User experience (UX) research puts the emphasis on the perspectives of users: what they value, need, and how they actually work (U.S. Department of Health & Human Services, 2016). The emphasis on user understanding is imperative (Nielsen, 2012) as often times misalignment between designer intention and actual user experience can result in unintended consequences. Figure 1 illustrates this misalignment between designers and “users” by revealing a somewhat common scenario in which a path for walking is designated and paved, yet pedestrians routinely chose a more direct route through the grass. Such misalignment is often true in web design as well since web users have preferred ways of navigation that may not be consistent with the web designer’s vision.

In the online realm, user experience testing provides a crucial bridge of understanding between designer intention and user execution. As usability proponent Krug (2014) has stated, “Testing reminds you that not everyone thinks the way you do, knows what you know, and uses the Web the way you do” (p. 114). Given the web interface mediates nearly all of online learners’ experiences with their courses, online learning seems a natural, if not critical, area for UX research. Indeed, as Koohang & Paliszkiewicz (2015) argued, “The sound instruction that is delivered via the e-learning courseware cannot alone guarantee the ultimate learning. It is the usability properties of the e-learning system that pair with the sound instruction to create, enhance, and secure learning in e-learning environments” (p. 60). Zaharias & Poylymenakou (2009) also describe the direct tie between the usability of e-learning designs and pedagogical value noting, “An e-learning application may be usable but not in the pedagogical sense and vice-versa” (p.1). In other words, both pedagogical usability and web usability are important components in course design.

However, even with the clear merits of UX testing with online learning, such efforts in the e-learning context have typically lagged behind other fields (Fisher & Wright, 2010). This may be in part because for many educators, there is a natural aversion to the conflation of “learners” with “users,” which some feel a UX perspec-
tive suggests. We argue, however, that e-learning course designers can prioritize pedagogy and academic rigor while still taking seriously the importance of intuitive course design. We consider intuitive course design to be design that allows learners to “focus on a task at hand without stopping even for a second” (Laja, 2017, para.2), when either the current and target knowledge is identical or the design helps learners bridge the gap without any explicit training (Spool, 2005). As Ardito et al. (2016) argued, “A poorly designed interface makes students spend more time in learning it than in mastering the provided knowledge, thus becoming a barrier to effective learning” (p.281). In online courses, the time and cognitive energy learners expend on non-intuitive course navigation is time and energy taken away from more important learning activities.

Notes (2001) emphasized the importance of knowing the learner in order to implement learner-centered design: “All too often, we assume we know everything about the people for whom we’re designing. But do we?” (Know your learner section, para. 1). We would argue that UX testing, especially through the think aloud observation (TAO) method, provides an excellent means by which to learn more about your learners and how they interact with your course design.

TAO at its most basic involves observing individuals as they navigate a website while they attempt to complete specific tasks and simultaneously externalize their internal thought processes. It is the cognitive processes that are typically hidden and not articulated that TAOs can make explicit (Nielsen, Clemmensen, & Yssing, 2002). In the specific context of evaluating the user interface of online course designs, the TAO method involves observing individuals in front of a computer as they attempt to complete common course-related activities (Cotton & Gresty, 2006). For example, a learner might be asked to “Determine what the lesson 2 reading is” and while externalizing their internal cognitive processes, might say something like “I’m wondering if I should click this link or that one.” The combination of observing how they attempt to complete the task alongside the externalization of their thought processes can reveal where design is intuitive and where there is a disconnect between designer intent and user experience.

Learning the ADDIE framework is a hallmark of many instructional designers’ education and includes the following five steps: Analyze, Design, Develop, Implement, Evaluate. The ADDIE framework includes a distinct phase for the evaluation of learning design. When it comes to online courses, instructional designers sometimes get feedback on problematic areas of course design from instructors and student surveys. Rarely, however, do they receive specific feedback on the UX of the online course. Therefore, if designers are interested in conducting TAOs to evaluate online course design, they may not know where to begin or how to proceed. Because of this we share our specific UX testing experiences with TAOs in a higher education. We also attempt to demystify the process by providing a guide for other course designers to conduct this testing in similar educational contexts. Additionally, we created a companion website with supplementary materials for conducting the testing. Before describing the recom-

![Figure 1. Desire Path photograph. Licensed under Creative Commons on Flickr.com (Wetwebwork, 2008).](image)
mended steps, we first briefly discuss our experiences with UX testing.

Our Experience with UX Testing

The authors of this paper all work at a large, multi-campus university which recently underwent a system-wide LMS transition from ANGEL to Canvas. This transition impacted all courses offered, including the online distance courses. The instructional design of the online distance offerings at this university is decentralized, and there are multiple design units responsible for different portfolios of courses. Four design units distributed across the university worked together to conduct TAOs on four online courses redesigned within the Canvas LMS. In brief, 19 students, approximately 4-5 per course design, were observed individually as they performed common course tasks while verbalizing their thought processes (i.e., thinking aloud). Each unit made improvements to the tested course design based on what they observed in the TAOs. The learners’ reflections and actual behaviors were also video-, audio-, and screen-captured, and all of the data were then collectively analyzed. This analysis was done in order to identify more generalizable practices related to students’ perceptions of Canvas, navigation tendencies and preferences, and design elements that interfered with seamless navigation (Jingjing & Qinglong, 2010; Mulwa, Lawless, Sharp, & Wade, 2011; Robal & Kalja, 2012). The study included some elements that were more formalized, like IRB approval, and others that were less formalized, like agile design improvements. Please see Figure 2 for an overview of our TAO study at-a-glance.

From the beginning of the study, we intentionally positioned ourselves as reflective practitioners wherein we iteratively improved research instruments and processes. As we were new to UX testing, we also spent time researching, creating, reviewing, and piloting information and technologies before bringing in actual participants to our facility to test. The practitioner-oriented recommendations below were developed through a systematic synthesis of the literature and the critical continuous self-reflections of our experiences with the TAO method. As an attempt to bridge theory and practice to address the disparity between these two strands of current TAO praxis (Boren & Ramey, 2000), we offer practical guidelines that are also theoretically consistent and grounded.

Determine, Pilot, Do: Conducting TAOs for Course Design

The recommendations below for conducting UX TAO testing are organized in three broad sequential categories: determine, pilot, do. First, the course designer determines foundational elements, next those foundational elements are piloted, and finally the actual

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**OUR TAO STUDY AT-A-GLANCE**

<table>
<thead>
<tr>
<th>Study context:</th>
<th>Study evolution:</th>
</tr>
</thead>
<tbody>
<tr>
<td>One university</td>
<td><img src="image" alt="Study evolution diagram" /></td>
</tr>
<tr>
<td>Multiple decentralized design units</td>
<td><img src="image" alt="Study evolution diagram" /></td>
</tr>
<tr>
<td>LMS transition from ANGEL to Canvas</td>
<td><img src="image" alt="Study evolution diagram" /></td>
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</table>

**Study methods:**

Think aloud observations (TAOs)
4 units (w/ different course designs) participated
19 total participants (each unit recruited their own)
Audio, video, screen recorded; fully transcribed

**Evaluation: Less formal**

Agile improvements made w/in each design unit based on observations of their participants

**Evaluation: More formal**

All data collectively analyzed across designs
Thematic analysis used to identify suggested best UX design practices for the university

Continuous research team reflections

What worked? (w/ TAO process)
What didn’t work? (w/ TAO process)
What should we do differently? (w/ TAO process)
Where did students struggle with course design?
What can we improve in our designs?
What does the literature say?

Collective identification of suggested TAO steps discussed in this article

*Figure 2. Our TAO Study at-a-glance.*
UX testing is conducted with recruited participants.

**Determine Foundational Elements**

When beginning any new endeavor, oftentimes the best course of action is making key determinations at the onset which then serve as a blueprint for the rest of the project (Farrell, 2017). In this section, we outline the key elements course designers should determine before undertaking your actual TAOs:

- What should be tested,
- The questions that should be asked,
- Who you should test,
- How TAO information will be captured,
- Where and when the test will be conducted
- The necessary forms and potential funding

**Pilot Key Steps in the Process**

After determining in advance the “blueprint” for your TAO testing, pilot key steps in the process as well as the whole process from start to finish. Piloting is a very important part of conducting successful TAOs as it provides the opportunity to (1) rehearse for the study to ensure it will run smoothly; (2) test the tasks themselves to ensure none of them are misleading or confusing; (3) make more realistic estimations of timing; and (4) validate the data and the wording of the tasks for reliable findings (Schade, 2015). While this may seem like a duplication of efforts, we found it invaluable. We would strongly recommend this practice to ensure more useful data collection and better participant experience. In this section, we outline the most important parts of the TAO process to pilot:

- Pilot your test questions and scenarios
- Pilot the equipment and room set-up
- Pilot getting participants to “think aloud”
- Pilot the entire process

**Conduct the UX Testing**

Once the key elements of TAO testing have been determined and piloted, shift into the actual recruiting of participants and conducting of the UX tests. In this section, we highlight the practical steps for conducting a TAO:

- Recruit participants & schedule TAO sessions
- Conduct TAOs
- Capture observations during & immediately following each UX test
- Analyze the data
- Make improvements to your UX design

**Companion Website**

Our companion website contains examples of our UX test materials and resources we used to conduct our own testing. These can serve as a starting point for creating your own materials. [https://sites.psu.edu/canvasUX/companion/](https://sites.psu.edu/canvasUX/companion/)

**Determine Foundational Elements**

We strongly suggest frontloading the work in terms of determining foundational elements and piloting. If course designers do a thorough job preparing, the actual conduct of the TAOs will be smoother and more productive. This section emphasizes the areas we suggest designers “determine” early in the process.

Determine: What will be tested. Because we were transitioning to a new LMS, we decided to test full course designs in the new environment in order to yield the most useful information pertaining to UX experience within the new system (i.e., real-life usability evaluation) (Nørgaard & Hornbæk, 2006). The course designs represented what actual students would see and experience when enrolled in the course. For our testing, the course content was placed in a test space within the LMS, only accessible to the participant and UX team members. Additionally, there was a separate course instance for each participant.

While transitioning to a new LMS led to our full course testing, the TAO method could have easily been adopted at a much smaller scale and without the impetus of a new LMS. In many ways, doing the UX testing earlier in the course design process is beneficial as “...evaluation is more formative the closer it occurs to the beginning of the development process” (Crowther et al., 2004, p.291). Practitioners may want to examine a new or existing course design, or even an individual course content element or assessment. When identifying what to test, consider things like UX design areas in which there is disagreement over the best approach, courses (or course elements) that have proven to be difficult to use in your experience, and developing a new interface or navigation scheme.

Determine: What to ask. After selecting what to test, we next focused on determining which specific elements to evaluate and then crafted questions to address those elements. In our case, we created realistic scenario-based tasks which corresponded to typical student experiences. These are typically described as “task scenarios” or “test questions.” For example, the following is an example of a task scenario we used: “Imagine it is week 7 of the course and you have a team assignment due at the end of the week. Please find your list of team members and demonstrate how you would reach out to them, speaking aloud while doing so.” Our approach is consistent with what Nørgaard and Hornbæk (2006) call “real-life usability evaluation”: evaluation that aims to obtain realistic inputs regarding the object of interest through authentic context and task implementation. We also created open-ended questions to probe the participants for more information in a post-test debriefing (Boren & Ramey, 2000).

In addition to crafting the questions for participants to think aloud while they performed the tasks, we also asked participants to rate each task on a difficulty scale of 1 - 5. This allowed us to collect quantifiable information which added to the qualitative data collection inherent in the think aloud process (Boren & Ramey, 2000).

An important note is that while developing these task scenarios, you will also need to determine where the participant should be located in the course. For in-
stance, it may be desirable to start on the course home page for each task or to start from a different location depending on the task.

**Determine: What to ask**
Please see the companion website for examples of test questions and screenshots of tasks. [https://sites.psu.edu/canvasUX/companion/](https://sites.psu.edu/canvasUX/companion/)

**Determine: Who should be tested.** Related to what is being tested and which questions are asked, is determining who will ultimately participate in the test. With UX testing, the goal is typically to try to find five “representative” participants, some designers recommend more and others recommend fewer (Nielsen, 2000). In general, it has been argued that testing five users can help yield roughly 80% of the usability problems in a system (Nielsen, 1993, & Virzi, 1992). Oftentimes, “representative” is defined in terms of demographics. In the case of distance education-related testing, representative participants can often mean students who are not located near your physical location. One decision focuses on whether the TAO testing will be conducted remotely and/or on-site. In our case, several distance education students were willing to travel to be a part of our UX testing, so we were able to do all of our testing on-site. However, these tests can also be done remotely using screen sharing web conferencing systems.

When trying to define your “representative user” we suggest keeping in mind Krug’s (2014) pragmatic suggestion that the designer should: “[T]ry to find users who reflect your audience, but don’t get hung up about it. Instead, try to make allowances for the differences between the people you test with and your real users” (p. 42). While representative users are nice, the most important thing is that you observe real people navigating the online course while completing authentic tasks. This will tell you much about what is working and what needs to be improved from a UX perspective, even when the participants do not exactly match the student target audience.

**Determine: How TAO information will be captured.** Another decision we made was how we wanted to capture the TAO information. The most important thing is that you be able to watch an individual attempt to navigate your course to complete common tasks while you observe what is easy and where there is confusion (Ericsson & Simon, 1980). While this is the minimum, you will learn important things about your course design from simply observing someone attempt to navigate. It is difficult to simultaneously facilitate, take notes, and monitor the TAOs (Boren & Ramey, 2000; Nørgaard & Hornbæk, 2006; Rankin, 1988). Therefore, we suggest also doing some sort of audio recording since a retrospective analysis of the think-aloud session can yield deeper understandings and improve the reliability and validity of the findings (Ericsson & Simon, 1993; Rankin, 1988).

For our UX testing, we decided we wanted observer notes taken by hand or computer. If at all possible, we would recommend two facilitators conducting the UX testing to allow for greater observation and not taking. In our case, for four of our nineteen observations we had two facilitators and noted this allowed one to focus on making sure everything ran smoothly while the other took notes on the participant’s navigation.

Additionally, we used screen capture video which recorded the participants’ screen while they were performing tasks within the LMS course environment as well as using external cameras to record participant audio and facial cues.

**Determine: Where and when will the test be conducted.** For our testing, we used a dedicated room for most of the testing. This was especially helpful not only for logistical purposes, but it also facilitated using the same technologies (hardware and software) without having to spend extra time setting up and taking apart the space for each individual test. If TAO testing is conducted at a distance, if at all possible, a dedicated place to conduct the testing will allow more consistency.

The use of technologies may impact room or location selection. For example, the use of external cameras may mandate that more floor space is needed. Whatever technologies are chosen, we would also recommend selecting a space that can accommodate two to three people and chosen equipment comfortably. If a dedicated testing room cannot be used, we would at least recommend using a room that is quiet to help eliminate external noise and distraction for the participant. To the extent possible, the testing space should be a quiet space that will comfortably accommodate you, your participant, and the necessary technologies. In terms of when testing should be conducted, plan ahead to when participants are likely to be available and then make sure that facilitators will also be available during these times.

**Determine: Necessary forms and potential funding.** If conducting a more formal study and IRB approval was required, insure that informed consent forms are available that participants sign indicating the purpose of the study and how their data will be used. A consent form is advisable even if the testing did not require IRB approval. Some universities have people sign performance release forms if videos will be played later. At a minimum, in a consent form the purpose of testing should be transparent so participants can understand how their data will be used.

In this case, additional funding for graduate assistant time and to provide incentives to participants was received. All 19 participants in our study received a $50 gift certificate to Amazon.com as an incentive for participation. While funding and/or incentives are not a requirement to conduct TAOs, it is described here as a step to consider early in the process.
Pilot Key Steps in the Process

After making our foundational determinations, we piloted many of the areas including test questions, equipment, and room setup. In our case, all UX team members reported that it was very helpful to practice in the actual location, with the equipment, and to do a complete run through of every step we would take with an actual participant. Below we have identified specific areas which should be piloted.

**Pilot: test questions and scenarios.** We advocate for UX testing because it can highlight disconnects between designer intent and actual student navigation experiences. This same disconnect can be found in the test questions and scenarios where designer assumptions may be present. The tasks need to be adequately complex yet feasible for testing for the participants (Boren & Ramey, 2000; Nørgaard & Hornbæk, 2006; Rowley, 1994). Importantly, the scenarios and specific tasks asked of your participants should be clear and unambiguous. Do not assume that just because a task scenario makes sense to you that it will also make sense to your participants. If a question contains misleading wording it may not be possible to accurately determine if participant confusion is due to a non-intuitive interface or problematic task questions.

For us, piloting test questions and scenarios emerged as one of our most important lessons learned as we did not conduct a thorough enough pilot of the questions themselves. An example is this task question: "You are ready to submit the Lesson 02 Fundraising Scenario assignment. How would you accomplish this task?" In trying to complete this task, some participants thought they needed to submit an actual assignment while others assumed they just needed to demonstrate how they would submit it. This task should have included specific directions clarifying just what participants were being asked to do. To avoid this type of situation in TAOs, we suggest asking a colleague or someone else not involved in the writing of the questions to read the question and then describe exactly what they think they are being asked to do. The usefulness of 'testing the tests' has also been empirically supported in a trial-run usability test to improve a usability test questionnaire and its implementation process (Rosenbaum et al., 2002).

**Pilot: The equipment and room set-up.** At times technology does not perform as intended. Based on this, it is strongly suggested that you complete a run-through of the technology to be used for the UX testing, ideally in the room in which it will be used. Such piloting will help detect any problems with audio and video capturing (Rowley, 1994; Schade, 2015). Practicing in the room itself will also provide a chance to discover potential issues with noise, temperature, and room configuration. It is better to figure out solutions to these potential problems in advance of your actual UX tests. See Figure 3 for a picture of our actual room setup.

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**Determine: Necessary forms and potential funding.** Please see examples of forms we used on the companion website. [https://sites.psu.edu/canvasUX/companion/](https://sites.psu.edu/canvasUX/companion/)

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*Figure 3.* Picture of the room and technology setup for the TAOs.
Pilot: Getting participants to “think aloud”. While you will learn important things from watching how your participants navigate and where they seem to get confused, it is the “thinking aloud” part of the TAOs that can be especially revealing. After all, as Rubin and Chisnell (2008) assert, through the think aloud technique, one is able to “…capture preference and performance data simultaneously…” (p. 204). This strategy can also expose participants’ emotions, expectations, and preconceptions (Rubin & Chisnell, 2008).

While thinking aloud can be very revealing, it is likely something the participant has not been asked to do before, and it is something that does not come naturally to most people (Nielsen, Clemmensen & Yssing, 2002). Therefore, we recommend that you demonstrate the “thinking aloud” process for your participants. Here we suggest a task scenario be prepared on a website that is not the site being evaluated and then “think aloud” while completing the task to demonstrate what it is like.

Additionally, since most practitioners do not have experience facilitating the thinking aloud process we suggest practicing the think aloud process and being prepared for two extreme types of participants: the reticent and tangential participants (Boren & Ramey, 2000).

The reticent participant. Some participants will not naturally verbalize their thought processes. For this type of participant, the evaluator can politely say something like: “Just a reminder to please say out loud what is literally going through your mind as you are attempting to complete this task.” For some, that is all it will take to remind them. For others, emphasize again that any information expressed about what they are thinking as they attempt to navigate the course is useful. Additionally, it can help to remind them that you are evaluating the UX of the course design, not their abilities to navigate.

The tangential participant. On the other extreme are participants who naturally editorialize rather than verbalize their cognitive processes. For this type of participant gently suggest that they hold onto their reflections until later in the process. Be sure to reserve space throughout the TAOs to invite participants to share additional thoughts.

Asking someone to think aloud, especially while being recorded, can make for an awkward encounter. But, in this phase, you can pilot your own skills of helping the participant through any nervousness or frustration (Boren & Ramey, 2000; Rowley, 1994). If there are multiple facilitators, they can practice with each other. If there is only one, a colleague should be enlisted to help. Either way, someone should play the role of the participant while practicing to help learners think aloud.

Pilot: The entire process. Finally, while it is important to practice and pilot each of the individual elements discussed above, we also strongly suggest piloting the whole process from start to finish before bringing in actual participants. The full pilot will not only reveal potential elements of testing process to change, but may also highlight design areas that can improve the course before beginning actual testing (Boren & Ramey, 2000; Rowley, 1994; Schade, 2015).

Here, it is important that a script is developed and that facilitors/evaluators read it faithfully in testing. A script will ensure that processes are consistent with each participant. The script should welcome the participant and outline the different phases of testing. It should also include information about how the facilitator may not be able to answer navigation-related questions from the participant during the testing phase. It is also very important to emphasize in the script that you are evaluating the UX of the course, not evaluating the participant. Additionally, create a detailed checklist of items to present or check during testing. This checklist may include items such as turning on all cameras, making sure the participant has access to the test environment, and having the participant sign any necessary form.

Do the Actual UX Testing

Now, it is time to recruit and bring in actual participants for the testing. The following steps will cover items not already outlined in the pilot area, although there will be obvious repetitions from piloting to conducting the actual UX testing. Additionally, this is ordered in a linear way, there may be steps that can be performed earlier or simultaneously such as recruiting participants.

Do: Recruit participants and schedule TAO sessions. Now that it is time to move forward with UX testing, you will have to recruit from your identified audience. If the decision was to use non-student representative testers, then your recruiting process may be as simple as asking a few non-learning design coworkers to assist.

If you recruit from actual students, there may be addition steps. In our case most of our participants were actual online students and because each design unit recruited their own participants, we used different methods. Some were recruited through an online survey which was forwarded to students by instructors. Others were recruited through a more direct effort where faculty members identified and approached specific individuals to participate.

Once the participants have been successfully recruited, then work out the logistics of scheduling a time for them to come to the testing facility for the UX testing. Having a dedicated room for the testing can be

Pilot: The entire process.
Please see the companion website for examples of a moderator script and a checklist for UX testing.
https://sites.psu.edu/canvasUX/companion/
beneficial. You will typically want to schedule tests with a gap in between testing times to allow for the facilitator(s) to record additional reflections and properly set up for the next participant.

**Do: Conduct TAOs.** It is normal to be nervous on “game day,” especially when meeting with the first participant. But here is where the earlier work in the process will pay off since you have already determined and piloted all elements of your TAO testing, including a run-through of the entire process from start to finish. When the actual UX testing is conducted, we use your script and checklist with each participant. This can serve as a safety net to ensure all participants have consistent experiences. Lastly, given the foibles of both technology and humans, expect at least one thing to go wrong: a participant will be late or will not show up at all, your screen capture software will fail to work, you will realize a task you piloted and were confident was clear was actually ambiguous. Here we suggest keeping in mind Krug’s always practical advice: “[T]esting one user is 100 percent better than testing none. Testing always works, and even the worst test with the wrong user will show you important things you can do to improve your site.” (Krug, 2014, p. 114).

**Do: Capture your observations during and immediately following each UX test.** It will be easier for one facilitator to take notes during the testing if there are two facilitators. But even if there is one, brief notes and audio recordings can still be taken during the test itself. In either scenario, capture your thoughts immediately after the testing is complete and the participant is no longer in the room. What is absolutely fresh in your mind while doing the TAO will be a distant memory very soon. It can be hard to recall specifics even thirty minutes later. This is such a crucial step that we suggest putting it explicitly in your checklist. Having a template created in advance for each participant can help as well.

When capturing your reflections, document anything that gives context for the particular participant and what was observed related to UX areas. Note both what was observed—e.g., “participant struggled with locating his group”- as well as your thoughts about how design improvements might be made. The more e-learning course designers can capture during and immediately following the testing, the better for making improvements to your design.

**Do: Analyze the data.** After conducting the TAOs, the next step is to use the information collected, both the recording of your testing and your documented observations—to make UX design improvements to your course. After testing was complete, we went through our observer notes and watched the captured video. We were able to do this in small groups within our respective design units which enabled productive discussion about where participants were struggling. Having the design team watch together also gives credibility to any suggested changes as you now have objective data to support arguments for change.

In addition to the agile analysis reviewing the data and identifying areas to improve, we also conducted a more formalized analysis (Gregg, Reid, Garbrick, Williams, & Aldemir, 2017). We found the data in the formal report was supported by the informal observations. While this formal analysis was useful in our case because in the middle of the university-wide LMS transition we were able to identify suggested best practices across individual designs, in general, designers do not need that level of analysis to identify and make meaningful UX improvements to the design.

**Do: Make improvements to your UX design.** In the end, the purpose of conducting UX testing is to improve course design and ultimately the student navigation experience. In our case, even during the testing itself, we were able to immediately observe ways in which students were confused by certain terminology, naming conventions, and navigational structures. While these areas seemed intuitive to the designers, after watching students struggle, it became apparent that changes needed to be made to improve the design. Krug (2010) recommends a “path of least resistance” approach to what should be changed by asking, “What’s the smallest, simplest change we can make that changes needed to be made to improve the design. Krug (2010) recommends a “path of least resistance” approach to what should be changed by asking, “What’s the smallest, simplest change we can make that’s likely to keep people from having the problem we observed?” (p. 111). Changes to our design included renaming assignments, adding better course and group identification descriptors, and adjusting course navigation to better align with participants’ natural behavioral tendencies.

**Conclusion**

As educators, we know that students are so much more than simply “consumers” and that teaching and learning is far more complex than a simple transaction or exchange of money for a service or product. Education involves personal challenge, change, growth, and development, no matter the discipline. At the same time, we also know that online students lost in a non-intuitive course interface have a lot in common with users who cannot easily navigate a consumer website. And, one of the biggest barriers in online learning environments that negatively impacts learning and learners’ satisfaction are technical challenges encountered by learners (Song et al., 2004). And while our
learners are probably less likely to simply leave their course website than a typical web user, bad UX design does have learning consequences.

Ultimately learner time and cognitive energy are limited resources, and time and energy spent on trying to find assignments or identify teammates in a poorly designed interface are time and energy they are not dedicating to the learning itself. Naturally, instructional designers want the navigation of course designs to be seamless from a UX perspective so that students can attend to the more important elements of the learning experiences. At the same time, designers can work in a vacuum without much, if any, direct feedback from students on the usability of their course designs. Additionally, there is often a distance between the designers of online courses and the actual learners’ experiences of those courses (Rapanta & Cantoni, 2014). Consider that many designers go into the field because they like technology and are likely not representative of the average student.

The authors of this article — working practitioners who conducted UX testing on their course designs — have witnessed firsthand the power of student feedback through the TAO method in improving course design. We would argue that receiving this form of feedback is a crucial element in course design which can help bridge the gap between designer intention and student execution. As we discussed in the beginning, UX testing is increasingly becoming the norm in industries that rely on web interfaces to reach their audiences. We strongly believe it should also play more of a role in e-learning. The framework and discussion here are a part of our efforts to ensure that UX testing plays a stronger role in our field.

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