



**PUBLIC HEALTH
EDUCATION ARTICLE**

Development and Delivery of a Novel Interdisciplinary Online Course Focused on Pandemics and COVID-19

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ABSTRACT

Misinformation regarding COVID-19 has clouded the judgment and perspectives of many individuals. At Ohio Northern University, an interdisciplinary online elective course was developed to allow students the opportunity to gain evidence-based insight about the far-reaching implications of pandemics, with a specific focus on COVID-19. This course is open to any undergraduate student at the university without any prerequisites; however the majority of enrolled students come from the pharmacy and nursing programs. This paper describes the development, delivery, and assessment methods of this course. Course evaluation and modifications have allowed this course to evolve over time and remain a well-enrolled course at Ohio Northern University.

Keywords: Interdisciplinary education; Pandemic, Online course design; Misinformation, Public health education, Pharmacy professional elective

INTRODUCTION

During the COVID-19 pandemic it became apparent that there was a dire need for public health education. After the discovery that SARS-CoV2 presented a global health emergency, citizens of the world were searching for answers in order to understand and better protect themselves from COVID-19. Early in the pandemic there was an emphasis on preventing transmission of the virus and it was evident that governmental and policy responses to the COVID-19 pandemic varied greatly.¹ Additionally, medical misinformation spread easily during the COVID-19 pandemic. This created challenges with conveying public health messaging and led to distrust of health care providers and the government.² The desire to dispel common myths and provide evidence-based information to our campus community was the goal of developing a course focused on understanding pandemics, with a focus on COVID-19. Universities and colleges with public health programming are an ideal setting to research and educate about this pandemic. Students represent a captive audience with potential to learn from the

pandemic in real time and benefit from insights across various different disciplines

An interdisciplinary approach has been proposed as an ideal method to research COVID-19.³ Scientific collaboration allowed COVID-19 researchers to evaluate various factors that facilitated management of challenges associated with the COVID-19 pandemic and, hopefully, prevent similar pandemics. Likewise, interdisciplinary education draws on multiple disciplines to acquire a deep understanding of complex issues.⁴ The desire to provide pandemic-related content from various angles in an accessible, online format inspired the development of an elective course at Ohio Northern University, an independent, comprehensive university located in rural northwest Ohio. The course, offered through the Rudolph H. Raabe College of Pharmacy, is open to any student enrolled in one of the university's undergraduate programs: Arts & Sciences, Business; Engineering, Pharmacy. The purpose of this paper is to describe the development and ongoing evolution of an online, elective course focused on the COVID-19 pandemic.





Course Development

During the spring of 2020 faculty members from the college of pharmacy began developing the framework for an elective, online course focused on the provision of accurate and scientific information regarding COVID-19. At the time, many other universities were developing educational courses and offering them to their students, as well as to the general public. Likewise, we sought to bring together the expertise on our campus and surrounding areas to educate students enrolled at our institution. The initial course offerings focused on providing information on the virus, disease process, and impacts on society and economics. Each semester the course has been modified to include the latest medical, public health, and economic information as the pandemic progressed. Over the time period in which this course was developed there were various structural changes within the university that included pausing enrollment in the public health major, however the public health minor remained available. While this course is offered through the college of pharmacy, instructors involved with the public health major and minor have contributed to this elective.

During course development, the involved faculty identified 5 main content areas that were of great importance during the early stages of the pandemic that corresponded to individual expertise on our campus. These included public health, health care response, economics, sociology, and media. The public health and health care content was provided by faculty from the college of pharmacy including those with expertise in public health, social and administrative sciences, infectious diseases, and critical care. The arts and sciences college contributed to the sociology content, provided by a professor of sociology, and media content was provided by a professor of communication and media studies. The dean of the college of business administration contributed the economic content, which aligned with that individual's training and scholarly interests. Due to faculty turnover between fall and spring semester in the first year of the course, the media content was replaced with content focused on education starting in the spring of 2021, provided by a professor from the university's center for teacher education.

Because the future of in person education was unknown at the time of course development, it was determined that offering an online course would be preferable. In order to allow this course to be taken by a wide variety of students, it was developed to include 1 credit hour of content and be offered online so that it could easily fit into students' schedules. It also counts toward professional elective hours that are required for pharmacy students earning their PharmD degree.

The course coordinator attended the university's required instruction for teaching online courses during summer of 2020 and built the course in the learning management system (LMS). This process involved using best practices from the Quality Matters Higher Ed Rubric Standards.⁵ A course alignment table was developed

which aligned the course to the overall course outcomes (1 for each block of material) with associated learning objectives for each block of material. Course learning outcomes underwent approval through the college of pharmacy curriculum committee which is a requirement of all new courses offered through the college. These outcomes were developed with input from the instructors of each block and served as the basis for any content specific objectives and assessment materials. After completion of the first offering of the course, it was submitted through peer review according to university requirements and successfully passed the standards required to become a regular course offering.

The course coordinator is responsible for maintaining the course content on the LMS, creating and updating the syllabus, communicating with faculty and students involved in the course, providing content for the course, entering grades, reviewing evaluations, and making course updates as needed. During the development phase of the course, the course coordinator communicated with the instructors teaching in the course via email and virtual meetings to ensure some degree of consistency was present between the blocks of material. Examples of this include posting objectives and a weekly overview for each block at the beginning of each new LMS section; requiring new materials will be posted by Wednesday of the week they were scheduled, and; encouraging various methods to interact with students and deliver content.⁶ Each block of material was designed to be independent. However, there is overlap among several of the concepts to ensure continuity and consistency of messaging. The course coordinator reviewed all material for the course. Additionally, because of the rapidly evolving dissemination of new information, especially early in the pandemic, this course was not designed to be fully self-paced. Instructors posted materials and any related assignments weekly and students were alerted to this through an email announcement each week. Finally, in order to create a sense of community within this course, students were expected to complete an introduction of themselves via a discussion board, participate in 3 to 4 virtual synchronous meeting times, and work in groups to complete group projects. This led to a delivery of an online course that provided a variety of learning modalities and assessment methods as described in the subsequent sections of this paper.

Course Delivery

The majority of the material was available in an online asynchronous learning environment. During each block of content, lasting an average of 2 to 4 weeks, learning materials were posted by faculty members based on expertise of the subject matter. The method of delivery and assessment for each content area was at the discretion of the individual faculty members responsible for that block of content. As mentioned previously, the course coordinator reviewed all new materials to ensure they were consistent with the course design and aligned with student expectations. If needed, instructors agreed to be flexible with respect to modifying



their content. An example of this was when an instructor posted additional recordings that exceeded that allotted time for that week. To rectify this, the instructor posted the extra material under “Optional Materials” and there was no formal assessment of that material.

Faculty were encouraged to provide content at an introductory level that would be appropriate for students from any major at any point in their college education. Learning materials consisted of educational PowerPoints, recorded lectures, videos, scholarly articles, and publicly available videos. Each new course week expanded the horizons and added depth to discussions and assignments for those enrolled in the course.

In addition to the asynchronous environment described above, students were required to attend 3 live virtual panel discussions throughout the term. Areas of panelist expertise included medical providers (physicians and nurses) in leadership roles within local health departments, professionals with background in testing and vaccine development, teachers and administrators from various K-12 school systems in the state, as well as physicians and pharmacists with practice experience during the pandemic. Panelists and students interacted in a virtual meeting in a question-and-answer format where a faculty member served as a moderator. Panelists were able to share thoughts, ideas, and actions related to their professional and personal experiences during the pandemic. Some examples include discussing the usefulness and data surrounding mask wearing, working through difficult and stressful situations surrounded by everyday life due to the impact of COVID-19, understanding protocols and testing criteria for the different vaccines created, and the pros and cons of remote education. The virtual nature of these panel discussions benefits students and the panelists. It allows for professionals from other parts of the state and country to interact with students, many of which have been repeat panelists and expressed excitement and a positive overall experience speaking with our students and engag-

ing with other professionals within their field. Students gain valuable insights from the practical experiences of the panelists.

Course Assessment

Students are assessed by various methods throughout the course. Formative assessments, such as quizzes, are used to assess students’ knowledge at the end of a block of content. These quizzes are delivered via the LMS and are open-resource. Completion of group projects is another assessment type that is utilized. Students complete 3 group projects focused around public health messaging, the economic impact of a specific business sector, and an educational topic. The final assessment method that students are graded on includes a reflection paper. Completion and participation points are earned for discussion question submission, panel meeting attendance, and a forum posting. Examples of course assignments and point allocations are listed in Table 1.

Course Evaluation

Several methods have been used to evaluate the course over the span of course offerings. A formal assessment process was used during the first 2 course offerings in the fall of 2020 and spring of 2021 through a research project which was granted exemption through the institutional review board at Ohio Northern University. Students enrolled in the course were encouraged to complete an optional 29 question Likert scale pre-survey and post-survey through a Qualtrics deidentified survey. Questions in the survey related to the topics that were included in the course. Results demonstrated that after completing the course, students were more likely to agree that information they had received about COVID-19 was accurate, less likely to agree that they had been lied to by the federal government, and more confident in their understanding of COVID-19 transmission, disease process, treatments, and vaccine development. Additionally, during the first semester of the course students were required to participate in focus group discussions to review what they learned in the course and identify what they liked best and least about the course.

Table 1. Course Assessment Methods

	Content area	Assessment method (points)
Block 1	History of pandemics and public health response	LMS Class Introductions (10) LMS Quiz (10) Panel 1 Question Submission (5) Panel 1 Participation ^a
Block 2	COVID-19: The virus and health care response	LMS Quiz (10) Group Assignment (10) Panel 2 Questions Submission (5) Panel 2 Participation ^a
Block 3	Societal impact of a pandemic	Online Forum Discussion (10) Reflection Paper (25)
Block 4	Economic impact of a pandemic	LMS Quiz (10) Group Assignment (20)
Block 5	COVID-19: Impact on education	Group Assignment (25) Panel 3 Participation ^a
Final assessment		Virtual Course Review (25) LMS Summative Quiz (25)

^a No points are associated with this activity, but it is listed as a mandatory course activity. Attendance is required and failure to appropriately notify and arrange a makeup activity will lead to failure of the course.



Standardized university course evaluations are reviewed each semester. These evaluations are not mandatory; thus, the overall response rate has been low, ranging from 14%-52% of enrolled students over the 5 semesters it has been offered. The most useful aspect of these evaluations has been the open response boxes which have assisted with course modification. In addition to the university course evaluations, each semester students are invited to complete an instructor-developed evaluation of the course which asks questions about the various blocks of content, panel discussions, projects, and allows for narrative comments as well. Feedback from these evaluations have led to changes such as adjusting the length of each block, allowing students to select their own groups for group projects, and modifying assignment due dates.

Lessons Learned

The course has been open to 50 students each semester it has been offered. It has been well enrolled, often reaching the enrollment cap and occasionally allowing students to enroll on an overload basis into this course. This illustrates a strong interest and demand for this type of an elective course. However, there have been several areas for improvement identified. Some of these course modifications have already been implemented and additional areas may be addressed in the future.

The online nature of this course, along with the involvement of multiple instructors has led to some inconsistency with course communication and student awareness of expectations. To address this, the course coordinator now offers a live, virtual course overview during the first week of the course. This is recorded and posted to the LMS. Additionally, an announcement is sent out at the beginning of each week alerting students of any new content posted, as well as any upcoming assignment due dates. Grading rubrics for group projects and any written assignments are posted to the LMS, along with assignment instructions.

Another challenge that has been faced includes recruiting diverse panelists with experience and background that supports the content students are learning. The virtual panel discussions occur during the content blocks focused on public health, the health care response, and education. Panelists have been invited based on relationships they may have to instructors in the course. Because these panels occur in the evenings at 7:00 PM EST, there can be challenges in availability of panelists. We have also encountered situations where certain panelists have dominated the conversation. Recruiting panelists continues to be a challenge, but through early invitations and additional networking we have been successful in hosting all panels in the course. To allow all panelists to contribute to the conversation, the moderator has been able to direct certain questions to specific panelists.

Another lesson learned is that this course needs to remain adaptable in the event of instructor turnover. Due to faculty leaving the university, the course has experienced the loss of 2 instructors

since its creation. We were able to find replacements with minimal impact to the overall course structure. Some of these modifications allowed for new instructors to add content in their areas of expertise (medical misinformation and disinformation) and allowed for the addition of the final block of the course (The Impact on Education).

A final challenge we continue to encounter is the lack of diversity within our learning community of students. The majority of students enrolled in the course are pharmacy students, followed by nursing students. A very small number of non-health care majors have taken this course. An area that could be explored includes broadly disseminating information about this course to the entire campus community. Another opportunity would be working with other colleges on campus to see if this course would meet any specific needs of their students. A specific example of this would be adding this course to the allowed electives for the public health minor.

PUBLIC HEALTH IMPLICATIONS

The intent of this course is to educate students about the complex impacts of the COVID-19 pandemic. Living through a pandemic and reflecting on what was done well and what could have been done better will hopefully leave students prepared to face similar challenges in the future. There were significant advances made in the areas of health care, but there were also areas where it was clear that the efforts fell short of what was expected and needed. One example that was discussed in various ways in all 5 content blocks was the impact and understanding of vaccine recommendations. Combating vaccine misinformation and disinformation through public education and funding is critical to life in a post-COVID-19 pandemic era. Better forms of communication to the public are essential to increasing the uptake of new vaccines, as well as knowledge about the proper actions to take to slow the spread of diseases.

This course was able to provide students with evidence-based information regarding the COVID-19 pandemic, opposing the misinformation and disinformation consumed by society. It remains a viable course offering to ensure we learn from the recent history of the COVID-19 pandemic, especially given the prevalence of "pandemic fatigue" as the world moves into a post-COVID-19 pandemic era. Pandemic fatigue is defined by the WHO as distress that can result in demotivation to follow the recommended protective behaviors, emerging gradually over time and being affected by a few emotions, experiences, and perceptions.⁷ Findings indicate that pandemic fatigue emerged early in the pandemic and continues to be prevalent as evidenced by impacts on mental health, social well-being, and economic factors.⁸ This course aims to provide enrolled students with a perspective that will allow them to face the challenges we continue to see as a result of the COVID-19 pandemic, as well as be prepared to face similar health emergencies in the future.



CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

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Author Contribution

Brittany N. Bates: Substantial contributions to the conception of the course, drafting of the following sections: Introduction, Course Development, Course Evaluation, and Lessons Learned; editing of the overall work, including interpretation of data; involved in final approval of the version to be published and agreeable to be accountable for all aspects of the work.

Daniel G. Thoryk: Substantial contributions to the drafting of abstract and Course Delivery section; editing of the overall work; involved in final approval of the version to be published and agreeable to be accountable for all aspects of the work.

Ryan M. Augustine: Substantial contributions to the drafting of Course Assessment and Public Health Implications sections; editing of the overall work; involved in final approval of the version to be published and agreeable to be accountable for all aspects of the work.

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