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Creating usable and accessible courses through usability testing in higher education: a Canvas usability assessment for diverse students

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CREATING USABLE AND ACCESSIBLE COURSES THROUGH USABILITY TESTING IN HIGHER EDUCATION: A CANVAS USABILITY ASSESSMENT FOR DIVERSE STUDENTS

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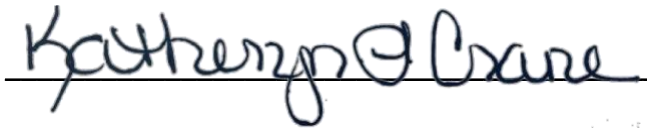

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Introduction

Higher education instructors have been using learning management systems (LMS) to teach their courses for many years and students have become accustomed to using them in their learning. However, when the COVID-19 pandemic hit in spring of 2020, instructors and students were pushed into teaching and learning completely online, making them entirely reliant on an LMS. This sudden change impacted everyone, and it became rapidly apparent to instructors that their courses needed to be accessible and usable for all students, especially diverse students who are ability, linguistically, or culturally diverse (Mincemoyer, 2017). Furthermore, instructors need to recognize that diversities and disabilities are not singular impairments, but rather become apparent when our courses and course materials are unaccommodating and limiting to those students (Walters, 2010, p. 430). Since instructors are limited in their ability to change a LMS, they must focus on changing their course design to better accommodate students (Hovde, July 12-15, 2015; Hovde, July 16-17, 2015).

Instructors receive a wide range of students with diverse learning needs and accommodations, so their courses, course materials, and course designs need to be usable and accessible to all students initially, rather than redesigning on a case-by-case student accommodation basis (Huntsman et al. 2019). To do this, instructors need to take on the role of a technical communicator. A strong understanding of technical communication aids instructors in identifying how to improve their course design and where those improvements are needed (Bartolotta et al., 2017). Usability testing is one way for instructors to identify where their diverse students are struggling, thus pinpointing where instructors can improve their course design so that it is more accessible and usable (Oswal, October 4-6, 2019).

While previous usability studies have been conducted on LMSs, there are limited studies that focus on the usability of a discipline specific course, like English, to determine how usable the tools within those courses are for students. Fathema and Akanda (2020) point out that the usability of the LMS depends on the discipline tools that they need for their courses and that more research needs to be done on this topic. Furthermore, there are a lack of usability studies on LMSs whose focus user group are diverse students, leading to a major population of students whose needs are not studied because they were never included in the design process (Rose, 2016). That is why I conducted a usability study on the LMS Canvas to understand how usable tasks in an English course were for diverse and disabled students. By doing so, even though it is a lot of work, instructors can design their courses with the knowledge of how to accommodate their students' needs so that the course tasks more efficient and satisfying for them.

Literature Review

In the literature review, the research that is currently known on this topic will be explained. Each subsection defines common terminology found throughout along with the research known on each topic. Furthermore, the gaps in the research are explained and how this study continues the research known.

Learning Management Systems

Learning management systems (LMS) are web based educational systems that facilitate teaching, training, and learning both on and off campus for universities. They allow teachers to design an in-person course, a hybrid (half online, half in-person) course, or a completely online learning course where students can access the materials, assignments, and exams anywhere

using the internet (Cassidy, 2016; Coy et al., 2014; Ifijeh et al., 2015; Nakamura et al., 2019; Nieves et al., 2019). Learning management systems are integral to education today (Babu & Singh, 2013) as they provide spaces for communication, group work, student assessment, assignments, discussions, and course materials (Babu & Singh, 2013; Cassidy, 2016; Nieves et al., 2019). These systems are adaptable, allowing instructors to create a course for any discipline and for students to learn in a multitude of different ways to better suit their learning needs (Fathema et al., 2015; Fearnley & Amora, 2020; Ifijeh et al., 2015; Walker et al., 2016; Wichadee, 2015).

The need to make these courses accessible for all students and learner types has been researched for decades. However, when the COVID-19 pandemic hit and all instructors and students were forced to rely solely on the LMS for educational learning, it exposed design and usability issues within the LMS and within instructors' courses. Instructors are limited in their ability to change a LMS itself to make it more usable for their students (Hovde, July 16-17, 2015). However, instructors can focus their attention on what they can do within their courses to make them as accessible and usable as possible to all students, including diverse students (Hovde, July 12-15, 2015).

Diversity in Students

Universities have a student body made up of people with diverse backgrounds. They come from different cultures and have differing linguistic, physical, mental, and technological abilities. They may have military training, have families, be first generation college attendees, be young adults or middle aged. Such diversity creates a culture of constantly changing student needs in which universities and instructors need to accommodate (Huntsman et al. 2019;

Wynants & Dennis, 2018). Furthermore, universities and their instructors are required by law through the Americans with Disabilities Act of 1990, Section 508 of the Rehabilitation Act, and Individuals with Disabilities & Education Act to provide accessible and usable courses to their students and provide modifications and accommodations when necessary. These requirements also apply to the LMS and learning materials that are being used as a part of the course (Babu & Singh, 2013; Simoncelli & Hinson, 2008). However, with such a diverse student body, it is understandable why instructors, and even the university, struggle to understand how to best accommodate all of their students. That is where technical communication can assist educators with this challenge.

Educators and Technical Communication

In order to understand how technical communication can help instructors and their courses, it needs to be defined. Technical communication is defined by the Society for Technical Communication's *Technical Communication Body of Knowledge* (TCBOK) as:

> A user-centered approach for providing the right information, in the right way, at the right time so that the user's life is more productive. The value that technical communicators deliver is twofold: They make information more usable and accessible to those who need that information, and they advance the goals of the companies and organizations that employ them. (TCBOK, 2021)

Through this definition, one can recognize that instructors, knowingly or unknowingly, implement technical communication into their everyday teaching. They need to provide course materials that contain accurate information for students, and they need to create usable course designs and course materials so students can access the information they need to be

productive in their assignments. In addition, instructors need to make their entire course accessible and usable for a broad and diverse student population who have different levels of experience using the LMS (Hovde 2015b; Huntsman et al. 2019).

Instructors use technical communication in other ways as well. Since a LMS is a web-based service, instructors take on a technical communicator role to help students adapt to the changes made when an LMS is updated (Oswal, October 28-30, 2019). They also need to use technical writing and usability skills so that they can edit their course design and materials for "readability, technical usability, and access" (Warner & Hewett, 2017). To do this effectively, instructors provide instruction on what to do for assignments, as well as how to complete the task through the LMS (Warner & Hewett, 2017). This means instructors need a high level of fluency with the material and the LMS to successfully write those instructions. Furthermore, instructors need these skills to support diverse students' learning abilities. These students might struggle with the LMS due to their sensory, coping, and proficiency abilities, or because they have limited LMS proficiently, technology availability, or support. All these challenges can impact how well students are able to use the learning technologies provided (Draffan & Rainger, 2006). Through the use of technical communication, usability, and technical writing skills, instructors are able to create courses that are usable and accommodating for students and will also be able to support their learning with these skills. However, many instructors use these skills unconsciously and do not know how to fully utilize their technical communication skills to their advantage and to their students' advantage.

For instructors to use their technical communication skills effectively, universities need to train and support them. Studies have shown that staff and instructors do not have the skills

and knowledge needed to develop inclusive practices and strategies within their courses to properly accommodate diverse students (Pearson et al., 2019; Simoncelli & Hinson, 2008; Wynants & Dennis, 2017; Wynants & Dennis, 2018). Therefore, research has recommended that universities assist teachers, and students, by providing training sessions on disabilities and the LMS so that all parties are comfortable and confident using the system (Alshammari, 2020; Wichadee, 2015). Furthermore, Bartolotta et al. (2017) has found that instructor training that focuses on technical communication and usability are foundational in creating more user-centered designs in courses. They also found that when instructors are trained in usability methodology and technical communication, they are able to effectively use their understanding to identify where to improve and how to improve the design of their course (Bartolotta et al., 2017).

Usability and its Impact in Education

To assess a course's usability, instructors need to know how well students can navigate their course to find the materials, lectures, assignments, and exams that they need to complete the class (Bartolotta et al., 2017). Usability is defined by the International Organization for Standardization (ISO, 2018) as the "extent to which a system, product, or service can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction" (sec. 3.1.1). Though this process is time-consuming due to the IRB, recruitment, testing, and analyzing process, it enables instructors to pinpoint where student users struggle and can therefore determine how to improve the course to remove those barriers (Hovde, July 16-17, 2015).

The definition of usability identifies that a user group and goals need to be specified. In a university that is trying to accommodate and make courses usable for a diverse range of learners and students, it may seem difficult to choose a user group. However, research has shown that focusing on improving courses for diverse and disabled students improves the learning experiences for many other students as well, leading to an overall better learning experience (Huntsman et al. 2019; Palmeri, 2006; Pearson et al., 2019; Walters, 2010; Wynants & Dennis, 2017). The field of TPC, or technical and professional communication, also encourages usability testing for diverse and disabled users because disability is seen as a social construct of oppression in an unaccommodating society rather than a single impairment within an individual (Huntsman et al., 2019; Walters, 2010). Furthermore, if usability testing and designers do not include vulnerable and diverse populations into their studies, then instructors' courses have a high chance of maintaining the inequities that we have delivered to our students in the past (Rose, 2016). This means we are maintaining the unaccommodating society that we should be trying to break out of. That is why it is critical for universities and instructors to focus their usability assessments on the diverse and disabled student body so that their needs, and consequently the needs of the broad student body, are understood and addressed.

When considering accessibility from a technical communication and usability standpoint, it is important to remember that diversities and disabilities are broad and have a spectrum of needs (Huntsman et al. 2019; Oswal & Meloncon, 2017; Pass, 2013). This means that one usability test cannot recognize the needs and struggles of all types of diversities and disabilities, especially since the needs of students change overtime. This is a limitation of usability testing as it "evaluates products in a very specific context that changes based on the

stage of a design process, the users tested, and the environment where the product is being tested" (Crane, 2021). However, usability testing is the beginning of a foundational understanding of how instructors can improve their courses to better serve their diverse students. In addition, the only way instructors know about the thoughts of disabled and diverse students is by learning through their interactions with the course. Through those usability analyses, instructors can design their course, not on the biases of what they think a disabled or diverse students need from the course design, instruction, and materials, but rather design based on the actual knowledge of what this user group needs (Oswal, October 4-6, 2019).

Usability studies on LMS have been conducted in the past and they typically focus on testing methods used for assessing a LMS and how students engaged with the system. Alshammari (2020) found that a positive and well-designed LMS lead to a better use of the system itself. Another study found that multimedia e-learning systems and tools were used the most by students (Ifjeh et al., 2015). The focus of one study was on blind and visually impaired users and found that the TUME method, a task-oriented, user-centered, multi-method evaluation technique, was effective in accessing the usability of a LMS for that user group (Babu & Singh, 2013). A further study was conducted on an adapted user experience questionnaire for LMS with a translated questionnaire for linguistic diverse students to understand the effectiveness of the usability survey (Santoso et al., 2016). One study tested two usability techniques to analyze LMS, finding that both were easy to use but each had limitations (Nakamura et al., 2019). Hovde (July 12-15, 2017) explained how to evaluate the usability of online course interfaces and their constraints. In their study, Oswal (October 4-6, 2019) found how to make user experience more inclusive to those with disabilities through the research

process and the user group process. Bartolotta et al. (2017) researched the ways in which usability test could be incorporated into revising online courses, providing recommendations and approaches on how to do the testing. The study conducted by Fathema and Akanda (2020) on instructors and their usability of the LMS found that the usability of the LMS depended on the course's specific discipline tools that they needed for their courses. These studies above demonstrate the research that has been conducted concerning usability and LMSs, and they also indicate where there is a need for further research.

A small number of studies exist concerning usability testing on discipline specific courses that utilize specific LMS tools. As Fathema and Akanda (2020) suggested, more research needs to be done on discipline specific courses because the LMS tools they use differ depending on the subject of the course. For example, composition courses use the LMS tool for peer-review, while most other courses may not use this tool at all. Furthermore, there is limited usability research on how usable LMSs are for diverse populations, although they have become more frequent in the past decade. This usability study aims to bridge part of this gap by conducting a usability test that explores how instructors can use the LMS Canvas to better serve diverse users and make the tasks more efficient and satisfying for them.

Methodology

This section will serve as an overview of how my study was conducted. It will discuss how the focus user group was chosen, how users were recruited, how the procedures for the study were implemented, and how the data was collected during and after testing. Eastern Washington University's Institutional Review Board (IRB) approved this study (HS-5987).

User Groups

A user is defined by the International Organization for Standardization, or ISO (2018), as a “person who interacts with a system, product, or service” (sec 3.1.7) and a user group is defined as a “subset of intended users who are differentiated from other intended users by characteristics of the users, tasks, or environments that could influence usability” (sec 3.1.8). The users for this study were students at Eastern Washington University (EWU) where the study took place. Furthermore, the user group chosen for this study were diverse and disabled student users since the focus of this study was to see how usable Canvas’s web platform (not the app) was for diverse students at EWU in order to give recommendations for course improvements to teachers and faculty.

To determine user demographics of the user group that I would be recruiting, a user matrix was established before the recruitment process (see Table 1). A user matrix is conducted to better understand user demographics and to help the researcher predetermine user groups that they should be looking for during recruitment to cover a wider basis of the user population. Based on demographic data collected to understand user populations and types of users, the user matrix includes demographics of age, gender, monolingual/multilingual, transfer/non-transfer, new user/current user, internet availability, device(s) used, and disability. General statistics on EWU’s student population was gathered from the university’s Student Enrollment & Demographics webpage (2020) which included data on age, gender, nationality, and transfer/non-transfer status for the general EWU student body. In addition, I gathered general statistics about internet availability through the U.S. Census Bureau (Department of Commerce) (2018) and (2020), device usage statistics though Statistica (2015), and language diversity through the United States Census Bureau (2015). Since my user group

focus was on disabled and diverse students, that was a general requirement for all users in the user matrix.

For the purposes of this study, the defining characteristics for a user to be considered diverse were as follows: anyone that was able-diverse, has a disability, or comes from a diverse background. Examples include: a student that is ability diverse, meaning they have varying abilities and/or disabilities due to their mental, social-emotional, and/or physical abilities; culturally diverse, which are the similarities and differences between people and the way they live and interact with others; and/or linguistically diverse, which is how language is understood, spoken and used, as well as how many languages are known to an individual (Mincemoyer, 2017). These demographics determined what demographic questions needed to be asked in the pre-test survey (see Appendix B). The pre-test survey was used to recruit participants for my usability study.

Recruitment

Once the IRB was approved, a recruitment message for the study was sent out to instructors and departments at EWU so that interested students could take the attached pre-test survey (see Appendix B). The departments the recruitment message was sent to were Disability Support Services (DSS), the Multicultural Center, the Pride Center, Chicana/o/x Studies, Africana Studies, American Indian Studies, and Disability Studies. There was no incentive provided by my study for participants, but instructors and departments were told that they were welcome to give an incentive if they chose to do so.

A pre-test survey (see Appendix B) was used to gather student participants and to help inform the decision of who the chosen users were for the usability testing. The pre-test survey

included a consent form (see Appendix E) for participation in the study, questions about participants' demographic information and questions about their willingness to participate in the study. To determine whether a user was able-diverse, was disabled, or was diverse, the pre-test survey had participants self-identify and explain their diversities and/or disabilities. This criterion was decided upon because diversities and disabilities are on a broad spectrum and the willingness to share that information depended on the individual. It was important to let the participants choose if they wanted to divulge that information after being informed that they would not be discriminated against, and their personal information would not be revealed in the findings of the study.

In usability testing, small usability testing is a valid method of collecting data through a usability test. As a singular researcher with limited time to conduct usability testing, I decided to test between 10 and 20 participants. Smaller usability tests with smaller user participants have been found to find 80-85% of findings and problems that users encounter within the area of the product that is having usability testing conducted (Barnum, 2011). With this knowledge, usability research has acknowledged that having a smaller number of participants still leads to valid results and findings.

Out of the 81 responses to the pre-test survey, 25 possible users were chosen based on their willingness to participate in the study and their response to being able-diverse and/or disabled. The demographics from the 25 potential participants were compared to the demographics in the user matrix to identify which users fit the general demographic user groups best. After comparing the demographics of potential participants to the demographics of the user matrix, I took their listed diversities and narrowed them into groups so that I could

Table 1

User Matrix

	User 1A	User 2A	User 3A	User 4A	User 5B	User 6B	User 7B	User 8B
Age	18-22	27-30	31-40	51-60	18-22	23-26	31-40	41-50
Gender	Female	Non-Binary	Male	Female	Male	Female	Female	Non-Binary
Linguistic	Multilingual	Multilingual	Monolingual	Monolingual	Monolingual	Multilingual	Monolingual	Monolingual
Transfer, non-transfer, or international	Non-transfer	Transfer	Transfer	Non-transfer	Transfer	International	Non-transfer	Non-transfer
New and Current User	New	New	New	New	Current	Current	Current	Current
Internet Availability	Reliable	Unreliable	Reliable	Unreliable	Reliable	Unreliable	Reliable	Reliable
Device	Laptop, desktop and cell	Desktop	Tablet and cell	Tablet, desktop, and cell	Laptop and cell	Laptop and cell	Desktop, laptop, and cell	Desktop, and cell
Able Diverse or Disability	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note. A user matrix table with eight users on top and the demographic information on the left. The user types were decided based Eastern Washington University demographic research and United States demographic research.

get a representative sample for each of the many different diversities and demographics that were presented. This narrowed my participant list down to 21 possible users.Once the 21 participants were chosen, a welcome message was sent to decide a date and time that users were available for usability testing (see Appendix C). Of the 21 emails sent, 12 of the users responded. Once a date and time were scheduled, an email with necessary materials (see Appendix D) was sent the day before the assessment. These materials were the test document (see Appendix H), the test image (see Appendix I), and the Zoom link needed to get on a conference call to perform the usability testing. 11 users showed up to the scheduled meeting time and took the usability evaluation: three male, six female, and two non-binaries.

Procedures

While participant recruitment was occurring, two pilot studies were conducted with two additional students to understand how appropriate the test script, tasks, and data collection were. Small changes were made to the test script once the pilot study was completed. These changes included changing “Canvas message” to email and changing the posttest survey link to the correct link.

Usability testing took place between February and March 2021 on the date and time that the 11 student users were available. For the purposes of maintaining their anonymity, each participant was assigned an alias of “User #A” or “User #B” depending on if they were a newer user or an experienced user of Canvas.

- A newer user was determined if they had one to three quarters of experience using Canvas, which is effectively one school year or less.

- An experienced user was determined if they had four or more quarters of experience using Canvas.

The usability tests took place on participants' computers and tablets due to everyone working remotely during the pandemic. The usability test was recorded onto my computer, uploaded to EWU's Google Drive, and then deleted from my computer so that no user's personal information would be stored on any personal computer. The usability evaluation took about 30 minutes, including the introduction, review of the consent form, description of procedures, the actual usability evaluation, post interview questions, and a post evaluation survey.

The usability testing method used was summative usability testing (Barnum, 2011). Summative usability testing is done when a product, service, or tool is finished so that it can be determined if it still meets the requirements of its users (Barnum, 2011). Since Canvas is already a developed learning management system (LMS) and this small study was conducted to understand if it still meets the needs of diverse student users, it was determined that a summative usability test should be conducted. Furthermore, the usability testing done was a small study, which uses the steps of "defining the user profile, create task-based scenarios, use a think-aloud process, and make changes and test again" (Barnum, 2011) to recruit users and collect data and findings.

Data Collection

At the beginning of the usability test, it was explained to participants that they would be recorded while going through a series of tasks. They were told to speak their thoughts and actions out loud, that their facial expressions were recorded and their screen video was

captured in order to accurately gather information such as touchpoints, time, completion, and error scale (Barnum, 2011). Users were then given the scenario of being an English 101 student trying to complete assignments commonly found in an English 101 course at EWU.

To get users comfortable with the testing process, which included thinking aloud and saying when they were done with the task, a practice task of finding a module and reading its contents out loud was given. Afterwards, users were asked to complete the five usability assessment tasks. As an English 101 teacher, I was able to create a fairly accurate representation of tasks in an EWU English course. There are a mixture of common tasks found in most courses and English specific tasks that are typically only found in English or Composition courses. The common tasks included in this assessment were:

- submitting a document to an assignment (task 1);
- replying to a discussion board (task 2);
- viewing general instructor feedback (task 3);
- replying to an announcement (task 5).

The tasks that were English or Composition course specific were:

- viewing instructor feedback that was made directly on an essay (task 3);
- making peer review comments on a peer's essay (task 4).

Once the tasks were completed, the participants were asked a series of interview questions about their experience (see Appendix G). Afterwards, they were sent a SurveyMonkey link over the Zoom chat so they could complete a posttest survey. This was done to gather further information about their experience.

To gather and collect data, both qualitative methods and quantitative methods were used as seen above. Qualitative data was gathered through the think aloud protocol, the posttest interview, the written notes in question 10 of the posttest survey, and the observation notes. Qualitative data was used to understand user error and the types of user error they faced, as well as what tasks were most difficult for them. Quantitative data was gathered through the recordings to determine time-on-task and user clicks, questions one through nine in the posttest survey, and the completion of the task.

To ensure user anonymity and privacy, all of the collected data was secured through Google Docs, Sheets, and Drive as well as through SurveyMonkey so that none of the users' personal information would be stored on personal computers. The surveys that were conducted before and after the usability test were done through SurveyMonkey. Furthermore, the usability testing and recording of users was done through Zoom since it had the capabilities to screenshare and record.

Results

The following section will discuss the results of the data collected from the usability tests. This includes the time on task, user clicks, completion rate, errors and their severity, and common patterns that were found with each task. The Error Severity Scale was used to determine the severity of the error a user faced. The scale determined if an error was cosmetic, serious, or catastrophic (see Figure 1 for definitions). Additionally, the results of how newer Canvas users did in comparison to experienced users will also be discussed.

Task 1

For task one, the participants were asked to find the next assignment due and submit

Figure 1

Error Severity Scale

ERROR SEVERITY SCALE

Rate	Category	Severity Description
1	Catastrophe	User cannot complete task; or user can complete the process but expresses extreme irritation at the process; or user needs assistance
2	Serious	User is frustrated but get through it; suggests that others may be less inclined to put up with the inconvenience or that frustration will be high
3	Cosmetic (minor)	User may hesitate or pick the wrong option, but user corrects it without incident; or user expresses minor irritation or annoyance, but it doesn't affect ability to complete task.

Note. An explanation of the error scale used in this usability assessment ranging from small (cosmetic) errors to big (catastrophe) errors. This is sourced from: Crane, K. (2020). Data collection methods_v2020. [PowerPoint slides].

the test document there. On average it took 10 clicks, which are touchpoints, and 90 seconds to complete. It was the third most difficult task to complete with five users unable to finish the task properly and six were able to complete it. Of the five users that were unable to complete the task, two were current users and three were newer users. There were five catastrophic errors for task one (see Figure 2) because one experienced user was unable to find the assignment and the other four users submitted to the discussion board instead of the next assignment due. For the posttest survey results on questions six through nine, users could check all that applied to their experience with the task which was why there are more than 11 responses in these upcoming results. In the posttest survey results, three users thought it was unnecessarily complex, one found it cumbersome to do, three thought it was unusable without prior instruction, and nine users thought it was easy to use and well-integrated.

Task 2

Task two asked participants to find the next discussion board assignment due and reply

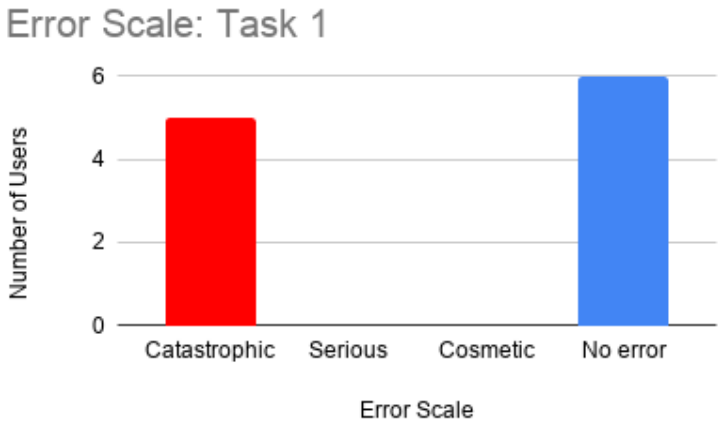
to the discussion board with four items: the test document, the test image, a short sentence, and a URL link. It took 23 clicks and 140 seconds on average to complete the task. Three users were unable to finish the task and eight were able to complete the task. Of the three that were unable to complete the task, two were current users and one was a newer user. However, while many were able to complete this task, there were six errors, three were catastrophic, one was serious, and two were cosmetic. Five users had no errors (see Figure 3). There were five participants that believed this task was unnecessarily complex, two that thought it was cumbersome to use, two users that thought this task would be unusable without any prior instruction, and seven that thought the task was easy to do and well-integrated. The biggest issue that users had with this task was the inability to attach the image and the document.

Task 3

For the third task, users were asked to find the instructor feedback for an assignment and speak out loud three instructor comments that were given as feedback. It took users on average 11 clicks and 100 seconds to complete. Only five users were able to complete this task while the other six were unable to finish or complete the task. Out of the five users that were unable to complete the task, three were newer users and two were current users. For errors, there were six catastrophic, one serious, two cosmetic, and only two users that had no error (see Figure 4). the post-survey results, seven users thought it was unnecessarily complex, four thought it was cumbersome to use, four thought that they would be unable to complete this task without prior instruction, and only three users thought it was easy to use and well-integrated. Finding the instructor comments that were directly on the users' essays was the biggest cause of error that student users faced.

Figure 2

Error Severity Scale Graph for Task 1



Note. This is a bar graph demonstrating the severity of errors and the number of users that encountered those errors for Task 1.

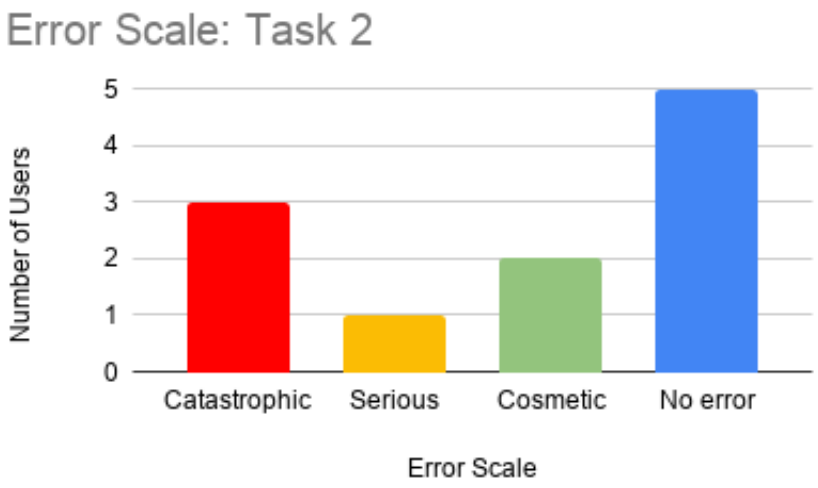
In

Task 4

Our fourth task asked the users to find their peer review partner on an assignment and write one submission comment and two comments directly on their peers' essay through Canvas. It took 11 clicks and 113 seconds on average for our users to complete this task. Only three were able to complete this task while the other eight could not finish. Of the eight users that struggled, four were current users and four were newer users. Ten users encountered an error with eight having a catastrophic error, two having a cosmetic error, and only one user not having any error with this task (see Figure 5). Eight users thought that this task was unnecessarily complex, seven thought it was cumbersome to do, five thought it was unusable without any prior instruction, and four thought it was easy to do and well-integrated. A common pattern of struggle was the inability to write a direct comment on the essay as eight users were unable to do so.

Figure 3

Error Severity Scale Graph for Task 2



Note. This is a bar graph demonstrating the severity of errors and the number of users that encountered those errors for task 2.

Task 5

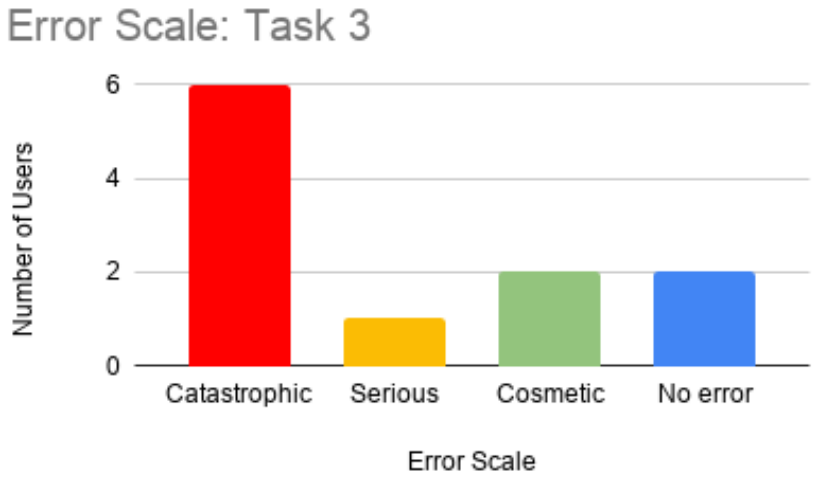
The fifth and final task was to find the most recent announcement and reply to the announcement with a short sentence. On average it only took users five clicks and 36 seconds to complete. All of the users were able to complete this task with no errors. Only one user thought that it was unnecessarily complex, two thought it was unusable without prior instruction, and 10 thought it was easy to use and well-integrated.

Analysis

The analysis will cover the collected data from the results section, including time-on-task, user clicks, completion, errors, and what the data showed about new versus experienced users means. Any patterns and areas of struggle are also explained. The interview notes will also be included in the analysis with the observations that were noted during the usability tests. Furthermore, learnability will also be noted and elaborated on using by Whitney Quesenbery's

Figure 4

Error Severity Scale Graph for Task 3



Note. This is a bar graph demonstrating the severity of errors and the number of users that encountered those errors for task three.

(2003) five dimensions of usability. This is also known as the five E method because the five components are: effective, efficient, engaging, error tolerant, and easy to learn (Quesenbery, 2003). As a brief overview, *effective* is how completely and accurately users can do a task, *efficient* is how quickly and accurately a user can complete a task, *engaging* is how satisfying and pleasant the product interface is to use, *error tolerant* is how the product is preventative towards errors and promotes recovery from those errors, and *easy to learn* is how well a user can learn to use a product and continue to learn with more complex tools within the product (Quesenbery, 2003). For exact definitions see Table 2.

Task 1

When users were doing task one, many struggles, patterns, and areas of the five Es became apparent. On average, it took users 111 seconds and 10 clicks to do the task with an outlier being user 2B, who struggled with major anxiety and spent 332 seconds and 17 clicks

Figure 5

Error Severity Scale Graph for Task 4

Note. This is a bar graph demonstrating the severity of errors and the number of users that encountered those errors for task four.

wandering around Canvas explaining their struggles and why they were so frustrated with trying to find the next assignment due. They did end up on the assignment page and explained how to submit the assignment but were unsure if that was the next assignment due, leading them to eventually giving up and moving to the next task.

I do want to mention that since the user focus group are diverse students, I hesitate to call user 2B an outlier as they represent a user group that exists in the diverse student body that should be represented. That is why when an outlier is mentioned, they are still considered a valid part of the user research that adds insight into the analysis, even though they did not follow the majority. When 2B was removed from the task one data, the average time was 89 seconds and average clicks was nine. There were two users that were efficient at this task. The most efficient time was 43 seconds to complete and the most efficient clicks to complete the task was six clicks. When evaluating the average clicks to the most efficient clicks, it shows how

Table 2

Whitney Quesenbery's Five Dimensions of Usability

Effective	The completeness and accuracy with which users achieve their goals.
Efficient	The speed (with accuracy) with which users can complete their tasks.
Engaging	The degree to which the tone and style of the interface makes the product pleasant or satisfying to use.
Error tolerant	How well the design prevents errors, or helps with recovery from those that do occur.
Easy to Learn	How well the product supports both initial orientation and deepening understanding of its capabilities.

Table 1 *The Five Dimensions of Usability with their definitions by Whitney Quesenbery including definitions for effective, efficient, engaging, error tolerant, and easy to learn (Quexenbery, 2003).*

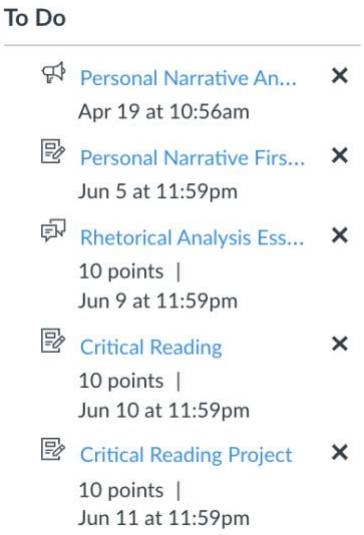
users struggled to effectively and accurately do this task.

Five users, three were newer Canvas users and two experienced, were unable to complete the task which led to five catastrophic errors. User 2B spent a lot of time navigating around Canvas to find the assignment. However, their stress about not knowing the due date caused them to never submit the test document to the assignment. They looked and interacted with the to do list on the home screen multiple times, even though they stated, "I never use the to do list because it is so confusing" which was attributed to the lack of understanding that the icons indicated what type of task it was (see Figure 6).

The other four users encountered difficulty with the available until date information. It was listed first under the assignment title causing users to think it was the due date (see Figure 7). This was a clear issue of engagement as the label 'available until' was either difficult to read or did not draw the attention of the users, leading them to the wrong assignment. Instead, they

Figure 6

To Do List on Canvas

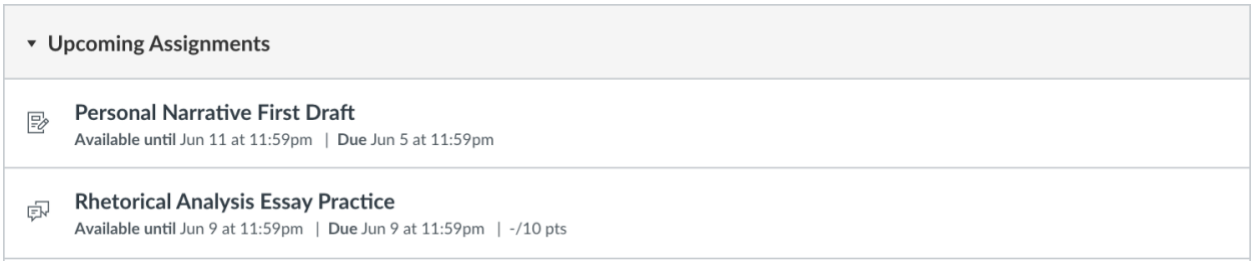


Note An image of the to do list from the test course. The icons on the left indicate the type of to do (assignment, discussion, announcement, etc.) followed by the title and date.

were led to the discussion board where they submitted the test document. User 1A even returned to the assignments tab to make sure the date they looked at was correct. After seeing the available until date, they returned to the discussion board feeling more confident. The six users that completed the task never looked at the due date and instead trusted that the top assignment listed on the assignment page was the next one due. This speaks to the error tolerance of this task with certain users being led to the wrong assignment, even after one user double checked, and other users relying on the interface which prevented a lot more errors from occurring. An important thing to note was that all users were comfortable submitting the test document once they were led to the proper assignment (in order to prepare for tasks three and four), so the isolated issues were the dates and the to do list being confusing.

Figure 7

Upcoming Assignments on Canvas



Note. An image of the assignment dates through Canvas with the available until date first and the due date second.

The next analysis was how the post survey results matched the actual data of users were able to complete task one. Three of the five users that were unable to complete the task replied that this task was complex and cumbersome while the rest mentioned that it was easy. While this did not quite match the five incompletes and six completes, it was important to remember that submitting the document was easy for all users, but finding the correct assignment was difficult. Three users also thought that prior instruction was needed to complete the task, with one response coming from a user that completed the task without issue. An important finding was that these responses were not quite reflective of the actual issues that these users faced, with more users facing difficulties, but the submission of the document was also not very challenging for many. This means the analysis of the ease of learning was slightly complex, as many users thought it to be easy, but a good portion of users encountered the same error. This could be a result of once prior experience or instruction has been encountered, there would not be a high need for repeated instruction to complete the task.

Looking at the data to see how newer users' experience with Canvas compared to experienced users, was another important aspect to examine for each task. For the completion of task one, three of the five newer users were unable to complete the task, while two of the six experienced users were unable to complete it. This indicated that the ease of learning was lacking for newer users and experienced users who had limited experience with or had never encountered available until dates before, but once the system was learned, it was easy to use. Overall, newer users had more issues with task one but both newer and experienced users expressed similar frustrations.

Task 2

To complete task two, users had to reply to the discussion board with four items: the test document, image, URL, and a short sentence. The number of items to complete in this task meant it took users longer and more clicks overall than the other four tasks to complete. On average it took users 174 seconds and 23 clicks to do the task. However, user 2B was an outlier for time in this case with them spending 543 seconds on this task. This was due to them not remembering what a discussion board was at first, then not thinking it was the correct discussion board because they were used to a lot of replies being available on the discussion board already, and then spending a lot of time trying to drag and drop the test image into the general discussion board textbox. This user explained that a big issue they had was spending "more time trying to figure out how to do the mechanics of the lesson than what I am learning" which was reflected within these first two tasks. When 2B was removed from the data, the average time was 137 seconds for the remaining users. When compared to the most efficient user, who spent 77 seconds and nine user clicks completing the task, it can be understood that

this task was difficult for many users. Furthermore, it was noticeable that the efficiency on doing the task in a timely manner as well as the effectiveness of being able to do the task with the least number of clicks was not very high which was due to certain errors that will be explained.

The effectiveness of the task was shown with only three users were unable to complete the task. While there were more errors when compared to task one, the errors were less severe with three were catastrophic, one was serious, and two were cosmetic. This shows the lack of error tolerance with the task. The two users, one newer and one experienced, that decided to go to the assignment tab first encountered the issue of not being able to identify which assignments were discussion boards. With the only assignment type indication in the assignment tab being the icons, and the lack of attention to icons in the to do list from task one, it was a clear indication that the icons do not help users (see Figure 6). This also indicates users being unfamiliar with them or not noticing them in general which points to a lack of engagement with the LMS interface.

There were three users that were unable to attach two items to a discussion board reply. One newer user was able to recognize that their second attachment replaced their first which made them frustrated. The other two users that experienced this problem never noticed and believed that they completed the task, not understanding that only one item could be attached. This caused users to fail to complete the task without knowing, but when the user discovered the discrepancy, it caused a great deal of frustration. Another struggle area was three users experienced some question about the upload image screen (see Figure 8). One user that encountered this issue mentioned “hmm, I don’t think that is what I want and I am a little

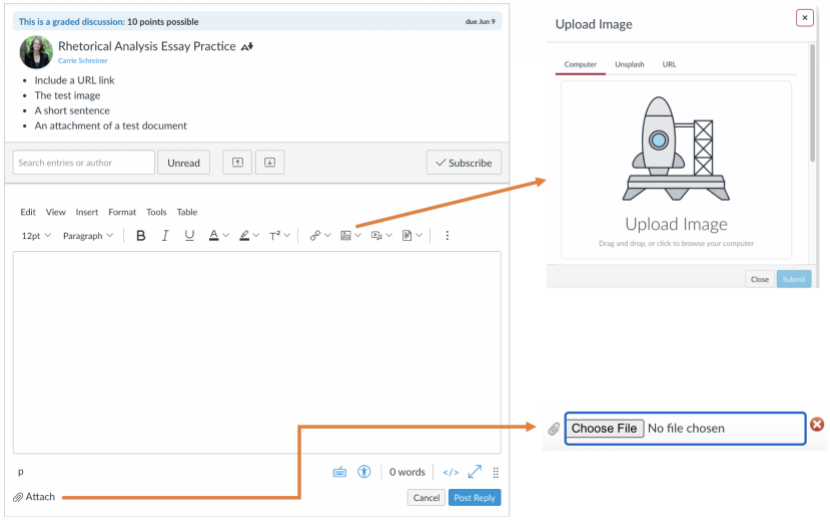
confused." This was because the icon overtakes the screen while the instructions are small and gray at the bottom. One user also tried to attach a document but was unsuccessful due to the red X next to the attachment leading them to believe it was not attached properly. They stated, "I seem to have done something wrong since this was here [points to the X]" which indicates that the visual has multiple meanings of removing the attachment and the attachment not being loaded properly. These areas of struggle indicate that there are many ways to complete this task, but those pathways have a low error tolerance due to areas not being engaging to the user.

Understanding if the task was easy to learn was another area to examine. The post-survey results had four users stating that the task was cumbersome or unnecessarily complex. Two of these users went to the assignment page but were unable to find it, one user had a cosmetic error, and one user had no errors when completing the task. It was surprising to find that the one user who identified their double attachment not working said that the task was easy and well-integrated. Seven users thought this task was easy and well-integrated which included the two users that never realized the attachment error. Surprisingly, only two users thought that this task needed prior instruction to be able to complete it. This indicates that this task was fairly easy to learn but has some deceptive errors that users would not realize until the assignment was graded and points were lost for the assignment.

Next, it was important to see how newer and experienced Canvas users were affected by task two to understand if experience with the LMS had an impact on the results. The completion rate differs from the number of errors as one newer user and two experienced users were able to complete the task while three newer users and three experienced users

Figure 8

Discussion Board on Canvas



Note. An image of the discussion board and the task relevant overlays that appear when a button is clicked on. This includes the attached button and the image upload button (which is very similar to the document upload button).

encountered errors while completing the task. This explained that there were more experienced users that could not complete task two but both newer users and experienced users ran into the same number of frustrations. This indicated that the ease of learning was lacking for users, but once they were familiar with the task, the discussion board was found to be easy to use.

Task 3

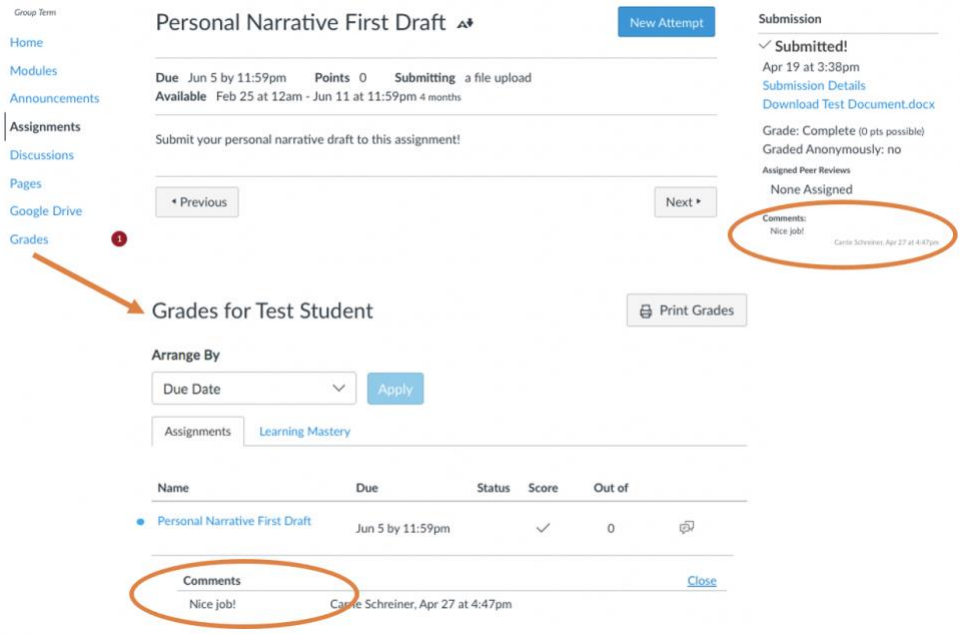
Finding the three instructor feedback comments on an assignment for task three was surprisingly difficult for most users. As mentioned in the methodology, tasks one, two, part of three, and five were tasks that most students have some experience with as they are common in most online courses at EWU. Task three was different, as instructor feedback in the form of submission comments seemed to be relatively known, but direct essay comments from

instructors were hard for users to find. Users likely struggled with direct essay comments as that was more of an English course function and was unfamiliar. It took users on average 100 seconds and 11 clicks to do the task. User 4B was an outlier and found the submission comment on the assignment page but did not spend any time or clicks trying to find the direct essay comments, ending the task at 47 seconds with two clicks. The average time and clicks without user 4B was 105 seconds and 12 clicks. In order to understand the efficiency of this task I compared the average time to complete the task to the most efficient learner's time. The fastest time of a user that completed the task was 51 seconds with seven clicks. The average times to complete the task were double what the most efficient user spent, and the average clicks were four or five higher than what the most effective user used. This comparison shows that the efficiency and effectiveness of this task in not very good due to low error tolerance and lack of experience with this task.

There were analyses on patterns of struggle that were found for this task. Six users, four were experienced and two were newer, used the grades tab to find comments from the instructor while five users, three newer and two experienced, used the assignments tab. This indicates that both the grade tab and assignment tab should be available for users to find instructor feedback for greater usability. On the assignment page, three users used the submission details button to access the feedback, but two experienced users were guessing or unsure when they clicked it. This indicates that either the label "submission details" or that button in general was unused by most users, making it an unengaging part of the user interface. Three users, two newer and one experienced, went to the peer review partner instead, causing one user to never find any comments and two to get confused when finding the comments.

Figure 9

Instructor Submission Comment on Canvas



Note. An image of the assignment and grades tab. The circles are where submission comments can be found.

This finding was due to a user not reading the headers on the assignment page and the peer review submission page, along with the confusion of the submission details and peer review pages looking almost identical. One experienced user even mentioned “I normally click ‘view feedback’ and I can see the instructor comments, but there are no comments here” when they were on the peer review page instead of the submission details page. This also points to engagement issues because users were unable to find or watch for the headers that indicated the windows were different, leading them to were confused or unaware about the layout and where to find that information.

Other patterns appeared in conjunction with the type of comment that users were looking for. Finding submission comments was a common task for many users and those

comments could be found in multitudes of ways. Two users found the comment on the assignment page, two found the comment in the grades tab, and five found it on the submission details page. However, even with three ways of finding the comment, two users never found this type of comment indicating that previous experience or prior instruction was required to know where to find this feedback. The other type of comment users looked for was instructor feedback directly on a submitted document. This was less common for general users and was more often found in English courses or courses with extensive writing assignments, which may be why these four users were never able to find this type of feedback. Three users clicked on the word document title (left of the view feedback button) but were confused when it started downloading their essay. This indicated that the lack of a download label leaves users thinking it will open up their document through Canvas when it actually downloads it. Three of the users that did find the direct comments on the essay faced some trouble with the small view feedback window with user 6B even exclaiming “Why was it so tiny?” and “I just want it bigger so stop moving.” This indicated that some users are never able to find this comment without prior instruction or experience and those that do find it may encounter more problems with the inability to read comments due to the small window size. It also indicated that users do not know how to enlarge the window.

The number of frustrations with this task was much higher in the posttest survey results which was reflective of the high error and incomplete rate. Nine users thought that this task was unnecessarily complex or cumbersome to do. All but one user that completed the task, which happened to be our most efficient user, mentioned that it was cumbersome or difficult which makes sense as most of them encountered an error while trying to complete. There were

only three users that thought it was easy to use and well-integrated while four users thought that prior instruction was needed. While there was a higher response of users needing prior instruction to do this task when compared to the previous tasks, it was surprising that only four mentioned the need as the data results indicate that quite a few users needed instruction. These results when paired with the responses of the posttest survey, do indicate that this task was difficult to learn without prior experience or instruction.

The next area of analysis was to see whether experience with Canvas plays a role in how users were able to do the task presented. For the completion, three newer users and three experienced users were unable to complete it. While the same three newer users that failed to complete the task encountered errors, all six experienced users encountered an error of some capacity during the task. Overall, it can be determined that experience using Canvas had less of an impact on how well the users did on this task. Instead, nine of the 11 users faced different and varied areas of struggle with this task.

Task 4

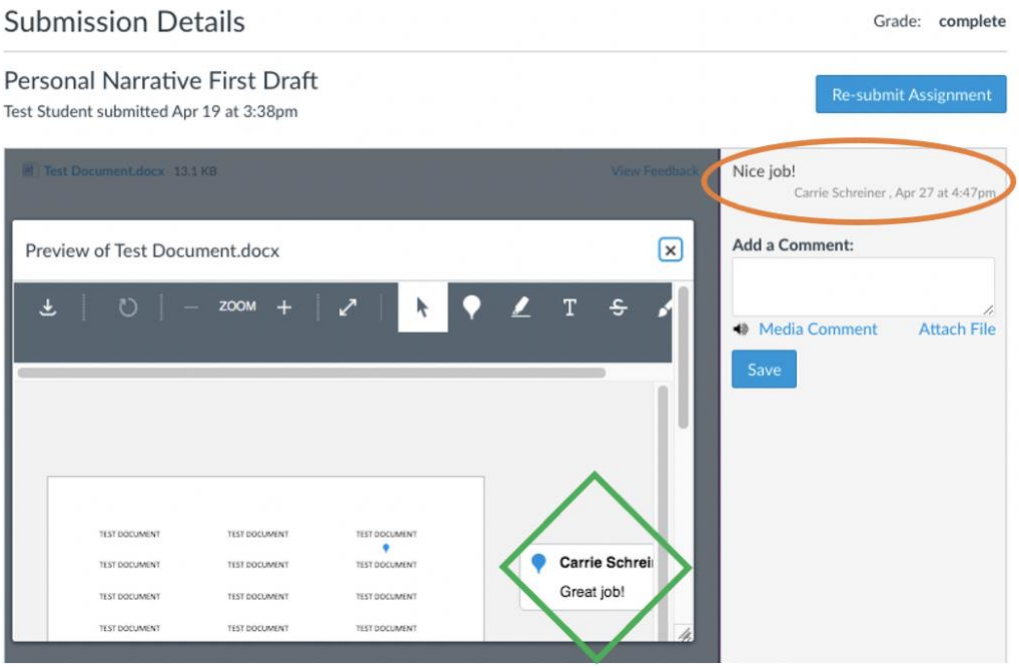
Similar to task three, task four asked the users to find their peer review partner's essay and give them one submission comment and one direct essay comment (see Figure 10). Task four was similar to task three because the layout of the submission details page and the peer review page are practically identical. However, instead of finding comments like they did in task three, they had to give comments to their peers. This was more commonly an English course task, so many users had not encountered this prior to the usability assessment which was represented with three users exclaiming this out loud. It was also analyzed that this was the reason why task four took users the second longest amount of time out of all the tasks with an

average time-on-task of 114 seconds. It also took users an average of 11 clicks to do the task. The most efficient user completed the task in 51 seconds and 12 clicks, which indicated an even higher rate of inefficiency when compared to task three. The average amount of clicks was lower than the most efficient user's clicks, which indicated users had a lack of navigational attempts when completing the task. Many users gave up quickly which impacted the effectiveness of completing the task. It was also the task with the highest number of incompletes and errors which leads us to examine why this was the case.

There were two comments students needed to provide to their peers, a submission comment through the "add a comment" section on the side and one directly on their peer's essay (see Figure 10). The only user that was unable to find their peer was user 2B who spent their time scanning the assignment page and then wandering through the Canvas course looking for it elsewhere. All users except for 2B were able to make a submission comment. Most of the errors were encountered when making the direct essay comment. Out of the six users that found the view feedback button, two were unable to complete the task because they scrolled down the smaller window too fast and the tool bar disappeared, leaving them thinking there was no way to add a comment in the small view feedback window. This indicated poor error tolerance and engagement when this type of error happens. Four users, two newer and two experienced, never found the view feedback button which was interesting because two of these four users found the view feedback button in task three while the other two did not, indicating the task was not easy to learn. This could be due to the label 'view feedback' being inappropriate for peer review, which was an engagement issue on the user interface. The previous three users from task three who were confused when they clicked on the Word

Figure 10

Submission Details Page on Canvas with Instructor Comments



Note. An image of the submission details page. The orange oval is where the submission comment can be found and the green diamond is where the direct essay comment can be found.

document title and it downloaded, again experienced this same error with task 4. Additionally, another newer user also encountered this struggle in task four. One experienced user used this download to their advantage, making the comment on the Word document. However, they ended the task without ever uploading it back to Canvas making it incomplete. These errors showed the lack of error tolerance that this task has.

Looking at the posttest survey results in comparison to the data results, task 4 was the hardest task for these users to do. All but one user indicated that this task was either easy to use or complex to use and this task had the highest number of users choosing both options. The one user who did not indicate either was a user that was unable to finish the task. While four users thought this task was easy to do and well-integrated, six users thought that they would

need prior instruction in order to complete the task, making task four have the highest response rate to it being complex, cumbersome, and needing to have prior instruction. This shows how the lack of prior experience or instruction impacts the user efficiency, effectiveness, and ease of learning of the task.

There was not a noticeable difference between newer and experienced Canvas users for task four. Four newer users and four experienced users were unable to complete the task. The number of errors was similar with four newer users having encountered an error while all six experienced users encountered an error. This means that eight out of 11 users were unable to complete the task and 10 of 11 users encountered an error. Overall, the number of errors and incompletes for both experienced and newer users indicated that this task was difficult for all users of Canvas, regardless of experience.

Task 5

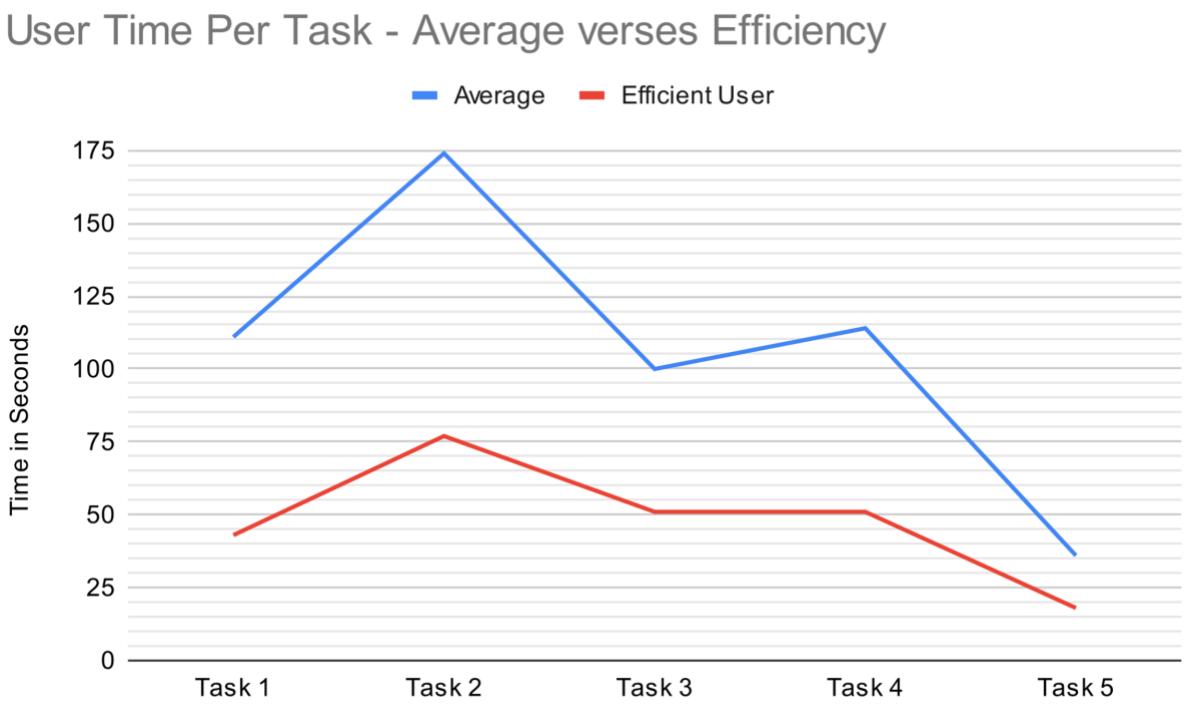
Task five was not a problem for any of the users as they were all comfortable replying to an announcement. All users were able to complete the task without any frustrations or errors. On average it took users 36 seconds and five clicks to complete. The most efficient user spent only 18 seconds and four clicks to complete the task. Only one user thought it was unnecessarily complex, while two users thought that the task was unusable without prior instruction. However, 10 users thought that it was an easy task and was well-integrated. Therefore, it was concluded that there was not much issue being able to complete this type of task.

Analysis Recap

Task one and two had errors that were encountered due to icons being the only assignment indication, the available until date being listed first, the discussion board only allowing one attachment, and the uploading of images and documents being confusing. Task three and four had errors that were due to users not understanding how to access direct instructor comments on essays nor how to give comments to their peers. Furthermore, the average time-on-task efficiency (see Figure 11) and the average user clicks (see Figure 12) for tasks one through four were significantly higher than the most efficient users which was an indication of the lack of effectiveness, efficiency, and error tolerance of the Canvas LMS.

Figure 11

User Time per Task – Average verses Efficiency Line Graph

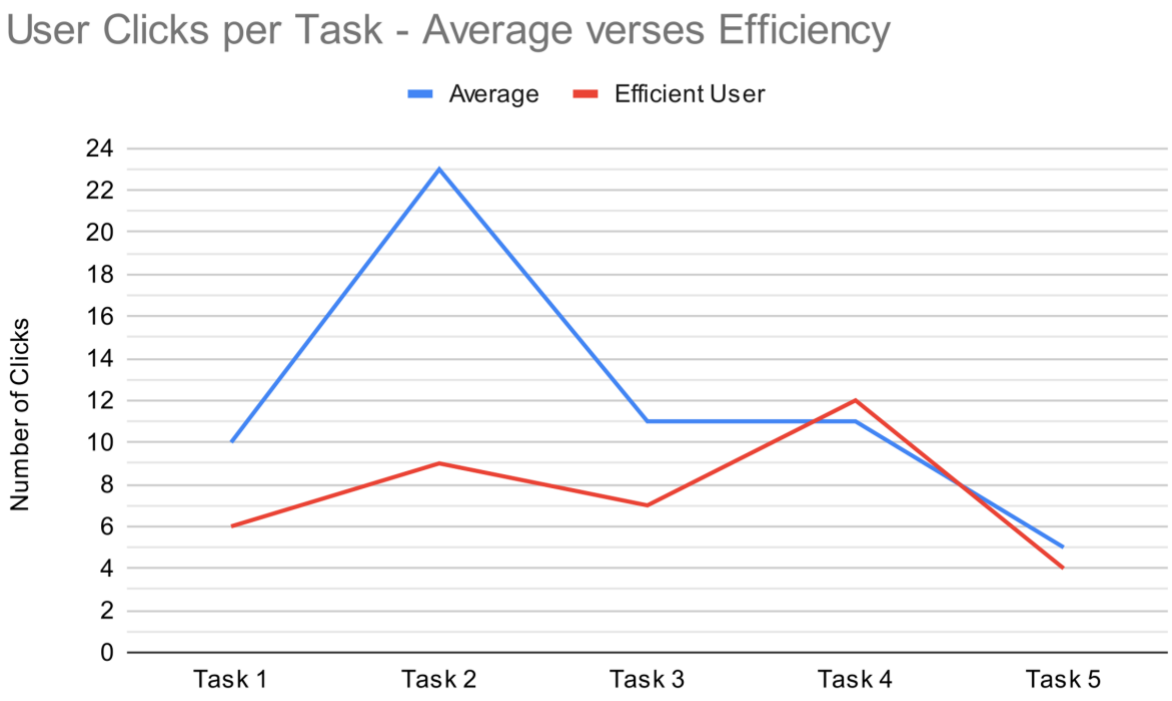


Note. A line graph depicting the average time per task for all tasks.

The learnability between task three and four was surprising since they were similar in how to complete the tasks. As one can see in Figure 11 and Figure 12, the time and clicks it took to do task three was lower when compared to task four, indicating that the learnability between the similar interfaces was low. This was especially interesting since two of the four users that never found the view feedback button in task four found it in task three. These analyses are important for instructors to know about so they can improve their courses' accessibility and usability, which will be explained further in the discussion section.

Figure 12

User Clicks per Task – Average verses Efficiency Line Graph



Note. A line graph depicting the average user clicks per task.

Discussion

As seen above, successfully completing coursework can be difficult for students, and doing this in an online only format due to a pandemic adds its own challenges, where outreach for questions and concerns are limited even further. These significant barriers to success lead to frustrations, impairments, and failure for students (Draffan & Rainger, 2006; Fruehwirth et al., 2021; Walters, 2010). By understanding the usability issues in the online LMS Canvas, instructors can identified what they can do to improve diverse students' learning experiences and success within the LMS. In this discussion, recommendations for instructors and universities will be given based off the usability assessment's analysis and results. In addition, limitations of this study and suggestions for further research will be discussed.

The findings of task one and two made it apparent that students struggled with available until dates, icons, and attaching multiple items in a discussion board. The university should provide a basic Canvas tutorial to new and transfer students that explains the icons and elaborates on the basic functions that students will need to succeed in their classes. Instructors should include these instructions in their course material as well. For instructors that use the available until dates in Canvas, it is important to explain at the beginning of the quarter how to find the due dates of assignments. The same is recommended for instructors that require multiple items to be attached or for anything that needs to be uploaded to discussion boards. Instructional videos and written instructions would be beneficial for students to efficiently complete the assignment rather than struggle to figure out the mechanics of the LMS (Hovde, July 16-17, 2015; Warner & Hewett, 2017).

For tasks three and four, which were specific English course tasks, the findings presented that locating direct essay comments and giving peer review feedback was extremely difficult for student users to do without prior instruction. Both experienced and newer student Canvas users did poorly on these tasks indicating that instructions and a usable interface design are beneficial for all experience levels of users (Hovde, July 16-17, 2015). For discipline specific tasks, instruction in multiple formats to provide the greatest accessibility to diverse and disabled students needs to be provided by instructors to help students complete the tasks efficiently and effectively. This is critical as previous research has found that providing support through detailed but clear and simple instruction improves students' confidence, ability, and efficiency to complete the task work assigned to them (Alexander, 2013; Alshammari, 2020; Hovde, 2015). This leads to a development of positive attitudes towards the LMS, leading to less difficulties with the technology and motivates students to use the LMS (Alshammari, 2020; Robinson, 2016).

Since the LMS is a system that provides instructional spaces and tools to make course content more accessible for students (Rao & Tanners, 2011), it is important for instructors to utilize these functions and tools to provide instructions in a variety of formats so that they are accessible to diverse and disabled student users. As seen with all users, but especially with user 2B, if the LMS and course design are not easy to use or transparent in how to complete a task, the student users spend more time on the areas of interaction with the LMS rather than the content they are learning (Hovde, July 16-17, 2015). Even worse is that by task three and four, student users were giving up when the task instructions were not clear, indicating a lack of tolerance for assignments and course designs that are not usable, accessible, and

understandable. That is why it is so important for instructors to gather student feedback through usability testing and correlate these insights about their struggles with the LMS (Hovde, July 16-17, 2015).

Some researchers have suggested using formats such as videos and illustrations as instructional formats (Nakamura et al., 2019). Others advocate that there are benefits and struggles to video instructions, visual instructions, and print (written out) instructions (Alexander, 2013). The benefits of video instructions are a higher comprehension rate and ability to understand how-to tasks, whereas visual instructions benefited visual learners, and print instructions were found to be more usable since users could find the information they needed faster (Alexander, 2013). As instructors using technical communication skills, we need to consider the most vulnerable student user group's frustrations and learn how to create a better course design that benefits them (Oswal, October 4-6, 2019). By providing multiple instruction formats, instructors can provide more accessible instructions and assignments for all of their students. It is also recommended that universities support their instructors by providing workshops and materials on how to create accessible course materials because supporting students with accessible courses requires a community that makes continuous efforts to create an accessible society (Huntsman et al. 2019).

It is important to understand that creating these instructions is more work on both the instructor's and university's part, but this is critical in creating an accessible classroom that benefits all learner types and students. We must recognize that disabilities and diversities are not "located in a single impairment but instead as existing in the limiting structures, designs, and products of the social and built environment" (Walters, 2010, p. 430). By using usability

testing and technical communication skills, instructors can become technically proficient in the LMS which helps them provide instructions on the mechanical aspects if an LMS and learning content needed for students to complete an assignment efficiently and effectively (Hovde, July 12-15, 2015).

Previous research has recommended universities provide training programs to instructors and students on the required LMS as it should not be the students who are required to seek support and assistance (Alshammari, 2020; Grabbinger et al., 2008). Instead, clear document design, course design, and instructional design that promotes accessibility for all students should be a natural implementation into courses and instructors can use their technical communication skills to do just this (Hovde, July 12-15, 2015; Huntsman et al. 2019). By providing a highly supported technical infrastructure, diverse students (and consequently all members of the student body) can navigate and complete course work with less stress and struggle because of a more accessible design.

Conclusion

My study had limitations due to the test course being based on EWU's English 101 course design. This means that further research on different courses and the tools they use needs to be done to discover how usable they are. Furthermore, the participants were not English 101 students at the time of this study, and some had never taken English 101 at EWU because they transferred to EWU. This study also had student participants from one university which may lead to the results and data findings being different if they were conducted at other higher education institutions. The same could be said about LMS other than Canvas.

While all users were able-diverse, diverse, and/or had a disability, the users did not cover all types of people. Therefore, further research with participants that have different disabilities or diversities should be conducted. In addition, research on instructor course layouts and their usability needs to be done in order to gather a better understanding of how the course layout impacts students and their needs. To conclude, this usability assessment is one small study of a larger user group and larger online learning platform. To better understand the usability of this online learning platform or diverse students, a longer period of research and studies should be conducted.

While instructors may have limited abilities in changing the actual learning management system itself, the support of their university and knowledge of technical communication skills can empower instructors to make their classrooms usable and accessible to all students. Usability testing is necessary in pinpointing the exact stress points that diverse students face so that instructors can make adequate course design changes such as instructions for both the assignment and the LMS mechanics needed to complete the assignment. Technical communication skills, such as technical writing and usability, can help teachers create clear instructions for all tasks and design their courses to be usable and accessible for all of their students.

References

Alexander, K. P. (2013). The usability of print and online video instructions. *Technical Communication Quarterly*, *22*(3), 237–259. https://doi.org/10.1080/10572252.2013.775628

Alshammari, S. H. (2020). The influence of technical support, perceived self-efficacy, and instructional design on students' use of learning management systems. *Turkish Online Journal of Distance Education*, *21*(3), 112–141.

Babu, R., & Singh, R. (2013). Enhancing learning management systems utility for blind students: A task-oriented, user-centered, multi-method evaluation technique. *Journal of Information Technology Education: Research*, *12*, 1–32.

Barnum, C. M. (2011). *Usability testing essentials: Ready, set-- test*. Morgan Kaufmann Publishers.

Bartolotta, J., Bourelle, T., & Newmark, J. (2017). Revising the online classroom: Usability testing for training online technical communication instructors. *Technical Communication Quarterly*, *26*(3), 287–299. https://doi.org/10.1080/10572252.2017.1339495

Cassidy, S. (2016). Virtual learning environments as mediating factors in student satisfaction with teaching and learning in higher education. *Journal of Curriculum and Teaching*, *5* (1), 113–123.

Crane, K. (2020). Data collection methods_v2020. [PowerPoint slides]. https://canvas.ewu.edu/courses/1383493/files/65179140?module_item_id=10768417

Crane, K. Out of industry, into the classroom: UX as proactive academic practice. Crane, K. and Cargile Cook, K. (Eds.). *User experience as innovative academic practice*. WAC Clearinghouse/UC University Press. (in press).

Coy, K., Marino, M. T., & Serianni, B. (2014). Using universal design for learning in synchronous online instruction. *Journal of Special Education Technology*, *29*(1), 63–74. https://doi.org/10.1177/016264341402900105

Draffan, E. A., & Rainger, P. (2006). A model for the identification of challenges to blended learning. *ALT-J: Research in Learning Technology*, *14*(1), 55–67.

Eastern Washington University. (2020). Student enrollment & demographics. *Office of Institutional Research*. https://inside.ewu.edu/institutional-research/factbook/enrollment/

Fathema, N., & Akanda, M. H. (2020). Effects of instructors' academic disciplines and prior experience with learning management systems: A study about the use of canvas. *Australasian Journal of Educational Technology*, *36*(4), 113–125.

Fathema, N., Shannon, D., & Ross, M. (2015). Expanding the technology acceptance model (TAM) to examine faculty use of learning management systems (LMSs) in higher education institutions. *MERLOT Journal of Online Learning and Teaching*, *11*(2), 210–232.

Fearnley, M. R., & Amora, J. T. (2020). Learning management system adoption in higher education using the extended technology acceptance model. *IAFOR Journal of Education*, *8*(2), 89–106.

Grabinger, R. S., Aplin, C., & Ponnappa-Brenner, G. (2008). Supporting learners with cognitive impairments in online environments. *TechTrends: Linking Research and Practice to Improve Learning*, *52*(1), 63–69.

Hovde, M. R. (2015, July 12-15). *Connecting in online technical communication courses: Addressing usability challenge for students and faculty members* [Paper presentation]. 2015 IEEE International Professional Communication Conference (IPCC), Limerick, Ireland. https://doi.org/10.1109/IPCC.2015.7235846.

Hovde, M. (2015, July 16-17). *Effective user experience in online technical communication courses* [Paper presentation]. Proceedings of the 33rd Annual International Conference on the Design of Communication, Limerick, Ireland. https://doi.org/10.1145/2775441.2775453

Huntsman, S., Colton, J. S., & Phillips, C. (2019). Cultivating virtuous course designers: Using technical communication to reimagine accessibility in higher education. *Communication Design Quarterly*, *6*(4), 12–23. https://doi.org/10.1145/3309589.3309591

Ifijeh, G., Osinulu, I., Esse, U., Adewole-Odeshi, E., & Fagbohun, M. (2015). Assessing e-learning tools in an academic environment: A study of availability and use among undergraduate students in a nigerian university. *International Journal of Progressive Education*, *11*(2), 76–87.

International Organization for Standardization. (2018). *Ergonomics of Human-System Interaction (ISO 9241-11:2018)*. https://www.iso.org/obp/ui/#iso:std:iso:9241:-11:ed-2:v1:en.

Mincemoyer, C. C. (2017) *CLAD – Cultural, linguistic, ability diversity – Are you self-aware?* Penn State Extension. http://bkc-od-media.vmhost.psu.edu/documents/HO_CLAD.pdf

Nakamura, W. T., Marques, L. C., Rivero, L., de Oliveira, E. H. T., & Conte, T. (2019). Are scale-based techniques enough for learners to convey their UX when using a learning management system? *Revista Brasileira de Informática Na Educação*, 27(1), 104–131. https://doi.org /10.5753/RBIE.2019.27.01.104

Nieves, L. H., Moya, E. C., & Soldado, R. M. (2019). A MOOC on universal design for learning designed based on the UDL paradigm. *Australasian Journal of Educational Technology*, *35*(6), 30–47.

Oswal, S. & Meloncon, L. (2017). Saying no to the checklist: Shifting from an ideology of normalcy to an ideology of inclusion in online writing instruction. *Writing Program Administration*, *40*(3), 61-77.

Oswal, S. (2019, October 4-6). *Breaking the exclusionary boundary between user experience and access* [Paper Presentation]. Proceedings of the 37th ACM International Conference on the Design of Communication, Portland, Oregon, USA. https://doi.org/10.1145/3328020.3353957

Oswal, S. (2019, October 28-30). *Disability, ICT and eLearning Platforms*. The 21st International ACM SIGACCESS Conference on Computers and Accessibility, Pittsburgh, PA, USA.

Palmeri, J. (2006). Disability studies, cultural analysis, and the critical practice of technical communication pedagogy. *Technical Communication Quarterly*, *15*(1), 49- 65.

Pass, K. (2013). Accessibility in the web design student. In Meloncon, L. (Ed). *Rhetorical accessibility: At the intersection of technical communication and disability studies* (pp. 115-134). Baywood.

Pearson, V., Lister, K., McPherson, E., Gallen, A.-M., Davies, G., Colwell, C., Bradshaw, K., Braithwaite, N., & Collins, T. (2019). Embedding and sustaining inclusive practice to support disabled students in online and blended learning. *Journal of Interactive Media in Education*, *2019*(1), 4, 1-10. http://doi.org/10.5334/jime.500.

Quesenbery, W. (2003) The five dimensions of usability. In Albers, M. J., & Mazur, B. (Eds.), *Content & complexity: Information design in technical communication* (pp. 81-102). Lawrence Erlbaum.

Robinson, L. (2017). Embracing online education: Exploring options for success. *Journal of Marketing for Higher Education*, *27*(1), 99–111. https://doi.org/10.1080/08841241.2016.1261978

Rao, K. & Tanners, A. (2011). Curb cuts in cyberspace: Universal instructional design for online courses. *Journal of Postsecondary Education and Disability,* 24(3), 211-229.

Rose, E. J. (2016). Design as Advocacy. *Journal of Technical Writing and Communication*, *46*(4), 427–445. https://doi.org/10.1177/0047281616653494

Santoso, H. B., Schrepp, M., Isal, R. Y. K., Utomo, A. Y., & Priyogi, B. (2016). Measuring user experience of the student-centered e-learning environment. *Journal of Educators Online*, *13*(1), 58–79.

Simoncelli, A., & Hinson, J. M. (2008). College students' with learning disabilities personal reactions to online learning. *Journal of College Reading & Learning*, *38*(2), 49–62. https://doi.org/10.1080/10790195.2008.10850308

Statista. (2015, December 10). Devices used to access the internet in the United States 2010-2015. https://www.statista.com/statistics/199055/devices-used-to-access-the-internet-at-home-in-the-united-states/

Technical Communication Body of Knowledge (TCBOK). (2021). *Definition of Technical Communication*. https://www.tcbok.org/technical-communication-body-of-knowledge/about-technical-communication/definition-of-technical-communication/

United States Census Bureau. (2015, October). Detailed Languages Spoken at Home and Ability to Speak English for the Population 5 Years and Over: 2009-2013. http://www.census.gov/data/tables/2013/demo/2009-2013-lang-tables.html

U.S. Census Bureau. (2018). *American community survey (ACS): Percent of households with high-speed internet access (metro)* [Data set]. SAGE Stats. http://data.sagepub.com.ezproxy.library.ewu.edu/sagestats/16219

U.S. Census Bureau. (2020). *American community survey (ACS): Percent of households with broadband internet (state)* [Data set]. SAGE Stats. http://data.sagepub.com.ezproxy.library.ewu.edu/sagestats/16339

Walker, D., Lindner, J., Murphrey, T., & Dooley, K. (2016). Learning management system usage: Perspectives from university instructors. *Quarterly Review of Distance Education*, *17*(2), 41–50.

Warner, R. Z., & Hewett, B. L. (2017). Technical communication coaching: A strategy for instilling reader usability assurance in online course material development. *Technical Communication Quarterly*, *26*(3), 300–313. https://doi.org/10.1080/10572252.2017.1339493

Wichadee, S. (2015). Factors related to faculty members' attitude and adoption of a learning management system. *Turkish Online Journal of Educational Technology - TOJET*, *14*(4), 53–61.

Wynants, S. A., & Dennis, J. M. (2017). Embracing diversity and accessibility: A mixed methods study of the impact of an online disability awareness program. *Journal of Postsecondary Education and Disability*, *30*(1), 33–48.

Wynants, S., & Dennis, J. (2018). Professional development in an online context: Opportunities and challenges from the voices of college faculty. *Journal of Educators Online*, *15*(1).

Appendix A: Recruitment Language

Student Email Recruitment:

Hello!

I am a current graduate student and English 201 instructor at Eastern Washington University (EWU). For my thesis, I am researching how usable Canvas (EWU's online learning platform) is for diverse students at EWU. This assessment is designed to learn how students use, approach, and operate the functions on Canvas as well as what your difficulties are in order to make improvements to help future students, faculty, and instructors use Canvas to best suit students' online learning needs.

I am looking for participants who would be willing to volunteer to participate in a brief pre-test survey (about 2 minutes), a brief consent survey (about 2 minutes), a Canvas usability evaluation (about 30 minutes), and a posttest survey (about 2 minutes).

If you would be willing and interested in participating in the usability evaluation, please complete the pre-test survey. The link is included below. If you are chosen to participate in the usability evaluation, you will be contacted via email with further steps.

I appreciate your time and consideration for helping me with this research!

Sincerely,

Carrie Schreiner

Pre-Test Survey Link: https://www.surveymonkey.com/r/B9LXKN9

Instructor or Department Email Recruitment Request:

Hello!

I am a current graduate student and English 201 instructor at Eastern Washington University (EWU). For my thesis, I am researching how usable Canvas (EWU's online learning platform) is for diverse students at EWU. This assessment is designed to learn how student users use, approach, and operate the functions on Canvas as well as what their difficulties are in order to make improvements to help future students, faculty, and instructors use Canvas to best suit students' online learning needs.

I would greatly appreciate your assistance in sending out this email requirement message to students. I am looking for participants who would be willing to volunteer to participate in a brief pre-test survey (about 2 minutes), a brief consent survey (about 2 minutes), a Canvas usability evaluation (about 30 minutes), and a posttest survey (about 2 minutes).

I will attach the email recruitment letter below and I greatly appreciate your assistance with this research!

Sincerely,

Carrie Schreiner
MA Student of English at Eastern Washington University

Student Email Recruitment Message Pasted Here:

Appendix B: Pre-test Survey

Pre-rest Survey Link: https://www.surveymonkey.com/r/B9LXKN9

Your participation is voluntary, and by taking a submitting this survey, you are giving consent. You have the right to stop the survey at any time.

1.What is your first and last name?

- _____

2. What is your email so that I can contact you if you are chosen for the study?

- _____

3. Are you a current student at Eastern Washington University (EWU)?

- Yes, I am a current student
- No, I am not a current student

4. What pronoun would you like to be addressed with?

- He/Him
- She/Her
- They/Them
- Other (please specify) _____

5. How old are you? Choose the age range you fit into. Note: By law you are not able to participate if you are under the age of 18.

- 0-17
- 18-22
- 23-26
- 27-30
- 31-40
- 41-50
- 51-60
- 61-70
- 71+

6. What is your linguistic background?

- Monolingual (fluent in one language)
- Bilingual (fluent in two languages)
- Multilingual (fluent in three or more languages)

7. How did you come to Eastern Washington University (EWU)?

- Non-transfer (you have been a student at EWU the whole time)
- Transfer (you transferred to EWU from another community college or university)
- International (you are an international student studying abroad at EWU)
- Other (please specify) _____

8. How reliable is your internet availability and connectivity where you live?
- Internet is reliable (little interruptions, loads quickly, dependable everyday)
- Internet is unreliable (interruptions occur frequently, loads slowly, not dependable on a day-by-day basis)
- Other (please specify) _____

9. How many quarters (Fall, Winter, Spring, Summer) have you used the online Canvas platform at EWU?
- First time Canvas user at EWU
- 1 quarter
- 2 quarters
- 3 quarters
- 4-6 quarters
- 7-9 quarters
- 10-12 quarters
- 13-15 quarter
- 16+ quarters

10. What device(s) do you use for EWU Canvas course work where you live? Choose all that apply:
- Desktop Computer
- Laptop
- Tablet
- Cellphone

The following questions relate to whether or not you are able diverse or have a disability. It is appreciated and understood that this is a sensitive issue for many people. However, in order to ensure that there are no barriers for able diverse students who use Canvas to learn, it is important that you are included and that your needs are recognized if they are not being met. In accordance to the Americans with Disabilities Act (ADA) and section 504 of the Rehabilitation Act, you will not be discriminated against nor will this information be publicized to anyone other than myself, Carrie Schreiner, who is the primary researcher and Dr. Kate Crane, who is a English professor at EWU overseeing this research, for this thesis. Please know that your information will be secured and confidential, and you will not be discriminated against.

11. Do you consider yourself to be able diverse or have a disability?

- Yes
- No

12. If yes, please give a brief explanation of your able diversity(ies) or disability(ies):

- _____

New Page

13. If chosen, do you agree to participate in the Canvas usability assessment study conducted and recorded by Carrie Schreiner who is a master's student at EWU? (Please know your recording and name will only be seen by Carrie. Your recording and name will not be seen or given to anyone else nor mentioned or used in the data findings.)

- Yes
- No

14. Do you give your consent to be recorded by audio and video of your face, speech, and screen of your electronic device during this study and use it for research purposes once you have completed the assessment of Canvas?

- Yes
- No

15. Do you agree to participate in this hour-long study if you are chosen as a user?

- Yes
- No

New Page

Thank you for your participation!
We really appreciate your time and feedback. This research will improve this system to help users like you in the future. We will contact you soon by email if you are chosen for the usability assessment. Have a great rest of your day!

Appendix C: Welcome Message

Hello _____ (**Insert the user's name here**),

Thank you for taking the time to complete the pretest survey! You have been selected to participate in the usability evaluation of Canvas. Please respond to this message with two optimal days and/or times that work for you during the week of _____ to _____ to complete the usability evaluation. This Canvas usability evaluation will take about an hour. To the best of your ability, we will ask you to complete this usability evaluation in a quiet, well-lit environment, with stable internet connection.

Once a day/time has been confirmed, you will receive a message with a Zoom meeting link for the agreed upon time. If you are unfamiliar with the Zoom platform, we have included a link containing step-by-step Zoom instructions.

Thank you again for your participation! Sincerely,

Carrie Schreiner

Zoom Instructions Link: https://support.ewu.edu/support/solutions/articles/10000030700-zoom-video-and-audio-conferencing

Appendix D: Materials Needed Message

Hello _____(**Insert the user's name here**),

Thank you for responding to my message! We have decided on a date and time based on your schedule which is _____**(insert day and time of Zoom meeting)**. The Zoom link for our meeting which will be available below at the end of this email. To attend this meeting, you must have Zoom ready on your device (a desktop, laptop, or tablet is preferred), have a camera, microphone, speaker or earphones either included on your device or external, and then you simply click the provided link on the day and time of the meeting.

We have also sent a Canvas course invite to your email address. You will need to accept this course invite prior to the usability evaluation. This Canvas course is for testing purposes only and your name, submissions, comments, and content will be deleted from the course upon completion of the usability evaluation.

We also included a link to our online consent form for you to review. Please review this form carefully and then agree and sign at the bottom. We will also be reviewing the form together at the start of our Zoom meeting on _____ **(insert day and time of Zoom meeting)**. We will be happy to answer any questions or concerns you have.

Finally, we have attached a Word document that you will need to have easy access to on your device during the usability evaluation. This means you should have it downloaded to a place where you can quickly find it and be able to be uploaded to Canvas.

Again, thank you for your time and we look forward to seeing you on _____ **(insert day/time)**

If you have any further questions or concerns, please do not hesitate to reach out!

Sincerely,

Carrie Schreiner

Consent Survey Link: https://www.surveymonkey.com/r/B9LXKN9

Zoom Link:

Attached test document and test image:

Appendix E: Electronic SurveyMonkey Consent Form

Consent survey link: https://www.surveymonkey.com/r/B9LXKN9

1. Student Investigator Write your first and last name:

- _____

Principal Investigator (PI)
Carrie Schreiner
Master's student of Technical Communication
Department of English

Responsible Project Investigator (RPI)
Dr. Kate Crane
Assistant Professor of Technical Communication
Department of English

Purpose and Benefits
This research activity is for Carrie Schreiner's thesis. The purpose of this research is to collect information about how users (EWU students) use Canvas and its processes to complete tasks and how they think and feel about Canvas. You may not directly benefit from this project, but this observation will lead to a usability report based on data from several observed users to help Carrie understand the success and failures of Canvas and provide recommendations for how to make Canvas better fit user needs.
With courses being online at EWU during the pandemic and Canvas being the primary learning platform, we emphasize the need to research users (stakeholders, design participants, and the actual users of processes, documentation, and products) on how usable Canvas is for diverse students. Users must be consulted in this process to understand their needs, actions, values, behaviors, and difficulties. In addition, observations are needed to understand how well they can perform tasks and processes on the Canvas platform. Usability, which is also referred to as user experience research, includes users in the design process so that we can understand how to improve products for our users in the future. With user data, we will suggest redesigning Canvas to better serve users and make users' tasks more efficient and satisfying.

We will be researching users (EWU diverse students) and preforming usability testing (observing representative users performing representative tasks) to understand how usable Canvas is. The data collected will then help me understand how Canvas needs to be altered to create a better user experience. This research will require me to conduct user research through interviews, surveys/questionnaires, observations, Zoom recordings, and usability observations. The users' names and the recordings will be seen only by the PI and RPI and will be anonymous in the data results and findings.

Procedures

This interview, survey, and observation should take no longer than one hour of your time. We will arrange a time and date for the interview, survey, and observation to take place and make arrangements to perform this research via a video conferencing tool (such as Zoom).

We will ask you to perform tasks using Canvas to understand how well that product is constructed to provide a good user experience. We may ask pre-observation and post-observation questions such as how you use certain types of products or processes, your attitudes and feelings about the product or processes, your level of experience using similar products and processes, and demographic information such as your level of education, type of work, and experience with technology. For instance, what kind of work do you do that would require using a similar product or process? How easy was it for you to complete this task?

We will record your screen, audio, and video for the interview and observation. These recordings will be saved on a password protected drive (such as Google Drive) and will not be sharing these recordings with anyone else. We will destroy the recording by the end of the term. "Washington State law provides that private conversations may not be recorded, intercepted, or divulged without the permission of the individual(s) involved." We may share my findings in publications or presentations. If we do, results will be in group format and no identifying information such as names or recordings will be used. Your responses will remain confidential and you will not be identified in any way. This is an electronic consent form and by typing you name below, you are signing and consenting to participating in this assessment.

Risk, Stress or Discomfort
This is a low risk research activity, that is the risks of participating are not expected to exceed the risks you encounter in your normal daily life. If you are uncomfortable answering any of the questions or performing any of the tasks, you may opt-out of those that you do not want to answer.

Other Information
Interview subjects are free to withdraw from this study or end the interview at any time without penalty.

2. Subject's Statement
The study described above has been explained to me, and I voluntarily consent to participate in this interview. I have had an opportunity to ask questions and I give permission to record, intercept, and/or divulge conversations in which I participate during this interview. I understand that by signing this form (typing your name below) I am not waiving my legal rights. If you have any concerns about your rights as a participant in this research or any complaints you wish to make, please contact Charlene Alspach, Executive Director, Grant & Research Development, 509-359-7971 or calspach@ewu.edu.

- *I accept*

3. Please type your full name below.

- _____

Appendix F: Posttest Survey

Posttest survey link: https://www.surveymonkey.com/r/B9KRPFL

Your participation is voluntary, and by taking a submitting this survey, you are giving consent. You have the right to stop the survey at any time.

This survey is to understand your experience. better after going through Canvas usability testing. Answer the following based on your Canvas testing experience.

1. I thought that Canvas was easy to use.
   - Strongly agree
   - Agree
   - Neither agree nor disagree
   - Disagree
   - Strongly disagree

2. I think I would need the support of a technical person to be able to use Canvas.
   - Strongly agree
   - Agree
   - Neither agree nor disagree
   - Disagree
   - Strongly disagree

3. I would imagine that most people would learn to use Canvas very quickly.
   - Strongly agree
   - Agree
   - Neither agree nor disagree
   - Disagree
   - Strongly disagree

4. I felt confident using Canvas.
   - Strongly agree
   - Agree
   - Neither agree nor disagree
   - Disagree
   - Strongly disagree

5. I need to learn a lot of general aspects and functions before I could use Canvas as an online learning platform.
   - Strongly agree
   - Agree
   - Neither agree nor disagree
   - Disagree
   - Strongly disagree

New page:
For the following questions, indicate which tasks apply to the following statements.

6. I found certain functions in Canvas to be unnecessarily complex. (Choose all answers that apply)
- Task 1: Find and use the functions in the assignment.
- Task 2: Find and use the functions in the discussion board.
- Task 3: Find and view the instructor feedback.
- Task 4: Find the peer review essay and use the functions to make comments.
- Task 5: Find and use the functions in the announcement.
- None of the tasks were unnecessarily complex.

7. I found certain functions in Canvas to be cumbersome to use. (Choose all answers that apply)
- Task 1: Find and use the functions in the assignment.
- Task 2: Find and use the functions in the discussion board.
- Task 3: Find and view the instructor feedback.
- Task 4: Find the peer review essay and use the functions to make comments.
- Task 5: Find and use the functions in the announcement.
- None of the tasks were cumbersome.

8. I found certain functions in Canvas were well integrated and easy enough to learn and use. (Choose all answers that apply)
- Task 1: Find and use the functions in the assignment.
- Task 2: Find and use the functions in the discussion board.
- Task 3: Find and view the instructor feedback.
- Task 4: Find the peer review essay and use the functions to make comments.
- Task 5: Find and use the functions in the announcement.
- None of the tasks were easy to use.

9. I found certain functions in Canvas to be unusable without prior instruction or help. (Choose all answers that apply)
- Task 1: Find and use the functions in the assignment.
- Task 2: Find and use the functions in the discussion board.
- Task 3: Find and view the instructor feedback.
- Task 4: Find the peer review essay and use the functions to make comments.
- Task 5: Find and use the functions in the announcement.
- None of the tasks were unusable without prior instruction.

11. I found certain functions in Canvas were usable with my able diversity(ies) or disability(ies). (Choose all answers that apply)
- Task 1: Find and use the functions in the assignment.
- Task 2: Find and use the functions in the discussion board.
- Task 3: Find and view the instructor feedback.

- Task 4: Find the peer review essay and use the functions to make comments.
- Task 5: Find and use the functions in the announcement.
- None of the tasks were usable.

12. I found certain functions in Canvas to be cumbersome to use with my able diversity(ies) or disability(ies). (Choose all answers that apply)

- Task 1: Find and use the functions in the assignment.
- Task 2: Find and use the functions in the discussion board.
- Task 3: Find and view the instructor feedback.
- Task 4: Find the peer review essay and use the functions to make comments.
- Task 5: Find and use the functions in the announcement.
- None of the tasks were cumbersome.

New Page

13. After completing the usability assessment, how do you feel about using Canvas?

- _____

New Page

Thank you for your participation!
We really appreciate your time and feedback. This research will improve this system to help users like you in the future. Have a great rest of your day!

Appendix G: Assessment Script

Pre-Test Directions for Facilitator

Starting here, non-bolded text will indicate action to be performed silently by the facilitator. Bolded text represents text to be spoken to the participant.

Preliminary Set-up: Facilitator

- Have the link to the consent form accessible for all facilitators via Google docs.
- Have copies of the test plan accessible for all facilitators via Google docs.
- Check that the pre-test survey has been completed by each of the potential participants.
- Check with all facilitators that the participant should be included in the assessment.
- Check that the participant has accepted the Canvas course invite and has access to the material.
- Wait for the participant to arrive on Zoom.

Preliminary Set-up: Material to Send to Participants

Canvas Message 1: Introductory Message.

- Send participants a pre-test survey and details concerning the usability test (see appendix C for the pre-test survey).
- Pretest Survey Link: https://www.surveymonkey.com/r/5QDD56R (See appendix B for the complete pre-test survey.)
- Let the participant know the maximum amount of time the test will take.

Canvas Message 2: Welcome Message.

- Send chosen participants a welcome message announcing they have been selected to participate in the usability test (see appendix D for the welcome message). Welcome message will ask participants to inform us of a day and time when they have an hour to participate in the test. Send the participant Zoom instructions (See appendix E for Zoom instructions).
- Zoom instructions link: https://support.ewu.edu/support/solutions/articles/10000030700-zoom-video-and-audio-conferencing

Canvas Message 3: Materials Needed Message.

- Send the participant the needed materials for the usability test (see appendix F).
- Send the participant a link to the consent form. Consent form link: https://www.surveymonkey.com/r/WNVPF85
- (See appendix G.)
- Send the participant a Zoom invite with agreed upon day/time.
- Send the participant the Canvas test course invite.
- Send the participant consent survey so the participant will give their consent before the testing actually begins.

- Send the participant the test document needed for the assessment.

Assign User ID

Once the participants have been chosen, they will be assigned a User ID which will be determined as such: Participant number (in order of who tests first) and A if testing as a new Canvas user or B if testing as a current Canvas user. For instance, if the third participant is a new Canvas user, his/her/their User ID will be 3A.

Greeting and Study Information

Make sure the participant received the Zoom invite and knows how to use Zoom.

Meet the participant on Zoom to read/review the following preliminary paperwork.

Read slowly

Welcome ___ _____ ! My name is Carrie and I will be guiding you through this usability test. The purpose of this study is to see how Eastern students use Canvas to complete various tasks. This test is a product assessment from a user standpoint, not a user test. Because of this, there is no wrong answer. The focus is on how Canvas can be improved to better suit students and your needs. We are evaluating the product. We are not evaluating you.

We will be recording video, audio, and screen capture during the test. Your name and personal information will not be associated in any of the research done after the recording. We may use the information from the recording to present findings in publications, professional conferences, and to share with EWU faculty and staff to better improve students' experiences with the Canvas platform. Your name and personal information will not be shared in the findings. We will be completing one practice task to help familiarize you with how the test will run. You will then complete five additional tasks. After you believe the task is complete please say, "Done," "Submitted," "Finished," or "Complete." If you are stuck on a task and wish to move on, please say "Done," Submitted," "Finished," or "Complete" and we will move on. We may ask you to answer questions about how you performed tasks to get additional information. Please inform us if there are internet connectivity issues by messaging us through the chat function on Zoom or worse case scenario, through email. If you are disconnected, please return back to the Zoom recording as soon as you are able to.

If you have questions at any time during the test, please let me know. If at any time you want to stop the test, please let me know. If you decide you do not want to complete the test after you have started, we will stop the test immediately. There will be no penalty for not completing the test. You are allowed to stop at any time. In a previous survey we asked you to sign the consent form to record video and audio during the study. Are you still comfortable with us recording your video, including both your screen and your face as well as audio knowing that your personal information nor the recording will be seen by anyone else?

Give the participant time to answer.

Thank you! Do you still agree to participate in this study?

Facilitator pulls up the consent form and shares the screen with the participant.
Consent survey link: https://www.surveymonkey.com/r/WNVPF85

Do you have any questions concerning the consent form from the survey you took you prior to this evaluation? Do you have any general questions before we get started?

Give the participant time to ask questions before proceeding.

We appreciate your participation! Let us get started.

Setting up the Participant with the Equipment

If you have not done so yet, please download the test document and test image that I sent to you through email and save them on your device because it will be needed for the assessment. Be sure to put it in an accessible place on your device. Let me know when you have finished downloading and placing the test document and test image on your device.

Give the participant time to download the test document.

The facilitator needs to allow the participant to share their screen. There is a green arrow next to the "share screen" button. Click it and allow any user to share their screen.

You will be needing to use certain functions in Zoom. Do you have any questions on how to use Zoom, the chat function, or how to start and stop the share screen function?

Give the participant time to ask questions.

Please open Canvas on your preferred web browser and share your screen through Zoom.

Give the participant time to open and share their screen.

Do you have access to the test course called "English 101 Academic Identities Student Site" through Canvas before we get started with the test?

Give the participant time to ask questions and access the Canvas course.

I will be starting the screen recording now. Please get comfortable while I start the recording:

- Facilitator asks the participant to get comfortable at the computer station.
- Ensure Zoom recording is on.
    - *** Both the video of the participant and the screen capture ***

- **PRESS RECORD!!!**

Do you have any questions?

Give the participant time to ask questions.

Open up the chat function in Zoom located above the green "share screen" at the top of your screen. Click "more" on the right-hand side of the black toolbar, and click "chat." Please let me know when you have opened the chat.

Do you have access to the chat or have any questions before we begin?

Give the participant time to access the chat and ask questions.

Test Scenario and Pre-Test Question

Here is your scenario. You are an online English 101 student using Canvas to complete the assignments and tasks assigned to you by your instructor. You will be asked to complete a series of tasks using the Canvas platform and will be asked to answer some question-based information about how you use the Canvas platform. You can use and navigate anywhere on Canvas or use any of the resources that the task may require to complete. Once you have finished a task you need to say "Done," "Found it," "Completed it" or "Submitted it." After indicating you have completed the task, please complete the next task. I will ask some questions once you finish all of the tasks. Let me know if you need the task repeated at any time and I will read it again for you. I will also post the task in the chat function in Zoom for reference. This is a think-aloud usability assessment. Please speak your thoughts out loud while you are completing each task including what you are doing to complete the task.
As a reminder, there will be no penalty for not completing the test. You are allowed to stop at any time.

Do you have any questions?

Give the participant time to ask questions.

We are going to start with a practice task to give you an idea for how the test process works. I will be posting each test question in the Zoom chat bar but you can ask me to repeat the task at any time. After you complete one test question I will then post the next one.

Practice question: **Access Canvas using your preferred web browser. Open the Canvas course titled, "English 101 Academic Identities Student Site." Locate course modules, and find Module 5. List the items under Module 5 out loud. Please speak your thoughts out loud while you are completing the task.**

Facilitator waits for the user to navigate to the information, prompts the user to speak their thoughts out loud if the user is not doing so, and waits until the user says "Done" or "Found it."

If the user indicates being finished with the task, but does not indicate completion, the facilitator will prompt the user to do so.

If the user does not begin to answer the comprehension question, the facilitator will prompt the user to do so.

Okay, that is how the test will run for the following tasks. Do you have any questions?

Give the participant time to ask questions.

Test Tasks

Facilitators need to write "task #" before putting the task into the chat box.
Remind participants to use "think aloud" protocol while completing tasks.

Task 1

Task 1: Here is your first task. Find the next assignment that is due from the test course. Submit the test document to this assignment.

Facilitator waits for the user to navigate to the information, **prompts the user to speak their thoughts out loud if the user is not doing so,** and waits until the user indicates completion.

If the user indicates being finished with the task, but does not indicate completion, the facilitator will prompt the user to do so.

If the user does not begin to answer the comprehension question, the facilitator will prompt the user to do so.

Task 2

Task 2: Find the next discussion board post that is due. Reply to the discussion board post. Your reply should include a URL link from any website, the test image, a short sentence, and an attachment of the test document.
Facilitator needs to:

- **Make 3 comments on the test document** in speed grader (Personal Narrative First Draft assignment)
    - Nice job
    - Add more here
    - Remove this
- **Assign the user a peer review partner** while the user completes this task (Personal Narrative First Draft assignment). Please assign the user the peer review partner "Shelby" or "Alyssa"

Facilitator waits for the user to navigate to the information, **prompts the user to speak their thoughts out loud if the user is not doing so**, and waits until the user indicates completion.

If the user indicates being finished with the task, but does not indicate completion, the facilitator will prompt the user to do so.

If the user does not begin to answer the comprehension question, the facilitator will prompt the user to do so.

Task 3

Task 3: Go back to the "Personal Narrative First Draft" assignment and access the detailed instructor feedback. Speak out loud 3 comments that were given as feedback.

Facilitator waits for the user to navigate to the information, **prompts the user to speak their thoughts out loud if the user is not doing so,** and waits until the user indicates completion.

If the user indicates being finished with the task, but does not indicate completion, the facilitator will prompt the user to do so.

If the user does not begin to answer the comprehension question, the facilitator will prompt the user to do so.

Task 4

Task 4: Return to the "Personal Narrative First Draft" assignment page, find your peer-review partner, and access their essay on Canvas. Provide feedback in two ways on their essay:

- **1 comment directly on your peer-review partner's essay on Canvas**
- **1 submission comment on your peer-review partner's essay on Canvas**

Facilitator waits for the user to navigate to the information, **prompts the user to speak their thoughts out loud if the user is not doing so,** and waits until the user indicates completion.

If the user indicates being finished with the task, but does not indicate completion, the facilitator will prompt the user to do so.

If the user does not begin to answer the comprehension question, the facilitator will prompt the user to do so.

Task 5

Task 5: Find the most recent announcement. Reply to the announcement with a short sentence.

Facilitator waits for the user to navigate to the information, **prompts the user to speak their thoughts out loud if the user is not doing so,** and waits until the user indicates completion.

If the user indicates being finished with the task, but does not indicate completion, the facilitator will prompt the user to do so.

If the user does not begin to answer the comprehension question, the facilitator will prompt the user to do so.

Post-Task Data Collection and Test Conclusion

After tasks are completed, the observer begins retrospective recall from notes taken during testing.

Thank you for completing the tasks! I now have a couple of questions I wanted to ask you about your experience.

How easy was it to navigate these tasks?

Give the participant time to respond.

What were some struggles you had when conducting these tasks?

Give the participant time to respond.

How do you think Canvas could be improved both in general and based on these tasks?

Give the participant time to respond.

Facilitator asks any other questions they have for the participant about the test.

This is the end of the test. Thank you for taking the time to work with us today! Your participation will help us greatly. If you have not already, please stop your screen share. Now that you have completed the Canvas Usability assessment, we'd appreciate it if you answered a few questions about your experience through a short post survey. I am now posting in the Zoom chat a URL that will take you to this short post survey for you to complete. Please let me know if you have any questions and when you have completed the survey.

Zoom Posttest Survey Link (See appendix H):

https://www.surveymonkey.com/r/B9KRPFL

Give the participant time to ask questions and complete the survey.

Again, thank you very much for participating in our Canvas Usability Assessment. Your participation has helped us greatly. The meeting will end now. Do you have anything else you would like to mention before leaving?

Give the participant time to ask questions.

Thank you very much and have a great day!

STOP RECORDING

- Facilitator ends the meeting and waits for the **file conversion to finish.**
- Each Zoom recording will be named after the User ID like this: UserID_Zoom.
- Facilitator then **saves the Zoom recording** and uploads it onto the shared GoogleDrive.
- Facilitator then **deletes the user** from the Canvas course.
- Facilitator then **deletes the discussion board reply and announcement reply** from the Canvas course.

Facilitator then opens up a new Zoom meeting room and prepares for the next test.

Appendix H: Test Document

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Appendix I: Test Image

VITA

Author: Carrie Schreiner

Place of Birth: Spokane, Washington

Undergraduate Schools Attended: Spokane Falls Community College,
Eastern Washington University

Degrees Awarded: Bachelor of Teaching English to Speakers of Other Languages, 2019,
Eastern Washington University

Honors and Awards: Graduate Assistantship, English Department, 2019-2021, Eastern
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Graduated Magna Cum Laude, Eastern Washington University, 2019