



Usability Report

Team Usability

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CSC 480/HCI 521 Software Design

12/8/2020

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1. Introduction

QuizMaker is a web application intended to foster a collaborative learning environment, where students and professors are able to create their own quizzes, as well as evaluate each other's quizzes. Furthermore QuizMaker's interface gives professors the ability to modify courses where the quiz creation will take place, as they are also the ones responsible for adding students to the system.

The members of the usability team from CSC 480/HCI 521 Software Design conducted a usability test fully online, based on the fully functional final product. The usability testing was done through a video conferencing tool and was performed through personal devices. An observer and an instructor were present during each test. The participants were given scenarios and tasks, which were monitored and recorded by the observer. Observers took notes with a method of their choosing on either a third device or hand-written notes. Only the experimenters and the participant were present at the time of the test. Each session collected different types of data like task completion time, after scenario satisfaction ratings, overall satisfaction of the interface, perceived ease of use of the interface (through screen recordings) and qualitative feedback (through think out loud measures).



Fig 1: Login page of QuizMaker

2. Executive Summary

The purpose of this usability test was to discover how users (students and professors) will navigate the application 'Quizmaker' by following specific tasks that users will be asked to complete.

The goals of this project were the following:

- Understand how SUNY Oswego students and professors interact with QuizMaker.
- To discover if the implementation of WCAG 2.1 industry standards in our final product are confirmed by user satisfaction.
- Identify pain points that impact user satisfaction and task completion time.

Results were generally positive, but varied depending on the task. Some issues identified by the participants were: difficulty adding the current filter settings to favorites, issues with reloading emails, specifically finding the reload button, being unsure when the analysis was completed for a given filter and difficulty clearing the filters and resetting the dashboard.

Throughout 10 business days, the researchers tested QuizMaker with 6 students and 7 professors, totaling in 13 participants. However, due to technical issues the researchers were forced to remove 3 participants of the data. Only their spoken feedback was used. Because of the Covid-19 pandemic and to adhere to safety measures, the team conducted the usability tests fully online through Zoom. The participants were recruited from email. The entire experiment took approximately 30 minutes in total.

The test gathered the following data: Task completion time for each scenario, perceived ease of use, Satisfaction and usability ratings provided through (SUS), recorded feedback and improvements given through the think aloud process

3. Methodology

Recruiting

Participants were recruited primarily from the State University of New York at Oswego. Students and professors were invited to the usability testing via email by asking if they wish to participate in a web application usability test. After their consent, the participants booked a time slot and were sent a Zoom link. For the usability test, the participants were required to log into Zoom from their personal devices.

Test setup

Before each test, the researchers scaffolded the database using MongoDB so that each participant would see the same interface. It was made that sure other teams (Engine and GUI) were not working on the database at the same time.

Usability test

Each test was accompanied by one participant, one observer and one investigator. The observer recorded each task completion time and took notes during the usability test, while the investigator moderated the usability test based on a pre-prepared script and guided the participants in case the test went through some technical issues.

Upon starting the Zoom call, the participant was presented with an informed consent form through a Qualtrics link. This was requested to be kept open on an additional tab at all times. After their consent, the participant was briefed about the study and shown the following screen:

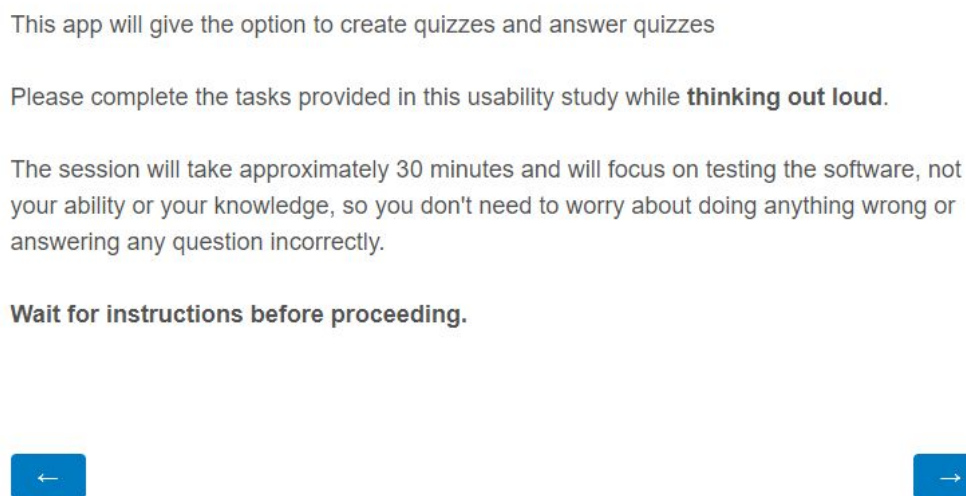


Fig 2: Same introduction screen for both participant types

The investigators then requested the participants to switch off their face cameras, and began to record the participants' shared screen. The participants were also requested to think out aloud during their process.

Participants were asked to complete four tasks based on a scenario to give a purpose within the web application. The tasks were different based on if they were a student or a professor. In addition, they were divided equally into completing the tasks on either dark mode and light mode of the web application. After the participants read Task 1 instructions, they were sent the QuizMaker link through the Zoom chat, which was also requested to be kept open on a separate tab.

<p>Task 1:</p> <p>Suppose you are a college student working hard during midterm. You are having trouble studying by yourself and you decide to try the web app application your professor has mentioned in the Intro to Mathematics course. You open QuizMaker.</p> <p>Please wait for the investigator to send you the link to the product.</p> <p>Log in to QuizMaker, go to the Intro to Mathematics course and take the "just some basic math" quiz.</p> <div style="display: flex; justify-content: space-between; margin-top: 20px;"> ← → </div>	<p><i>Task 1 for Student participant</i></p>
<p>Task 1:</p> <p>Suppose you are a college professor that teaches Intro to Mathematics, History and Biology. You decide to use the web application QuizMaker to help to promote peer-learning between your students. You open QuizMaker.</p> <p>Please wait for the investigator to send you the link to the product.</p> <p>On the application, go to your course Intro to Mathematics page and add the student: Sean Green (sgreen@oswego.edu) to your class roster.</p> <div style="text-align: right; margin-top: 20px;"> → </div>	<p><i>Task 1 for Professor participant</i></p>

Fig 3: Sample tasks for students and instructors

Table 1: Different tasks based on participant type

	TASK 1	TASK 2	TASK 3	TASK 4
STUDENT	Take a quiz	Create a quiz	Find “Quizzes I took” table	Filter a Quiz
PROFESSOR	Add student to course	Import questions in a quiz	Favorite a quiz	Add topic to course

After completing each task, the participant was guided to the next screen which held an After Scenario Questionnaire (ASQ) based on the Perceived Ease of Use scale which measures the degree to which a person perceives QuizMaker as easy or effortless. The measurements were as follows: interface is clear and understandable, tasks do not require a lot of mental effort, easiness of use, and easiness of getting the interface to do as required. The questionnaire consisted of four questions based on a 5-point Likert scale, with 1 being “Strongly Disagree” to 5 being “Strongly Agree”(check Appendix A Figure 14 for the full questionnaire).

The participant was asked to pause sharing their screen during the answering process so that the researchers would not see their answers. This was repeated four times after each task was completed. After completing the fourth and final ASQ, participants were asked to click next and wait for instructions.

Thank you for completing our tasks.

Please wait for instructions. Let the investigator know you are on this page.

*Fig 4: Screen after participant finishes ASQ after task 4*

At the above screen, participants were briefed about the next step and were guided to the System Usability Scale questionnaire (SUS). This 10 question questionnaire asked about the overall process and interface experience of the web application (check Appendix A Figure 15 for the full questionnaire). This was based on a 5-point Likert scale, with 1 being “Strongly Disagree” to 5 being “Strongly Agree”. The recordings were concluded at this point. The participant was again asked to pause sharing their screen during this process so that the researchers would not see their answers.’

After the questionnaire, the participants were thanked for their participation and time. They were then debriefed and offered the opportunity to ask any questions before concluding the study and ending the meeting.

4. Experiment Results

4.1 Task completion time Hypothesis

A hypothesis was generated for experimentation to test out each task completion time to determine easiness and ease of flow in completing tasks for expert users and novice users:

H0: There is no significant difference between expert users and first-time users, in terms of task completion time.

H1: There is a significant difference between expert users and first-time users, in terms of task completion time.

A series of independent-samples t-test were conducted to compare task completion time between Expert and First-time users regarding multiple tasks within the web-application.

The mode for the Perceived Ease of Use was also calculated and was used to compare with the independent-samples t-test. For the results that did not have a mode, the mean was calculated instead. Graphs of the results are shown below. The blue bar indicates the first question of the Perceived Ease of Use after scenario questionnaire. The red bar indicates the second question, the yellow and green bars indicates the third and fourth questions respectively.

The results are the following for each task:

Students Task 1: Take a quiz

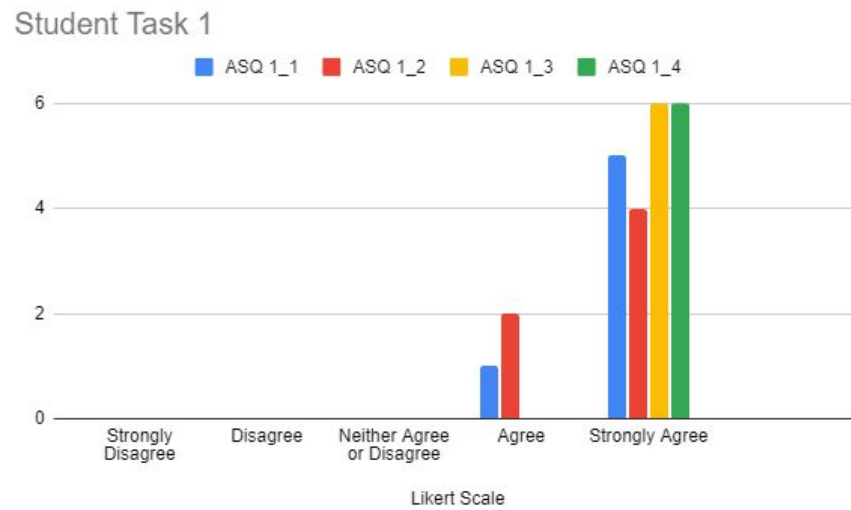


Fig 5: Student's Perceived Ease of Use on "take a quiz"

- Time on Task: Figure 5 shows a significant difference in terms of task completion time, between Expert (SD=13.740) and Novice (SD=28.687) users; $t(10) = -3.915$, $p = 0.003$.
- Perceived Ease of Use: The results shown in Figure 5 suggest that users found the "take a quiz" user flow to be easy or effortless (Mode = 5). The qualitative feedback collected during the user-testing was confusion about finding the quizzes, not understanding the upvote or downvote button. These helped us suggest UI aesthetic changes related to this task.

Students Task 2: Create a quiz

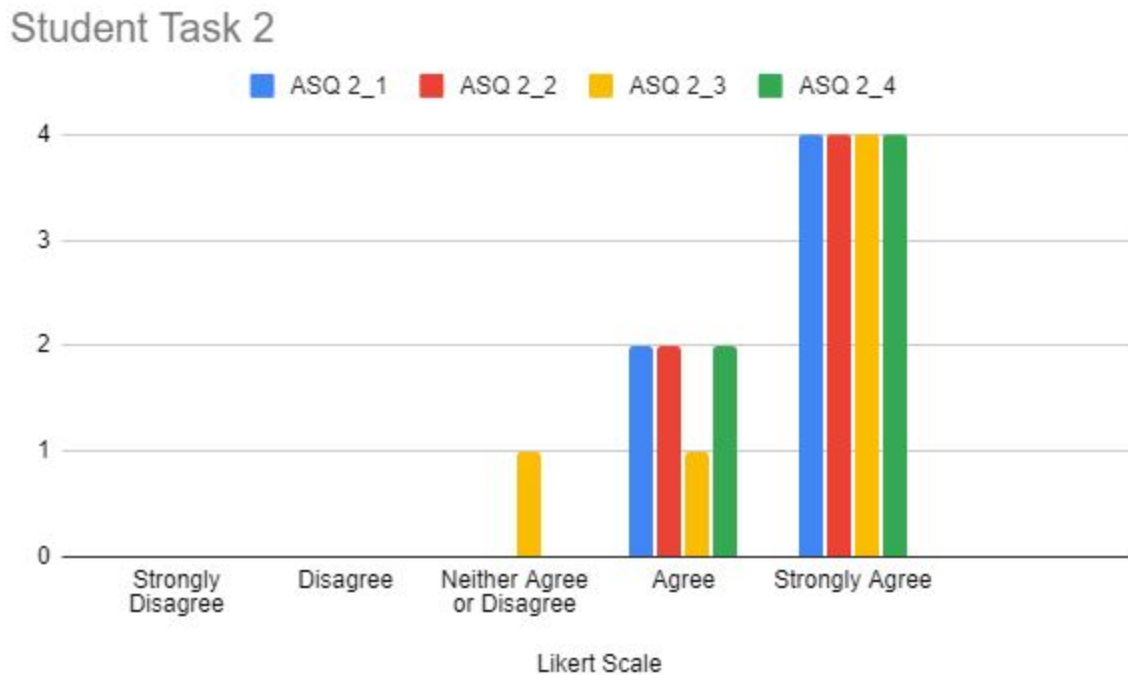


Fig 6: Student's Perceived Ease of Use on "create a quiz"

- **Time on Task:** Figure 6 shows a significant difference in terms of task completion time, between Expert (SD=21.166) and Novice (SD=23.216) users; $t(10) = -5.055$, $p < .001$.
- **Perceived Ease of Use:** The results shown in Figure 6 suggest that users found the "create a quiz" user flow to be easy or effortless (Mode = 5). The qualitative feedback collected during the user-testing like confusion about writing the quiz title while creating quizzes, problems related to participants not clicking add question and click publish question and assumed that the question would appear on the quiz helped us implement and fix these changes related to this task.

Students Task 3: Find “Quizzes I took” table

Student Task 3

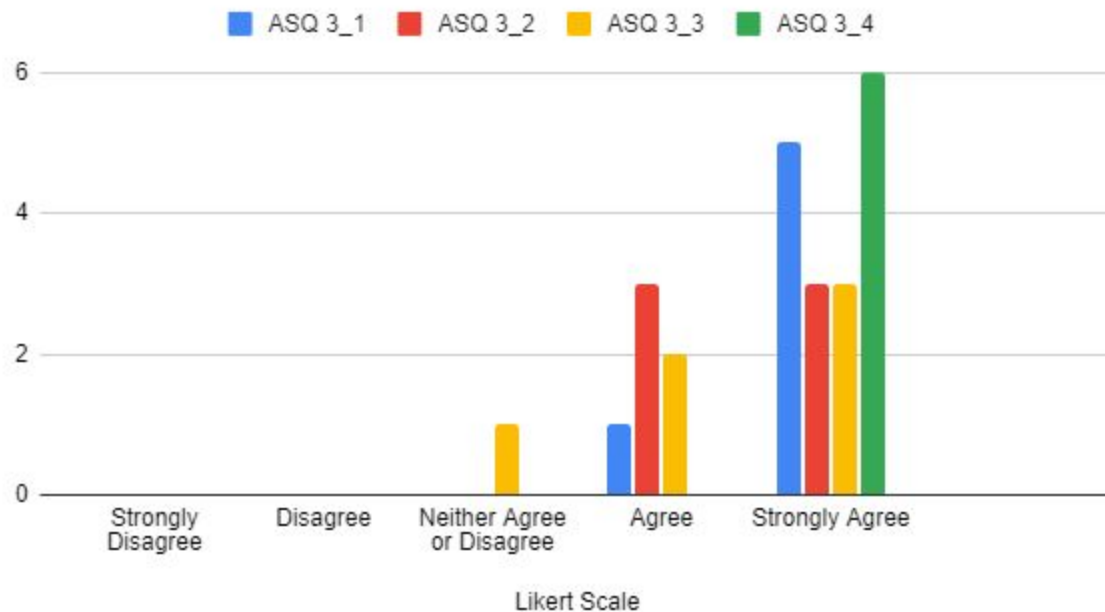


Fig 7: Student’s Perceived Ease of Use on “Find ‘Quizzes I took’ table”

- Time on Task: Figure 7 shows a significant difference in terms of task completion time, between Expert ($SD=3.488$) and Novice ($SD=15.587$) users; $t(10) = -2.403$, $p = 0.037$.
- Perceived Ease of Use: The results shown in Figure 7 suggest that users found this user flow to be easy or effortless (Mode = 5). The qualitative feedback collected during the user-testing like trouble finding ‘quizzes I took tab’, helped us implement and fix changes, such as stronger outlines around the text to make it more noticeable.

Students Task 4: Filter a Quiz

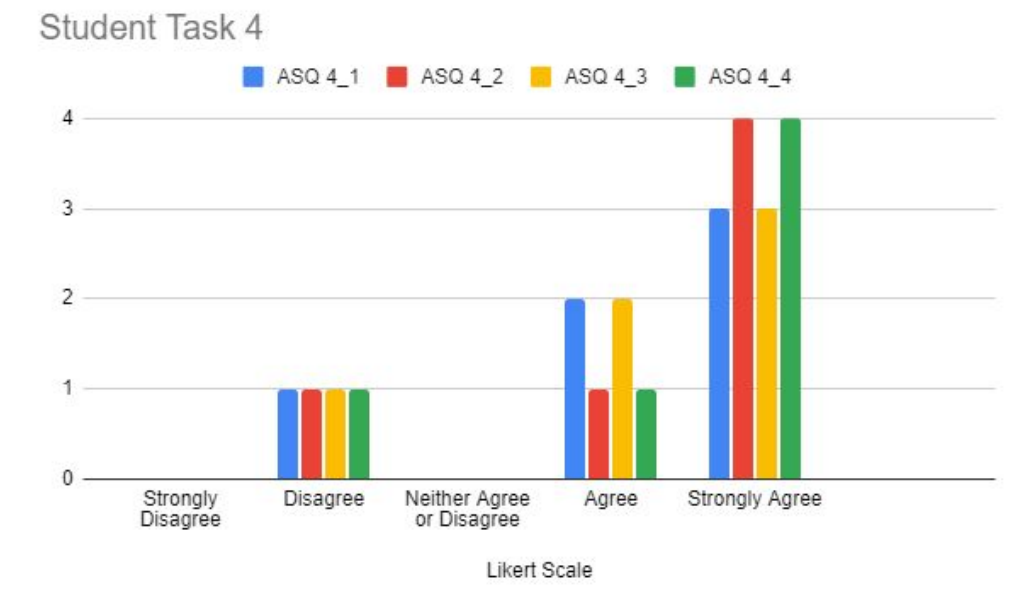


Fig 8: Student's Perceived Ease of Use on "Filter a quiz"

- Time on Task: Figure 8 shows a significant difference in terms of task completion time, between Expert (SD=21.166) and Novice (SD=23.216) users; $t(10) = -2.403$, $p = 0.011$.
- Perceived Ease of Use: The results shown in Figure 8 suggest that users found this user flow to be easy or effortless (Mode = 5). However, it was the only student task that we observed "Disagree" answers on the Likert-Scale. That and the qualitative feedback during the user-testing like not being able to find the 'filter for topics' box, not being able to find quizzes on the quiz table, not being able to find favourite quizzes helped us suggest UI changes like add a clickable option to favourite quizzes from the quiz table, add a call to action in light gray for select a topic while creating a quiz.

Student Task Completion Time Conclusion

There was a significant difference in the scores for users familiar with the product ($M = 106.833$, $SD = 31.708$) and users not familiar with the product ($M = 276.167$, $SD = 61.206$).

These results suggest that Expert users have an easier time navigating QuizMaker. Results also reject the null hypothesis that there is no significant difference between expert users and novice users, in terms of task completion time.

In addition, the Perceived Ease of Use showed that although participants took a longer time in navigating, they did not consider the tasks to be difficult.

Professors Task 1: Add student to course

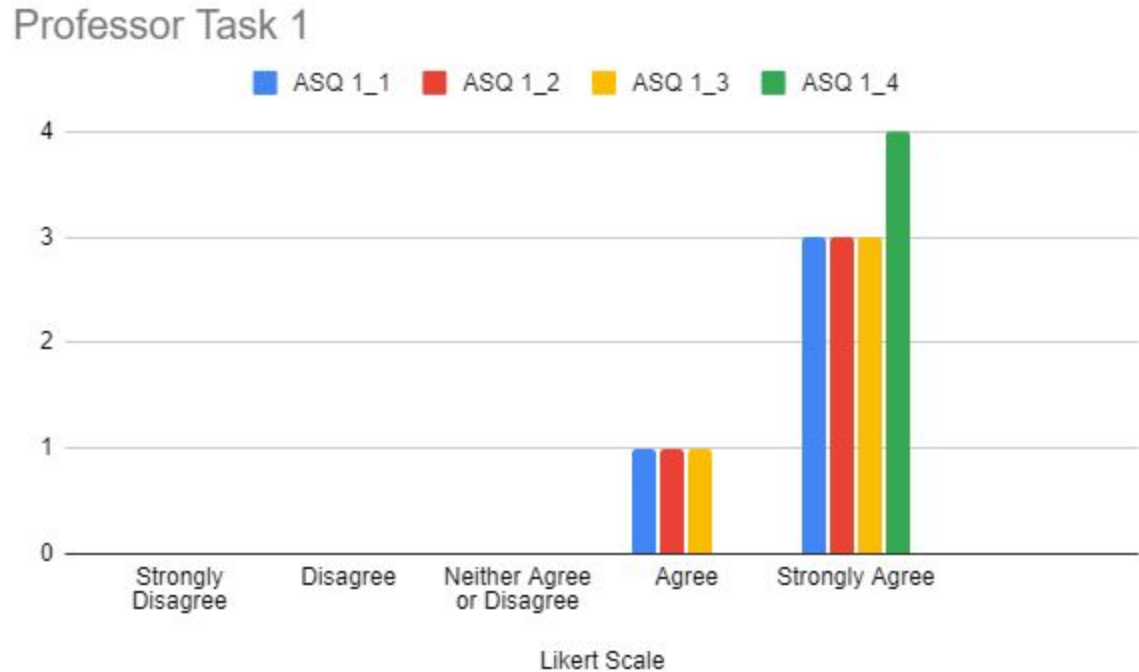


Fig 9: Professor's Perceived Ease of Use on "Add a student to a course"

- Time on Task: Figure 9 shows a significant difference in terms of task completion time, between Expert (SD=5.586) and Novice (SD=97.126) users; $t(10) = -4.722$, $p < .001$.
- Perceived Ease of Use: The results shown in Figure 9 suggest that users found this user flow to be easy or effortless (Mode = 5). The qualitative feedback collected, such as not understanding whether to click save changes after adding the student, helped us suggest changes to make the navigation more noticeable for the save changes button.

Professors Task 2: Import questions in a quiz

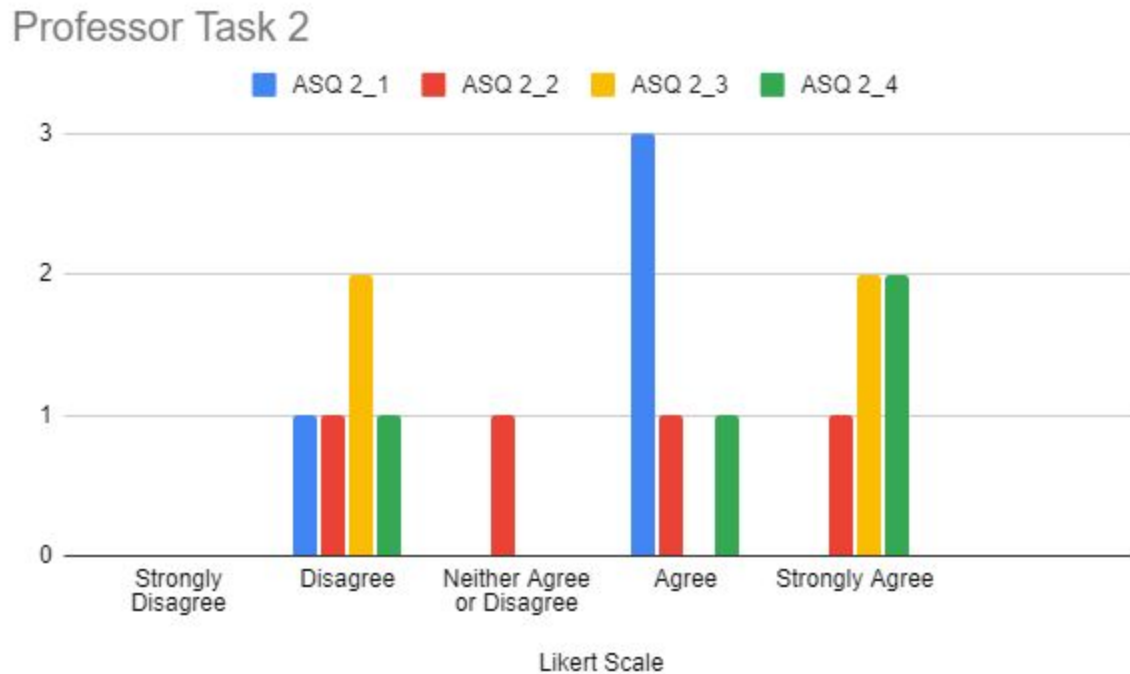


Fig 10: Professor's Perceived Ease of Use on "Import questions to a quiz"

- Time on Task: Figure 10 shows a significant difference in terms of task completion time, between Expert (SD=8.649) and Novice (SD=97.126) users; $t(10) = -3.647$, $p = 0.004$.
- Perceived Ease of Use: The results shown in Figure 10 suggest that users found this user flow not easy or effortless (Mean = 3.5). The qualitative feedback during the user-testing helped us conduct a few UI changes on this flow. Our data correlates with the qualitative feedback, showing that the participants had more difficulty dealing with the task and not understanding the task.

Professors Task 3: Favorite a quiz

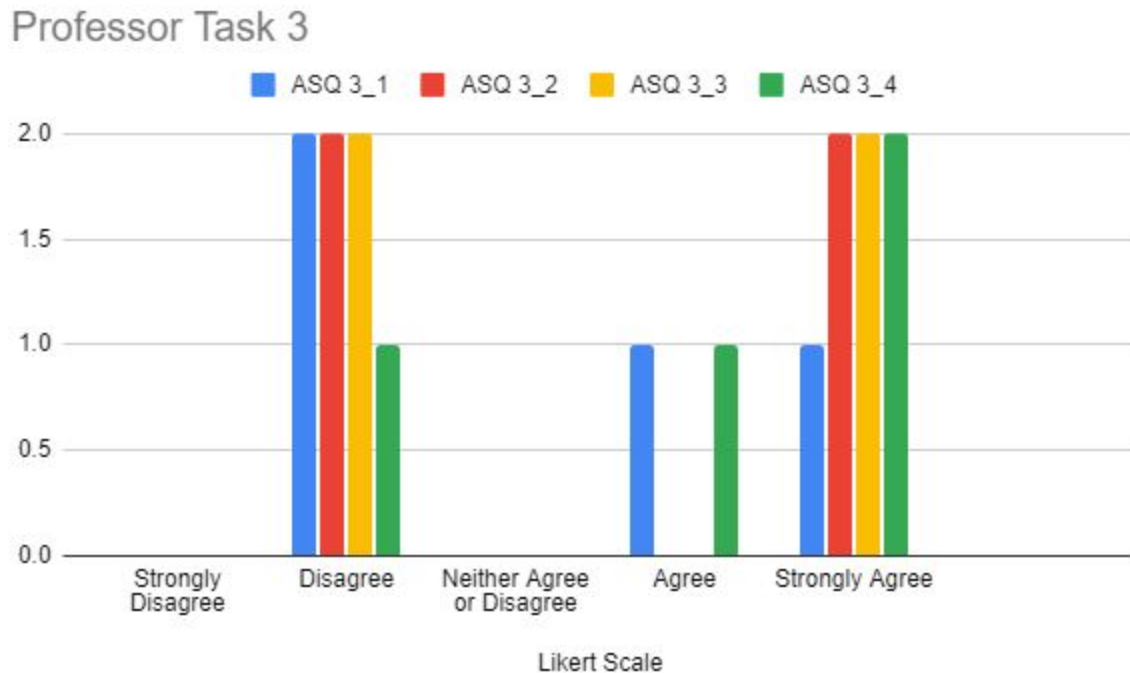


Fig 11: Professor's Perceived Ease of Use on "Favorite a quiz"

- Time on Task: Figure 11 shows no significant difference in terms of task completion time, between Expert (SD=5.115) and Novice (SD=73.538) users; $t(10) = -1.927$, $p = 0.083$.
- Perceived Ease of Use: The results shown in Figure 11 suggest that users found this user flow not easy or effortless (Mean = 3.5). The qualitative feedback during the user-testing helped us implement a few UI changes like adding yes or no instead of true or false on the quiz table to show the quiz being favorited. Our quantitative results correlates with the qualitative feedback, showing that this was the flow that the participants had more difficult dealing with.

Professors Task 4: Add a topic to course

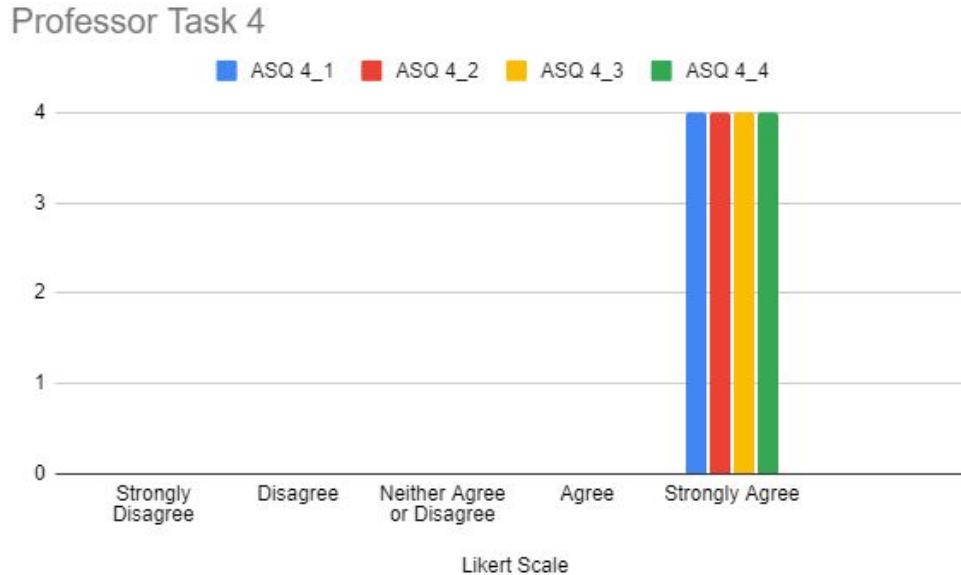


Fig 12: Professor's Perceived Ease of Use on "Add a topic to a course"

- Time on Task: Figure 12 shows no significant difference in terms of task completion time, between Expert (SD=5.645) and Novice (SD=18.360) users; $t(10) = -2189$, $p = 0.053$
- Perceived Ease of Use: The results shown in Figure 12 suggest that users found this user flow to be easy or effortless (Mode = 5). The qualitative feedback collected for the task reinforces that participants found adding topics easy.

Professor Task Completion Time Conclusion

There was a significant difference in the scores for users familiar with the product ($M = 79.500$, $SD = 14.335$) and users not familiar with the product ($M = 392.167$, $SD = 101.885$).

There was a significant difference, in terms of task completion time, between Expert ($SD=14.335$) and Novice ($SD=101.885$) users; $t(10) = -7.444$, $p < .001$.

However, there was no significant difference, in terms of task completion time, between Expert and Novice users regarding Task 3 (favorite a quiz) and Task 4 (add a topic to a course). Regarding Task 3 and 4, the null hypothesis was accepted, because there's no significant difference between novice and expert users.

These results suggest that we have to readjust the user-flows for Task 1 (add students to course) and Task 2 (import quizzes). Results also reject the null hypothesis that there is no significant difference between expert users and first-time users, in terms of task completion time.

4.2 Display Satisfaction Hypothesis (Light Mode & Dark Mode)

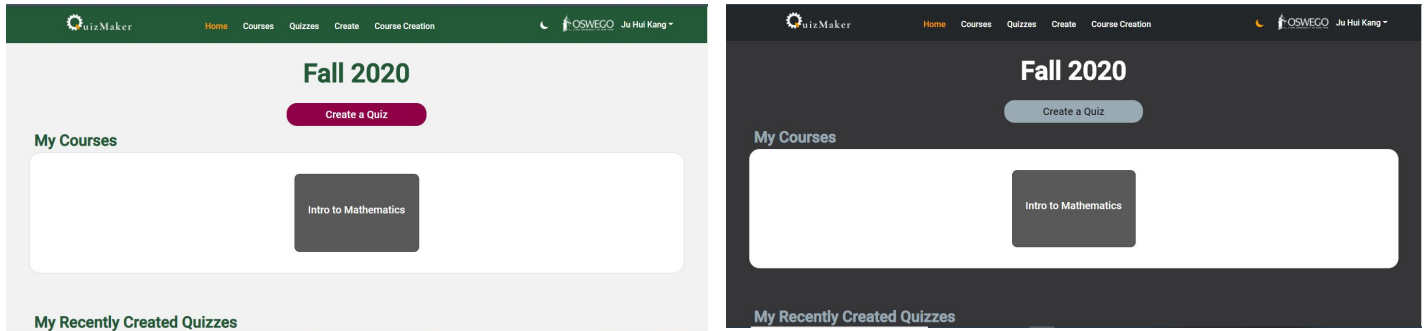


Fig 13: Light and dark mode screenshots

A hypothesis was formed to measure Display Satisfaction for each mode (shown in Figure 13) that was created to research if users were content with the overall use of QuizMaker for both cases:

H0: There is no significant difference between dark mode and light mode, in terms of user satisfaction measured by SUS.

H1: There is a significant difference between dark mode and light mode, in terms of user satisfaction measured by SUS.

The SUS scale was chosen for this usability study because it is a widely standard questionnaire used to assess the overall perceived usability. Research has suggested that the Systems Usability Scale has great reliability, validity, and sensitivity to a variety of independent variables (Tullis & Stetson, 2004).

The assumption of normality, as assessed by the Shapiro-Wilk's test, ($p > .05$) was met (check Appendix A Figure 16 for detailed results).

A t-test was used to determine the statistical significance of both visualisations (Evelina & Panayiotis, 2014).

An independent-samples t-test was conducted to compare both visualizations. Results showed that there is no significant difference between QuizMaker's light and dark mode: $t(8) = -0.143$, $p = 0.889$. Therefore, the null hypothesis was not rejected.

Table 2: System Usability Scale score for overall experience based on interface type

Interface mode	Light mode					Dark Mode				
SUS score from each participant	80	95	92.5	70	90	95	72.5	100	100	52.5

Both modes scored high on the System Usability Scale score, as seen in Table 2. Also, they are rated above the industry standard score, which is 68. Only one score was rated below it. Results indicate that the light mode ($M = 85.500$, $SD = 10.368$) is perceived to be more user friendly than the dark mode ($M = 84.000$, $SD = 20.961$).

Therefore, these results show that there is no significant difference between dark mode and light mode in terms of user satisfaction measured by SUS which means that the above null hypothesis holds true for our results.

5. Findings and Recommendations

Feedback and recommendations from observations

By analyzing the feedback from the think-aloud process and the participants' shared screen from the usability test, six notable issues with the interface were identified for changes. (Please refer to Appendix B for the images of each function). The results were analyzed by function, feedback, recommendations and severity.

Table 3: Feedback and recommendations from observations

	Function	Feedback	Recommendations	Severity
1	General	Some users said they would like a mouseover function to show information about where they are clicking. Some icons were not clear enough to indicate their usage. Users would ask questions such as “Hmm, what would this do?”	Based on the participants suggestions, it would be best to add a mouseover function that explains what action they can make. This way, the user may get some feedback on what they are seeing or clicking.	High
2	Select Topic when creating a Quiz	Some users were confused with the text icon when hovering the mouse over a button or item that they can’t type. This was also noticed on several items throughout the web application.	Add a hand pointer instead of the text icon when hovering. Considering universal design, this would help the users understand that the button or item is clickable.	High
3	Quiz Table (located in the “Courses” and “Quizzes” page)	Some users said they would like to favorite a quiz directly from the table instead of having to go through the whole quiz taking process.	Add a clickable option on the “favorite” column. This will allow users to favorite the quiz directly from the table interface itself without having to take the quiz	Low
		Some mentioned the “favorite” section did not make sense with its terminology of true or false.	Change the string to “YES” and “NO” which can help clarify the meaning of “favorite”	High
		Many users did not find the “Quiz table” prompt window to filter quizzes clear enough. They would click randomly on the table to figure out what was clickable	A solution can be to add a call to action in light gray: “Select topic...” to indicate what the function can do.	Low
		Many users would type lower case to filter a topic and become confused when no search results appeared.	This can be fixed to make the filtering not case sensitive.	Medium

4	Taking a quiz	Some users were not sure what the thumbs up and thumbs down meant. Many also did not notice it during the quiz taking process.	For the thumbs up and down icon problem, it can be addressed by adding a tooltip information when the user hovers their mouse over it. In addition, to make it look more responsive, the color can change to the same purple used on the “Create a Quiz” button.	Medium
		Some users expressed that they would like a back button to go back to a question they already answered	Meanwhile, upon the participants' requests, a back button can be implemented at the side or the bottom of the question table for users to navigate back and forth questions	High
5	Quizzes Page	Some users (mainly student participants during their task) had trouble finding the “Quizzes I took table” on the Quizzes page.	As participants had trouble noticing the function, this problem could be addressed by giving a stronger outline around the tab or making the font bigger.	Medium
6	Create a Quiz	Some users expressed that they would prefer a review page with all the questions after creating a quiz.	This problem can be addressed by adding a review page, so that when users finish creating a quiz, it shows all the list of questions and answers they just created	High
		Most users did not notice they had to create a title for the quiz until they tried to add another question	Give a call to action: "Type your Quiz Title..." or add a text box that stands out from the background.	High
		Some users were confused with the necessity of hitting "add question" after typing the question. Some thought when typing, the question was already on the database and could just click "publish quiz".	It is suggested that when clicking “publish quiz”, the question that is typed will be added to the database.	Low
		Some users wanted to check the questions they made during the quiz creation process.	Adding a back button when creating a quiz or adding a question box below the question users just created may be used to address this problem. This would help the user scroll up and down the questions they made.	High
		Some users seemed to want to import multiple questions at a time.	Based on participants' suggestions, add check boxes next to questions to allow users to select as many as they	High

			want in choice. If not possible, a call to action text can be added to tell the users that they can add one question at a time.	
		Some users seemed to look for "import quiz" at the top. They seemed confused at first where it was.	As some participants suggested, move the "import question" and "add question" to the top where users can notice it when they open the page.	High
		Some users didn't realize they had to click "add question" to add the question to the quiz. They thought clicking "import questions" would add another question.	When importing questions, make the interface add the question and automatically move to question 2 when users click "use question".	Medium

6. Conclusion

Our initial goal of the usability test was to use different scenarios to understand how students and professors at SUNY Oswego interact with QuizMaker, to find out how satisfied they were with the overall product and to identify pain points that impact user satisfaction and task completion time. We tried to determine easiness in navigating the interface with the help of usability testing where we conducted tasks and calculated task completion times of each task. These task completion times were then compared between Expert users and Novice users. The satisfaction of tasks and overall design were tested by analyzing the Perceived Ease of Use scale which was taken after each task. A Dark mode and Light mode were implemented in the interface and was measured by the System Usability Scale to analyze user satisfaction at the end of all tasks.

6.1 Students task completion time and perceived ease of use

Students were asked to complete tasks based on: Take a quiz, create a quiz, find “Quizzes I took” table and filter a Quiz.

The tests showed that Novice users had a significant amount of time difference in contrast to the Expert users on all four tasks. By examining just these results, this initially could mean the tasks and interface were difficult to conduct. However, by using the Perceived Ease of Use questionnaire, it was found Novice users were highly satisfied with all tasks (the majority of the participants selected highly satisfied on the likert scale). These results suggest that although users took longer completing the tasks, they found the interface relatively easy to use.

6.2 Professors task completion time and perceived ease of use

Professors were asked to complete tasks based on: Add a student to the course, import questions in a quiz, favorite a quiz and add topic to course.

Similar to students, professors also had a significant difference in terms of task completion time between Expert and Novice users. However, this was shown only in Task 1 (add students to course) and Task 2 (import quizzes). This correlated with qualitative feedback. Many participants recommended changes in the “importing questions” section. For “adding students”, we observed that participants did not understand whether to click save changes after adding the student. These results helped us suggest minimal changes to the interface.

Regarding Task 3 (favorite a quiz) and Task 4 (add a topic to a course) there was no significant difference between Expert and Novice users task completion time. However, based on the Perceived Ease of Flow results, Task 3 had a mean calculation of 3 (user flow not easy or effortless), with a majority of participants selecting disagree on the likert scale. This reason was identified through the qualitative results. It was shown some users had difficulties with the user

flow and terminologies with Task 3. Therefore, these results suggest that professors had a more difficult time with the interface.

6.3 Display Satisfaction between Light mode and Dark mode

The System Usability Scale was used to measure the satisfaction between the two modes, which was created based on the stakeholders feedback. The data was used to see if the apps usability was above the industry standard.

Results showed that there is no significant difference between dark mode and light mode in terms of user satisfaction measured by the System Usability Scale. This means there were no difficulties or problems users faced with the difference in each interface based on the color and the users were satisfied with the overall product.

6.4 Future recommendations

There were issues such as some technical difficulties encountered during the usability testing that could have hindered our task completion times and perceived ease of use. However, as seen in the Perceived Ease of Use and SUS results, the Quizmaker interface is in overall perceived as an interface that is easy to use and navigate. An additional usability test may be useful for discovering more usability findings and suggest further changes to improve the interface.

7. References

Patsoule, E., & Koutsabasis, P. (2014). Redesigning websites for older adults: a case study. *Behaviour & Information Technology*, 33(6), 561–573.

Tullis, T. S., & Stetson, J. N. (2004). A comparison of questionnaires for assessing website usability. Paper presented at the Usability Professionals Association Annual Conference, UPA, Minneapolis, MN. Retrieved September 13, 2017.

8. Appendix A

Web Application link: <http://pi.cs.oswego.edu:9080/>

Fig 14. After Scenario Questionnaire

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
1. My interaction with QuizMaker is clear and understandable during this task.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Interacting with QuizMaker during this task does not require a lot of my mental effort.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I find QuizMaker to be easy to use during this task.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I find it easy to get QuizMaker to do what I want to do during this task.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Fig 15. System Usability Scale Questionnaire

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
1. I think that I would use this system frequently.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I found the system unnecessarily complex.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I am satisfied with the support information when completing this task.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I think that I would need the support of a technical person to be able to use this system.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I found the various functions in this system were well integrated.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I thought there was too much inconsistency in this system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I would imagine that most people would learn to use this system very quickly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I found the system very cumbersome to use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. I felt very confident using the system.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. I needed to learn a lot of things before I could get going with this system.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Fig 16. System Usability Scale Results**Independent Samples T-Test ▼**

Independent Samples T-Test

	t	df	p
SUS score	-0.143	8	0.889

Note. Student's t-test.

Assumption Checks

Test of Normality (Shapiro-Wilk)

		W	p
SUS score	Dark	0.831	0.141
	Light	0.896	0.390

Note. Significant results suggest a deviation from normality.

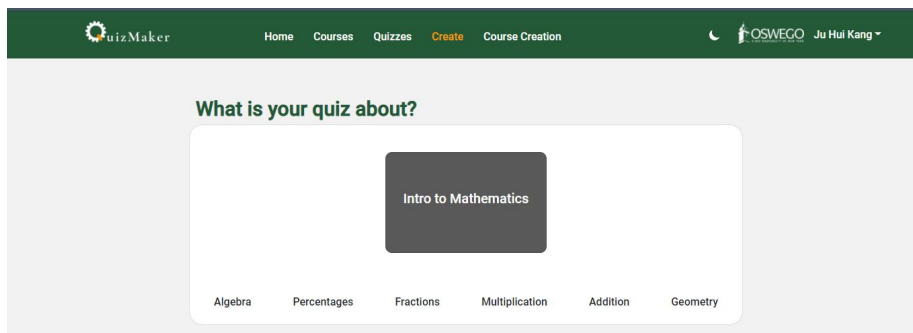

Descriptives

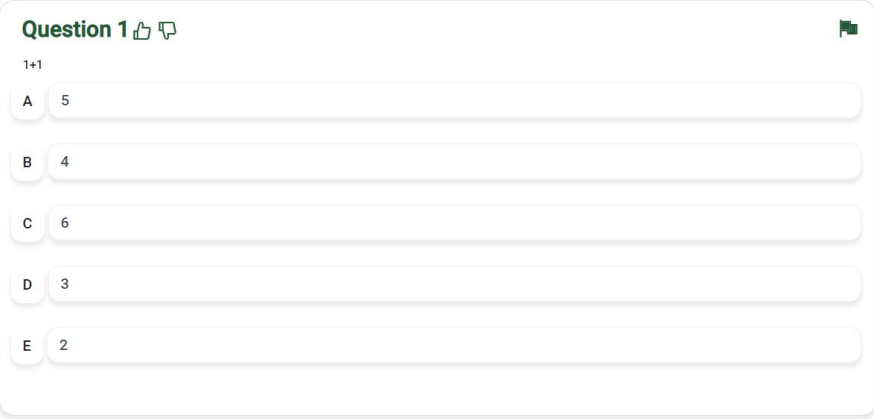
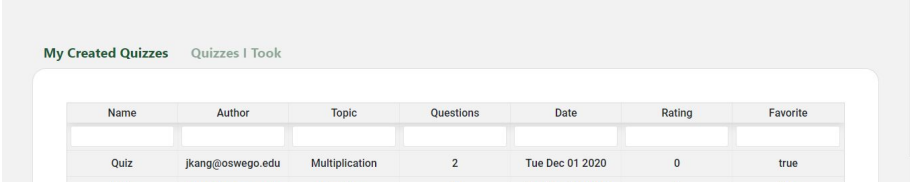
Group Descriptives

	Group	N	Mean	SD	SE
SUS score	Dark	5	84.000	20.961	9.374
	Light	5	85.500	10.368	4.637

9. Appendix B

Table 5. Screenshots for each function

	Function	Screenshots of interface																																																																													
1	General																																																																														
2	Select Topic when creating a Quiz																																																																														
3	Quiz Table (located in the “Courses” and “Quizzes” page)	<table><tr><th>Name</th><th>Author</th><th>Topic</th><th>Questions</th><th>Date</th><th>Rating</th><th>Favorite</th></tr><tr><td>Math</td><td>diarosa@oswego.e...</td><td>Summation</td><td>3</td><td>Fri Nov 06 2020</td><td>8</td><td>false</td></tr><tr><td>Practice Quiz</td><td>molson4@oswego....</td><td>Percentages, Fracti...</td><td>1</td><td>Thu Nov 12 2020</td><td>0</td><td>false</td></tr><tr><td>Matt's easy Multipli...</td><td>mjljlic@oswego.edu</td><td>Multiplication</td><td>2</td><td>Tue Dec 01 2020</td><td>0</td><td>true</td></tr><tr><td>Quiz Math</td><td>diarosa@oswego.e...</td><td>Multiplication</td><td>2</td><td>Tue Dec 01 2020</td><td>0</td><td>true</td></tr><tr><td>Quiz</td><td>jkang@oswego.edu</td><td>Multiplication</td><td>2</td><td>Tue Dec 01 2020</td><td>0</td><td>true</td></tr><tr><td>Anisha's Quiz</td><td>akc@oswego.edu</td><td>Multiplication</td><td>2</td><td>Mon Nov 30 2020</td><td>2</td><td>true</td></tr><tr><td>Fun with Multi</td><td>penginee@oswego....</td><td>Multiplication</td><td>2</td><td>Mon Nov 30 2020</td><td>0</td><td>true</td></tr><tr><td>my quiz 2</td><td>lgarrido@oswego.e...</td><td>Multiplication</td><td>2</td><td>Mon Nov 30 2020</td><td>0</td><td>true</td></tr><tr><td>Fun multiplications!</td><td>sandy@oswego.edu</td><td>Multiplication</td><td>4</td><td>Wed Nov 04 2020</td><td>7</td><td>true</td></tr><tr><td>Title</td><td>jkang@oswego.edu</td><td>Fractions</td><td>2</td><td>Tue Dec 01 2020</td><td>0</td><td>false</td></tr></table> <div><div>Previous</div><div>Page1of3</div><div>10 rows</div><div>Next</div></div>	Name	Author	Topic	Questions	Date	Rating	Favorite	Math	diarosa@oswego.e...	Summation	3	Fri Nov 06 2020	8	false	Practice Quiz	molson4@oswego....	Percentages, Fracti...	1	Thu Nov 12 2020	0	false	Matt's easy Multipli...	mjljlic@oswego.edu	Multiplication	2	Tue Dec 01 2020	0	true	Quiz Math	diarosa@oswego.e...	Multiplication	2	Tue Dec 01 2020	0	true	Quiz	jkang@oswego.edu	Multiplication	2	Tue Dec 01 2020	0	true	Anisha's Quiz	akc@oswego.edu	Multiplication	2	Mon Nov 30 2020	2	true	Fun with Multi	penginee@oswego....	Multiplication	2	Mon Nov 30 2020	0	true	my quiz 2	lgarrido@oswego.e...	Multiplication	2	Mon Nov 30 2020	0	true	Fun multiplications!	sandy@oswego.edu	Multiplication	4	Wed Nov 04 2020	7	true	Title	jkang@oswego.edu	Fractions	2	Tue Dec 01 2020	0	false
Name	Author	Topic	Questions	Date	Rating	Favorite																																																																									
Math	diarosa@oswego.e...	Summation	3	Fri Nov 06 2020	8	false																																																																									
Practice Quiz	molson4@oswego....	Percentages, Fracti...	1	Thu Nov 12 2020	0	false																																																																									
Matt's easy Multipli...	mjljlic@oswego.edu	Multiplication	2	Tue Dec 01 2020	0	true																																																																									
Quiz Math	diarosa@oswego.e...	Multiplication	2	Tue Dec 01 2020	0	true																																																																									
Quiz	jkang@oswego.edu	Multiplication	2	Tue Dec 01 2020	0	true																																																																									
Anisha's Quiz	akc@oswego.edu	Multiplication	2	Mon Nov 30 2020	2	true																																																																									
Fun with Multi	penginee@oswego....	Multiplication	2	Mon Nov 30 2020	0	true																																																																									
my quiz 2	lgarrido@oswego.e...	Multiplication	2	Mon Nov 30 2020	0	true																																																																									
Fun multiplications!	sandy@oswego.edu	Multiplication	4	Wed Nov 04 2020	7	true																																																																									
Title	jkang@oswego.edu	Fractions	2	Tue Dec 01 2020	0	false																																																																									

4	Taking a quiz	
5	Quizzes Page	
6	Create a Quiz	