

Investigating Online Instructional Strategies: Perspectives from Instructional Designers

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Abstract: Teaching and learning have changed dramatically since the 2020 spring semester. Designing online courses and moving face-to-face courses online have been drawing attention in every educational institution. This article analyzes the challenges that we encountered when designing online courses at Purdue University followed by the introduction of solutions that we investigated. The final section of the article provides suggestions for future course design and studies.

Keywords: Instructional design, online courses, instructional strategy.

Background

Teaching and learning have changed dramatically all over the world since the 2020 spring semester. The pandemic created both challenges and opportunities in online teaching ([Adedoyin & Soykan, 2020](#)). Courses that were taught in classrooms had to be moved online or delivered through a hybrid method (a combination of online class and in-person class). This notable change created tension for both faculty and instructional designers. It has also produced opportunities to explore methods to make online instructions more effective, efficient, and engaging. This article will review the challenges that we faced from an instructional designer's perspective and will discuss the methods, especially online teaching strategies, that have been investigated by the instructional designers in the course production team at Purdue University.

Challenges and Opportunities

In the past two years, the main challenges that faculty and instructional designers have encountered in our university can be concluded in three aspects. First, many faculty members did not have experience in teaching virtually, particularly fully online courses. There has been confusion on the concept of online teaching, and some faculty members were apprehensive about converting their traditional in-person classes to online class. Second, a wide range of instructors were not familiar with using learning management system (LMS). This situation became extremely complicated and increased tensions as our university started to move to a new LMS in January 2020. Finally, faculty members have expressed concerns about assessing online learning. One of the biggest concerns was how to maintain academic integrity in ways that are comparable to an in-person class assessment.

While working with faculty, instructional designers realized the second and the third challenges can be solved by providing workshops, consultations, and related technical support. However, it takes longer time and more efforts to overcome the first challenge, which is the lack of online teaching experience for many faculty members. Additionally, researchers pointed out most university faculty lack formal trainings compared to teachers and have been using more

unofficial methods that they have been taught, such as in many STEM courses (Yang, 2017). They have been caught in more difficult situations while attempting to design online courses. Given this situation, designers worked together with faculty by analyzing online teaching phases. Similar to the methods of teaching traditional in person courses, online teaching includes three phases, which are planning instruction, delivery of instruction, and evaluation of student learning. Greater emphasis should be placed on the initial planning phase (Simonson, Smaldino, Albright, & Zvacek, 2012) due to the teaching strategies and evaluation plans needed to complete this phase. Instructional strategies refer to the methods instructors use to help students achieve learning goals (Smith & Ragan, 2005), and they are considered as critical factors that impact online teaching and learning (Fresen, 2005). Therefore, investigating online teaching strategies became one of the first steps in our course design process.

Investigating Online Instructional Strategies

Educators have discussed online instructional strategies and provided suggestions, such as encouraging student interactions (Miller, 2007), using student-led discussions (Simonson, Smaldino, Albright, & Zvacek, 2012), providing prompt feedback (Sorensen & Baylen, 2004), and adapting some methods that were proven to be successful in a traditional classroom setting (Simonson, et al, 2012). These discussions and suggestions inspired our investigation. While working with faculty, our designers adopted the backward design method (Richard, 2013) and followed three principles to choose/create instructional strategies, which are connecting the course activities, mapping the course content, and engaging class online. Each of these principles includes multiple strategies.

Connecting Course Activities:

The most popular strategies that we have been using to deliver the content in fully online courses include using online discussion boards for class discussion, creating course Q & A (online discussion board) to encourage students asking question, recording lecture videos to guide learning, and providing synchronous session/virtual office hours. We noticed that these activities are usually designed independently to each other and often lack in connections between each other. For example, some faculty members complained that some students were working on the homework without watching lecture videos. One way we have solved this problem was to add in-video quizzes or after-video quizzes. Another way we tried was by connecting the lecture videos with online discussions. In other words, instructors could ask questions at the end of the video and students would be required to post their response on discussion board. The faculty noticed that the number of views on lecture videos have increased significantly after adopting this strategy and concluded this was a better way to assess learning progress.

In fully online courses, office hours also need to be held virtually. However, faculty members have reported that this is not as efficient as regular face-to-face office hours. Students seemed to be unwilling to ask questions using a video conference tool. The solution that we found was to connect the Course Q & A online discussion forum directly to virtual office hours. Students can choose to post their questions on the forum before office hours. Faculty review the questions and answer the ones that are easy to explain in the course Q & A forum and lead a deeper

discussion on the more complex questions in the video conference. This method has reported to be extremely successful and resulted in a higher efficiency of virtual office hour usage. Therefore we kept working in this direction and added small element to the live (synchronous) classes. We encouraged instructors to post the topics and detailed plans of the live sessions on the course site to help online students better prepare for the live class and discussions. The following images show a synchronous session plan and a virtual office hour plan that have been posted on two different course sites.



Figure 1: Synchronous Session Plan.

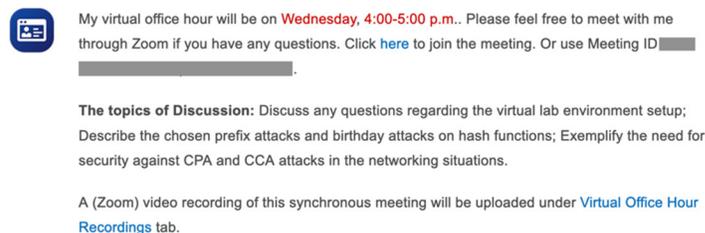


Figure 2: Virtual Office Hour Plan.

Connecting course activities can also engage students in hybrid course settings. The instructors of a hybrid MBA course designed a group assignment for students to draft discussion questions based on the readings and learning resources in the first week of class. This assignment was required to be submitted before the end of the week. In the following week, students met in classrooms and each small group led the class discussion using the questions that they drafted in the assignment. This was reported as a very effective way to engage hybrid students and we are planning to adapt this strategy for future fully online courses.

Mapping Learning Objectives

Instructional design should follow a well-organized procedure that provides guidance to instructors and students (Simonson, Smaldino, Albright, & Zvacek, 2012). For instructors, one way to organize the course materials is to create clear course outcomes and unit/module level learning objectives. Learning objectives are described as statements that explain what students should be able to do after they have completed a segment of instruction (Smith & Ragan, 2005). Well-written learning objectives are specific, measurable, and can provide a clear road map of the course content and assessment.

Learning objectives not only help faculty organize course content but also helps to improve learning. In traditional in-person class, stating learning objectives in class is considered to be an effective teaching strategy (Englert, 1984). Research shows explicitly linking learning objectives and class activities helps motivate and engage students (Reed, 2021). In addition, sharing learning objectives with students in each lecture and aligning objectives with assessments helps increase student academic performance (Englert, 1984). Research studies shows that students consider the list of learning objectives as the most helpful component of a lecture (Armbruster, Patel, Johnson, & Weiss, 2009).

In both online and in-person course design, we tried to map course content starting with helping faculty create two levels of learning objectives: the course level learning outcomes and the weekly module level learning objectives. For example, in a computer science course, course level objectives are listed under course introduction page and the module level objectives are listed under each lecture video and assignment. The following image shows the connections between module level learning objectives and lecture videos.

 **Video Lecture: Government Spending Around the World**
 Run Time: 12:59
 PowerPoint: [Lecture 1.1](#)

Objectives: after watching this video, students will be able to

- Summarize the trend in levels of government spending and tax revenue over time and how the U.S. compares to other countries (LO1.1)

Figure 3: Learning Objectives

[Lecture 2.3_Block Ciphers \(19:58\)](#) 
 External Learning Tool

 Read the following **Learning Objectives** before you start to watch the lecture video (click on the above "Lecture 2.3_Block Ciphers" link to watch the video):

At the end of this lecture, students will be able to:

- Recognize the need for block ciphers for secure communication .
- State prominent block cipher modes and their comparison .

These objectives are directly connected to the Course Outcomes 3.

- CO3: Identify the appropriate defense mechanism(s) and its (their) limitations, given a network threat .

Figure 4: Learning Objectives and Course Outcomes

Adapting In-person Class Activities for Online Courses.

As mentioned earlier, many strategies that have been successfully used for traditional in-person classes can be adapted for online courses (Simonson, Smaldino, Albright, & Zvacek, 2012). Research shows that many methods can help improve learning efficiency in traditional in person classes such as group work (Chad, 2012), case-based class discussion (Mackavey, & Cron, 2019), project-based learning (Langer-Osuna, 2015), and flipped classroom (Zheng, Bhagat, Zhen, & Zhang, 2020), etc. In addition, the Seven Principles (Chickering & Gamson, 1987) of

good practice in undergraduate education have been proven to be successful in traditional in-person classes. These principles are:

- 1. Encourage contact between students and faculty
- 2. Develop reciprocity and cooperation among students
- 3. Use active learning techniques
- 4. Give prompt feedback
- 5. Emphasize time on task
- 6. Communicate high expectations
- 7. Respect diverse talents and ways of learning (Chickering & Gamson, 1987, pp.3)

In the past 20 years, these principles have been adjusted to fit online education (Sorensen & Baylen, 2004). The strategies that focus on student center learning and incorporate communication and interactions are considered the most successful methods (Miller, 2007; Simonson, Smaldino, Albright, & Zvacek, 2012). While designing online course instructional strategies, we adapted the seven principles for online courses and focused on encouraging communication. The following table shows the specific strategies that we have been using in online course design.

Table 1
Online Course Instructional Strategies

Seven Principles	Adapted Instructional Strategies for Online Courses
Student -faculty contact	<ul style="list-style-type: none"> • Set up Course Q & A forums under discussion boards. In many courses, the faculty only chose to set up Q & A forum for each module. • Provide weekly virtual office hours using video conference tools • Provide synchronous class sessions using video conference tools
Collaboration among students	<ul style="list-style-type: none"> • Set up self-introduction forum and random topics forums under the discussion board • Assign online group discussion questions and encourage online communication • Set up group projects and homework • Use peer evaluations to encourage participation
Active learning	<p>It refers to giving students opportunities to think about a topic and respond to learning content (Sorensen & Bylen, 2004), such as case study analysis and structured discussions (Simonson, Smaldino, Albright, Zvacek, 2012).</p> <ul style="list-style-type: none"> • Create virtual presentation homework • Utilize peer evaluation and critique • Create simulations or case study projects • Connect online discussions with live classes to improve deeper understanding
Prompt feedback	<ul style="list-style-type: none"> • List feedback turnaround time on syllabus and course site • Host virtual office hours to answer questions

Time on task	<ul style="list-style-type: none"> • Clearly list due dates on course site • Use checklists to help students manage their time • Use weekly task lists to remind current learning tasks
High expectations	<ul style="list-style-type: none"> • List extra reading and learning materials for students who would like to explore more relating to specific topics. • Encourage students to explore more if they are interested in any topics that are covered by the learning materials.
Respect for diverse talents and ways of learning	<ul style="list-style-type: none"> • Create self-check quizzes and review documents/resources to help students review the content that have been previously covered. (These activities won't count for the course final grades). • Provide options on the assignment topics for students to choose, especially on the final project (For example, the final presentation can be pre-recorded, present in a synchronous session, or other options such as a term paper) • Record virtual office hour meetings and live sessions and upload them to the course site for students who did not attend • Provide a wide variety of instructional strategies to meet students' needs.

Conclusion

Working together to solve the challenges that we encountered in online course design helps faculty realize that the key concepts to successful online teaching and learning are in the design, development, and delivery of instruction (Dempsey, & Van Eck, 2007; Kidd, 2005; & Simons, Smaldino, Albright, Zvacek, 2012). In addition, with a high-quality instructional design, online learning can be just as or more effective compared to traditional learning (Colvin, Champaign, Liu, Zhou, Feredricks, & Pritchard, 2014). The three principles and the related strategies that are discussed in this article focus on engaging online student and encouraging communication, which is considered as one of the most important principles for online teaching (Sorensen & Baylen, 2004). However, the effectiveness of these strategies is greatly impacted by many other factors, such as the course content, the way faculty deliver the course, and student motivation. We would like to see more studies on the effectiveness of these specific strategies in the future.

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