcomes (measured through final average grades).

This exploratory case study is bound to one specific course section that is taught by the same instructor with each iteration of the course. The course is always offered fully asynchronous and online. There is no face-to-face instruction. Instead, the students watch lecture videos that the instructor has pre-recorded and reuses with each iteration of the course. In addition, the students read selections from a textbook, work through practice exercises, and take exams which are the only summative assessments for the course. The instructor is available for questions by appointment and does not otherwise have interactions with the students. Additionally, the specific iterations of this course that are being studied in this exploratory case study are courses that were administered in 2020 and 2021.

The case study looks closely at student engagement with the materials as well as overall student outcomes. The data collected will further the purpose of this exploratory case study to understand how course navigation affects student engagement. The findings will attempt to clarify why course navigation affects student engagement with the materials and overall student outcomes.

We will know if course navigation is important as we study the course over time, first to establish a baseline for student engagement and performance and second, after making adjustments to course navigation, collect the same data in another iteration of the course to analyze it for changes in student behavior.

The exploratory case study will show how student engagement with the materials and overall student outcome both change when course navigational structure is taken into consideration when designing online learning environments. The case study will also show how a more constructivism-based and learner-centered learning environment will produce more favorable student outcomes even when course content remains static. This case will shed empirical light on the epistemological foundations of constructivism and learner-centered learning environments formulating a working hypothesis based on the case study that could potentially be applied to future similar virtual learning environments.

To examine the quality of this research design, we can judge it in relation to three tests: construct validity, external validity, and reliability (Yin, 2014). Due to the nature of this case study, judging it according to internal validity is not applicable. The construct validity test shows that this case study uses multiple sources of evidence from three iterations of the course, however, all the data was taken from the analytics provided by the institutional learning management system (LMS). The external validity test shows that the exploratory case study's findings can be generalized based on the theory used in this single case study mentioned in the above paragraph. The reliability test demonstrates that the data collection procedures followed a consistent protocol for each iteration of the course and that a case study database was created in a spreadsheet, maintaining a chain of evidence for the data to be replicated should further research be conducted.

Evidence Collection

During the preparatory efforts to collect data for this exploratory case study, the ADDIE model of instructional design was applied to the course in question to make adjustments to the course navigational structure. No changes were made to the course content, but instead, the way the course content was organized was revised to follow best practices for online learning environments (Standards from the Quality Matters Higher Education Rubric, Sixth Edition),

learner-focused environments (Hannafin, 2013), and organization of content that follows the constructivist theories of learning (Harasim, 2017).

After the adjustments were made to the course navigational structure for the upcoming iteration of the course, evidence was collected from the two previous iterations of the course prior to the navigational changes and, once the upcoming iteration of the course had been completed, the same evidence was collected for the most recent iteration of the course that took into account the navigational changes. The three iterations of the course each took place over different a 5-week period in 2020 and in 2021.

The data for this case study is documentation from the analytics of the learning management system that students use to interact with the course content. Evidence collected included analytics on page views per week, average page views per week, and average final grades.

Analysis

The two research questions set forth at the onset of this exploratory study are (1) How does course navigation affect student engagement with course materials? (2) How are student outcomes affected by course navigation? Let us examine the evidence that addresses the first question.

When studying student engagement with course materials, analysis of the number of times that students view the material is a point of evidence. Average page views per student were collected throughout the five weeks of the Winter 2020 run of the course (Figure 1).

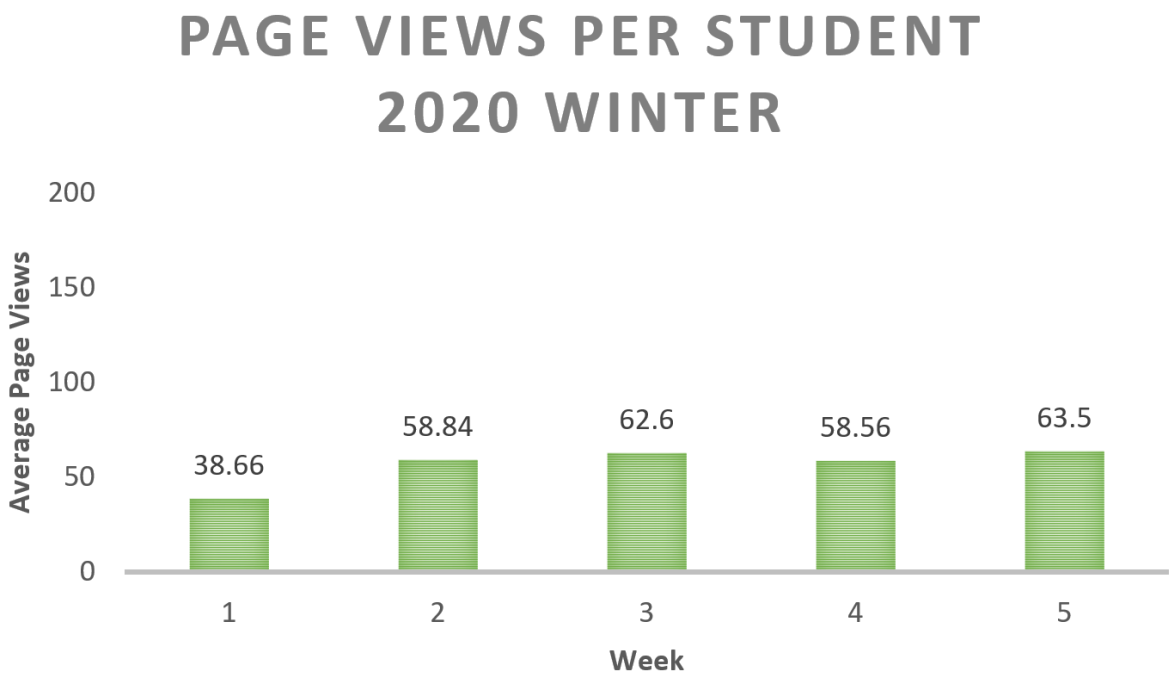

Figure 1. Average page views by week in the 2020 Winter run of the course.

A page view is defined as a request to a Canvas server wherein a student loads any page within the Canvas course. This could be the course home page, the assignments page, a page with a lecture video, or a page with any course content (2021). This helps to establish a baseline of student engagement with the materials. The Summer 2020 run of the course (Figure 2) furthers this baseline as we see a similar pattern of engagement with course materials.

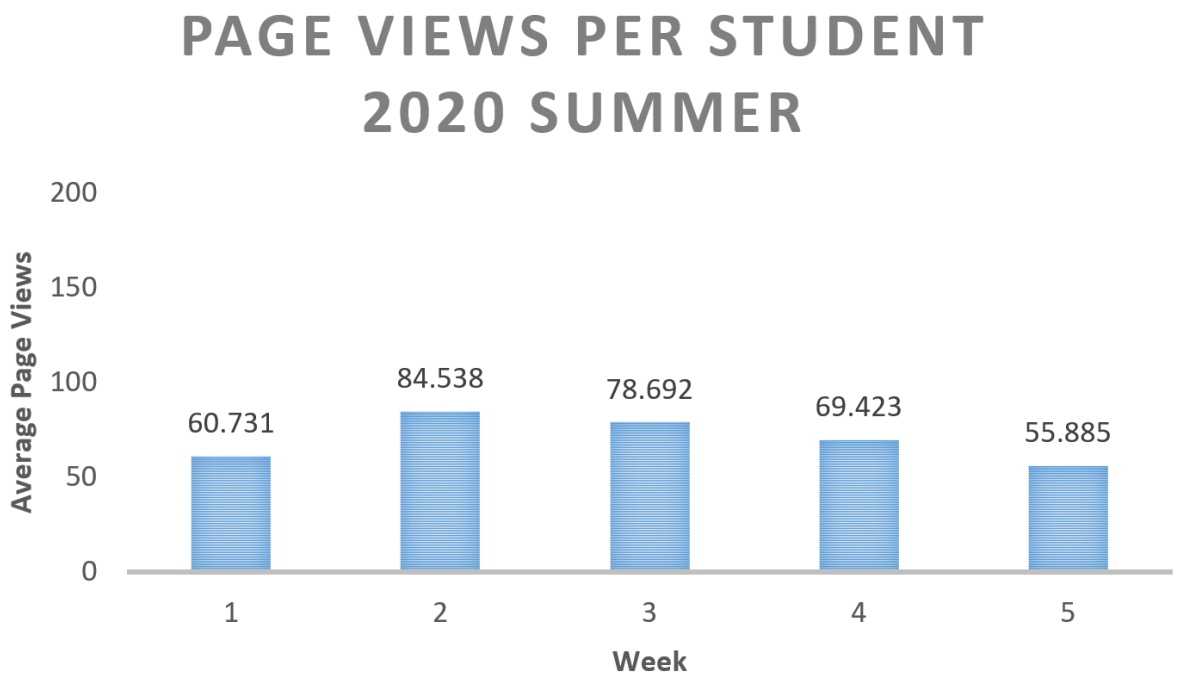

Figure 2. Average page views by week in the 2020 Summer run of the course.

After the first two iterations of the course, changes were made to the course navigational structure to provide a clear path for students to engage with the course content. Instead of using Canvas as a file repository, this navigational structure provided scaffolding for students to help them manage and focus their time in the course. These modules were broken down into topics as the course progressed, with overviews and video lessons provided in each module as well as practice exercises, practice quizzes, details on assessments, and guidance on the next steps as each module concluded. This navigational implementation made stark modifications to average page views per week for the Winter 2021 iteration of the course (Figure 3). The page views doubled, and in most weeks, tripled. This navigational structure caused the students to work through the course content in a linear and time-based progression that helped them engage more often with the course materials.

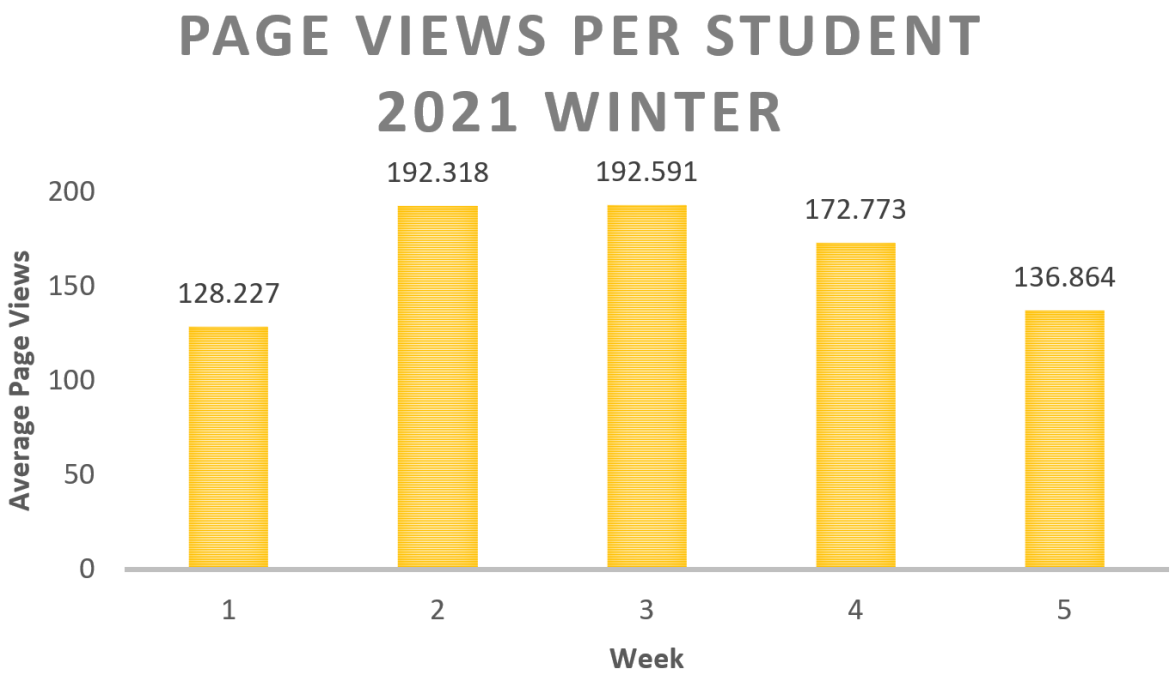

Figure 3. Average page views by week in the 2021 Winter run of the course.

The evidence that addresses the question “How does course navigation affect student engagement with course materials?” is answered by studying the composite view of average page views per student for all three iterations of the course (Figure 4).

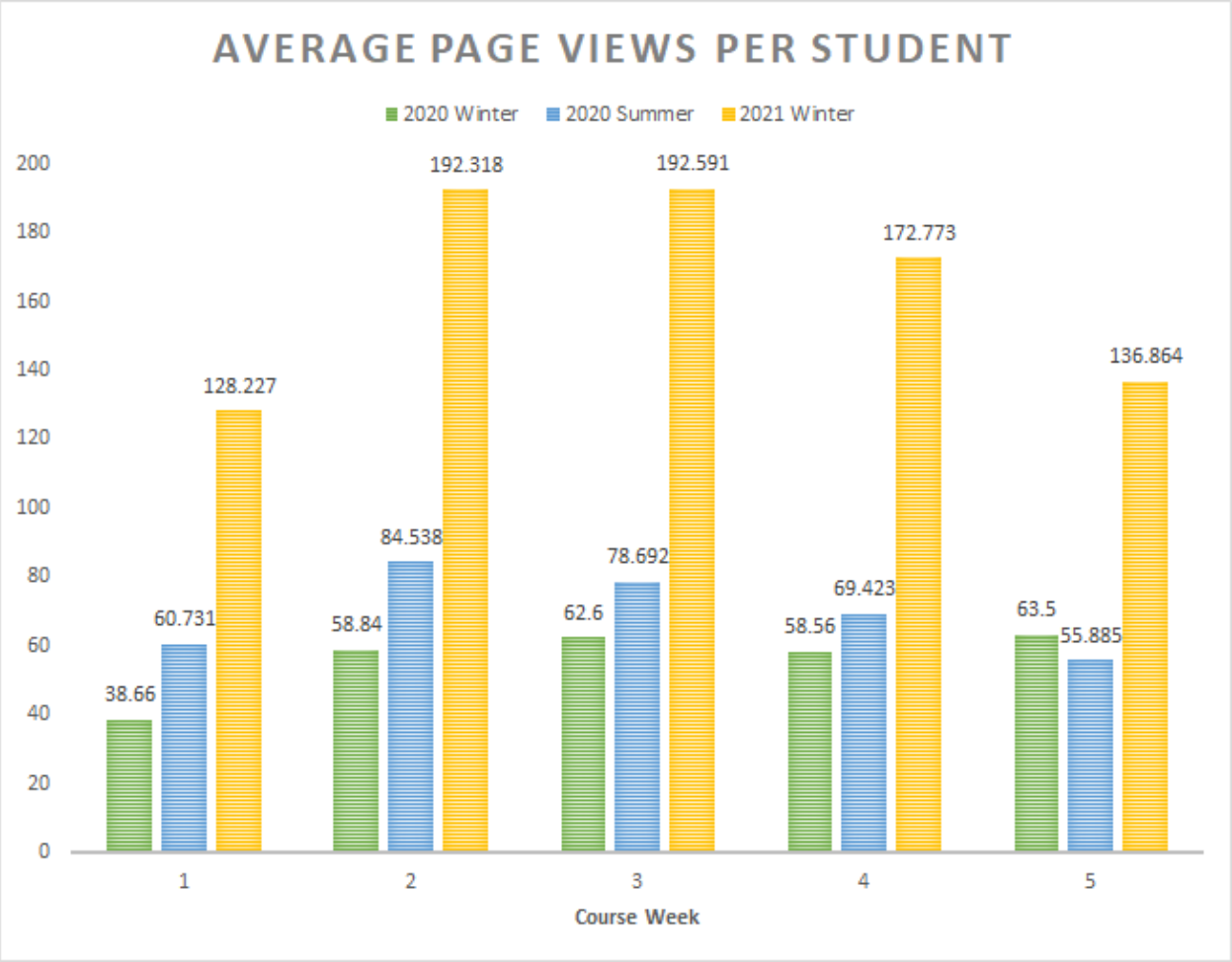

Figure 4. Composite average page views by week.

Tentative conclusions based on the weight of the evidence are that page views increase when course content is organized into time-based navigation modules and pages. Students are forced to examine course content through the module structure and all items needed for assessment preparation are contained in the module structure. They need not look through “Files” or “Media Gallery” in Canvas for any course content nor are they required to match up which course content goes together - that effort is all completed for them as the course content is organized and presented to them in the “Module” structure in the LMS (Canvas). This result is not surprising when taken into account that in previous iterations of the course, there were not many pages to view. So the next logical question is: does course navigation, which can influence page views, affect student outcomes?

Overall student performance during the three iterations of the 5-week course, as measured by a percentage grade, is the evidence that addresses the second question in this exploratory case study, “How are student outcomes affected by course navigation?” When anticipating average course grades for the three iterations of the course (Figure 5), we can make some inferences about how the increase in page views has influenced overall student performance. We can be led to conclude that if students spend more time with the material (measured in average page view by week), higher student outcomes may result. However, when we look closely at the evidence, the results are not as expected.

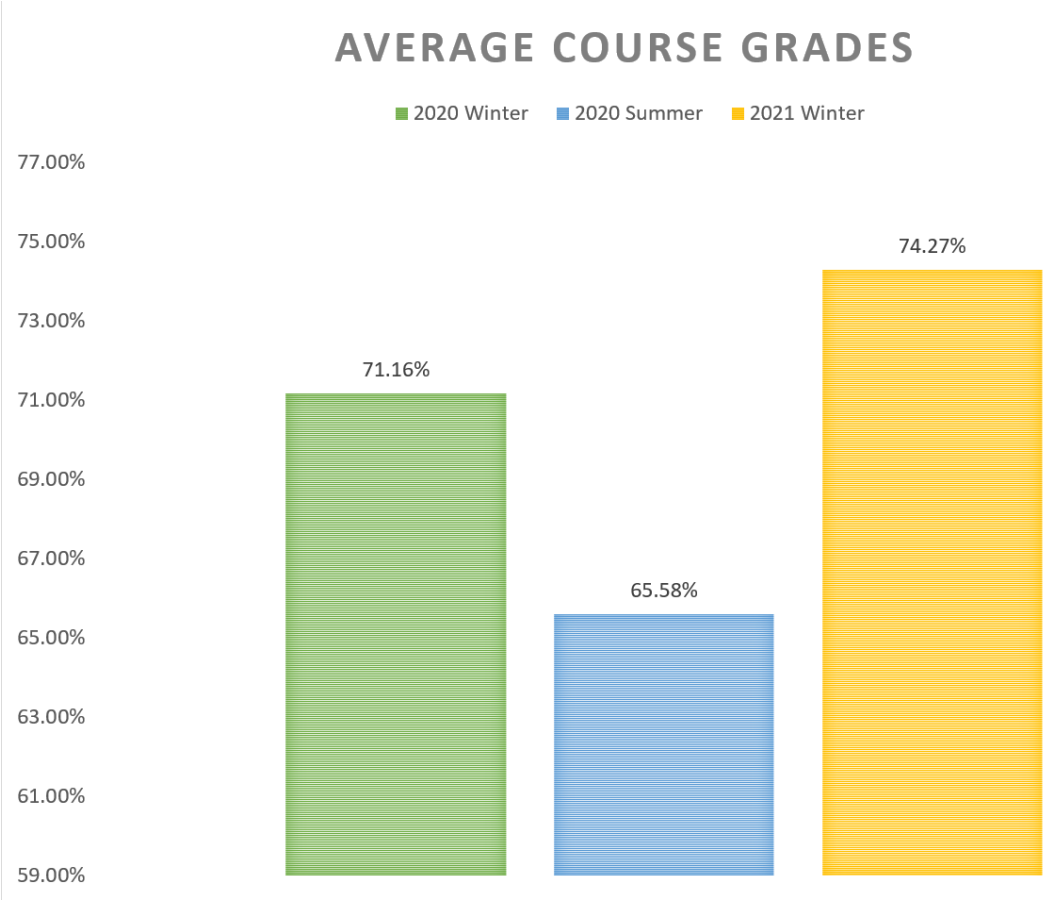

Figure 5. Composite average course grades for the three iterations of the course.

Implications for analytic generalizations can lead to greater insight about the “how” questions that were posed at the outset of the case study. When compared to page views, the expectation was to see a direct correlation between the students’ engagement with course

materials and the overall student outcomes. Although we see an increase in student outcomes by almost three percent from 2020 Winter to 2021 Winter, we also notice a large decrease in student grades during the 2020 Summer iteration of the course, even though the two iterations of the course are identical. This could be due to a number of reasons, namely the student demographics of those taking the course in the summer and the pandemic learning that students have struggled through in 2020 and 2021. The 2020 Winter iteration of the course was conducted and completed before the onset of the pandemic. The 2020 Summer iteration carried with it the uncertainty of the future and a full-scale emergent pandemic learning mindset. The data does reflect a more than full recovery in student outcomes by the 2021 Winter iteration of the course, despite still running in the middle of the pandemic, which brings light to the effect that the course navigational structure likely brought to student outcomes. A tentative conclusion based on the weight of the evidence is that course navigation does influence overall student outcomes, but conducting another case study of older iterations of the course, especially summer iterations versus winter iterations, may lead to a greater body of data to study and interpret.

Conclusion

When taking the weight of the evidence into account, the tentative conclusion can be made that providing a clear and consistent time-based course navigational structure for students will affect student engagement with the course material and with overall course outcomes. Although the same data was pulled from the learning management system for all three iterations of the course, this data was the single source of evidence for this exploratory case study and highlights a weakness of the case. In addition, other factors could have influenced student performance. Perhaps the 2020 summer course grades were lower because students were struggling in the midst of the Covid-19 pandemic, but the 2021 winter course grades were higher because students were more adjusted to pandemic learning.

Since we know that correlation does not equal causality, a companion case might augment this single-case study to strengthen the case for the priority to develop clear course navigation in order to improve student engagement with the materials and overall student outcomes. This companion case could study similar data points within another course with similar student demographics. Further, a mixed-methods study wherein several research methodologies are used to collect data for analysis that also share the same research questions and complementary data and analyses would also help provide a clearer picture of the effect of course navigation on student outcomes.

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