2016 WolfWare Usability Evaluation

Results of a faculty usability study of the WolfWare website

NC STATE UNIVERSITY

Distance Education and
Learning Technology Applications

Contents

Overview

More than 40,000 NC State faculty, students and staff use DELTA's WolfWare website to set up, administer and access courses. During Fall 2016, we conducted the first-ever usability testing on the WW website, although improvements have been made over time.

The usability of the WolfWare website is a concern based on the help calls we have been receiving as well as anecdotal evidence accumulated over time (see Watkins, 2016). As we consider how to position WolfWare to handle the new educational technology tools that will be created and integrated as we retire WolfWare Classic in May 2018 (e.g., WordPress, class email), we thought it would be valuable to gain a better understanding of what works and what faculty struggle with in the current site.

Our focus for this study was solely on the faculty experience; we did not consider the student or staff support experience. We wanted to concentrate on the primary group that we serve. The staff experience, while closely aligned with the faculty experience, would require additional study to look at some larger course management type of tasks as well as information display density. Understanding and improving the student experience would require a completely different focus and should be considered prior to implementing any substantial changes that affect student users. We asked faculty to do eight tasks representative of the types of tasks they need to perform to prepare for a semester, paying particular attention to difficulties mentioned in the help call analysis referenced above.

Providing the most effective support for the NC State community requires ensuring that the WolfWare website is as usable and useful as possible. Moreover, we believe this high-visibility product should be commensurate with and representative of the high caliber of work for which DELTA and NC State University are known.

Desired Outcomes

This study was designed to evaluate the usability and faculty user experience of the WolfWare website for the purpose of supporting future decision making about changes to the site design.

More specifically, we set out to acquire:

- An understanding of how faculty feel about, think about and use the current website (what instructors are trying to do, what they are actually doing and why, and what they would like to be doing).
- A set of problem areas and recommendations on what we should do to improve the WW website and inform development decisions.
- Experience conducting usability testing on campus that will help us develop a process model that we can use for other project planning.

Ultimately, we hope that this study will be used to inform and guide design changes that will, in turn, lead to a better user experience for faculty.

Relationship to DELTA Goals

As an organization, DELTA has a dual focus on 1) implementing and enhancing Distance Education (DE) programs and 2) providing faculty support for the incorporation of learning technologies into instruction in all (online, blended and classroom-based) courses. Our mission is to *collaboratively apply expertise in innovative technologies and pedagogies to solve instructional challenges in an efficient, effective and service-oriented environment, with the overarching goal of helping faculty build student success*. In this sense, WolfWare is mission-critical.

DELTA's 2017-2020 Strategic Plan states:

> Helping students make timely progress toward a degree means rethinking how courses are developed, delivered and scheduled, taking advantage of innovative learning technologies to provide flexible delivery methods for easy access to course materials, supporting emerging pedagogies, using technologies that

> support the university's Quality Enhancement Plan by engaging students in critical and reflective thinking with a variety of learning materials, and providing excellent and timely support for students and instructors. DELTA will continue to provide the resources, training and support needed for faculty to leverage technology to provide meaningful, flexible and innovative learning environments in support of student success.

To this end, DELTA's Goal One involves *leveraging learning technologies to improve student success* [University Goals 1 & 2]. The WolfWare website explicitly furthers DELTA Goal One as it 1) represents innovation in course design, delivery and management, 2) makes use of emerging learning technologies and pedagogies, and 3) provides flexible access to course materials.

The WolfWare website helps achieve Goal Two for *research, implementation and support of innovative, scalable and reliable learning technologies and methodologies* [University Goals 1 & 3].

Project Background and Description

The About WolfWare page of the WolfWare website (https://wolfware.ncsu.edu/about/) provides an overview of what WolfWare is and does:

> WolfWare is NC State's enterprise suite of academic technologies and tools that provides instructors, students and staff with a cohesive online environment for course enhancement and delivery. The WolfWare Mission is to provide a suite of online tools to instructors, students and support staff that facilitate teaching and learning in fully online, face-to-face and blended environments.
>
> Since the launch of WolfWare Classic in 1999, DELTA has offered an accessible course management platform that allows instructors and students to focus on course content and learning, rather than on the technologies themselves. The WolfWare suite comprises a variety of academic tools and technologies to support learning and content delivery. Additionally, WolfWare integrates and links to other campus-based technologies, such as the NCSU Libraries Course Tools and WeBWorK, an online homework system for math and science courses.
>
> WolfWare (and WolfWare Classic before it) has been an important part of teaching and learning at NC State since its inception, and it is continually being updated to provide the most effective support for the NC State community as more and more courses move to full or partial online delivery.

Assessment Method

Population

The population of interest for this evaluation of the WolfWare website is faculty. Future user testing is needed to evaluate the needs and experience of support staff and students.

Sample

Recruitment

Initially, we sent an invitation (to participate in the study) via email to a group of 100 NC State instructors randomly selected (using Stata 13's random sample generator command, `sample`) from a list of all 3,942 individuals with the role of 'Instructor' in at least one Moodle section in the 2016 calendar year. Our goal was to conduct individual sessions with at least 10 faculty volunteers. To plan for possible attrition, we scheduled 12 sessions, not including our pilot test with a DELTA staff member who is also faculty. After only getting one confirmed participant, we sent a second round to an additional random sample of 960 names/emails from the original list of 3,942.

Response rate

We received offers to participate from 38 individuals (a 3.9 % response rate). Of the 26 who had emailed after we had already filled the test session slots, 14 noted they would be willing to participate in the future. (We did not hear back from the other 12 regarding willingness to participate in future usability studies.)

Study participants

We conducted 13 tests with instructors—12 faculty and one graduate teaching assistant—from a dozen departments across the university (*Table 1*). They ranged from heavy Moodle and WolfWare users with 8+ years of experience working with WolfWare to set up and manage course spaces to those with as little as one year. The average reported number of years using Moodle was six. (For more details about participant characteristics, see *Appendix A: Supplemental Tables and Figures*.)

Table 1. Participants' home departments.

Department		
Accounting	English	Library and Population Health
Biological Sciences	Foreign Languages	Molecular Biomedical Sciences
Business Management	Graphic Design and Industrial Design	Parks, Recreation and Tourism Management (x2)
Educational Leadership, Policy, and Human Development	International Programs	Psychology

Assessment Tools

We conducted in-person, moderated usability tests utilizing a standard talk-aloud protocol, which involves the participants thinking out loud as they complete a series of tasks (Lewis, C, 1982; Lewis, C. & Rieman, 1993). The test sessions were held in or near the participants' offices on campus and lasted an average of 45 minutes.

When scheduling sessions, we asked faculty what type of computer, (PC vs Mac) and browser (Chrome, Firefox, Safari, Internet Explorer, Edge) they typically use and set up the test for them on a Dell PC or Mac laptop accordingly. The test sessions were recorded using Mediasite or Camtasia Recorder. We watched the recordings and compiled notes in a Google Form. Google Analytics and Scott Watkins' report served as supplementary tools

in our analysis. Tables and charts were made in MS Excel 2013, 2016 and Stata. Adjusted-Wald confidence intervals for completion rates were computed in RStudio.

Assessment Questions

(A) *Pre-test.*

Prior to beginning the tests, we asked participants to provide us with some background information. We called this the "getting to know you" part of the session. The purpose of these questions is three-fold: (a) get the participants comfortable talking about themselves, which makes it easier when they must start thinking out loud, (b) demonstrate that you will be listening to what they have to say, and (c) give us some indicators for how computer- and web-savvy they are and how much domain knowledge and experience they have going into the test (Krug, 2010).

Table 2. Pre-test questions.

Pre-test Questions	
1.	What department are you in?
2.	How long have you been teaching?
3.	How many classes do you typically teach each semester? Which ones?
4.	Approximately how many years have you been using Moodle?
5.	On a scale of 1 to 7, 1 being never, and 7 being always, how often do you use a mobile device (i.e., a tablet or smartphone) to access the WolfWare website or Moodle?
6.	Now, roughly how many hours a week altogether — just a ballpark estimate — would you say you spend using the internet, including web browsing and email, at work and at home?
7.	And what's the split between email and browsing — a rough percentage?
8.	What kinds of sites are you looking at when you use the web?
9.	Do you have any favorite web sites? (you like how they work/function)
10.	What does "WolfWare" mean to you?

After answering these questions, the homepage of the WolfWare website (test version) was loaded and participants were prompted to "*look at this page and tell me what you make of it: what strikes you about it, what you can do here, and what it's for. Just look around and do a little narrative*."

(B) *Tasks.*

As previously mentioned, we used the results of the help call analysis to guide our formulation of the tasks. The vast majority of help calls received by the help desk were during the months of May, August and January and had to do with getting a class ready for a new semester. Each task is representative of a common scenario that frequently poses difficulty for faculty.

Participants were informed that, for the purposes of the following tasks, they would be assuming the identity of Jamie Wolf, an instructor at NC State preparing for the upcoming Spring 2017 semester. Tasks were handed to the participant in written form as well as read aloud to them. They received only one task at a time, presented in the order shown in *Table 3* below. Please note that participants only received the text in the second column of this table; they were not given cues, for instance, that they needed to begin the first task by logging in to the website.

Successful completion of the first task (*create a new course space*) was a prerequisite for completing most of the other tasks in the test. Therefore, in cases where participants were unable to create the new course, we walked them through the steps after they filled out the post-task questionnaire shown in *Table 4*.

Table 3. Usability test tasks.

Tasks (aka Scenarios)	
1. Log in and create a Moodle space	Let's get started by requesting a new Moodle space for next semester, Spring 2017. You will be teaching XYZ 123-001 in Spring 2017. Please go ahead and create your Moodle course space for next semester.
2. Add pic to profile	You want your picture to appear in Moodle next to your posts. Upload your image so that it will be seen in Moodle. You will find your picture on the desktop.
3. Add TA to Moodle	Add your teaching assistant, Jonathan Champ, id jrchamp, to the course.
4. Set availability date	The first day of class is January 10th (second day of the semester), 2017 but you want your students to be able to go to the Moodle site before that. Make the course available to students starting January 5th.
5. Course Copier	Copy all the content over from last year's (Spring 2016) Moodle space to your new (Spring 2017) space.
6. Recopy course content	You realize you copied the wrong semester; you actually wanted the content from Fall 2016. Please fix this now.
7. Cross list sections	You have just been informed that you will also be teaching XYZ 123-002, an additional section of the same class. You want to use the same Moodle space for both sections. What do you do?
8. Collaborate Session	You want to schedule an online office hour in Blackboard Collaborate from 1-2 PM on January 10th 2017. Please navigate to the place on the WolfWare website you would go to access the Collaborate tool.

Below each typed scenario were instructions saying, "*When you're ready, please indicate how much you agree or disagree with the following statements by marking one response for each statement*." These statements, presented to participants as three 7-point Likert items, are shown below in *Table 4*.

Table 4. Post-task questionnaire.

Post-task Questions									
I am confident that I successfully completed this task.									
Strongly Disagree	❍	❍	❍	❍	❍	❍	❍	Strongly Agree	NA ❍
I am satisfied with the ease of completing this task.									
Strongly Disagree	❍	❍	❍	❍	❍	❍	❍	Strongly Agree	NA ❍
I am satisfied with the amount of time it took to complete this task.									
Strongly Disagree	❍	❍	❍	❍	❍	❍	❍	Strongly Agree	NA ❍

(C) ***Post-test.***

Finally, after completing each usability test, we asked the participant a series of open-ended questions.

Table 5. Post-test questions.

Post-test Questions	
1.	Do you have any questions for me, now that we're done?
2.	How do you feel about the WolfWare website now that you've played with it a little bit?
3.	What was most frustrating or confusing about the site?
4.	Was there anything you particularly liked about the site?
5.	If you could improve one thing about the WolfWare website, what would it be?

6.	What's missing that you would like for WolfWare to do/have/offer?

Assessment Information

Participant-level metrics

For each of the 13 participants in our sample, the following usability metrics were compiled:

P1. ***Task completion rate***—proportion of tasks a participant successfully completed
P2. ***False completion rate***—proportion of tasks a participant thought he/she had completed (but had not)
P3. ***Total errors***—sum of a participant's errors[1] across all tasks in the test
P4. ***Average errors***—mean and median errors for a participant across all tasks
P5. ***Post-task ratings***—a participant's overall level of agreement with the 3 post-task statements (see *Table 4*)

Task-level metrics

For each of the eight tasks (i.e., scenarios), we compiled the following usability metrics[2]:

T1. ***Task completion rate***—proportion of participants who successfully completed the task
T2. ***False completion rate***—proportion of participants who thought they completed the task (but had not)
T3. ***Total errors***—sum of errors for a task across participants
T4. ***Average errors***—mean and median errors for a task across participants
T5. ***Post-task ratings***—overall level of agreement with each of the three post-task statements (see *Table 4*)

Issues

For each problem/issue identified, we compiled the following data points:

I1. ***Participants affected***—total number of participants with the problem
I2. ***Problem frequency***—total number of times the problem occurred across participants
I3. ***Problem severity***—author-assigned rating (0 to 3) that reflects the extent to which the issue impacts users (see *Table 6* below)

In the *Results* section of this report, individual task scenario results, identified usability issues, and the authors' general recommendations are presented. Usability issues identified during testing were rated using Jeff Sauro's (2013) scale of usability problem severity:

Table 6. Problem severity scale.

Usability Problem Severity (Sauro, 2013)
0. ***Insight/Suggestion*:** Users mention an idea or observation that does or could enhance the overall experience.
1. ***Minor*:** Causes some hesitation or slight irritation.
2. ***Moderate*:** Causes occasional task failure for some users; causes delays and moderate irritation.
3. ***Critical*:** Leads to task failure. Causes user extreme irritation.

While not an exact scale, the Severity Scale is a useful tool to begin discussions regarding the prioritization of solutions to identified usability issues.

Please note that the number and frequency of issues associated with a task will not necessarily equal the number of observed errors across participants for that task. Remember that an "issue" is a usability problem; an "error" is any mouse click that doesn't bring the participant closer to completing the task.

[1] An *error* was defined as any click that doesn't follow an execution path (bring the participant closer to completing the task).
[2] *Time on task* (i.e., amount of time spent on the task before completing or having to move on) is another standard measure.

Results

(A) Pre-test Results

Participants' background characteristics

For details, please refer back to *Study participants* on page 5 and see *Appendix A: Supplemental Tables and Figures*.

What does WolfWare mean to you?

The open-ended question, "What does WolfWare mean to you," revealed instructors' perceptions of what WolfWare is and does. Replies included a variety of ontological metaphors, most of which allude to a view of WolfWare as something that contains or encompasses individual tools and resources, or something that functions as a gateway (i.e., point of access) connecting to those tools/resources. The following examples are taken from participants' responses:

WolfWare as a *container*:
- "storage facility…place where we can store materials, Moodle components and other things that go into it"
- "huge virtual file cabinet for the university"
- "repository where I can go to access all the data I need (courses for Moodle, add instructors)"
- "where all of the curriculum is housed"
- "place where university plops everything I need as an instructor…"
- "the bigger envelope that contains Moodle"
- "place to put homework and respond to it"
- "repository…keeping knowledge in here"

WolfWare as a *gateway*:
- "starting point to find past, present, future classes, add instructors; where I go when I need stuff"
- "…kind of like my connection point"
- "means being able to give students access to me and to course information all the time"

WolfWare as a *unifier*:
- "the umbrella brand for the tools we use as faculty members"
- "overarching NC State IT site"

WolfWare as a *collection of tools*:
- "our toolkit"
- "place where university plops everything I need as an instructor…"

Participants' definitions of WolfWare were often closely tied to Moodle. Eight of 13 participants (62%) specifically mentioned Moodle in their responses. One participant, who seemed to equate WolfWare with Moodle, questioned the name, itself: "I don't understand why WolfWare is there; the branding—it's extraneous. I just go to Moodle." Another offered, "Moodle. Course design. A place to put homework and respond to it." One of the participants said more simply, WolfWare is "where I go for Moodle."

Commentary on the WolfWare website homepage

Participants were shown the website homepage and prompted to "*look at this page and tell me what you make of it: what strikes you about it, what you can do here, and what it's for. Just look around and do a little narrative*."

The majority of participants mentioned that they use this site to login to either access their "tools," "access courses" or "get to their Moodle site." Six of the participants said they felt that the initial screen was sparse or wasteful of space. They made comments like "graphics — a lot of clutter in the way," "seems like you could use the space better", "It's a lot of page and very little information" and "this is a big blank; I go right to login".

Matters of taste and aesthetic preference can be difficult to assess within a usability study and were not our focus. It is not uncommon to get conflicting feedback; for example, of the six participants who mentioned the animated clouds on the site, three liked them and three expressed distaste.

The participants in our sample had little experience with or understanding of Explore. Nine of the 14 participants questioned the need for Explore, making comments like, "what am I exploring," "I hadn't noticed the Explore link before," and "I've never clicked on Explore." One participant, however, expressed his affinity for the Explore feature, explaining that he makes extensive use of it when working with students in his capacity as a faculty advisor.

Overall, sentiment was neutral; some positive comments seemed to be based on what was in the site, a few appreciated the simplicity, and a few thought the entry/login page was an impediment to getting to their course or tools.

(B) Tasks

Completion Rates

Completion rates (sometimes called success rates) are the most simple and fundamental usability metric (Nielsen, 2001). The completion rate is the proportion of participants who are able to complete a task. While admittedly a somewhat crude metric, since it tells us nothing about *why* test participants have difficulty, task completion rates are helpful nevertheless because they give us a broad sense of our application's usability.

Despite our sample's considerable experience using WolfWare, just two of the study participants (15%) could complete all eight tasks without any assistance (see *Figure 1*). One person completed just four. The average number of tasks completed by participants was six.

We can see in *Figure 2* and *Table 7* that participants struggled most with the first task (*create a new Moodle course space*) and had the highest rate of success on task 5 (*copy course content from a prior semester*). Only seven of 13 participants completed task 1 without assistance (53.85%), whereas all but one participant successfully completed Task 5 (92.31%).

Since DELTA does not currently have an established benchmark for what a "good" task completion rate is for the WolfWare website (or acceptable minimums for individual tasks), we suggest using 78% as a starting point for making comparisons. According to an analysis conducted by Jeff Sauro (2011) of 1189 tasks in 115 usability tests with 3,472 users from more than 12 organizations across several industries, the average task-completion rate is 78%. Using this standard, we found that Tasks 1, 4 (*update the course availability date*), 7 (*create cross-listed course space*) and 8 (*navigate to the Blackboard Collaborate Administration Tool*) have below-average completion rates and Task 1's rate is significantly below average.

Figure 1. Histogram of task completion.

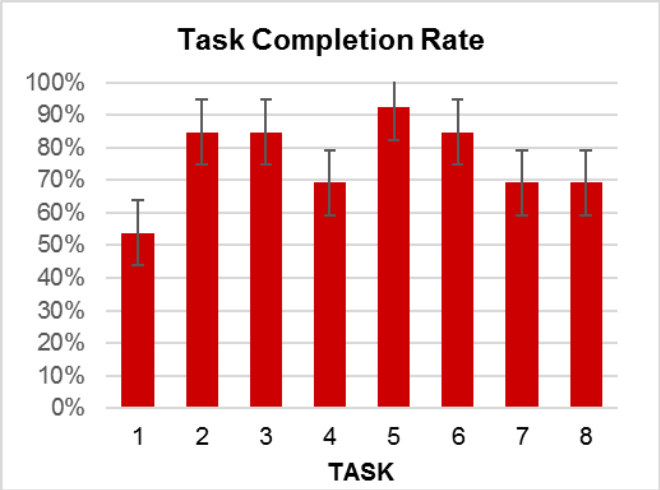

Figure 2. Task completion rates.

Table 7. Summary of task completion.

	Task Success			Task Failure		
	f	%	95% Conf. Interval	*f*	%	95% Conf. Interval
TASK 1	7	53.85%	29.13%, 76.81%	6 (3 false complete)	46.15%	23.19%, 70.87%
TASK 2	11	84.62%	56.54%, 96.90%	2	15.38%	3.10%, 43.46%
TASK 3	11	84.62%	56.54%, 96.90%	2 (1 false complete)	15.38%	3.10%, 43.46%
TASK 4	9	69.23%	42.04%, 87.65%	4 (4 false complete)	30.77%	12.35%, 57.96%
TASK 5	12	92.31%	64.58%, 100.0%	1 (1 false complete)	7.69%	0.00%, 35.42%
TASK 6	11	84.62%	56.54%, 96.90%	2	15.38%	3.10%, 43.46%
TASK 7	9	69.23%	42.04%, 87.65%	4	30.77%	12.35%, 57.96%
TASK 8	9	69.23%	42.04%, 87.65%	4	30.77%	12.35%, 57.96%

Note: Completion rate confidence intervals computed using the adjusted-Wald method.

Based on the success rates of the participants our sample, we estimate with 95% confidence that the true population success rates for these tasks fall between the upper and lower limits of the confidence intervals shown in

Figure 1. Histogram of task completion.

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False Completion

A false complete is an instance of task failure in which the participant is under the false impression that he/she was successful in completing a task. Almost one-half of the participants in the study (n=6, 46.2%) had at least one false complete. No participant had more than two. Notably, all false completes were observed on Tasks 1, 3, 4, and 5. Almost one-third of false completes were on task 4 *(update course availability*).

Figure 3. Histogram of task completion.

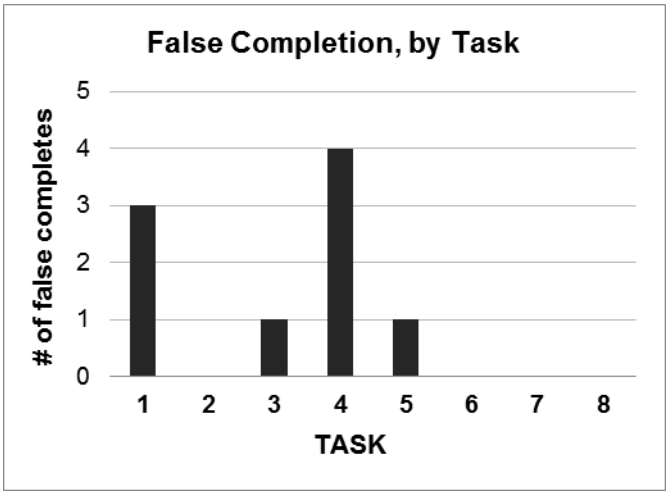

Figure 4. Count of false completes by task.

Errors on Task

Quantifying errors provides further insight into where and why users have difficulty executing tasks on a web application. As a reminder, an error is any action taken by a user (i.e., mouse click, key press) that doesn't bring the participant closer to completing the task.

Figure 5 below shows box plots (a.k.a. box and whisker diagrams) of the distribution of participant errors for all eight tasks. Box plots are a standardized way of displaying the distribution of data based on a five-number summary: minimum, first quartile, median, third quartile and maximum. The "box" represents the first through third quartiles (i.e., the middle fifty percent, aka the interquartile range); the whiskers correspond to the farthest points that are not outliers (i.e., no further than 1.5 times the interquartile range); the line is the median. The points outside the whiskers are outliers that lie outside the range we would expect them to be in based on the rest of the observations—error counts for participants that are more than one and a half times the length of the box from either end of the box. The 'X' represents the mean.

Due to issues with the recording software for participant 2 and a technical issue part way through our pilot with participant 1, we only have error counts for 12 participants for Tasks 1 through 3, and for 11 participants for Tasks 4 through 8.

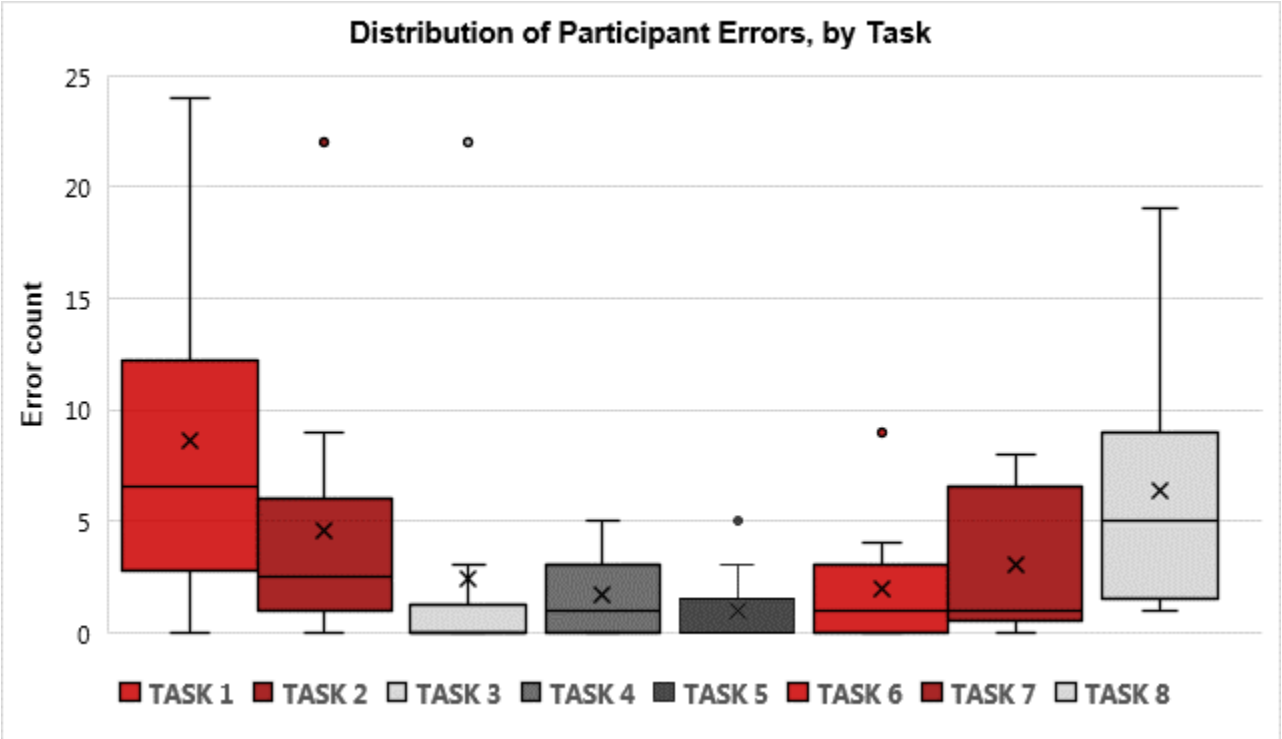

Figure 5. Participant errors by task.

Before detailing the main problems discovered during testing, we want to emphasize that participants had many positive things to say about the website. In particular, those individuals who have been using WolfWare for a number of years consistently remarked on how much it has improved over time. Faculty generally deem the website functionally adequate, and several remarked that the visual design is aesthetically pleasing.

Post-task ratings

Table 8 and *Figure 6* summarize participants' self-reported level of agreement with the following three statements for each task of the usability test:

"I am confident that I successfully completed this task."
"I am satisfied with the ease of completing this task."
"I am satisfied with the amount of time it took to complete this task."

Table 8. Average post-task agreement ratings, by task.

	POST-TASK RATINGS								
	TASK 1	TASK 2	TASK 3	TASK 4	TASK 5	TASK 6	TASK 7	TASK 8	*Average*
Confident in completion	4.69	6.00	6.38	6.23	5.92	4.85	4.08	5.08	5.45
Satisfied with task ease	4.38	4.77	6.00	5.77	6.38	4.92	4.85	3.85	5.12
Satisfied with task time	4.38	4.85	6.08	5.92	6.31	5.15	4.77	4.54	5.25

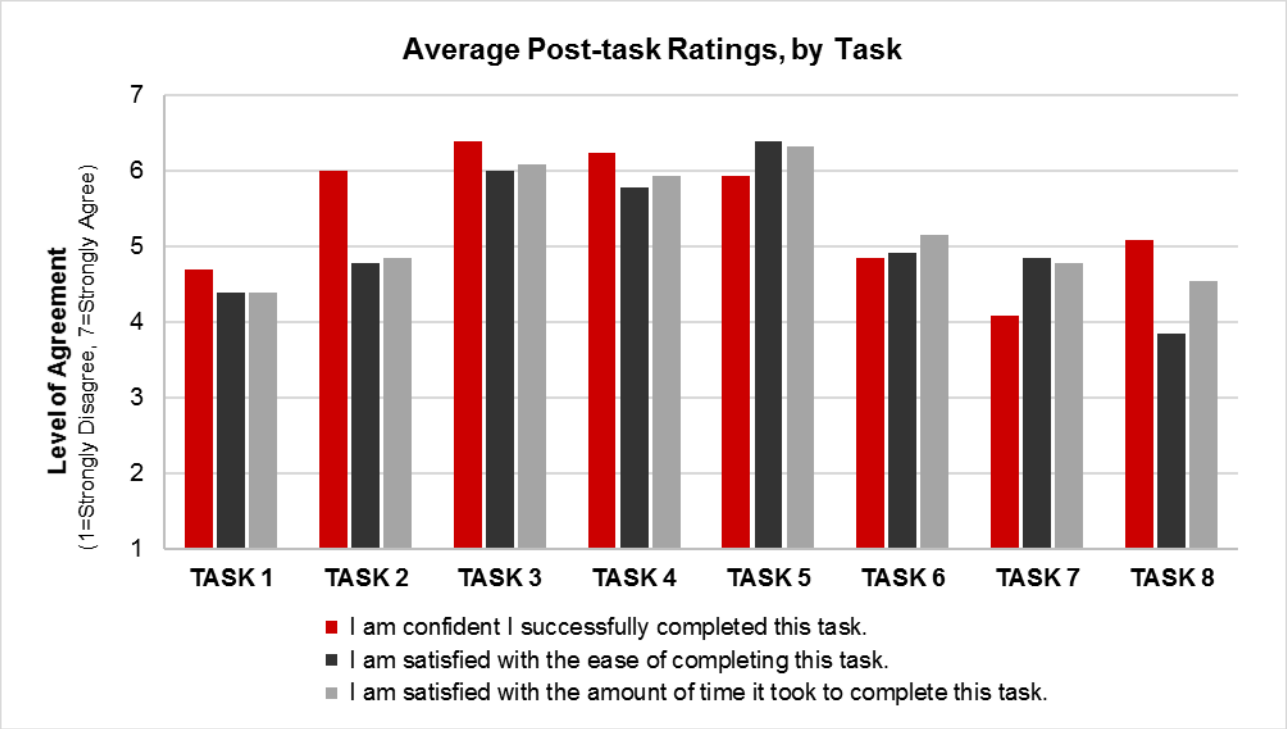

Figure 6. Average post-task ratings.

Task 1. Create new Moodle course space

Task 1 Scenario

Let's get started by requesting a new Moodle space for next semester, Spring 2017. You will be teaching XYZ 123-001 in Spring 2017. Please go ahead and create your Moodle course space for next semester.

Task 1 Results Summary

Table 9. Task 1 summary statistics.

	TASK 1. Create new Moodle course space						
	sum	mean	sd	min	median	max	% w. errors
Participant errors	103	8.58	8.12	0	6.5	24	83.33
Confident in completion		4.69	2.32	1	5	7	
Satisfied with ease		4.38	1.85	1	5	7	
Satisfied with time		4.38	2.29	1	5	7	

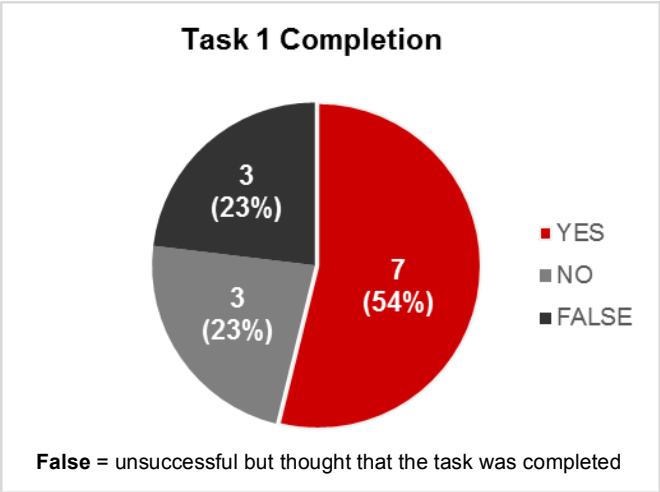

Figure 7. Successful completion of Task 1.

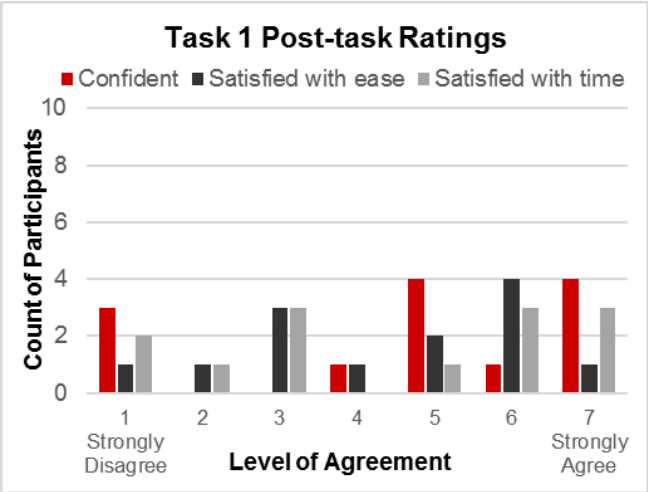

Figure 8. Task 1 confidence and satisfaction ratings.

Task 1 Usability Issues and Recommendations for Consideration

1-i. Functionality not available in Current tab (SEVERITY: 3)

Participants are attempting to create a course from the default or Current tab, not realizing that they have to go to the future tab to find the future course brick. Participants are having difficulty distinguishing between the current and future tabs; the default behavior takes them back to the Current tab when they return to MyWW regardless of which tab they were on before.

Participants with issue: 10 out of 13

Problem frequency: 15

Recommendation(s) for consideration: Need to consider alternate behavior or display of courses. Need to consider enabling users' mental models even if they are not the models we have, for instance by allowing them to create a course from the default or Current tab or have a create course button handy on all course related screens.

1-ii. Mental model does not match system model (SEVERITY: 2)

Faculty were attempting to make a copy of the current course to use for future. One participant took the current semester course, tried to rename and then copy/set it up. Users have particular mental models of how this should happen and where, which differs amongst users and is inconsistent with the system model.

Participants with issue: 6 out of 13

Problem frequency: 7

Recommendation(s) for consideration: We should consider a new interaction or increased visibility to guide users to the correct location or provide alternative ways to perform this task.

1-iii. Location or language of Create not clear (SEVERITY: 2)

Participants were looking through all options in the left-hand menus, searching but not finding Create space. One user said that they can never remember where it is because they only do this twice a year.

Participants with issue: 6 out of 13

Problem frequency: 6

Recommendation(s) for consideration: We need to look at a way to make functionality more visible,

easily discoverable and consistent with user expectations.

1-iv. Create not on My WW page (SEVERITY:2)

Participant hovered around the second and third tabs of the left menu (Profile and Announcements) looking for Create or Manage. They were confused because menus are not consistent depending on whether the space has already been created on not.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Left-hand menus are not consistent, consider revamping design and consistency.

1-v. Lack of feedback for completion (SEVERITY: 1)

Participants did not feel that they got enough feedback that the action was successful despite the message that was displayed upon completion.

Participants with issue: 3 out of 13

Problem frequency: 4

Recommendation(s) for consideration: Messages often provided a subtle change in the screen and might not be in the area where the action was performed. Need to look at feedback overall for many of the tasks to ensure consistency and effectiveness.

1-vi. Course Management tab didn't perform an action (SEVERITY: 1)

The Course Management tab looks like a menu option so users clicked on it expecting something to happen. The Course Management tab appears to be a menu item as opposed to a menu heading.

Participants with issue: 2 out of 13

Problem frequency: 2

Recommendation(s) for consideration: Add helpful content to Course Management and/or rethink navigation structure and appearance.

1-vii. Project Space Confusion (SEVERITY: 1)

Participant didn't understand text on screen, created project space to use for their class.

Participants with issue: 2 out of 13

Problem frequency: 2

Recommendation(s) for consideration: This is a tough one. If creating course space was easier to find, we might not have this issue.

1-viii. Clicking Title of Course didn't yield desired result (SEVERITY: 1)

Participant clicked title of course first, went to info page and was confused as to what to do there.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Consider what faculty should see when they click on a course that has not been set up.

1-ix. Create Course space under course admin menu doesn't perform action (SEVERITY: 1)

The participant expected the menu selection from the upper right menu to take them to the actual place in the UI to create a space. Not serious, but the user was expecting the menu item to lead to an action not an explanation.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Consider making menu items take you to places where you can do actions.

1-x. Course Brick appeared complete (SEVERITY: 0)

Because a brick was visible, it looked to the user like the course space was already set up.

Figure 9. Screenshot of course brick for a course without a Moodle space created.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Consider changing brick display for courses that aren't set up yet.

Task 2. Add picture to user profile

Task 2 Scenario

You want your picture to appear in Moodle next to your posts. Upload your image so that it will be seen in Moodle. You will find your picture on the desktop.

Task 2 Results Summary

Table 10. Task 2 summary statistics.

	TASK 2. Add picture to user profile						
	sum	mean	sd	min	median	max	% w. errors
Participant errors	55	4.58	6.13	0	2.5	22	83.33
Confident in completion		6.00	2.24	1	7	7	
Satisfied with ease		4.77	2.68	1	6	7	
Satisfied with time		4.85	2.70	1	6	7	

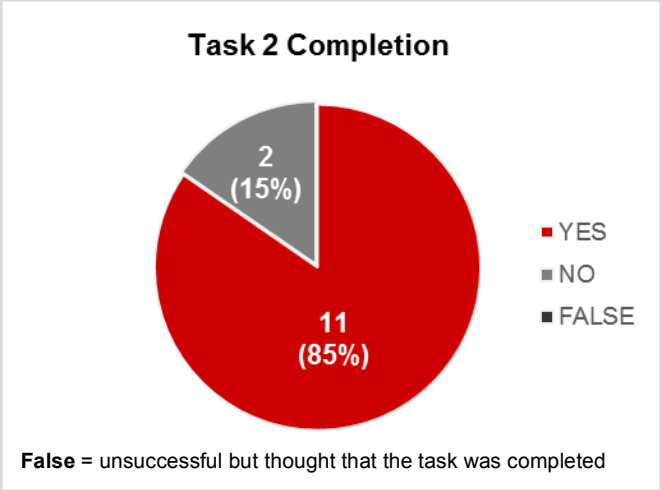

Figure 10. Successful completion of Task 2.

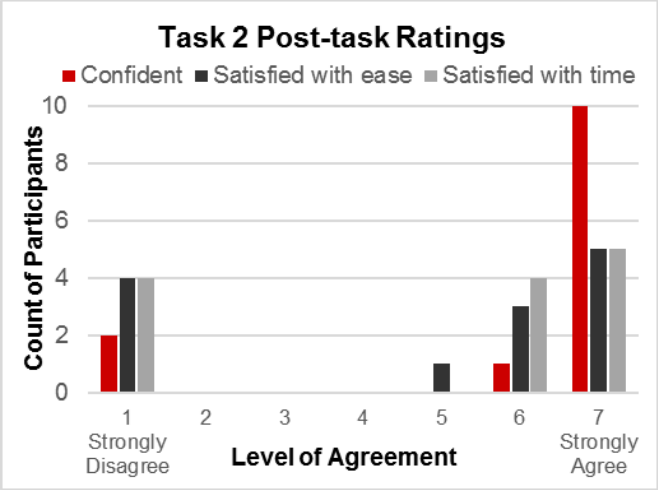

Figure 11. Task 2 confidence and satisfaction ratings.

Task 2 Usability Issues and Recommendations for Consideration

2-i. Upper right (wolf and person icon) give appearance of functionality (SEVERITY: 2)

A majority of participants were trying to add their picture to what they perceived as the user information area (login). Conventional UI patterns for profile-based applications (like social media) frequently show a user's profile image next to the user name, and near log in/log out options.

Participants with issue: 7 out of 13

Problem frequency: 12

Recommendation(s) for consideration: We should think about revamping visual cues and how the profile relates to system architecture and/or have the username link to profile.

2-ii. Mental Model to set in Moodle (SEVERITY: 2)

Participants had no idea where to set the profile picture, attempted to do so in Moodle since the picture would appear in Moodle. None of them got far enough into Moodle to see the link taking them to the correct page in WW.

Participants with issue: 5 out of 13

Problem frequency: 5

Recommendation(s) for consideration: The profile is important, what else will be set there? We need to think about how to make it more discoverable. Direct people from the Moodle profile back to the WW profile.

2-iii. Mental Model to set on Manage Moodle tab (SEVERITY: 2)

Participants went to Manage Moodle to set their picture appearing in Moodle.

Participants with issue: 4 out of 13

Problem frequency: 4

Recommendation(s) for consideration: The profile is important, what else will be set there? We need to think about how to make it more discoverable.

2-iv. Help didn't have relevant content (SEVERITY: 2)

There was nothing in help to assist the participants.

Participants with issue: 2 out of 13

Problem frequency: 2

Recommendation(s) for consideration: Add help resources.

2-v. No menu item made sense (SEVERITY: 2)

Participants looked through all menu items and either Profile didn't resonate with them to add a picture or they searched through interface for a while to try to find a likely place before spotting Profile

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: The profile is important, what else will be set there? Need to think about how to make it more discoverable.

2-vi. Insufficient feedback (SEVERITY: 1)

Didn't get enough feedback of change in picture, two users were expecting to see picture by user name. One participant wasn't happy with message feedback, scrolled down to see file name. One scrolled down, clicked the chevron to see picture file name and said, "I hope it shows up in Moodle."

Participants with issue: 10 out of 13

Problem frequency: 11

Recommendation(s) for consideration: Messages often provided a subtle change in the screen and might not be in the area where the action was performed. Need to look at feedback overall for many of the tasks for consistency and effectiveness.

2-vii. Save not executed (SEVERITY: 1)

It wasn't obvious to one participant that it was necessary to hit save.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: This is related to feedback, see 2-vi.

2-viii. Course search box doesn't work in this context (SEVERITY: 1)

Participant tried to search for help in the course search box.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Course search box is misleading, it is not clear that it provides value given the screen real estate it occupies.

Task 3. Add TA to course space

Task 3 Scenario

Add your teaching assistant, Jonathan Champ, id jrchamp, to the course.

Task 3 Results Summary

Table 11. Task 3 summary statistics.

	TASK 3. Add TA to course space						
	sum	mean	sd	min	median	max	% w. errors
Participant errors	29	2.42	6.24	0	0	22	41.67
Confident in completion		6.38	1.71	1	7	7	
Satisfied with ease		6.00	1.91	1	7	7	
Satisfied with time		6.08	1.89	1	7	7	

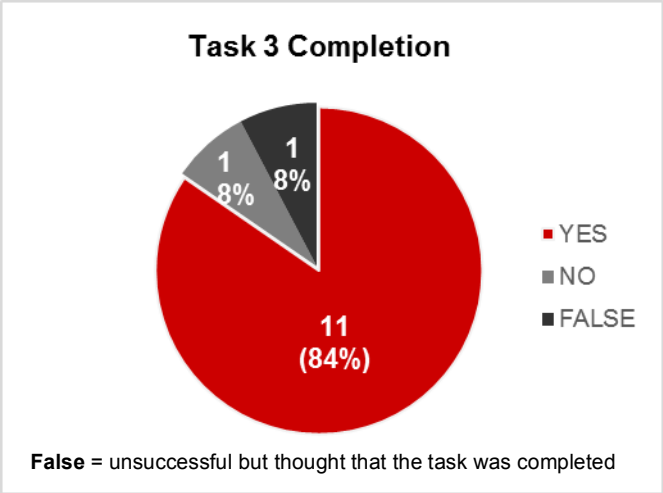

Figure 12. Successful completion of Task 3.

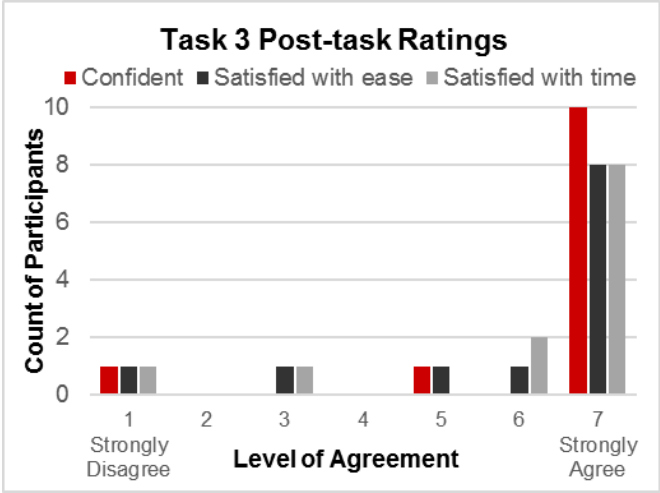

Figure 13. Task 3 confidence and satisfaction ratings.

Task 3 Usability Issues and Recommendations for Consideration

3-i. Functionality not available in current tab (SEVERITY: 3)

Participants are attempting to perform the task from the default or Current tab, not realizing that they have to go to the Future tab to find the future course brick. Participants are having difficulty distinguishing between the Current and Future tabs, the default behavior takes them back to the Current tab when they return to MyWW regardless of which tab they were on before.

Participants with issue: 8 out of 13

Problem frequency: 11

Recommendation(s) for consideration: Need to consider alternate behavior or display of courses.

3-ii. Menu items not mapping to user intention (SEVERITY: 2)

Participants are not finding Manage Users and Rosters. They can't figure out which option to go to so they are trying to set in Manage Moodle. One participant remembered adding them in Moodle.

Participants with issue: 3 out of 13

Problem frequency: 3

Recommendation(s) for consideration: We need to look at a way to make functionality more visible and easily discoverable and consistent with user expectations.

3-iii. Insufficient feedback (SEVERITY: 1)

Participants are looking for feedback it worked, not seeing any assumed it "took."

One user felt they needed to do one more thing to save.

Participants with issue: 2 out of 13

Problem frequency: 2

Recommendation(s) for consideration: Messages often provided a subtle change in the screen and might not be in the area where the action was performed. Need to look at feedback overall for many of the tasks for consistency and effectiveness.

3-iv Save and search are confusing (SEVERITY: 1)

User hit search again instead of hitting save.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: ?

3-v. Mental Model of setting in Moodle inconsistent with system (SEVERITY: 1)

The participant went to the Moodle space to add their TA.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: We need to do a better job of establishing the relationship between Moodle and WolfWare to clarify what's set where.

3-vi. Add user by email address (SEVERITY: 0)

Participant would like to be able to add users by email address, not just unity id or name, easier to copy and paste

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Allow users to search by name, unity id or school email address.

Task 4. Update the course availability date

Task 4 Scenario

The first day of class is January 10th (second day of the semester), 2017 but you want your students to be able to go to the Moodle site before that. Make the course available to students starting January 5th.

Task 4 Results Summary

Table 12. Task 4 summary statistics.

	TASK 4. Update the course availability date						
	sum	mean	sd	min	median	max	% w. errors
Participant errors	19	1.73	1.79	0	1	5	63.64
Confident in completion		6.23	1.64	1	7	7	
Satisfied with ease		5.77	1.79	1	7	7	
Satisfied with time		5.92	1.75	1	7	7	

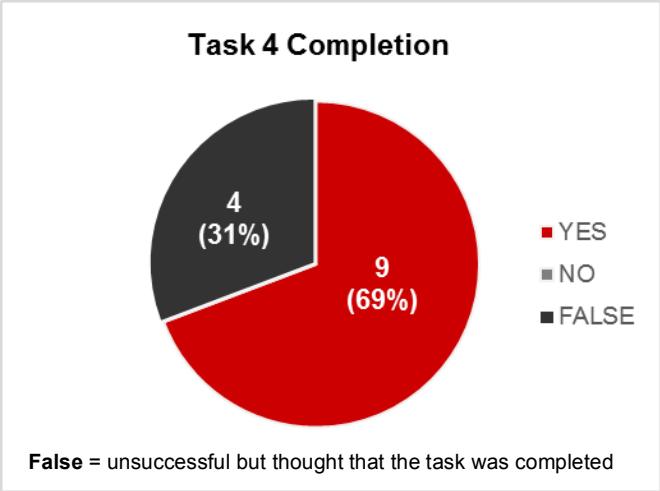

Figure 14. Successful completion of Task 4.

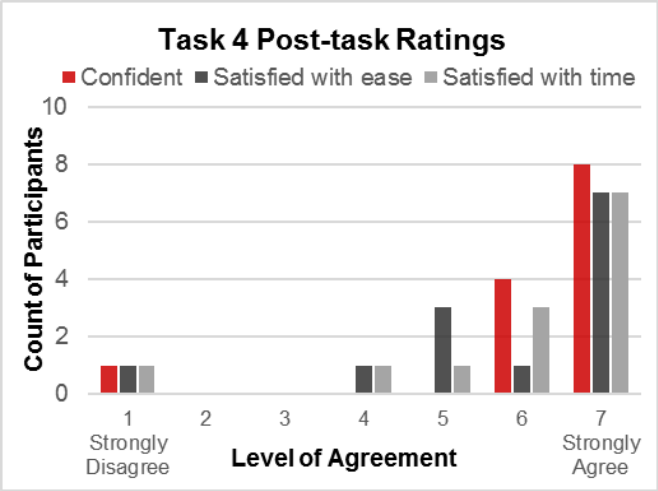

Figure 15. Task 4 confidence and satisfaction ratings.

Task 4 Usability Issues and Recommendations for Consideration

4-i. Functionality not available in Current tab (SEVERITY: 3)

Participants are attempting to perform the task from the default or Current tab, not realizing that they have to go to the Future tab to find the future course brick. Participants are having difficulty distinguishing between the Current and Future tabs, the default behavior takes them back to the Current tab when they return to MyWW regardless of which tab they were on before.

Participants with issue: 6 out of 13

Problem frequency: 6

Recommendation(s) for consideration: Need to consider alternate behavior or display of courses. Need to consider making the tab you are on is "sticky" so that it doesn't change unless you change it.

4-ii. Save button not visible (SEVERITY: 2)

Participants can't find the save button since it's below the fold, are searching for it or thought save was for themes not availability.

Participants with issue: 7 out of 13

Problem frequency: 7

Recommendation(s) for consideration: The layout and location of settings needs to be reviewed.

4-iii. Insufficient feedback (SEVERITY: 2)

There is not enough feedback for user to feel certain that the task was completed.

Participants with issue: 2 out of 13

Problem frequency: 2

Recommendation(s) for consideration: Messages often provided a subtle change in the screen and might not be in the area where the action was performed. We need to look at feedback overall for many of the tasks for consistency and effectiveness.

4-iv. Browser pop-up indicated unsaved changes after changes saved. (SEVERITY: 2)

One participant completed the task but didn't realize it due to a bug. After updated the availability date and saving the changes, the participant clicked on Course Management link in left-hand menu, but instead of loading the Course Management page a pop-up was displayed which said, "Do you want to leave this site? Changes you made may not be saved." The participant gave low ratings because of this.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Check for bug in code.

4-v. Course Management tab didn't perform an action (SEVERITY: 1)

The Course Management tab looks like a menu option so users clicked on it expecting something to happen.

Participants with issue: 6 out of 13

Problem frequency: 9

Recommendation(s) for consideration: The Course Management tab appears to be a menu item as opposed to a heading.

4-vi. Mental Model of setting in Moodle inconsistent with system (SEVERITY: 1)

The participants recall they used to set this in Moodle. It didn't make sense to them to do it in WolfWare.

Participants with issue: 2 out of 13

Problem frequency: 2

Recommendation(s) for consideration: We need to do a better job of establishing the relationship between Moodle and WolfWare to clarify what's set where and why.

4-vii. Menu items not mapping to user intention (SEVERITY: 1)

Participants were not sure where to set availability. Both participants tried to set it in Users and Rosters. i.e. what users can do. One person commented "would be nice if manage dates were a separate option."

Participants with issue: 2 out of 13

Problem frequency: 2

Recommendation(s) for consideration: We need to look at a way to make the functionality more visible and easily discoverable and consistent with user expectations.

4-viii. Course Copier and Save buttons too close, confusing (SEVERITY: 1)

A participant hit the Course Copier button instead of update Moodle settings

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: The layout and location of settings needs to be considered.

4-ix. Confusion between start date and availability date (SEVERITY: 1)

A participant wanted to change the start date but did not understanding the difference between start and availability.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Copy help text from Moodle and plunk it behind a question mark beside the start date information in WolfWare. Also, help text in Moodle should have an active link to WolfWare.

Task 5. Copy course content from previous semester

Task 5 Scenario

Copy all the content over from last year's (Spring 2016) Moodle space to your new (Spring 2017) space.

Task 5 Results Summary

Table 13. Task 5 summary statistics.

	TASK 5. Copy course content from previous semester						
	sum	mean	sd	min	median	max	% w. errors
Participant errors	11	1.00	1.79	0	0	5	27.27
Confident in completion		5.92	1.80	1	7	7	
Satisfied with ease		6.38	1.04	4	7	7	
Satisfied with time		6.31	0.95	5	7	7	

Figure 16. Successful completion of Task 5.

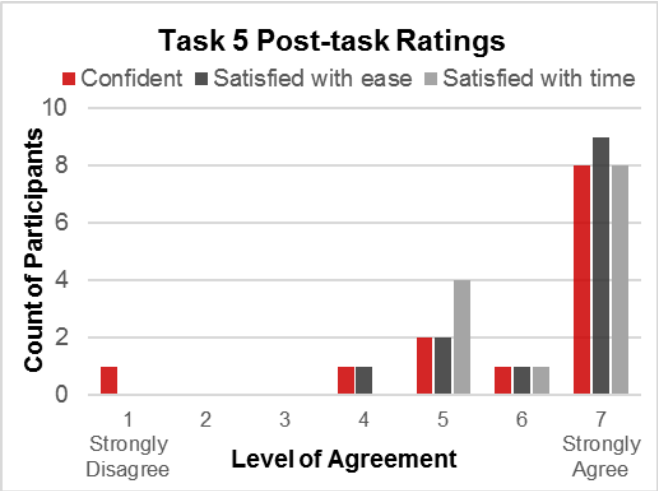

Figure 17. Task 5 confidence and satisfaction ratings.

Task 5 Usability Issues and Recommendations for Consideration

5-i. Functionality not available in Current tab (SEVERITY: 3)

Participants are attempting to perform the task from the default or Current tab, not realizing that they must go to the Future tab to find the future course brick. Participants are having difficulty distinguishing between the Current and Future tabs, the default behavior takes them back to the Current tab when they return to MyWW regardless of which tab they were on before.

Participants with issue: 4 out of 13

Problem frequency: 4

Recommendation(s) for consideration: We need to consider alternate behavior or display of courses.

5-ii. Ramifications of Copy not clear (SEVERITY: 2)

Participant didn't understand what was being copied over.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: What's involved in a course copy needs to be clearer, i.e. what's copied, overwriting, etc.

5-iii. Feedback not clear (SEVERITY: 1)

Participants got a green-colored "settings saved" message, but felt message should say something about the Course Copier and/or they looked at the page for a while before noticing status message.

Participants with issue: 2 out of 13

Problem frequency: 2

Recommendation(s) for consideration: Messages often provided a subtle change in the screen and might not be in the area where the action was performed. Need to look at feedback overall for many of the tasks for consistency and effectiveness.

5-iv. Copy destination is not clear (SEVERITY: 1)

User thought you should be able to specify the course you were copying to, didn't feel confident about the location

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Along with Current/Future tab confusion, users do not appear to be getting enough of a cue as to which class they are operating on.

5-v. Breadcrumbs didn't reflect hierarchy of site (SEVERITY: 1)

A participant clicked on a breadcrumb but didn't go where they thought they should.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Breadcrumbs do not always appear to be consistent in terms of location and labeling, need to review. Not clear where you should go if you click on course.

5-vi. Clicked Copy without setting source (SEVERITY: 1)

Participant did not get an error message.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Give them an error message if they haven't specified info they need to specify

5-vii. Copy not visible on Manage Moodle page (SEVERITY: 1)

Participant couldn't find the copy block on the page.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: We need to look at a way to make functionality more visible and easily discoverable and consistent with user expectations.

5-viii. Tab heading is imprecise. (SEVERITY: 1)

Feedback: "I'm not managing Moodle, I'm managing my course."

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Determine whether Manage Moodle should be renamed.

Task 6. Re-copy course content from alternate semester

Task 6 Scenario

You realize you copied the wrong semester; you actually *wanted the content from Fall 2016. Please fix this now.*

Task 6 Results Summary

Table 14. Task 6 summary statistics.

	TASK 6. Re-copy course content from alternate semester						
	sum	mean	sd	min	median	max	% w. errors
Participant errors	22	2.00	2.72	0	1	9	63.64
Confident in completion		4.85	2.61	1	6	7	
Satisfied with ease		4.92	2.63	1	6	7	
Satisfied with time		5.15	2.51	1	6	7	

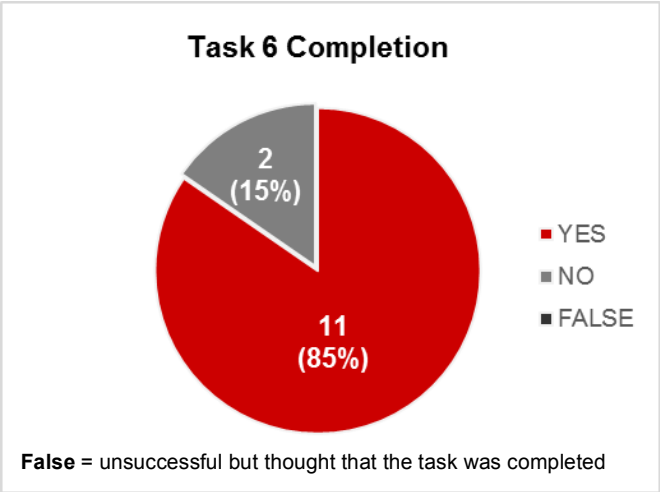

Figure 18. Successful completion of Task 6.

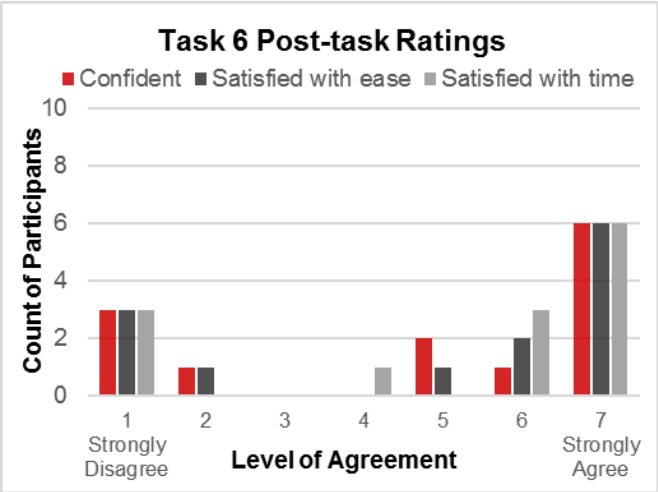

Figure 19. Task 6 confidence and satisfaction ratings.

Task 6 Usability Issues and Recommendations for Consideration

6-i. Course Copier operation not clear: overwrites (SEVERITY: 3)

Many participants were concerned that since they already did a copy, they might need to go into the course and delete previous content, two users were looking for the option to set replace, one other user assumed overwrite but suggested there should be a warning. Two users were actively looking for delete.

Participants with issue: 9 out of 13

Problem frequency: 9

Recommendation(s) for consideration: What's involved in a course copy needs to be clearer, i.e. what's copied, overwriting, etc.

6-ii. Functionality not available in Current tab (SEVERITY: 3)

Participant was in the Current tab instead of Future tab. Participants are having difficulty distinguishing between Current and Future tabs, default behavior takes them back to current when they return to MyWW regardless of where they have been.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Need to consider alternate behavior or display of courses.

6-iii. Course Copier not clearly discoverable (SEVERITY: 2)

Even though the participants previously did the task they couldn't find the Course Copier block, searched through the Course Management page because the copier was at the bottom of the page.

Participants with issue: 2 out of 13

Problem frequency: 2

Recommendation(s) for consideration: We need to look at settings and where available to consider most discoverable layout.

6-iv. Course Management tab didn't perform an action (SEVERITY: 1)

The Course Management tab looks like a menu option so users clicked on it expecting something to happen.

Participants with issue: 1 out of 13

Problem frequency: 2

Recommendation(s) for consideration: We need to rethink the design of the menu.

6-v. Insufficient feedback (SEVERITY: 1)

Participants completed the action but feedback didn't give a clear enough indication of completion.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Messages often provided a subtle change on screen and might not be in the area where the action was performed. Need to ensure overall feedback consistency and effectiveness.

6-vi. Selected wrong section (SEVERITY: 0)

Participants picked the wrong section from the course listbox.

Participants with issue: 2 out of 13

Problem frequency: 2

Recommendation(s) for consideration: Consider confirmation step.

Task 7. Create cross-listed course space

Task 7 Scenario

You have just been informed that you will also be teaching XYZ 123-002, an additional section of the same class. You want to use the same Moodle space for both sections. What do you do?

Task 7 Results Summary

Table 15. Task 7 summary statistics.

	TASK 7. Create cross-listed course space						
	sum	mean	sd	min	median	max	% w. errors
Participant errors	33	3.00	3.49	0	1	8	72.73
Confident in completion		4.08	2.60	1	4	7	
Satisfied with ease		4.85	2.58	1	6	7	
Satisfied with time		4.77	2.59	1	6	7	

Figure 20. Successful completion of Task 7.

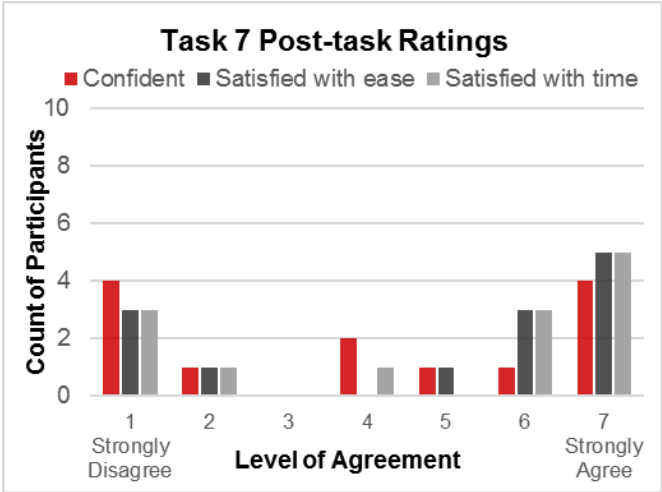

Figure 21 Task 7 confidence and satisfaction ratings.

Task 7 Usability Issues and Recommendations for Consideration

7-i. Mental model of managing as part of Moodle inconsistent with system model (SEVERITY: 3)

Many participants were looking to perform this operation in Manage Moodle.

Participants with issue: 7 out of 13

Problem frequency: 8

Recommendation(s) for consideration: Users are not really understanding the difference between WW and Moodle and where things are or happen. We need to do a better job of establishing this hierarchy.

7-ii. Creating Moodle space for section 2 (SEVERITY: 3)

Participants created a Moodle space for section 2 so that they could join with section 1.

Participants with issue: 3 out of 13

Problem frequency: 3

Recommendation(s) for consideration: It appears that users do not understand what has to happen, how to set and the language we use for cross lists. We need to come up with a better system model for them or, better yet, support the model they already have.

7-iii. Menu items not mapping to functionality (SEVERITY: 2)

Participants were exploring the interface to try to find a menu option that looks like it will do this task.

Participants with issue: 3 out of 13

Problem frequency: 3

Recommendation(s) for consideration: We need to look at a way to make functionality more visible and easily discoverable and consistent with user expectations.

7-iv. Looking for roster in Section 2 to add to section 1 (SEVERITY: 2)

One participant attempted to go into section 2 user and rosters to find the roster to add to section 1

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: It appears that users don't understand what has to happen, how to set up the cross list and the language we use for cross lists. We need to come up with a better system model for them.

7-v. Uncertainty as to completion of operation: looking for save button (SEVERITY: 1)

Participants didn't see the roster added message. The interaction style is inconsistent because here you don't have to save settings. One user finally saw the message (in inconsistent colors)

Participants with issue: 3 out of 13

Problem frequency: 3

Recommendation(s) for consideration: Not enough feedback (too subtle perhaps) and inconsistent with the rest of the system.

7-vi. Uncertainty as to completion of operation: lack of feedback indicating result (SEVERITY: 1)

The participant was not sure if any other actions needed to be performed to complete the cross list.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: There may not be enough feedback about what's required to make this happen.

7-vii. Attempted to clone one section to put in other (SEVERITY: 1)

One participant tried to clone section 1 to make a section 2.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: It appears that users don't understand what has to happen, how to set up the cross list and the language we use for cross lists. We need to come up with a better system model for them.

7-viii. Trying to "glue" one section to another (SEVERITY: 1)

One participant was looking in settings for section 2 (no space yet) and trying to bring over section 1.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: It appears that users don't understand what has to happen, how to set up the cross list and the language we use for cross lists. We need to come up with a better system model for them.

7-ix. Trying to use Collaborate (SEVERITY: 1)

Collaborate might allow both sections to collaborate with each other? Lack of familiarity with Blackboard Collaborate appears to have contributed to confusion while seeking appropriate area of the website to complete the task.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: It appears that users don't understand what must happen. We need to come up with a better system model for them and use language for cross lists that faculty will understand, whether or not they are familiar with Blackboard Collaborate. Given the frequency with which this happened, it might not be worth trying to disambiguate the two different meanings of "collaborate." Another possibility would be that the left-hand navigation menu text might need to be changed to something more action oriented like Use BlackBoard Collaborate.

7-x. Course name change to reflect both sections (SEVERITY: 0)

Participant felt that the name of the Moodle space should change to reflect the combination of the two sections.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: An interesting suggestion.

Task 8. Getting to the Blackboard Collaborate Administration Tool (CAT)

Task 8 Scenario

You want to schedule an online office hour in Blackboard Collaborate from 1-2 PM on January 10th 2017. Please navigate to the place on the WolfWare website you would go to access the Collaborate tool.

Task 8 Results Summary

Table 16. Task 8 summary statistics.

	TASK 8. Get to the Blackboard Collaborate Administration Tool (CAT)						
	sum	mean	sd	min	median	max	% w. errors
Participant errors	70	6.36	5.52	1	5	19	100.00
Confident in completion		5.08	2.10	1	6	7	
Satisfied with ease		3.85	1.82	1	4	7	
Satisfied with time		4.54	1.81	2	4	7	

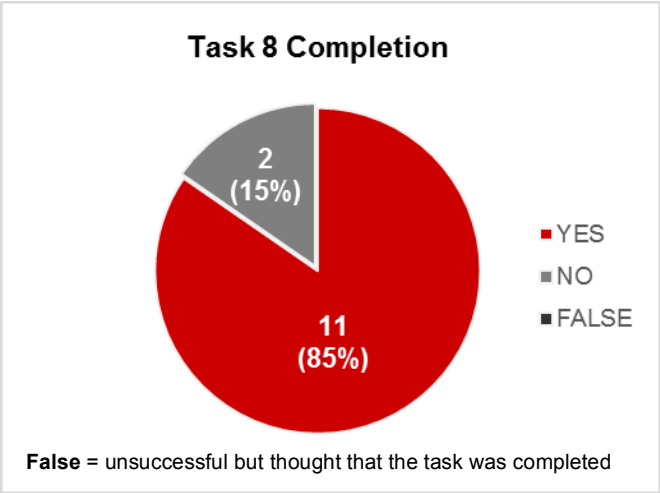

Figure 22. Successful completion of Task 8.

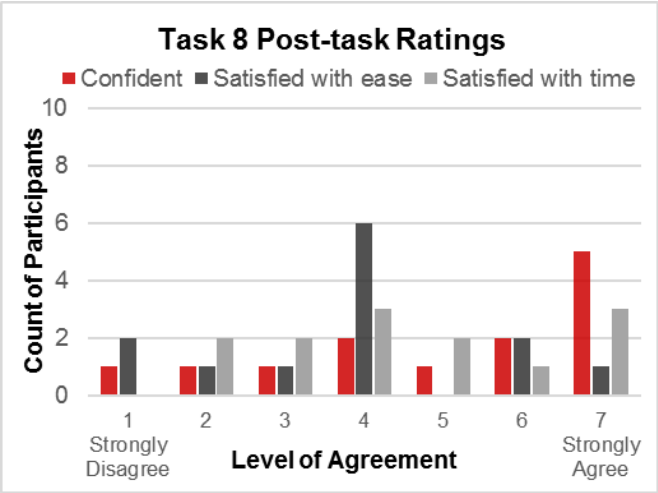

Figure 23. Task 8 confidence and satisfaction ratings.

Task 8 Usability Issues and Recommendations for Consideration

8-i. Purpose of Course Uses Collaborate Not Clear (SEVERITY: 3)

Many participants felt they had to turn course uses collaborate on to use the tool. They expected to get to somewhere they could create a session then. One user suggested it would help to have a resource on this page to get to the Collaboration Administration Tool (CAT) since there was minimal feedback of anything happening on this page.

Participants with issue: 8 out of 13

Problem frequency: 10

Recommendation(s) for consideration: What's the purpose of this and how can we make this clear and/or more relevant? Maybe embed CAT tools here? Maybe they should have to turn on Collaborate before being able to create a session. What does the Collaborate button do in the brick for students? It could take them to a list of sessions for that class.

8-ii. BB icon on brick not providing functionality or misleading (SEVERITY: 3)

Several participants were trying to activate BB Collaborate from the icon just added through "Uses Collaborate" even though it does nothing.

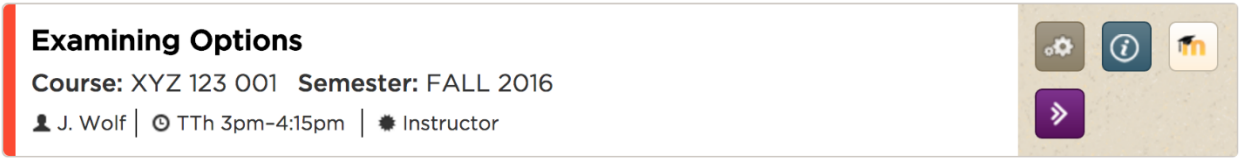

Figure 24. Screenshot of course brick for a course with the purple Collaborate icon.

Participants with issue: 4 out of 13

Problem frequency: 7

Recommendation(s) for consideration: Make the button do something like open a pop-up window indicating the course is using Collaborate and go to an FAQ/help page about using Collaborate..

8-iii. Menu items don't map to intended action (SEVERITY: 2)

Many participants were searching for location of the functionality in the interface and were not sure where to go. One user kept clicking MyWolfware in the breadcrumbs and scanning menu options. One user just did a serial search in resources until they found it.

Participants with issue: 8 out of 13

Problem frequency: 15

Recommendation(s) for consideration: We need to look at a way to make functionality more visible and easily discoverable and consistent with user expectations.

8-iv. Can't find CAT link in KB article or good KB help (SEVERITY: 2)

One participant searched on BB Collaborate office hour Module, got nothing useful.

The BB Collaborate at NC State Page was overwhelming, couldn't easily find link to the CAT.

Participants with issue: 5 out of 13

Problem frequency: 5

Recommendation(s) for consideration: Need clearer help resources

8-v. Can't find CAT from Resources (SEVERITY: 2)

Participants went to Resources, clicked first link under Collaborate, and were overwhelmed by page. See iv.

One faculty member clicked on Overview for moderators, was nonplused by having to watch a Collaborate session to learn how to use Collaborate. Two users expected the first link to be an action.

Participants with issue: 4 out of 13

Problem frequency: 4

Recommendation(s) for consideration: Need clearer help resources

8-vi. Help page contains no Collaborate help (SEVERITY: 2)

The help menu item on the left-hand navigation menu went to the WW Help page where there was nothing about Collaborate.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Need clearer help resources

8-vii. Didn't want icon on brick (SEVERITY: 1)

A participant felt that icon on brick implied that the entire course was in Collaborate.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Not sure that this warrants remediation.

8-viii. Got to CAT but didn't realize it would let you create a session (SEVERITY: 0)

A participant got to the CAT and navigated away from the page, not realizing they had reached their destination.

Participants with issue: 1 out of 13

Problem frequency: 1

Recommendation(s) for consideration: Not sure that this warrants remediation.

Global issues

G-i. Operating on wrong semester's class (SEVERITY: 3)

Many faculty were performing operations on the Fall 2016 course instead of the Spring 2017 course. Users are not getting enough feedback as to which class they are in, can be particularly troublesome when they teach the same class each semester. This problem may have been amplified by the user having trouble knowing which tab they were on since many also had trouble knowing if they were on current or future.

Participants with issue: 8 out of 13

Problem frequency: 14

Recommendation(s) for consideration: Need much better organization and visual clues that aid in assessing the current course being manipulated.

G.ii. Examining Options in breadcrumbs leads to Course Management (SEVERITY: 1)

Users were confused by what this was.

Participants with issue: 2 out of 13

Problem frequency: 3

Recommendation(s) for consideration: Breadcrumbs do not always appear to be consistent in terms of location and labeling, need to review.

(C) Post-test results

How do you feel about the WolfWare website now that you have played with it a bit?

The instructors participating in the study seemed to be, for the most part, content with the WolfWare website. The website provides the functionality instructors need to manage their classes and even offers tools some participants had not even known were available to them. One participant said she was "amazed" to learn that there was "so much in WolfWare."

Two participants responded by saying they "like[d] it," and several participants (n=3) noted and expressed their appreciation for the changes and improvements that have been made over time. Said one person, "To me, I think it is much more user-friendly than what we used to do…everything is at least in the same place. It has evolved." Another, the website is "definitely nicer than it used to be... I think it's good, not perfect, but going in the right direction."

No one despised or even appeared to wholly dislike the website, however the positive sentiment did not extend much past lukewarm. Even the participant with the overall highest post-task confidence and satisfaction ratings (and among the most experienced of our users) went only so far as to say, "I still feel fairly good about it." Acknowledging his relative expertise, he continued, "Early in the process [of using the WW website] I felt like a lot of faculty probably do, but I would just call the help desk when I had issues." One of the participants, an instructor with comparatively little experience using the WolfWare website and a general aversion to using Moodle, referred to it as "necessary evil," and said he "[felt] about the same as before [the test]." "However," he said, "I see the virtue of this for an online [course]."

Analysis of adjectives ascribed to the site revealed that the most common descriptor across participants was "clunky". One instructor said, "It does its job, but it's got some clunky parts." Another stated, "I think it's all there, but it's sort of clunky." A third called the website "very clunky." When asked to elaborate, responses tended to focus on the way information and options are organized and presented: "It just feels like things are all over the place"; "there are so many options and it's hard to find it all…especially with tools or a process you don't use very much, it's hard to remember where to go and which spot it's in once you get there." This user attributed some of the difficulty to what seems like "a lot of overlapping functionality in some ways" and gave the example of trying to determine where to go when wanting to manage Moodle users (Manage Moodle versus Users and Rosters).

Perhaps due in part to the emphasis on user recall then recognition, some participants found the website inefficient. Another user said, "I can usually, eventually, get to where I need to go but sometimes it takes a few extra clicks." One participant called it "inefficient in terms of the number of clicks."

Two participants wished for a better experience when using a mobile device. Said one, “I would prefer it was easier to access on a mobile phone” Another participant felt the website is “fine”; “it serves its purpose. It lets me do my job” but went on to mention that she would “like it” if it were easier to use on a mobile device phone smaller screen "would make my life easier."

One participant described the site as “very old school.…the design just feels not as fresh and interactive as a lot of the websites I go onto these days. Not just the UI but the whole experience.” “I think it's okay, but I think it could be more straightforward and intuitive from a user perspective.”

What was most frustrating or confusing about the site?

Much like participants’ overall evaluation of the WolfWare website described above, responses to this question were lukewarm, though participants’ frustration seem to center on their own doubts or perceived shortcomings. For example, many of the comments and observations focused on not remembering where to go to, or the steps necessary, to complete a task. The WolfWare website contributes to this in its own ways, however. In particular, one participant was most frustrated by perceived differences when using the website on a mobile versus PC or Mac — speaking of the Course Management page specifically, this individual thought they recalled seeing content on the Course Management page in the past and the formatting of the page makes it seem like there should be content there. “When you don't see what you're expecting to see,” they noted, “you think it's broken.” Having to remember what is in each section of the site (for example, what is under “manage Moodle,” and what must be done elsewhere) is another source of frustration related to respondent memory, as it causes participants to have to stop and think, which slows down their productivity.

Setting up a course was also a source of frustration for at least two participants. “Things you don’t do all the time are hard to do,” one participant said, while another reported that “remembering where to do stuff” caused them the most frustration. While related to discussions of both user memory (above) and the needs of novice users (below), it is also a major source of frustration when setting up a course, which two participants described as a “frustrating process.” This was in large part because, according to the participant, the steps involved in doing so were not what she was used to, and thus she had to pause and think along the way.

Novice WolfWare website users had their own types of frustrations. For example, one respondent expressed a desire to have instructions within the site be clearer with regards to what needs to be (or can be) done in each area of the WolfWare website. Still another participant needed help remembering which tab and temporal context (past, current, future) they were currently in when looking at their many courses, and offered suggestions for solving this problem. After looking at the Help page for the first time, another novice user simply stated, “it doesn't have the kind of stuff I would be asking.”

Participants also expressed frustrations and/or confusions when it came to using the WolfWare website in other key areas. For example, one user expressed difficulty with accessing the Collaborate tool, particularly when it comes to creating a session. They ascribed this to only have to do this three or four times per semester, however. Another user wants to be able to get to Moodle quicker, while another wanted Help to be visible all the time. Finally, one participant expressed frustration with the links in the Resources page, indicating that they should be more action oriented.

Overall, participants’ frustrations are couched in a generally positive impression of the WolfWare website. No single respondent seemed to have any dramatically frustrating or confusing experiences, and all of them provide constructive insight into improving the site.

Was there anything you particularly liked about the site?

While participants, particularly those who are newer or less experience with the WolfWare website, expressed frustration with having to remember in which Moodle course they were manipulating, or where to go for certain tasks, when asked what they particularly liked about the site, they painted a different picture. Many of the positive comments about the WolfWare website in fact focused on how easy it is to learn, and how intuitive it feels once the user has some experience with it. Five participants said it easy, with most commenting in general terms about

the website's readability and layout. One participant offered specific praise for how easy it is to add an extra roster to a class ("it was slick"), and another praised the left-hand navigation. It should be noted, however, that among those who said the site is easy after one learns it, participants also said it is not an easy site to master, and requires some effort to do so.

Related to this praise for the WolfWare website's navigation and intuitive structure is participant praise for having everything in one site (so one does not have to go to different websites), as well as praise for the settings button, the search box to browse courses, and general presence of Moodle as part of Wolfware.

In an interesting trend, many participant comments also focused on the WolfWare website's design and color choices. One participant called the site "beautiful," while another praised the animated clouds on the home page. One participant like "the color-changing, content-specific messaging" she saw when she clicked on the "?" button, and another likes the yellow announcements because they are "in her face." Overall, participants praised the site as "usable," "reliable," "familiar," comfortable," and "fairly intuitive."

If you could improve one thing about the WolfWare website, what would it be?

Participants' suggestions to improve the WolfWare website focused on efficiency. One participant suggested making it quicker to get to their Moodle sections, while another would like to "simplify the number of clicks it takes to get to stuff." Four participants focused on making the WolfWare website more efficient through more user-friendly guides or structures. For example, one would like to see a step-by-step guide on the website for creating your own course, and another said they needed more first time help and guidance. Another suggested provided quick 1-2-3 bulleted task lists as checklist for setting up courses for a future semester. Finally, one participant wanted to make items in the Course Admin menu available on the Course Management page.

Participants also provided suggestions for improving specific tools or areas within the WolfWare website. One participant wanted to see color-coded backgrounds for each of the different course views (past, present, future), while two participants requested tool tips for menu options that showed instructions or contents when the user hovered over the links. There was also specific confusion about dates – one participant suggested have a date relocation option for content that was uploaded to the wrong course, and another asked if Moodle adjusts dates when they copy a course.

Overall, suggestions to improve the WolfWare website focused on Moodle usage and navigation, and most were supportive and positive in their foci. One participant suggested an improved "trendy" color scheme for Moodle, with new icons (such as red or orange for the Help button, or a face for the Profile tab). One participant's suggestion, however, centered on the perceived need to make WolfWare more faculty oriented. They like the tabbed navigation on the left, but feel the content is not what they expect or need: "My WolfWare should be about the tools, I use as a faculty member, rather than having to dig into resources not called out at the level I would expect…" This participant suggested making WolfWare more faculty-driven "because this is their access to the toolkit," while letting said faculty tell students where to go as necessary — "make it easier for faculty to set and teach courses."

What's missing that you would like for WolfWare to do/have/offer?

After participants were asked about suggestions to improve WolfWare overall, the researchers asked participants if there was anything missing that they would like to see in the site. Many chose not to focus on a specific addition, but rather general improvements to the site. One participant, for example, said the difference between the Course Management and Moodle Management tabs is not intuitive, while another participant thinks the tools are there, but "maybe not in front of the user as much as they could be."

Other participants offered more specific changes to the site. Two users, for example, suggested better functionality between WolfWare and external software or systems. One participant requested having access to advising within WolfWare, while another wants to have a dynamic calendar link to their Google Calendar. One user requested the link within the site specifically say "Create a Session" under the Blackboard Collaborate

resources, and another wants the ability to do video feedback on forums, not just assignments. One participant also emphasized again that there seemed to be a lot of clicks necessary to change just one thing.

Finally, participant suggestions for what is missing within WolfWare focused on the general system or structure of courses. In particular, participants focused on how courses are saved and/or created. One participant requested the ability to better organize their courses in the past courses view, and to be able to get rid of or delete courses from that list. Another participant suggested having the ability to create "Moodle profiles" or personal templates that would allow them to apply certain common settings across multiple classes and years. They suggested, for example, templates based on whether the course is taught during the summer, fall or spring, and if the structure is based on topics or weeks. These themes could carry over and be easily applied to new courses.

Overall, much like when they were asked those post-test questions above, participants tended to focus on the positive, and provided suggestions for improvement within the context of a site that is already largely successful. One participant said they didn't "have a lot of gripes" about the system, while another participant, in response to the prior question on suggested improvements, said they were "generally one of your satisfied users" even though they cautioned that they "will probably never be delighted by a site [they're] using for work." Thus, participants appear to be satisfied with WolfWare in general, but they do have some very specific and focused suggestions for improvements, as described above in this section and earlier sections.

Discussion

System Strengths

Although identifying user experience *problems* was a primary focus of this study, the test results also demonstrate the WolfWare website's strong points. Strengths of the application were revealed in participants' performance on some of the tasks as well as in their subjective feedback. The data for Tasks 3 and 5 (*add TA to course* and *copy course content*, respectively) are especially noteworthy. They show few errors and many post-task ratings of 7. Despite one false completion on each of these tasks, the overwhelming majority of participants were not only successful, they also performed the tasks with few (if any) slips or mistakes. They reported feeling confident in their success and satisfied with both the ease of and time needed for completion.

Participants made numerous positive comments about the WolfWare website. As we mentioned previously, those who have been using WolfWare for a number of years consistently remarked on how much it has improved over time. Faculty are generally satisfied with the website's functionality, and several told us they like the site's visual design. Several faculty expressed that they were happy to have things in one place and a few attributed their difficulties in performance to their own shortcomings of not being able to remember how to do infrequent tasks from semester to semester. Faculty were also generally positive about the reliability of the site.

The current site works quite well with the set of tools we have available. There are certainly areas where small changes would reduce the challenges faculty have with the current site, but we must keep in mind that we are planning on increasing the depth of our offerings and will likely need to consider restructuring the architecture of the site to incorporate new tools.

Key Problem Areas

The following is a synopsis of the major pain points and difficulties users in the study encountered when using the WolfWare website, based on our observations of participants' behavior during the tasks as well as their subjective commentary and responses to the pre/post-test and post-task questions. The categories are presented in no particular order.

Explore

A majority of participants report never having clicked on Explore. Several noted they had never actually noticed it prior to this usability test. One faculty member mentioned that he uses it extensively in his advising capacity.

Current vs. Future tabs

Many faculty, particularly infrequent users, were tripped up by the lack of persistence in the selection of a tab on the My WolfWare page. When users selected Future, performed some operation and then returned to My WolfWare, they often did not recognize the need or remember to click the tab again (i.e., Future). [This could cause confusion particularly if they were teaching the same class in current and future semester or if they knew they were operating on the first class in the list.] In addition, two faculty were completely unaware that there even was a Future tab since they have never requested a course that far in advance.

Course Management Menu

The course management menu changes based on whether a Moodle space exists already or not for the selected class. Create Moodle Space and Manage Moodle are in the same place on the menu structure, causing confusion for a couple of users. Users clicked on Course Management expecting something to happen because they saw it as a menu option, not a menu heading. Some of the menu items were off the page when a user scrolled to the bottom of a long page. This hiding of potential actions available can be confusing to users. The most frequently used menu items tend to be at the top of the menu. The Manage Collaborate item was confusing; users expect it to do something when they select yes and nothing was apparent. When users went back to a course brick they were surprised to see a Collaborate icon there and clicked on it expecting something to happen as it does when they click one of the other icons.

Link and Menu Labels

Participants were confused by link names and frustrated when links took them somewhere else than where they anticipated. Also, see *Scheduling Collaborate* and *Breadcrumbs* below.

Breadcrumbs

Some users were confused by breadcrumbs that didn't return them to the expected page (e.g., clicking on the course name, in this case, Examining Options).

Creating a new course

Faculty had different mental models for creating a new space for their course. Most faculty were fine with the notion of creating a new space and then copying content into it, even if they had problems actually executing, (possibly because they regularly do it) but at least two faculty were trying to clone a current class and use it for the future much like we might copy and paste a file or document. Figuring out how to even start the process was challenging. Knowing to click on the setting button for the course desired was not obvious to most users, particularly since they rarely do this. Once they did so, most found the Create Moodle option on the left. Finding the save button was challenging for many since it is not on the bottom of the page. System feedback provided was inconsistent; see Instructions and Feedback below.

Course Copier

Faculty were unclear as to whether the copy would overwrite or append to the existing course if they copied again. Feedback for successful operation was not clearly interpreted by many users. Several of the users were stymied by the limitations of the usability test website since the site did not allow them to go to the actual Moodle site to check the effects of their actions.

Instructions and Feedback

Instructions are typically in blue tinted boxes, feedback in green tinted boxes. This was not consistently applied, in some cases feedback appeared in blue. Course Copier and adding user feedback was not given in color, it appears in tabular form. Feedback typically displayed at the top of a page, "jumping" users away from the place where they set or changed something. This made it difficult for them to follow what happened particularly when they didn't notice or understand the feedback. Website users are notorious for not reading carefully (Krug, 2013; Nielson and Morkes, 1998; Nielson, 2008), and this test proved no exception. When participants did read, they often did not understand. They do not seem to process more than a word or two of the feedback or instructions if they read it at all. Labels and lengthy instructions can't be relied upon. The lack of consistency, visibility and positioning of feedback was particularly taxing for users on the Manage Moodle tab. There is a difficult tradeoff between having small pages that do one or two tasks and having one page that has everything a user needs. As the page gets longer and more complex, structuring the page appropriately and providing feedback in an intuitive place becomes a challenge which we see from our results was a contributing factor to several of the errors users experienced.

Feedback UI

Instructions are typically in blue-tinted boxes, feedback in green-tinted boxes. This was not consistently applied, in some cases feedback appeared in blue. Course Copier and adding user feedback was not given in color, it appears in tabular form. Feedback typically displayed at the top of a page, "jumping" users away from the place where they set or changed something. This made it difficult for them to follow what happened particularly when they didn't notice or understand the feedback. Website users are notorious for not reading carefully (Krug, 2013; Nielson and Morkes, 1998; Nielson, 2008), and this test proved no exception. When participants did read, they often did not understand. They do not seem to process more than a word or two of the feedback or instructions if they read it at all. Labels and lengthy instructions can't be relied upon. The lack of consistency, visibility and positioning of feedback was particularly taxing for users on the Manage Moodle tab. There is a difficult tradeoff between having small pages that do one or two tasks and having one page that has everything a user needs. As the page gets longer and more complex, structuring the page appropriately and providing feedback in an intuitive

place becomes a challenge which we see from our results was a contributing factor to several of the errors users experienced.

Combining Sections

Faculty have some different ideas about how to "put two or more sections together". Several of our test subjects wanted to create a Moodle space for both sections and then "glue" them together. Others got the model of creating a single space and then adding other rosters to them. Is it because this made sense to them or they were trained to do this from previous semesters. Based on the number of times faculty skipped over the menu item it is not clear that Manage Users and Roster was the clear place to look for this functionality. Either they didn't see past Add Users, or Rosters didn't mean anything to them.

Scheduling Collaborate

Several faculty were accustomed to scheduling their sessions within Moodle so this task might not have represented usages patterns well for some of our subjects. Faculty had difficulty finding Collaborate (within the Resources Page) and when they did were likely to click the first link which took them to a help page on the DELTA Knowledge Base. This page proved overwhelming to many of them, eliciting a "whoa" reaction from two of them. Some found the link to the CAT on that page, others backed out and tried the second link which took them to CAT. Only a few were able to deduce from the link descriptions on the Resource page which link would be most helpful to them to get to the tool. The Manage Collaborate menu option under course management was useless to our test subjects and only served to confuse them as indicated above.

Moodle vs WolfWare

DELTA has been pursuing the goal of making WolfWare the collection of learning technologies that faculty use to teach their class(es) as the driving force behind WolfWare. Our tests suggest that most instructors do not fully understand this model and/or the implications of our model for the access, use and configuration of these tools.

Most of the participants viewed WolfWare as a container or repository for their content as opposed to a connection point or portal for technology as we are trying to position WolfWare. This gap between the participants' mental model and our system model makes it more difficult for them to understand why settings are in WolfWare instead of Moodle for example, or how to find tools and personalization attributes. We project that this will only get more difficult as we add additional tools to the WolfWare suite if we continue to use the same organizational strategy.

A few of our participants viewed Moodle and WolfWare as synonymous. We would guess that they were not familiar with using any DELTA-provided technology aside from Moodle. As a result, they were more likely to see WolfWare as an impediment to getting to Moodle and were more likely to want to try to go to Moodle to do configuration related tasks. It is clear from this that DELTA needs to do a better job of getting the vision of WolfWare out to our faculty, especially given the new tools that will be coming online in the coming year.

Relationship to Call Issues Analysis Report

Most of the tasks that participants were asked to perform were selected on the basis of being areas identified as having a large number of help calls in (Watkins, 2016). There was a high degree of agreement between the analysis of help calls DELTA received and participants having difficulty performing these tasks. There are probably several factors here which contribute to this. In some cases, it might simply be because the task is done frequently, so there are a large number of people trying to complete the task and thus even a small percentage of users calling will produce a large number of help calls. In other cases, the task involved might only be done by a small segment of the user population but it is difficult enough or involves "fatal" errors (for example, cross listing after requesting the second section) that might necessitate a help call. While we cannot infer a causal relationship between task difficulty and number of help calls, it is clear there are tasks such as requesting a Moodle space or cross listing a course that generates a proportionally large number of help calls and our participants demonstrated

uncertainty or difficulty with task completion. We deem the help call analysis a good indicator of potential areas for improvement in the user interface.

Relationship to Google Analytics

Web analytics can be useful for uncovering and diagnosing some types of usability issues and is a good source of data to use in conjunction with qualitative information to triangulate problems (Cardello, 2013). Although Google Analytics cannot tell us about what users are trying to do, it can point to patterns and, in some situations, provide additional evidence to substantiate or disprove hypotheses generated by usability testing. The inability to detect user intent is one of the shortcomings of analytics-based UX research, however a couple of findings are worthy of mention here.

For instance, using the In-page Analytics Google Chrome extension, we examined link click behavior on the WolfWare website homepage that appears to echo what participants told us during the test sessions. According to Google Analytics data on page clicks during a peak month of 2016, 52% of the links clicked on the WolfWare homepage took visitors to My WolfWare. By contrast, less than .1% of visitors clicked Explore.

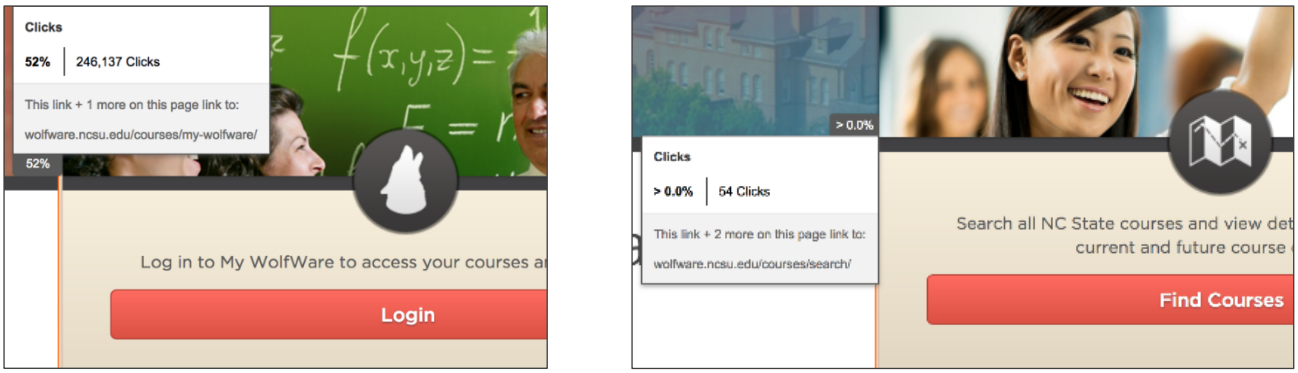

Figure 25. Clicks on MyWolfWare and 'Explore' during a peak month in 2016.

In-page analytics also support our observation that few participants seemed to notice or use the new toolbar menu below the standard NC State web utility bar. A comparison about link clicks in January 2016 and January 2017 shows no increase in use of the toolbar.

Figure 26 below is a screenshot of a Google Analytics dashboard showing data from January 2016 that provides a high-level overview of the pages in the DELTA KnowledgeBase that users land on, presumably when seeking help with WolfWare, as well which pages on the WolfWare website from which users came.

referrals from WolfWare to KnowledgeBase

Landing Page	Sessions	% New Sessions
/knowledgebase/moodle-at-nc-state/index.php	292	67.12%
/knowledgebase/index.php	50	54.00%
/knowledgebase/using-moodle-with-wolfware/index.php	41	53.66%
/knowledgebase/how-do-i-create-a-moodle-space-for-a-class/index.php	11	54.55%
/knowledgebase/blackboard-collaborate-at-nc-state/index.php	10	0.00%
/knowledgebase/configuring-your-computer-for-blackboard-collaborate/index.php	9	22.22%
/knowledgebase/how-do-i-add-or-remove-people-in-my-moodle-course/index.php	6	0.00%
/knowledgebase/what-computer-configuration-is-needed-to-view-mediasite-presentations/index.php	4	50.00%
/knowledgebase-topic/blackboard-collaborate/index.php	2	0.00%
/knowledgebase-topic/moodle/index.php	2	0.00%

Wolfware referrals to knowledgebase by Referral Path

Referral Path	Sessions	% New Sessions
/courses/my-wolfware/	174	60.92%
/help/	72	47.22%
/	57	68.42%
/courses/details/	57	63.16%
/courses/resources/	26	38.46%
/courses/manage/	17	23.53%
/profile/	13	61.54%
/courses/search/	9	66.67%
/moodle-upgrade.php	6	66.67%
/admin/	5	60.00%

Sessions

Figure 26. Google Analytics reports: referrals to DELTA KB from the WolfWare website.

Limitations of this Assessment and Future Work

Like all user experience research, this study has its shortcomings. By conducting our usability tests at instructors' place of work, we can better mimic realistic working conditions but at the expense of having a controlled environment where we are able to limit confounding variables. Yet, even in a natural setting, usability testing is a contrived experience and subject to issues such as observer and social desirability biases.

The recommendations we have offered in our issue summaries are purposefully general. They are meant to provide an entry point for discussions with WolfWare stakeholders. We have intentionally presented problems without proposing clear solutions. Our issue severity ratings are, to a certain extent, subjective and others may find other points of disagreement. The process for prioritizing design changes and selecting design strategies are part of a larger conversation about the future of WolfWare. DELTA's roadmap for short-, mid- and long-term changes is a work in progress, and we hope that formative UX assessment will be built into the plan. Summative research methods such as formal usability testing have their place, but our organization stands to benefit from making informal user experience research a consistent part of an iterative design process. We also suggest stakeholders establish minimum acceptable completion rates that consider the risk associated with task failure to use as benchmarks for future usability testing.

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Authors

Lauren Hirsh, M.Ed.
Digital Teaching and Learning Analyst
Distance Education and Learning Technology Applications (DELTA)

Martin Dulberg, Ph.D.
Senior Coordinator, Learning Technologies
Distance Education and Learning Technology Applications (DELTA)

Christopher C. Willis, MSR, M.Ed
Coordinator, Learning Analytics & Assessment
Distance Education and Learning Technology Applications (DELTA)

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For more information about WolfWare or this project, please contact:

Dr. Martin Dulberg
Senior Coordinator, Learning Technologies
Distance Education and Learning Technology Applications (DELTA)
Center for Technology and Innovation
1010 Main Campus Drive, Suite 230
Campus Box 7113
919.513.3339
msdulberg@ncsu.edu

Dr. Traci Temple
Assistant Director for Planning and Assessment
Distance Education and Learning Technology Applications (DELTA)
Center for Technology and Innovation
1010 Main Campus Drive, Suite 220
Campus Box 7113
919.513.3193
tltemple@ncsu.edu

Appendix A: Supplemental Tables and Figures

Study participant background characteristics

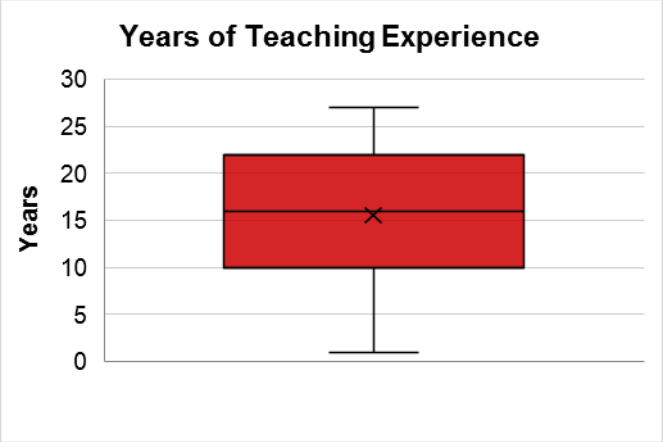

Figure 27. Teaching experience.

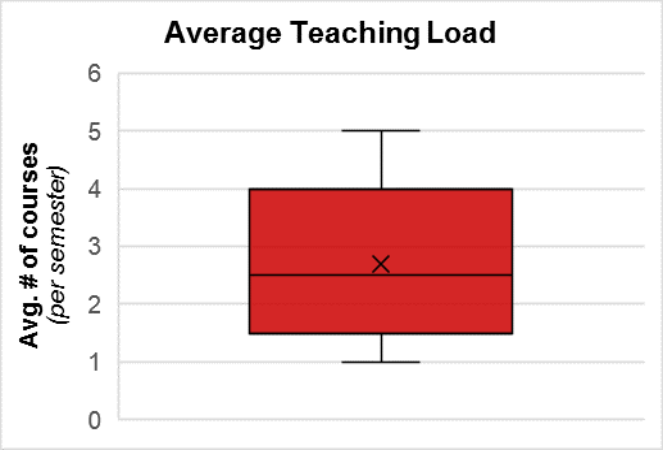

Figure 28. Typical teaching load per semester.

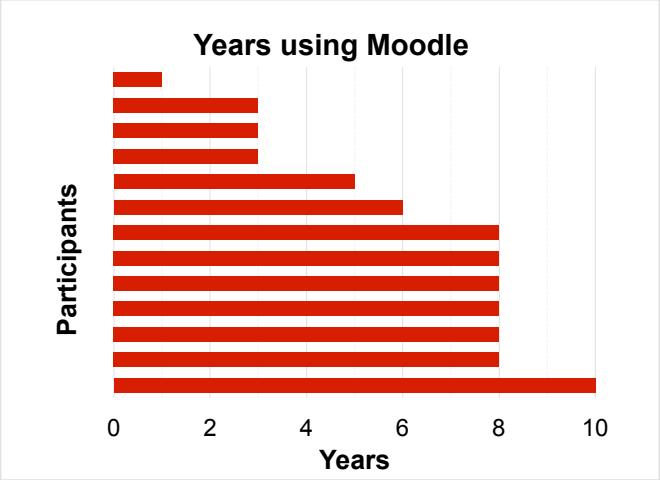

Figure 29. Moodle experience.

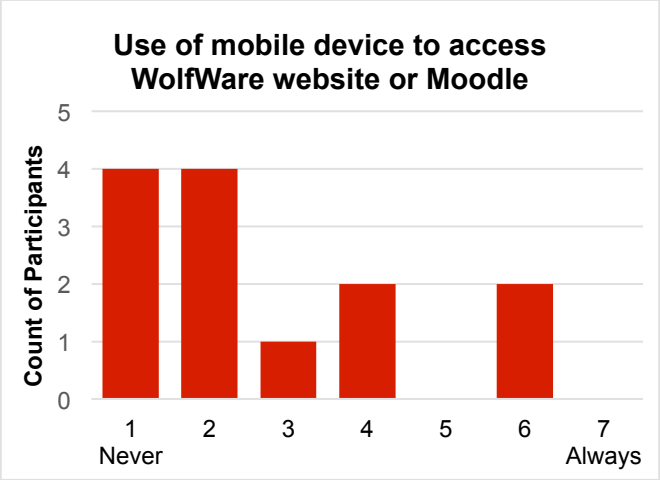

Figure 30. Self-reported mobile device usage.

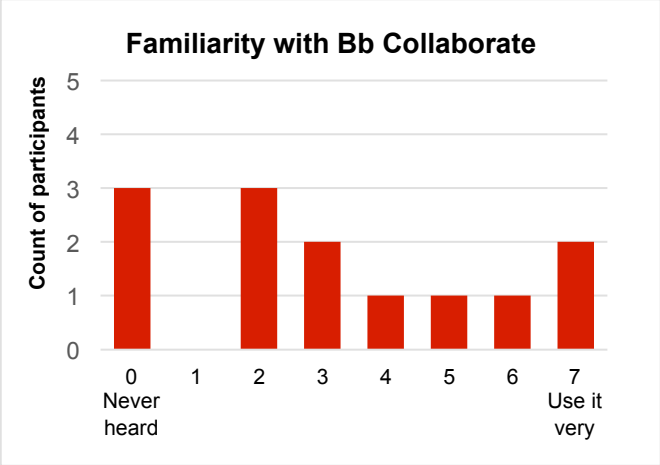

Figure 31. Familiarity with Blackboard Collaborate

Results summary by task and participant

Table 17. Task 1 results by participant.

	TASK 1 SUMMARY BY PARTICIPANT													
	01	02	03	04	05	06	07	08	09	10	11	12	13	Avg.
Successful	No	Yes	Yes	Yes	Yes	No	Yes	No	Yes	No	No	No	Yes	53.8%
False complete	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	No	23.1%
Errors	7	--	22	2	0	16	11	7	0	6	24	5	3	8.58
Confidence in completion	1	5	5	7	5	1	5	4	7	6	1	7	7	4.69
Satisfaction with ease	1	5	6	6	3	3	6	5	6	4	2	3	7	4.38
Satisfaction with time	1	6	6	7	3	3	5	6	7	1	2	3	7	4.38

Note: -- indicates missing error count

Table 18. Task 2 results by participant.

	TASK 2 SUMMARY BY PARTICIPANT													
	01	02	03	04	05	06	07	08	09	10	11	12	13	Avg.
Successful	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	84.6%
False complete	No	No	No	No	No	No	No	No	No	No	No	No	No	0.0%
Errors	3	--	1	2	1	0	9	6	0	22	6	2	3	4.58
Confidence in completion	1	7	7	6	7	7	7	7	7	7	7	1	7	6.00
Satisfaction with ease	1	1	7	7	6	7	6	5	6	1	7	1	7	4.77
Satisfaction with time	1	1	7	7	6	7	6	6	7	1	6	1	7	4.85

Note: -- indicates missing error count

Table 19. Task 3 results by participant.

	TASK 3 SUMMARY BY PARTICIPANT													
	01	02	03	04	05	06	07	08	09	10	11	12	13	Avg.
Successful	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	84.6%
False complete	No	No	Yes	No	No	No	No	No	No	No	No	No	No	7.7%
Errors	0	--	1	0	2	3	0	1	0	22	0	0	0	2.42
Confidence in completion	7	7	7	7	5	7	7	7	7	1	7	7	7	6.38
Satisfaction with ease	7	7	7	7	3	5	7	6	7	1	7	7	7	6.00
Satisfaction with time	7	7	7	7	3	6	7	6	7	1	7	7	7	6.08

Note: -- indicates missing error count

Table 20. Task 4 results by participant.

	TASK 4 SUMMARY BY PARTICIPANT													
	01	02	03	04	05	06	07	08	09	10	11	12	13	Avg.
Successful	Yes	Yes	No	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	69.2%
False complete	No	No	Yes	No	No	Yes	Yes	Yes	No	No	No	No	No	30.8%
Errors	--	--	1	0	0	4	5	3	3	2	0	0	1	1.73
Confidence in completion	7	6	7	7	6	7	6	7	7	7	7	6	1	6.23
Satisfaction with ease	7	5	7	7	5	7	6	7	4	7	7	5	1	5.77
Satisfaction with time	7	6	7	7	5	7	6	7	4	7	7	6	1	5.92

Note: -- indicates missing error count

Table 21. Task 5 results by participant.

	TASK 5 SUMMARY BY PARTICIPANT													
	01	02	03	04	05	06	07	08	09	10	11	12	13	Avg.
Successful	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	92.3%
False complete	No	No	No	No	No	Yes	No	No	No	No	No	No	No	7.7%
Errors	--	--	0	0	0	5	0	3	0	0	0	0	3	1.00
Confidence in completion	4	7	7	7	6	5	1	5	7	7	7	7	7	5.92
Satisfaction with ease	7	7	7	7	5	4	7	5	7	7	7	6	7	6.38
Satisfaction with time	7	7	7	7	5	5	7	5	7	5	7	6	7	6.31

Note: -- indicates missing error count

Table 22. Task 6 results by participant.

	TASK 6 SUMMARY BY PARTICIPANT													
	01	02	03	04	05	06	07	08	09	10	11	12	13	Avg.
Successful	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	84.6%
False complete	No	No	No	No	No	No	No	No	No	No	No	No	No	0.0%
Errors	--	--	1	0	3	9	0	1	4	3	0	1	0	2.00
Confidence in completion	7	5	7	7	2	1	7	5	1	1	7	7	6	4.85
Satisfaction with ease	7	7	7	7	2	1	6	5	1	1	7	6	7	4.92
Satisfaction with time	7	7	7	7	4	1	6	6	1	1	7	6	7	5.15

Note: -- indicates missing error count

Table 23. Task 7 results by participant.

	TASK 7 SUMMARY BY PARTICIPANT													
	01	02	03	04	05	06	07	08	09	10	11	12	13	Avg.
Successful	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	No	Yes	Yes	69.2%
False complete	No	No	No	No	No	No	No	No	No	No	No	No	No	0.0%
Errors	--	--	0	1	1	8	8	5	0	1	8	1	0	3.00
Confidence in completion	4	1	7	7	5	1	2	1	7	4	1	6	7	4.08
Satisfaction with ease	6	7	7	7	5	1	2	1	7	6	1	6	7	4.85
Satisfaction with time	6	7	7	7	6	1	2	1	7	4	1	6	7	4.77

Note: -- indicates missing error count

Table 24. Task 8 results by participant.

	TASK 8 SUMMARY BY PARTICIPANT													
	01	02	03	04	05	06	07	08	09	10	11	12	13	Avg.
Successful	Yes	Yes	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	69.2%
False complete	No	No	No	No	No	No	No	No	No	No	No	No	No	0.0%
Errors	--	--	1	1	9	5	5	2	1	19	11	7	9	6.36
Confidence in completion	7	5	7	4	1	4	2	3	7	7	6	6	7	5.08
Satisfaction with ease	4	1	7	4	1	3	2	4	4	4	4	6	6	3.85
Satisfaction with time	5	3	7	4	7	3	2	2	4	5	4	6	7	4.54

Note: -- indicates missing error count

Post-task ratings, by participant

Table 25. Post-task ratings: Confidence in successful task completion.

AGREEMENT RATING FOR STATEMENT: "*I am confident that I successfully completed this task.*"									
Participant	**Task 1**	**Task 2**	**Task 3**	**Task 4**	**Task 5**	**Task 6**	**Task 7**	**Task 8**	***Avg.***
01	1	1	7	7	4	7	4	7	4.75
02	5	7	7	6	7	5	1	5	5.38
03	5	7	7	7	7	7	7	7	6.75
04	7	6	7	7	7	7	7	4	6.50
05	5	7	5	6	6	2	5	1	4.63
06	1	7	7	7	5	1	1	4	4.00
07	5	7	7	6	1	7	2	2	5.38
08	4	7	7	7	5	5	1	3	4.88
09	7	7	7	7	7	1	7	7	6.25
10	6	7	1	7	7	1	4	7	5.00
11	1	7	7	7	7	7	1	6	5.38
12	7	1	7	6	7	7	6	6	5.88
13	7	7	7	1	7	6	7	7	6.13
Task Avg.	4.69	6.00	6.38	6.23	5.92	4.85	4.08	5.08	5.45

Note: 1 = *Strongly Disagree*, 7 = *Strongly Agree*

Table 26. Post-task ratings: Satisfaction with ease of task completion.

AGREEMENT RATING FOR STATEMENT: "*I am satisfied with the ease of completing this task.*"									
Participant	**Task 1**	**Task 2**	**Task 3**	**Task 4**	**Task 5**	**Task 6**	**Task 7**	**Task 8**	***Avg.***
01	1	1	7	7	7	7	6	4	5.00
02	5	1	7	5	7	7	7	1	5.00
03	6	7	7	7	7	7	7	7	6.88
04	6	7	7	7	7	7	7	4	6.50
05	3	6	3	5	5	2	5	1	3.75
06	3	7	5	7	4	1	1	3	3.88
07	6	6	7	6	7	6	2	2	5.25
08	5	5	6	7	5	5	1	4	4.75
09	6	6	7	4	7	1	7	4	5.25
10	4	1	1	7	7	1	6	4	3.88
11	2	7	7	7	7	7	1	4	5.25
12	3	1	7	5	6	6	6	6	5.00
13	7	7	7	1	7	7	7	6	6.13
Task Avg.	4.38	4.77	6.00	5.77	6.38	4.92	4.85	3.85	5.12

Note: 1 = *Strongly Disagree*, 7 = *Strongly Agree*

Table 27. Post-task ratings: Satisfaction with time needed for task completion.

AGREEMENT RATING FOR STATEMENT: "*I am satisfied with the amount of time it took to complete this task.*"									
Participant	**Task 1**	**Task 2**	**Task 3**	**Task 4**	**Task 5**	**Task 6**	**Task 7**	**Task 8**	***Avg.***
01	1	1	7	7	7	7	6	5	5.13
02	6	1	7	6	7	7	7	3	5.50
03	6	7	7	7	7	7	7	7	6.88
04	7	7	7	7	7	7	7	4	6.63
05	3	6	3	5	5	4	6	7	4.88
06	3	7	6	7	5	1	1	3	4.13
07	5	6	7	6	7	6	2	2	5.13
08	6	6	6	7	5	6	1	2	4.88
09	7	7	7	4	7	1	7	4	5.50
10	1	1	1	7	5	1	4	5	3.13
11	2	6	7	7	7	7	1	4	5.13
12	3	1	7	6	6	6	6	6	5.13
13	7	7	7	1	7	7	7	7	6.25
Task Avg.	4.38	4.85	6.08	5.92	6.31	5.15	4.77	4.54	5.25

Note: 1 = *Strongly Disagree*, 7 = *Strongly Agree*

Table 28. Cross-tabulation of errors by task and participant.

ERRORS BY PARTICIPANT AND TASK										
Participant	**Task 1**	**Task 2**	**Task 3**	**Task 4**	**Task 5**	**Task 6**	**Task 7**	**Task 8**	***Avg.***	***Median***
01	7	3	0	---	---	---	---	---	3.33	3.0
02	---	---	---	---	---	---	---	---	---	---
03	22	1	1	1	0	1	0	1	3.38	1.0
04	2	2	0	0	0	0	1	1	0.75	0.5
05	0	1	2	0	0	3	1	9	2.00	1.0
06	16	0	3	4	5	9	8	5	6.25	5.0
07	11	9	0	5	0	0	8	5	4.75	5.0
08	7	6	1	3	3	1	5	2	3.50	3.0
09	0	0	0	3	0	4	0	1	1.00	0.0
10	6	22	22	2	0	3	1	19	9.38	4.5
11	24	6	0	0	0	0	8	11	6.13	3.0
12	5	2	0	0	0	1	1	7	2.00	1.0
13	3	3	0	1	3	0	0	9	2.38	2.0
Total	103	55	29	19	11	22	33	70		
Average	8.58	4.58	2.42	1.73	1.00	2.00	3.00	6.36		
Median	6.5	2.5	0.0	1.0	0.0	1.0	1.0	5.0		
% w. Errors	83.33%	83.33%	41.67%	63.64%	27.27%	63.64%	72.73%	100.00%		

Note: --- denotes missing error counts due to technical issues during the test with the site or recording software.

Task 1 Results Summary Charts

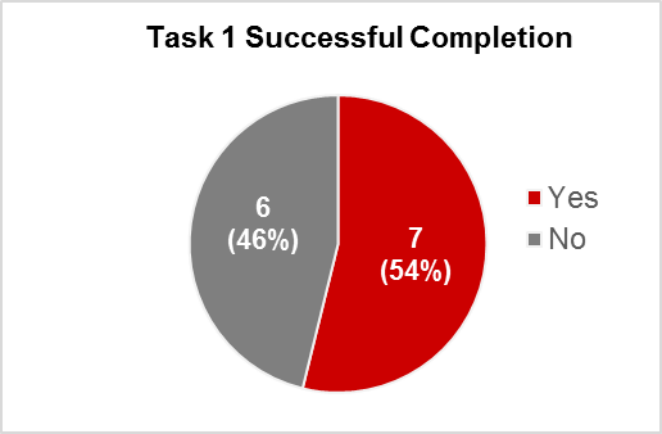

Figure 32. Successful completion of Task 1

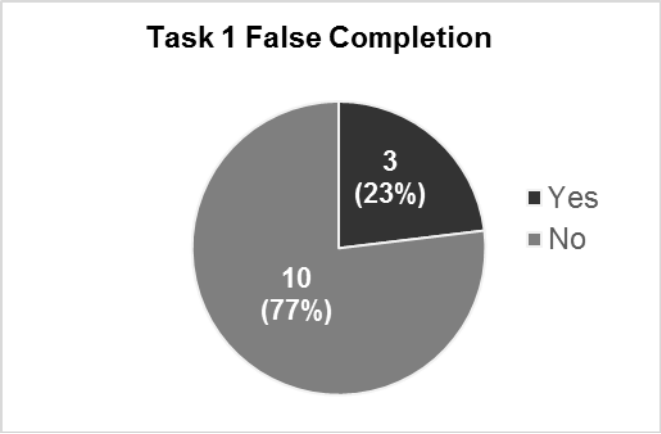

Figure 33. Incorrectly thought Task 1 completed

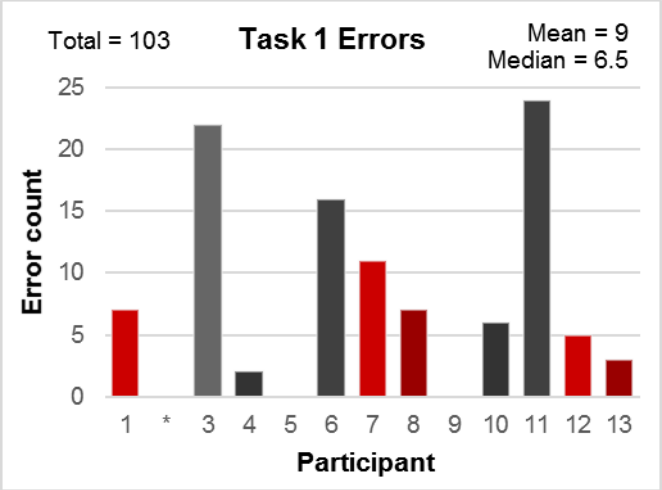

Figure 34. Task 1 Total and Average Errors

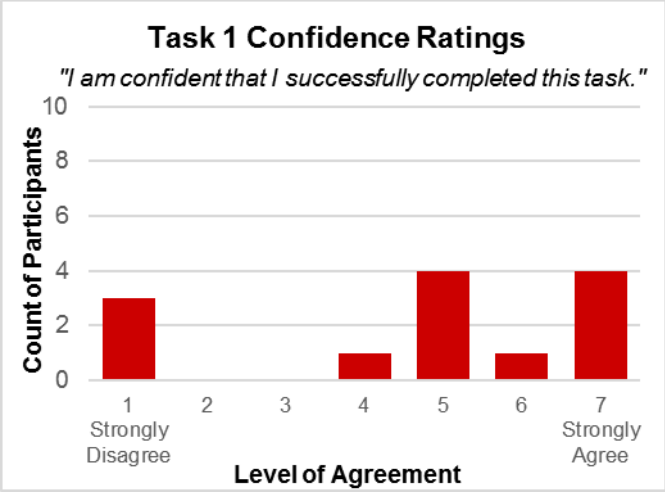

Figure 35. Confidence in completion of Task 1

Figure 36. Satisfaction with ease of Task 1

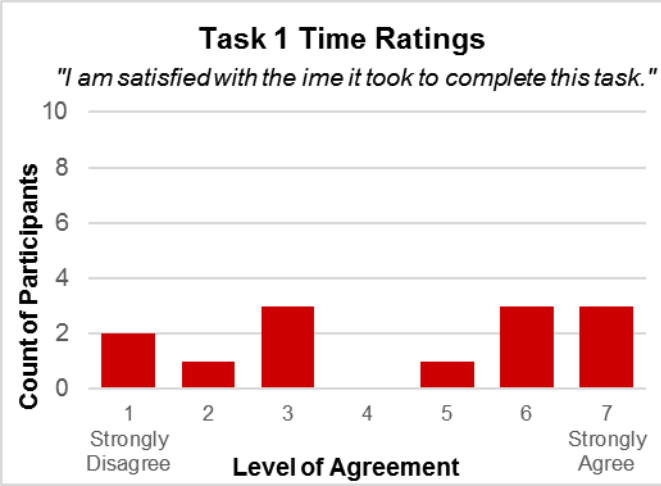

Figure 37. Satisfaction with time needed for Task 1

Task 2 Results Summary Charts

Figure 38. Successful completion of Task 2

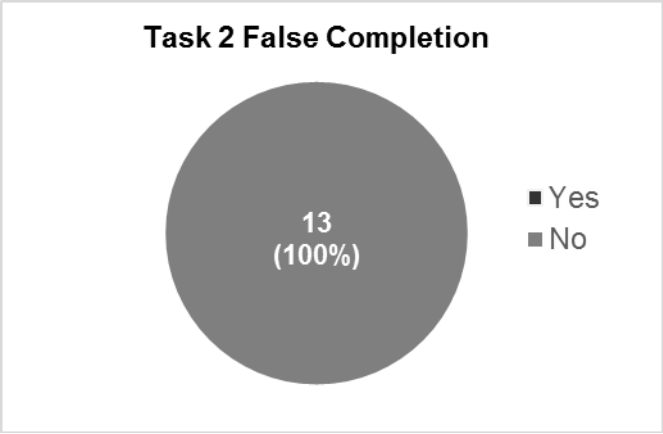

Figure 39. Incorrectly thought Task 2 completed

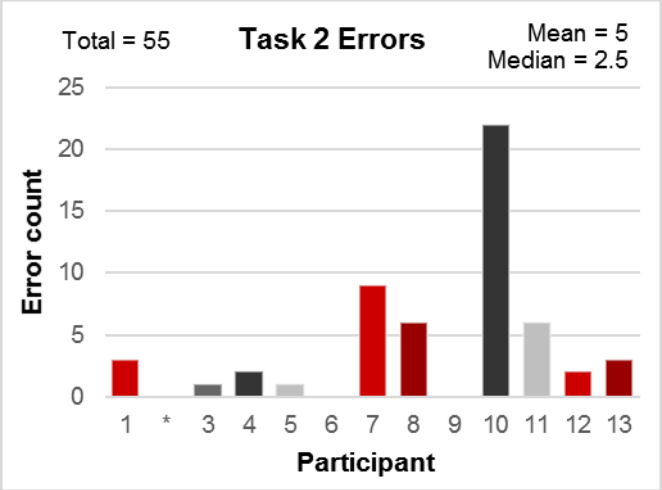

Figure 40. Task 2 Total and Average Errors

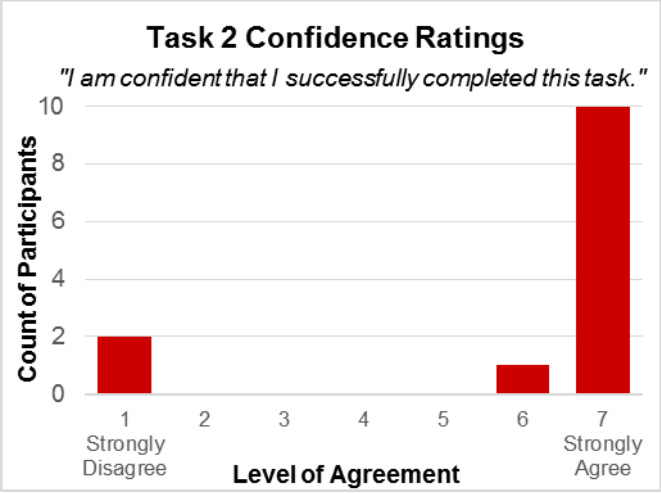

Figure 41. Confidence in completion of Task 2

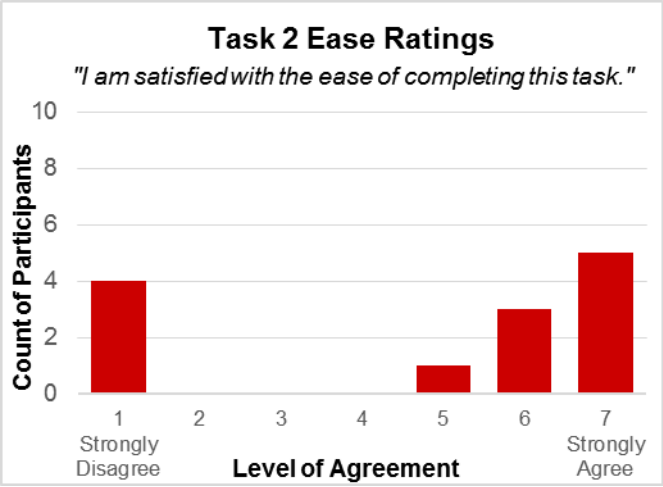

Figure 42. Satisfaction with ease of Task 2

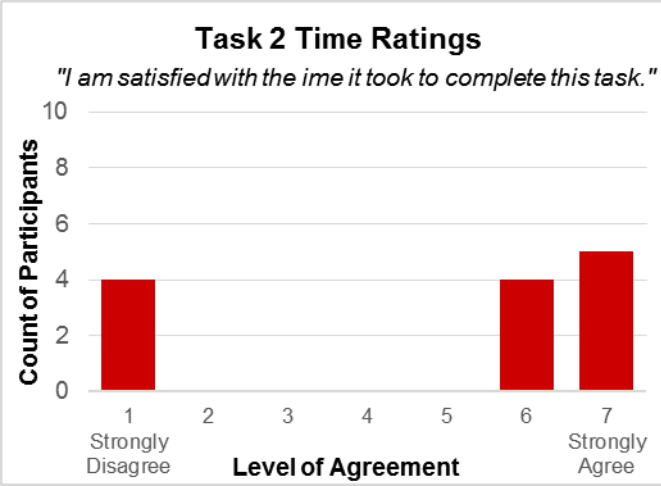

Figure 43. Satisfaction with time needed for Task 2

Task 3 Results Summary Charts

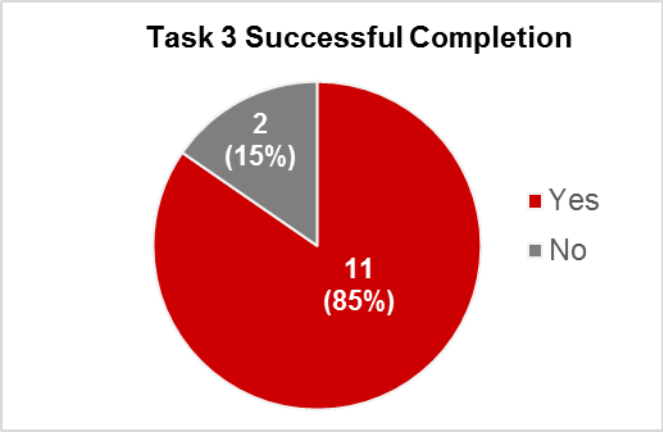

Figure 44. Successful completion of Task 3

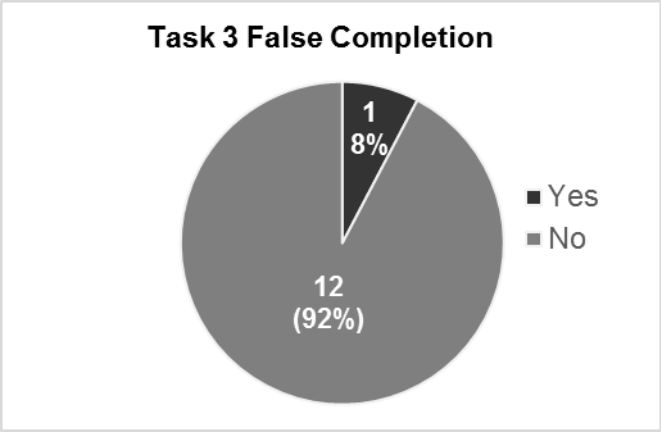

Figure 45. Incorrectly thought Task 3 completed

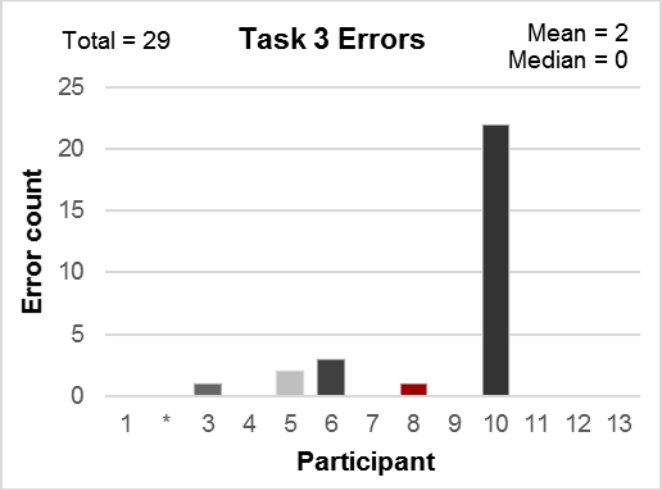

Figure 46. Task 3 Total and Average Errors

Figure 47. Confidence in completion of Task 3

Figure 48. Satisfaction with ease of Task 3

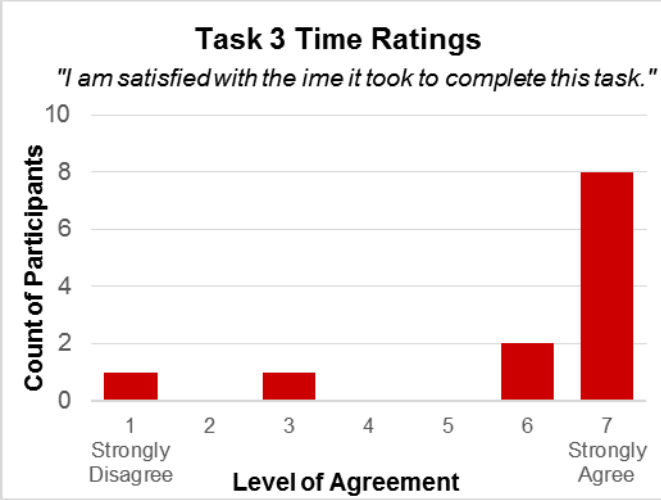

Figure 49. Satisfaction with time needed for Task 3

Task 4 Results Summary Charts

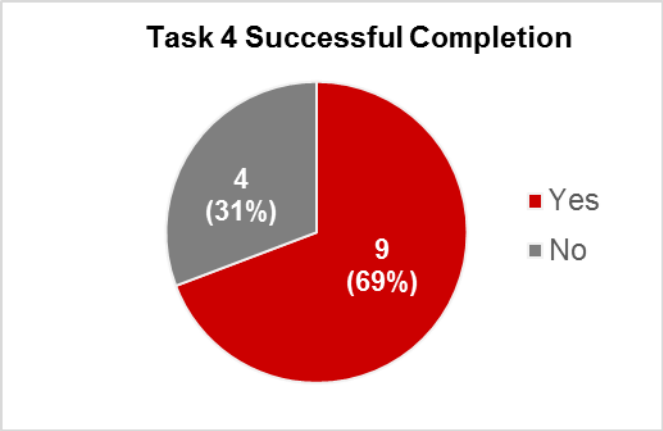

Figure 50. Successful completion of Task 4

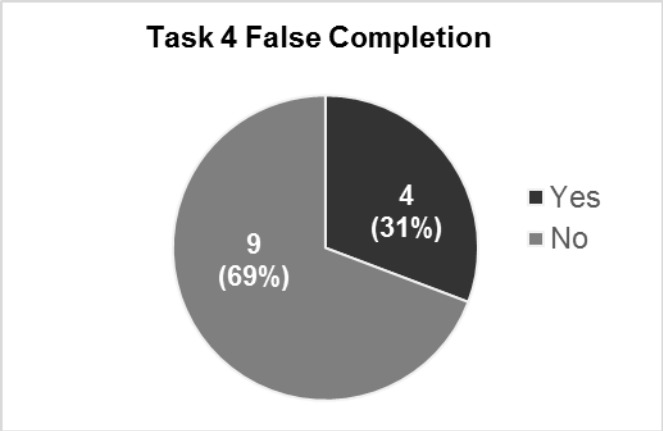

Figure 51. Incorrectly thought Task 4 completed

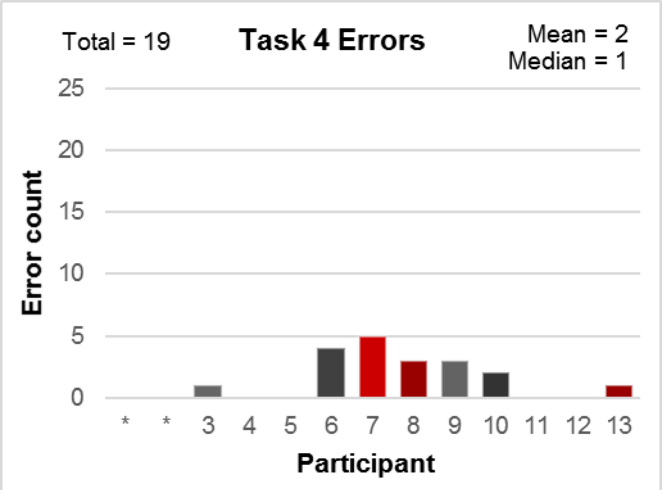

Figure 52. Task 4 Total and Average Errors

Figure 53. Confidence in completion of Task 4

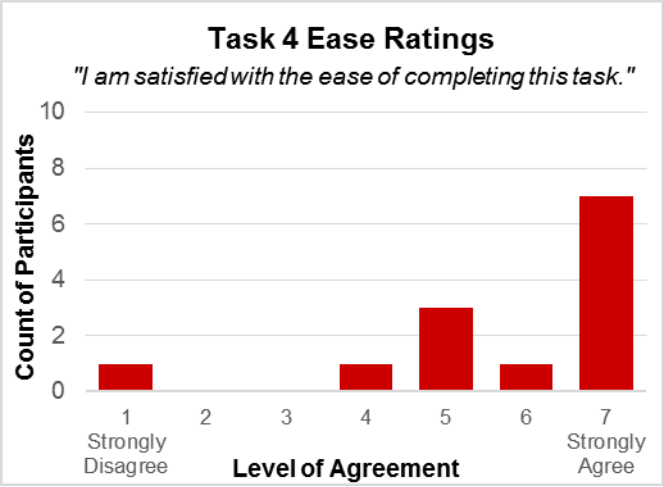

Figure 54. Satisfaction with ease of Task 4

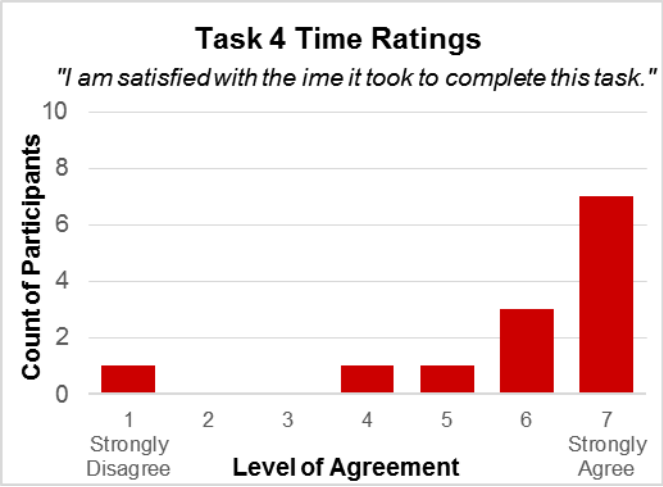

Figure 55. Satisfaction with time needed for Task 4

Task 5 Results Summary Charts

Figure 56. Successful completion of Task 5

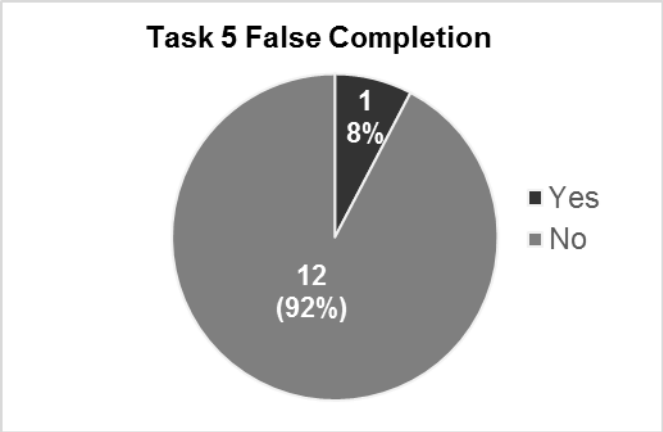

Figure 57. Incorrectly thought Task 5 completed

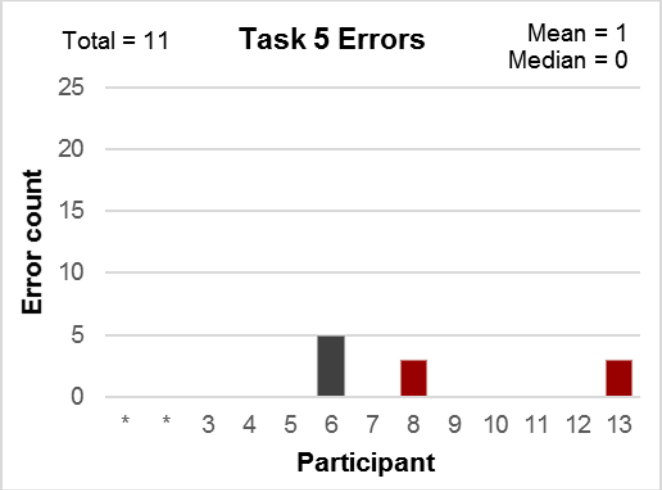

Figure 58. Task 5 Total and Average Errors

Figure 59. Confidence in completion of Task 5

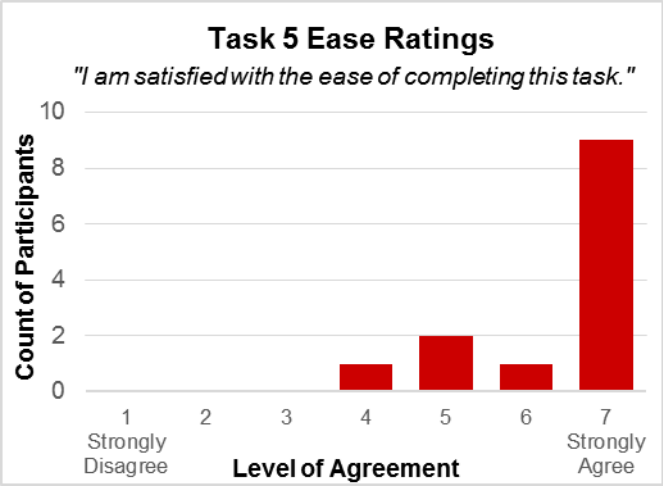

Figure 60. Satisfaction with ease of Task 5

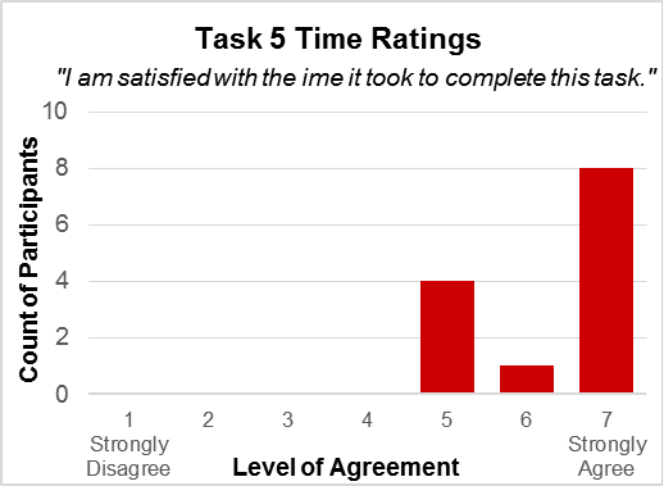

Figure 61. Satisfaction with time needed for Task 5

Task 6 Results Summary Charts

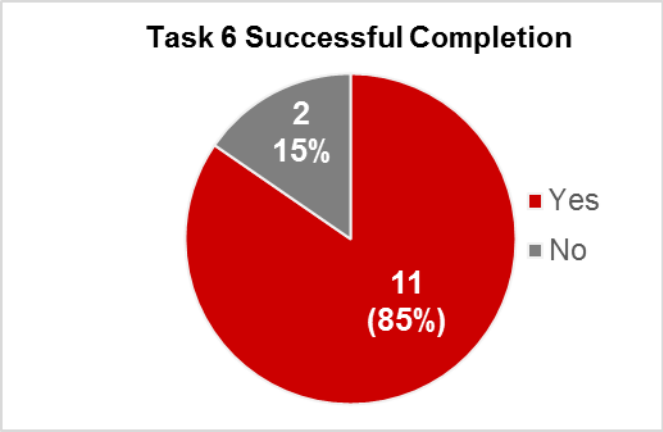

Figure 62. Successful completion of Task 6

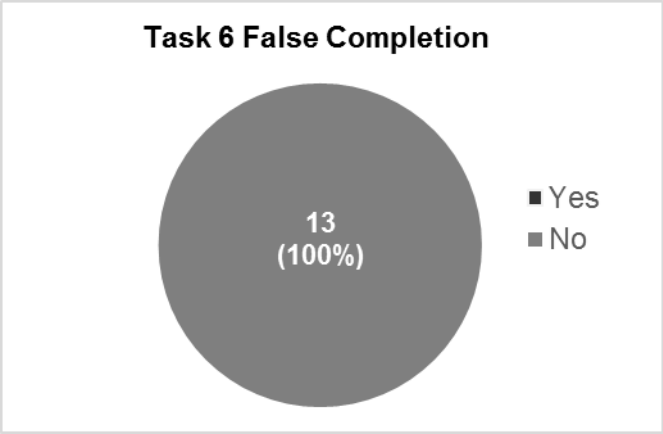

Figure 63. Incorrectly thought Task 6 completed

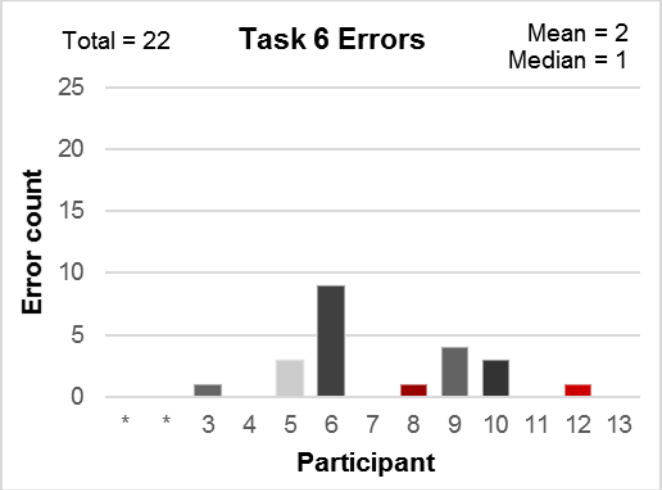

Figure 64. Task 6 Total and Average Errors

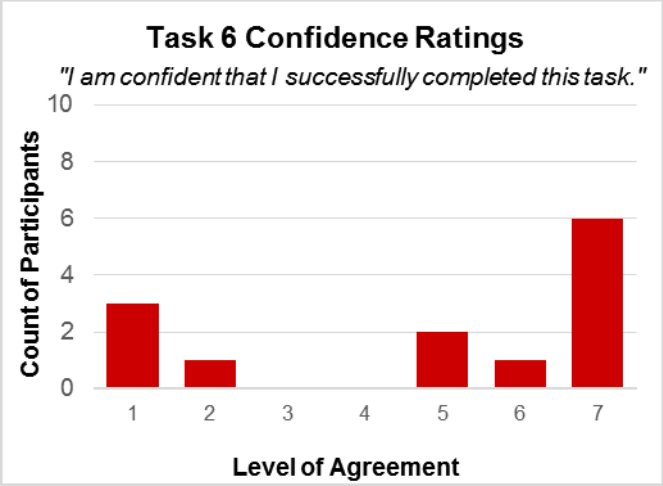

Figure 65. Confidence in completion of Task 6

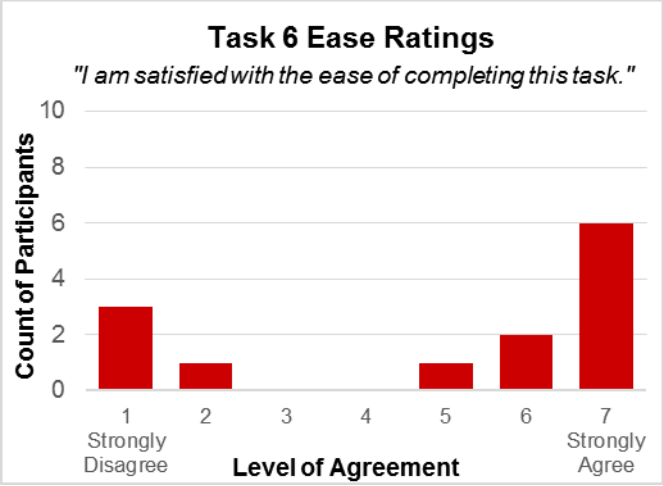

Figure 66. Satisfaction with ease of Task 6

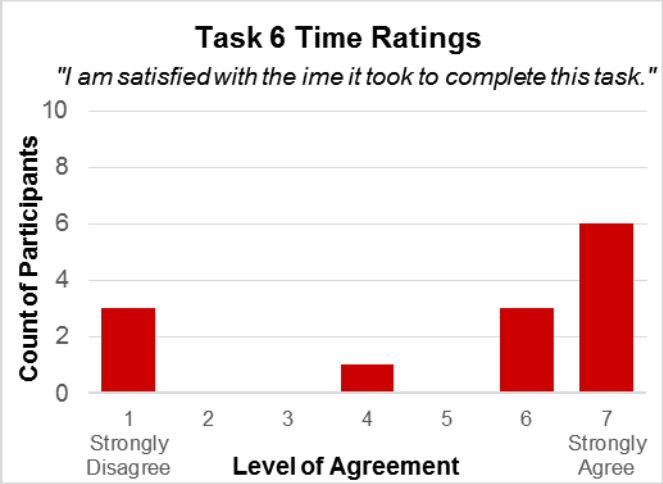

Figure 67. Satisfaction with time needed for Task 6

Task 7 Results Summary Charts

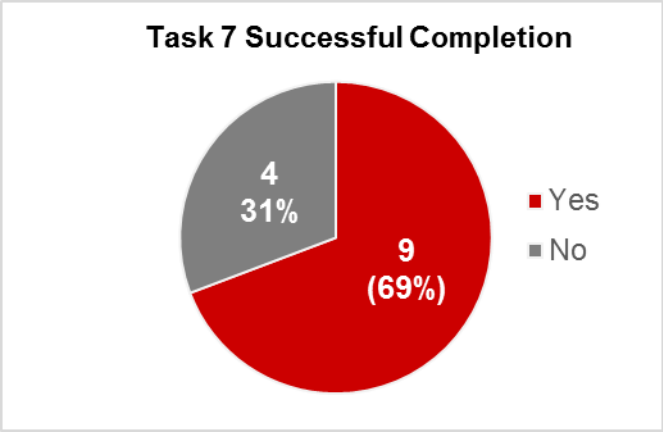

Figure 68. Successful completion of Task 7

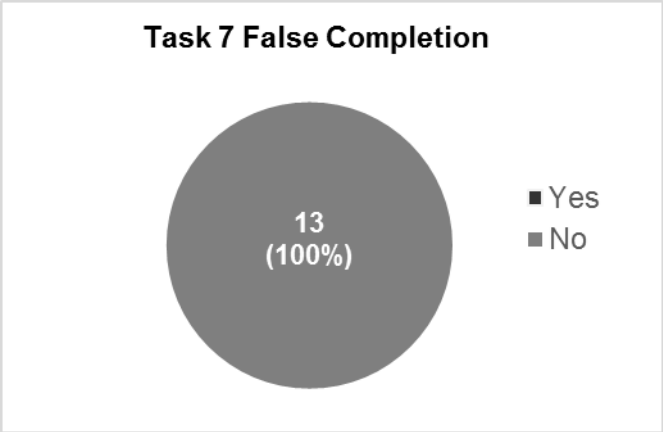

Figure 69. Incorrectly thought Task 7 completed

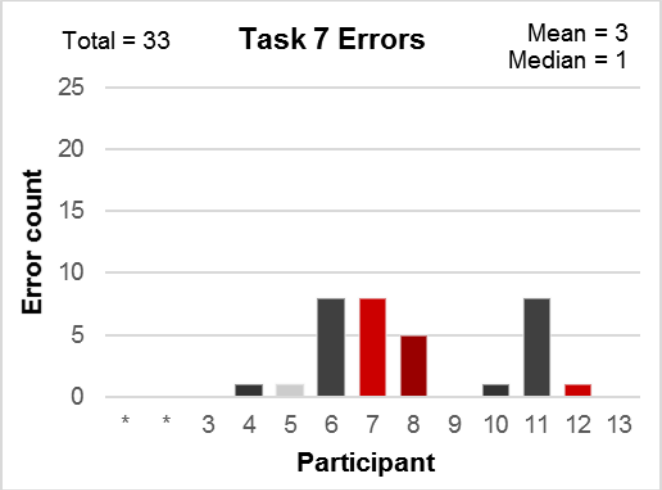

Figure 70. Task 7 Total and Average Errors

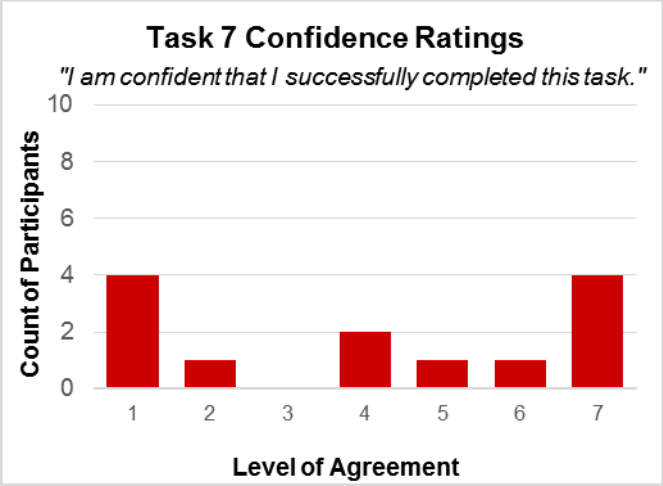

Figure 71. Confidence in completion of Task 7

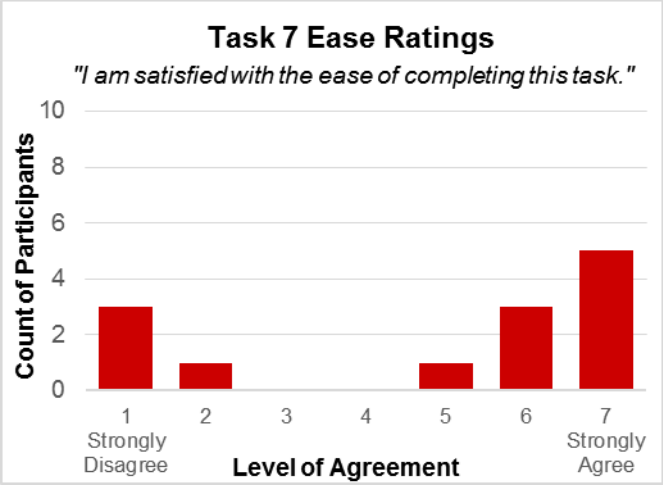

Figure 72. Satisfaction with ease of Task 7

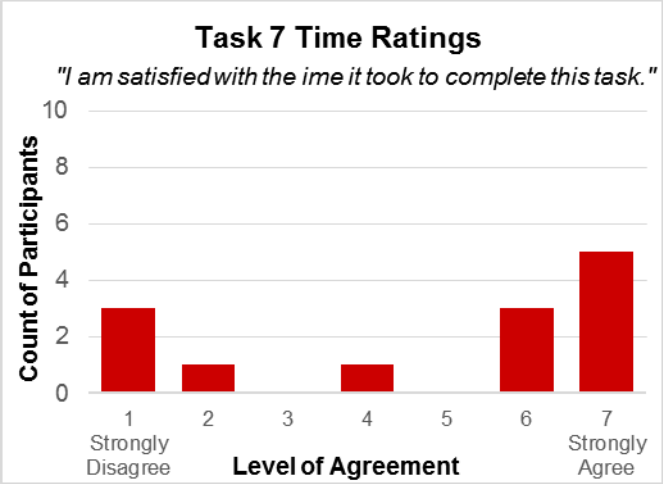

Figure 73. Satisfaction with time needed for Task 7

Task 8 Results Summary Charts

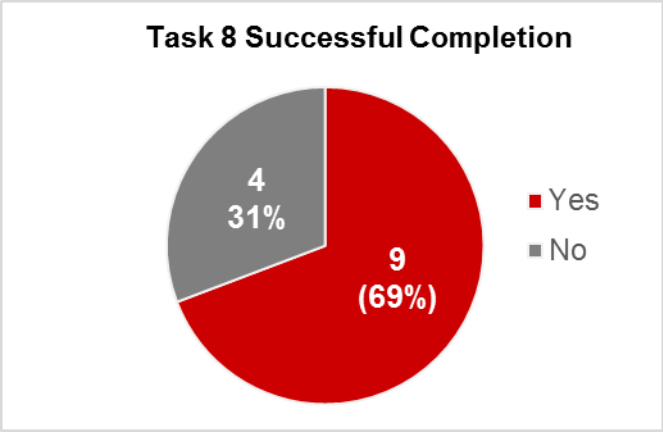

Figure 74. Successful completion of Task 8

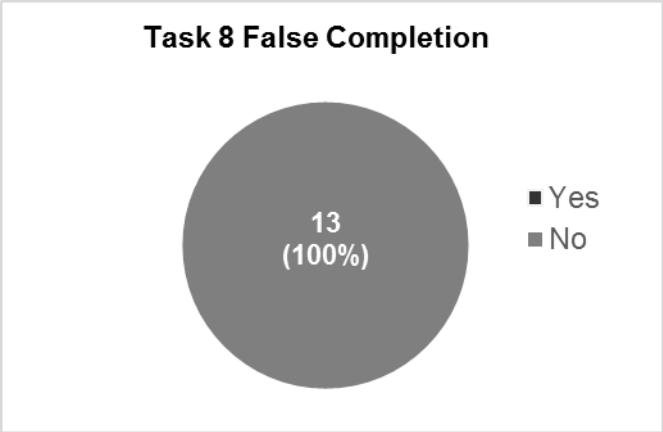

Figure 75. Incorrectly thought Task 8 completed

Figure 76. Task 8 Total and Average Errors

Figure 77. Confidence in completion of Task 8

Figure 78. Satisfaction with ease of Task 8

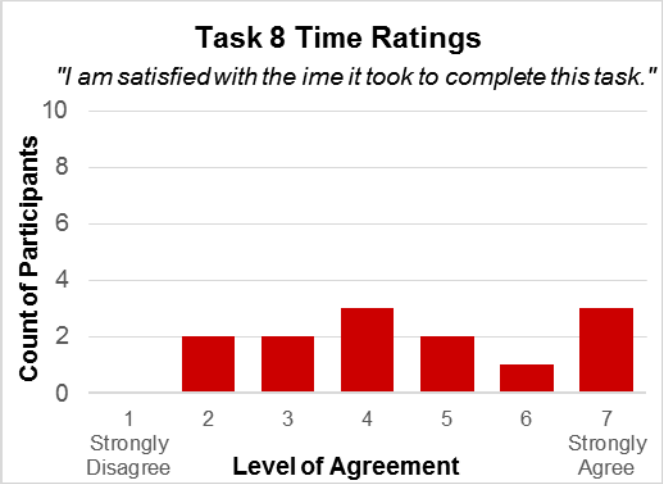

Figure 79. Satisfaction with time needed for Task 8

Appendix B: Participant Recruitment Materials

Initial Email (Sent through MailChimp)

[NOTE: When scheduling sessions, ask faculty what type of computer, (PC vs. Mac) and browser (Chrome, Firefox, Safari, Internet Explorer, Edge) they typically use.] In the future, it should be made explicit that the reply gets sent to Laurie, not Lauren, as this is confusing and awkward for recipients.

SUBJECT LINE: DELTA needs volunteers for a usability study

Hello [FACULTY NAME],

My name is Lauren Hirsh, and I'm helping Martin Dulberg, NC State University's Learning Technologies Coordinator, run a usability study for the Distance Education and Learning Technology Applications (DELTA) department. In an effort to improve the university's WolfWare website, we're looking for instructors who would be willing to participate in a usability test session of the site between [DATE] and [DATE] on a day and at a time of your choosing.

What will I be doing in a usability study?
You will be asked to do a series of short tasks using the WolfWare website. You will also be asked questions about your experience and perceptions of the site.

How long is a session?
One hour or less

When and where?
Up to you! We will be conducting individual sessions on the NC State campus Monday through Friday, from Mon [MM/DD] through Fri [MM/DD]. You will be asked to participate in person, however no traveling is required as we will come to you so you can test the site from the comfort of your own office.

Interested in participating?
Please reply to this email with your contact information and we will be in touch to schedule a session at your convenience.

If you have any questions at any time about the study or the procedures, you can reach Marty and I via email at marty_dulberg@ncsu.edu and lahirsh@ncsu.edu, respectively.

Thank you for your time and interest,

Lauren Hirsh

Confirmation Email (Laurie sent)

[NOTE: This can be sent as an email or in a Google calendar meeting notice.]

SUBJECT LINE: Confirmation: Your participation in our usability study

Dear [PARTICIPANT NAME]:

Thank you for agreeing to help us test DELTA's WolfWare website. As I mentioned, you will be asked to try out the website and give us your thoughts about your experience. You won't need to prepare anything before the session.

You are scheduled to participate as follows:

DATE: [DAY, DATE]
TIME: [TIME]

PLACE: [ADDRESS]

A few key reminders:

- During the study, we will ask you to complete some tasks using the website. You'll talk out loud as you work so the facilitator can follow along.
- With your permission, the session will be recorded. We will only use the recording to decide how to improve the website. Your name will not be used for any purpose beyond this session.
- Your participation is voluntary; you will not receive any monetary compensation.

Also, we have only one person scheduled at a time for these sessions so if you find that you cannot participate on your scheduled day, please contact me as soon as possible so I can reschedule your session.

Thanks again!

Laurie Gyalog

Reminder Email (Lauren sent; cc: Marty)

SUBJECT LINE: Reminder: Website study tomorrow

Dear [PARTICIPANT NAME]:

Thanks again for agreeing to help us out with testing DELTA's WolfWare website. We are looking forward to talking with you.

You are scheduled to participate as follows:

DATE: [DAY, DATE]
TIME: [startTIME] - [endTIME]
PLACE: [ADDRESS]

A few key reminders:

- During the study, we will ask you to complete some tasks using the website. You'll talk out loud as you work so the facilitator can follow along.
- With your permission, the session will be recorded. We will only use the recording to decide how to improve the website. Your name will not be used for any purpose beyond this session.
- Your participation is voluntary; you will not receive any monetary compensation.

Also, we have only one person scheduled at a time for these sessions, so if you find that you cannot participate tomorrow at [startTIME], please contact us as soon as possible so we can reschedule your session.

Thanks again!

Lauren Hirsh and Marty Dulberg

Appendix C: Usability Test Script

Before session begins:

- Web browser should be open to Google or some other "neutral" page
- Put site in URL bar but don't press enter: https://wolfware-ui.delta.ncsu.edu/
- Ensure profile image is on the desktop
- Ensure UI is reset: https://wolfware-ui.delta.ncsu.edu/reset.php
- Ensure task/rating sheets are in the correct order
- Have extra pen and blank consent form
- Queue up software (Mediasite Desktop Recorder)

After session ends:

- Stop the screen recorder and save the file!!!
- Reset the UI: https://wolfware-ui.delta.ncsu.edu/reset.php
- Thank them and depart (or escort them out if meeting at DELTA).
- Debrief

Intro (2.5 minutes)

Hi, _____. My name is Lauren, and I'm going to be walking you through this session today.

Before we begin, I have some information for you, and I'm going to read it to make sure that I cover everything.

You probably already have a good idea of why we asked you here, but let me go over it again briefly. We're asking people to try using a Web site that we're working on so we can see whether it works as intended. The session should take about 45 minutes.

The first thing I want to make clear right away is that we're testing the *site*, not you. You can't do or say anything wrong here.

As you use the site, I'm going to ask you as much as possible to try to think out loud: to say what you're looking at, what you're trying to do, and what you're thinking. This will be a big help to us.

Also, please don't worry that you're going to hurt our feelings. We're doing this to improve the site, so we need to hear your honest reactions.

If you have any questions as we go along, just ask them. I may not be able to answer them right away, since we're interested in how people do when they don't have someone sitting next to them to help. But if you still have any questions when we're done I'll try to answer them then.

You may have noticed the recording software. With your permission, we're going to record what happens on the screen and our conversation. The recording will only be used to help us figure out how to improve the site, and it won't be shared with anyone except the people working on this project. And it helps us, because we don't have to take as many notes.

Also, there (is someone/are a few people) from the design team observing this session in another room. (They can't see us, just the screen.)

If you would, I'm going to ask you to sign a simple permission form for us. It just says that we have your permission to record you, and that the recording will only be shared with the people working on the project.

- Give them a recording permission form and a pen
- While they sign the form, START the SCREEN RECORDER

Questions (3 minutes)

Do you have any questions so far?

OK. Before we look at the site, I'd like to ask you some quick questions about yourself. We'll call this the "getting to know you" part of this session - we're really just gathering some demographic info.

First, what department are you in?

How long have you been teaching?

[M] How many classes do you typically teach each semester? Which courses?

[M] Approximately how many years have you been using Moodle?

On a scale of 1 to 7, 1 being never, and 7 being always, how often do you use a mobile device (a tablet or smartphone) to access the WolfWare website or Moodle?

Now, roughly how many hours a week altogether—just a ballpark estimate— would you say you spend using the Internet, including Web browsing and email, at work and at home?

And what's the split between email and browsing—a rough percentage?
What kinds of sites are you looking at when you use the Web?

[M] Do you have any favorite Web sites?

[M] What does "WolfWare" mean to you?

Are you familiar with Blackboard Collaborate, NC State's web conferencing tool?
{If yes} How familiar on a scale from 0, never heard of it to 7, use it very frequently?

OK, great. We're done with the questions, and we can start looking at things.

Homepage (1-3 minutes)

- Go to the site's Home page: https://wolfware-ui.delta.ncsu.edu/

First, I'm going to ask you to look at this page and tell me what you make of it: what strikes you about it, what you can do here, and what it's for. Just look around and do a little narrative.

You can scroll if you want to, but don't click on anything yet.

- Allow this to continue for three minutes at most.

Tasks (30 minutes)

Thanks. Now I'm going to ask you to try doing some specific tasks. I'm going to read each one out loud and give you a printed copy. After each task, I'm going to ask you to rate your experience using the scale I provide you.

And again, as much as possible, it will help us if you can try to think out loud as you go along.

For the purpose of this exercise, you will be assuming the identity of *Jamie Wolf*, an instructor at NC State.

- Hand the participant the first scenario, and read it aloud.
- Allow user to proceed until you it's no longer of value or the user becomes very frustrated.
- Repeat for each task or until time runs out.
- Hand the participant the task rating sheet.

{1. log in and create a Moodle space}

Let's get started by requesting a new Moodle space for next semester, Spring 2017. You will be teaching XYZ 123-001 in Spring 2017. Please go ahead and create your Moodle course space for next semester.

When you're ready, please indicate how much you agree or disagree with the following statements by marking one response below each statement.

I am confident that I successfully completed this task.									
Strongly Disagree								Strongly Agree	NA
I am satisfied with the ease of completing this task.									
Strongly Disagree								Strongly Agree	NA
I am satisfied with the amount of time it took to complete this task.									
Strongly Disagree								Strongly Agree	NA

Thanks, that was very helpful.

If you'll excuse me for a minute, I'm just going to see if the people on the team have any follow-up questions they'd like me to ask you.

- See if the observer(s) have any questions.
- Ask the observers' question, then probe anything you want to follow up on.
- Hand the participant the next task/rating sheet.

{2. add pic to profile}

You want your picture to appear in Moodle next to your posts. Upload your image so that it will be seen in Moodle. You will find your picture on the desktop.

- Probe anything you want to follow up on.
- Hand the participant the next task/rating sheet.

{3. add TA to Moodle}

Add your teaching assistant, *Jonathan Champ*, id *jrchamp*, to the course.

- Probe anything you want to follow up on.
- Hand the participant the next task/rating sheet.

{4. set availability date}

The first day of class is January 10th (second day of the semester), 2017 but you want your students to be able to go to the Moodle site before that. Make the course available to students starting January 5th.

- Probe anything you want to follow up on.
- Hand the participant the next task/rating sheet.

{5 & 6. Course Copier}

(card 1) Copy all the content over from last year's (Spring 2016) Moodle space to your new (Spring 2017) space.

- Probe anything you want to follow up on.
- Hand the participant the next task/rating sheet.

(card 2) You realize you copied the wrong semester; you actually wanted the content from Fall 2016. Please fix this now.

- Probe anything you want to follow up on.
- Hand the participant the next task/rating sheet.

{7. Cross list}

You have just been informed that you will also be teaching XYZ 123-002, an additional section of the same class. You want to use the same Moodle space for both sections. What do you do?

- Probe anything you want to follow up on.
- Hand the participant the next task/rating sheet.

And for our final task...

{8. Collaborate Session}

You want to schedule an online office hour in Blackboard Collaborate from 1-2PM on January 10th 2017. Please navigate to the place on the WolfWare website you would go to access the Collaborate tool.

- Probe anything you want to follow up on.

Post-task questions (3-5 minutes)

Do you have any questions for me, now that we're done?

How do you feel about the WolfWare website now that you've played with it a little bit?

What was most frustrating or confusing about the site?

Was there anything you particularly liked about the site?

If you could improve one thing about the WolfWare website, what would it be?

What's missing that you would like for WolfWare to do/have/offer?

- Stop the screen recorder and save the file!!!
- Reset the UI: https://wolfware-ui.delta.ncsu.edu/reset.php
- Thank them and depart (or escort them out if meeting at DELTA).
- Debrief

Appendix D: User Interface Heuristics

Not to be confused with “heuristics” as used in cognitive psychology (i.e., mental shortcuts), these principles are called heuristics because they are broad rules of thumb and not specific usability guidelines.

Table 29. Jakob Nielsen's (1994) 10 general principles for interaction design.

Usability Heuristics and Descriptions (Nielsen, 1994)	
1. Visibility of system status	The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.
2. Match between system and the real world	The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.
3. User control and freedom	Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.
4. Consistency and standards	Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.
5. Error prevention	Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.
6. Recognition rather than recall	Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.
7. Flexibility and efficiency of use	Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.
8. Aesthetic and minimalist design	Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.
9. Help users recognize, diagnose, and recover from errors	Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.
10. Help and documentation	Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.