Project #4: Conduct a User Observation Study

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CS 443: User Interface

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Contents

1. Introduction

The overall purpose of this user observational study is to test which of the two systems being observed (Sequential Tutorial and User-Managed Checklist) has a higher usability for college students. The usability will be measured using completion time and a 5-question multiple choice quiz on the reading material given at the end. The first system "Sequential Tutorial" was created by Jackson Zenti and guides the user through 4 stages (survey, question, read/recite, and review). The user is given clear instruction while they are guided through these sequential stages. The next system "User-Managed Checklist" created by Sorin West the right-hand side of the system displays the text, whilst the left-hand side of the system is where the user applies the SQ3R Notes and check list. The right-hand side has 3 tabs that the user can switch between. These tabs are: SQ3R checklist, note taking, and note review. There are also links provided at the bottom of the screen on what SQ3R entails. I hypothesize that the Sequential Tutorial will lead to more accurate comprehension due to its structured design, whereas the User-Managed Checklist may allow faster completion times due to its flexible layout.

2. Methodology

Participants. For this study four individuals were recruited to being observed using the two systems. These participants were recruited due to proximity and availability as they are my roommates. Participants provided informed consent to participate in the study.

Background information:

Participant #1:

Age: 21

Major: Elementary Education

Expected Graduation: Spring 2025

Current Occupation: Afterschool teacher

Occupational aspirations: Elementary teacher after graduate school

Participant #2:

Age: 21

Major: Human and Family Services

Expected Graduation: Spring 2025

Current Occupation: Afterschool teacher

Occupational aspirations: Social worker after graduate school

Participant #3:

Age: 20

Major: Art

Expected Graduation: Spring 2025

Current Occupation: N/A

Occupational aspirations: Art teacher

Participant #4:

Age: 21

Major: Sociology

Expected Graduation: Spring 2026

Current Occupation: Waitress

Occupational aspirations: Teacher

Setting. The study was conducted in the shared living room of the participants' residence. This location was chosen to ensure a familiar and comfortable environment effective for focused task completion. The living room is a neutral space often used for studying and completing homework assignments, making it suitable for evaluating these systems in a realistic context. Participants were allowed to choose between sitting on the couch with the laptop in their lap or sitting at the table with the laptop on the surface. A smartphone mounted on a stable support system was positioned behind each participant to capture their interactions with the system without obstructing their workspace or capturing their faces.

Materials. For this study, the participants were given a computer to run the systems on. This device does not belong to any of the participants. The system that the participant is using will be displayed on the screen so that the user does not need to navigate to it. The participant was also given a printed out copy of the participant instruction that was also read aloud by the experimenter. A consent form is signed and received that the participant understands and is in

agreement to participate in the procedure based on their understanding of its nature, its potential benefits and possible risks, and that they can withdraw at any point.

The experimenter is behind the participant with a phone camera that is stabilized to record the procedure. The experimenter has a printed out copy of the instructor instructions and the participant instruction.

Materials Listed

- Consent form
- Phone
- Computer
- Sequential Tutorial or User-Managed Checklist Prototype
- Experimenter instructions handout
- Participant instruction handout

Experimental Design. This study employed a between-subjects experimental design to avoid learning effects or biases resulting from repeating exposure to both systems. Participants were randomly assigned to one of the two systems (Sequential Tutorial or User-Managed Checklist) using an online randomization tool, ensuring an unbiased allocation process. Each participant interacted with only one system to complete the same set of SQ3R-related tasks. The primary performance measures included:

1. **Task Completion Time**: The time taken to complete all assigned tasks within the system.

2. **Task Accuracy**: Performance on a 5-question multiple-choice quiz evaluating their comprehension of the reading material.

Procedure.

Before the session:

1. Use the online randomization tool to allocate two participants to either the Sequential Tutorial or User-Managed Checklist.
2. On the computer, open the assigned system in the browser. Ensure the system is ready to use, with the PDF reading material already preloaded and viewable.
3. Set up the camera behind the couch on a tripod. Ensure that the computer screen is visible and will not be obstructed by the user.
4. Print out five copies of the Participant Instructions, one copy of the Instructor Instructions, four consent forms, and four copies of the 10-question multiple-choice quiz.
5. Inform other residents in the house that the experiment is occurring and not enter the premises.

During the session:

1. Greet the participant and have them take a seat
2. Begin the recording on the camera.
3. Follow the introduction script:

   "Hello! To begin, I would like to thank you for your participation in this study. This interview is part of a class project for CIS 443 User Interfaces taught by Dr. Anthony Hornof at the University of Oregon. Your participation in this study is entirely

voluntary and you may withdraw from the study at any time without penalty. All data gathered from this study will be treated confidentially. If videos or photos are taken, these may be shown to the instructor and other students in the class, but they will not be published online or in print. There are no known risks to participation in this study. Please feel free to ask if you have any questions and, if you would like to participate, please sign and date this form. Thank you very much. The form to sign is in front of you, along with a pen."

4. Receive the consent form. If the participant does not agree to sign, then end the procedure here.
5. Follow the explanation of the SQ3R method script:

   "The SQ3R method is a structured approach to reading and studying that enhances reading comprehension and memory. SQ3R stands for Survey, Question, Read, Recite, and Review. It provides a systematic framework for active reading which makes it particularly effective for studying.

   The steps in the SQ3R Method are:

   Survey

   Begin by skimming the chapter to gain an overview of the structure and content. The purpose is to create a mental map of the text and identify key concepts.

   Question

Create questions based on the information you surveyed. For example, turn headings and subheadings into questions like "What is the main idea of this section?" These questions help focus attention and create a purpose for reading.

Read

Read the chapter with the goal of answering the questions you created. Pay attention to details and try to identify the main ideas and supporting information. Avoid passive reading by actively engaging with the text and writing notes.

Recite

After reading a section, pause and recall the main ideas and the answers to your questions without referring to the text. Summarize the information in your own words. This step reinforces your memory and helps identify areas that need further review.

Review

Finally, review the material to solidify your understanding and retention. Revisit your notes, summaries, or the text itself to reinforce what you've learned and clarify any concepts that remain unclear.

Do you have any questions regarding using the SQ3R Method? You will have the information on SQ3R during the study"

6. Answer any questions regarding the SQ3R method that the participant may have. Once all questions are clarified then proceed to the next step.

7. Follow the user instructions script:

   "For this study you will be tasked with using the prototype in front of you to apply the SQ3R method to a chapter of text. I will be unable to assist or answer any questions you may have during the study. However, please think aloud as you work. Any observations, challenges, or thoughts that you have should be verbalized. Let me know when you believe that you have finished applying the SQ3R method to the text. Once you have finished you will be quizzed on the SQ3R method and the chapter.

   Thank you again for your participation. You may begin when you are ready."

8. Start the timer.
9. Observe and take notes on the user's interactions with the prototype.
10. Stop the timer.
11. When the participant says they are finished, give them the quiz.

After the session:

1. Stop the recordings on the camera and ensure that the process was successfully captured on video with audio.
2. Capture screenshots of the screens and the data that the user inputted.
3. Save the recordings, screenshots, and scanned copy of the consent form into a designated folder.
4. Thank the individual for their participation in this study. Reiterate that the recording and feedback will remain confidential and only be used for this study.
5. Grade the quiz using the answer sheet and record the time the user took to complete the task.

Threats to external validity. Three potential threats to external validity were identified and addressed:

1. **Small Sample Size**: With only four participants, findings are not generalizable to a broader population. To mitigate this, the study focuses on qualitative insights rather than statistical conclusions. In the future, further research should be conducted with a larger sample size to gain a deeper understanding of the usability.
2. **Participant Bias**: Familiarity between the experimenter and participants may influence performance. The level of familiarity is roughly equal among all participants to ensure consistency. Efforts were made to minimize the bias by maintaining neutrality during the observation.
3. **Environment:** The study setting (a living room) may differ from real-world use cases of the systems. However, the familiar environment was chosen to ensure participants' comfort and natural behavior during the study.

3. Results

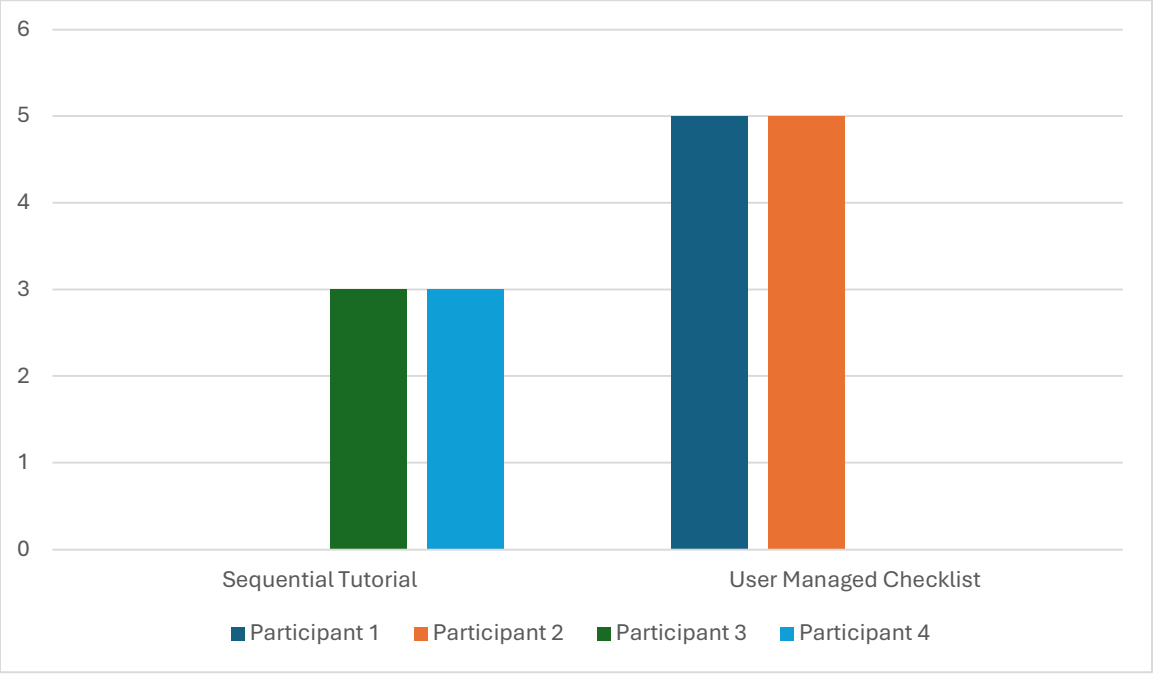
This section summarizes the data observed from participants' interactions with the two systems: Sequential Tutorial and User-Managed Checklist. Data includes quiz accuracy, task completion time, and usability issues identified during observations. Performance measures are presented with tables and figures for clarity.

Quiz Accuracy

Table 1 and Figure 1. Summarize the total quiz scores for each participant, grouped by system. Each participant answered five multiple-choice questions testing their comprehension of the SQ3R method and the given reading material. If the participant answered correctly, they receive a 1. If they answer incorrectly, they receive a 0.

	Question 1	Question 2	Question 3	Question 4	Question 5	**Total**
Sequential Tutorial	**0, 1**	**1, 1**	**1, 1**	**1, 0**	**0, 0**	**3, 3**
User-Managed Checklist	**1, 1**	**1, 1**	**1, 1**	**1, 1**	**1, 1**	**5, 5**

Figure 1. Total quiz scores for each participant based on the assigned system.

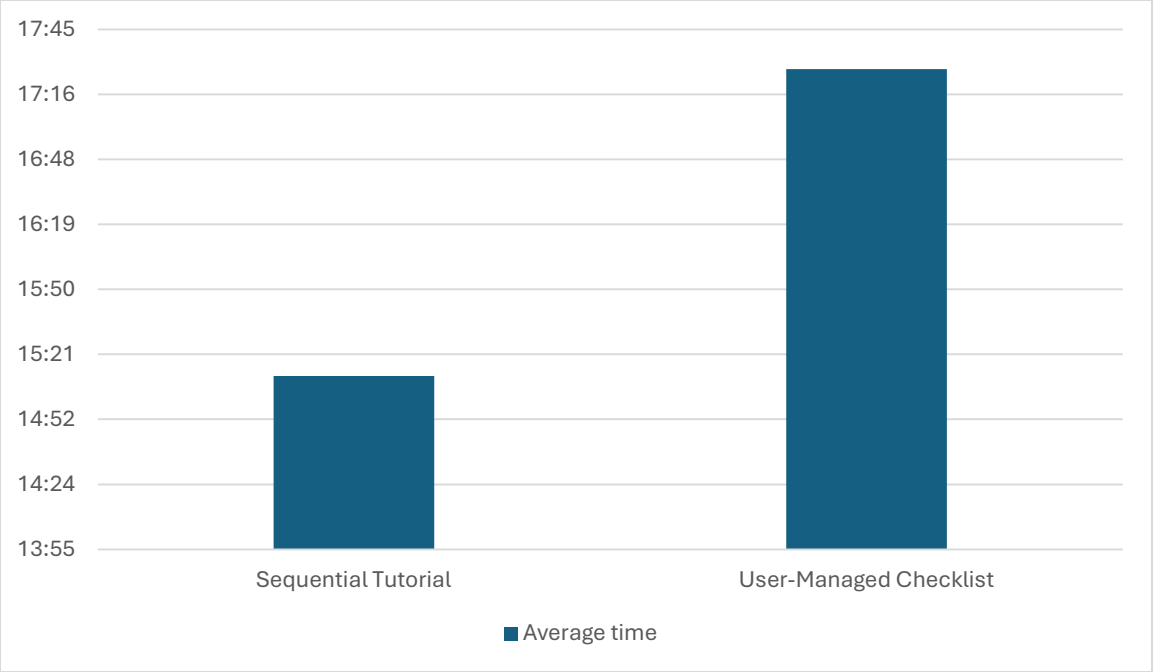


Completion Time

Table 2 and Figure 2. present the time taken by each participant to fully complete the SQ3R method. Times are recorded in minutes and seconds.

	Participant 1	Participant 2	Participant 3	Participant 4	**Mean**
Sequential Tutorial	**N/A**	**N/A**	**18:06**	**11:38**	**15:12**
User-Managed Checklist	**16:32**	**17:43**	**N/A**	**N/A**	**17:28**

Figure 2. Average completion times (in minutes: seconds) for participants using Sequential Tutorial and User-Managed Checklist.



Usability Observations

1. Sequential Tutorial:
    a. Navigation Issues: Participants struggled to locate the scrollbar, delaying task completion.
    b. Input Challenges: Some users found the input fields for note-taking non-intuitive, leading to backtracking.
2. User-Managed Checklist:
    a. Flexibility Issues: Despite explaining to the participants what the process of SQ3R method is prior to the study, they applied their own note taking preferences, rather than using the SQ3R method.
    b. Efficiency: Both participants completed tasks slightly faster than with the Sequential Tutorial.

To conclude, these results did not support my hypothesis that the Sequential Tutorial will lead to more accurate comprehension due to its structured design, whereas the User-Managed Checklist may allow faster completion times due to its flexible layout. In fact, the opposite was true. The User-Managed Checklist had slower completion time but a higher score on the multiple-choice quiz. Further research should be done with a higher sample size.

4. Analysis

This section discusses the observed trends, identifies usability challenges, and assesses the systems' effectiveness in meeting usability goals.

1. Sequential Tutorial

The Sequential Tutorial system demonstrated notable strengths in guiding participants through the structured steps of the SQ3R method, but a few usability challenges were observed:

Reading Challenges: Participant 3 initially struggled to identify how to scroll through the text, highlighting a need for clearer visual indicators or instructions. Incorporating a visible, intuitive scrollbar could improve navigation and enhance user experience.

Confusion with Input Boxes: Participant 4 had trouble identifying where to enter notes during the "Survey" phase, as the first two pages were primarily informational. While the introductory content on SQ3R was helpful, usability could be enhanced by embedding the note-taking section directly beneath this information or making it more visually distinct.

Structured Guidance: Despite these challenges, participants valued the system's detailed, step-by-step guidance. They noted that the Sequential Tutorial is particularly beneficial for individuals unfamiliar with the SQ3R method, as it provides clear, structured support throughout the process.

2. The User-Managed Checklist

The User-Managed Checklist offered higher flexibility but required users to understand the SQ3R method and manage their progress independently. Observations include:

1. **Navigation Challenges**: Participants occasionally struggled with switching between tabs, which could disrupt workflow. Simplifying navigation or providing clearer instructions may enhance usability.
2. **Flexibility vs. Structure**: While the flexibility of this system allowed users to approach tasks in their preferred order, it led to the user incorrectly applying the SQ3R method. For example, both participants who used the User-Managed Checklist prototype ignored the survey step and began fully reading the text. Whereas the other participants started surveying the material prior to writing questions. Thus, this system may be better suited for users with prior knowledge of the SQ3R method who prefer greater self-autonomy rather than step-by-step guidance.

3. Performance Metrics

1. Participants using the User-Managed Checklist achieved perfect quiz scores, indicating better comprehension. However, this may reflect individual prior knowledge and education rather than system design.

2. Sequential Tutorial participants had lower quiz scores but stated that they valued the structured guidance, thus the system may be better suited for SQ3R training purposes.

5. Conclusion

Overall, this study provided valuable insights into the usability and effectiveness of two user interface systems designed to support the SQ3R reading and studying method. From this project, I learned the importance of balancing structure and flexibility in user interface design. Structured systems like the Sequential Tutorial can provide essential guidance and information but risk confusing users if navigation and instructions are not intuitive. Flexible systems, like the User-Managed Checklist, appeal to experienced users but may lack the guidance necessary for novices. These insights show the need to design interfaces that cater to diverse user skill levels. Thus, highlighting the value of user observation in discovering usability issues that might not be evident during development. Observing participants' interactions revealed critical insights into how users interpret and navigate interfaces, informing areas for refinement.

I were to build a system based on these findings, I would aim to create a hybrid interface combining the Sequential Tutorial's structured guidance with the User-Managed Checklist's flexibility. For example, I could implement optional prompts or hints that users can toggle on or off, providing guidance without limiting autonomy. Additionally, I would focus on improving navigational cues and reducing cognitive load through clearer visuals such as the text having a permanently visible scroll bar. All-in-all, this project has deepened my understanding of user-centered design and reinforced the importance of iterative testing in creating effective and efficient user interfaces.