Project #2: Design a User Interface

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CS 443: User Interface

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1. Reflecting on the Task

In the application of the SQ3R (Survey, Question, Read, Recite, Review) technique to the reading of "Chapter 2: Writing Paragraphs" by Huckin and Olsen, it revealed the crucial steps involved in efficient and effective studying to commit the knowledge into your long-term memory.

The first key step was to gather all necessary materials and set up an environment conducive to studying. Like Jun, the example student in the problem scenario, on my desk I had a pencil, highlighter, printout of the chapter, and the summary of the SQ3R technique. I also chose a quiet area to study and turned off my phone to reduce distractions. The preparation and setup stage was necessary to minimize interruptions and ensure that all tools were readily available, thus allowing for focus and structuring the workflow.

Once the study environment has been set up, the next steps are to "Survey" and "Question" the reading. While surveying, the reader should skim through the chapter to get an overview of the main ideas. The reader should highlight any headings, subheadings, visual aids, and bold or italicized information. This phase allows me to understand the structure and ideas presented in this reading. After the reader has finished surveying, begin creating specific questions that would guide the reading, as well as turning headers into questions. For example, the title "Writing Paragraphs" turned into the question "What makes a paragraph good or bad." This example led me to think about the differences between a well-written paragraph and a poorly written one while reading. Thus, shifting my reading from passive to active, sustaining my attention throughout the chapter.

The three "R"s in SQ3R have the reader actively learning the content of the chapter and reinforcing that knowledge into long-term memory. For example, the "Reading" stage requires the reader to actively search for the answers to the questions created in the previous stage. During this phase, it is important to make notes, write down the answers to the questions, and underline the main ideas. I spent the majority of my time on this stage. After the reader has read and written down the answers, they will enter the "Recite" phase which involves verbally answering the questions in their own words. After verbally answering, compare it to the written answer. This phase was crucial in committing the knowledge to my long-term memory as it tested my understanding and retention of the information. Finally, the "Review" step has the reader review and test their memory of the notes. This step reinforced and organized the content into a coherent structure which made it easier for me to recall the specific techniques used in paragraph writing.

Overall, applying the SQ3R method demonstrated the need for a structured approach to reading to break the task into smaller, more manageable steps. Unlike my usual approach to studying, which is to simply read the textbook, I found that by focusing on one stage at a time I was able to focus and gain a deeper understanding of the material.

Figure 1. This figure shows the first page of my notes using the SQ3R. Includes questions, answers, highlights, and underlining. Full PDF here.

2. Rough Design Ideas

<u>User needs</u>

- Highlighting tool

- Ability to comment/make questions

- Underling tool

- Display text

- SQ3R

Optional features

- Quiz for review

- AI Summaries created

- Flashcards generated from the user's questions and answers

- Memory recall prompts

These are rough design ideas that explore a wide range of ideas and approaches while all incorporating the user's needs:

 Note taking website

- Like Adobe/Word but more simple

- For the Desktop

- Ability to highlight, underline, bold, and take notes on the side

- Shows the whole page with scrolling features

Step-by-step annotation application

- User is only shown one passage at a time

- Uses fingers or the next button to swipe to the next step

- Simple UI

- Goes through the steps of SQ3R one by one. Allowing only certain features at each step.

Dual Screen and Flash Card Generator

- Splits screen into left and right panels

- Desktop

- Left panel: shows the chapter and allows scrolling and searching

- Right panel: SQ3R prompts and note-taking editor.

- For the review section, flashcards are generated from the questions and answers the user wrote.
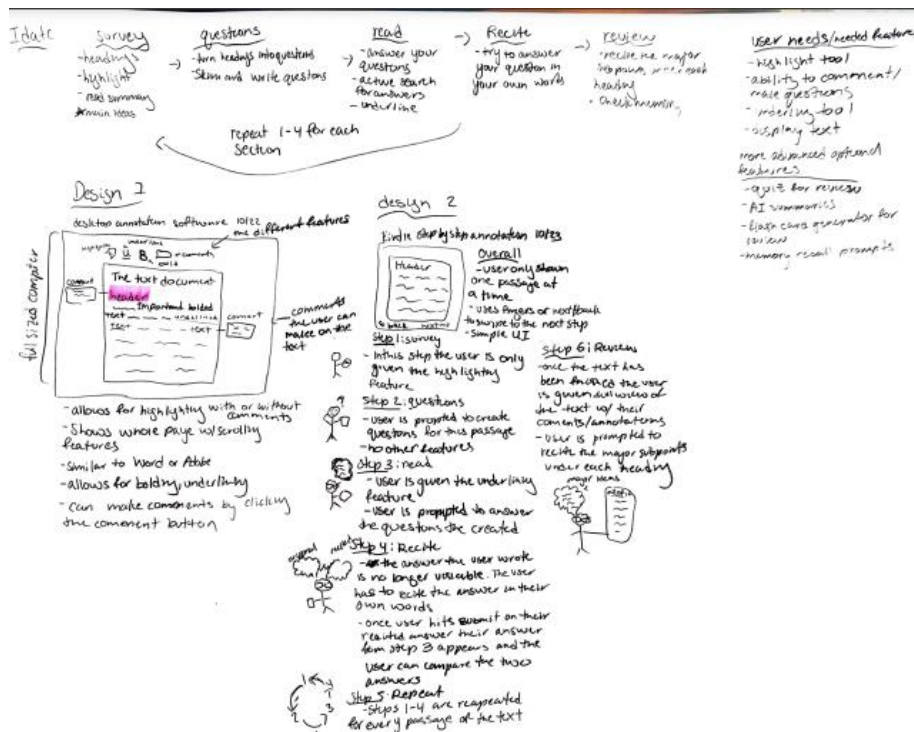
The user tests their memory of what they have learned.

Figure 2. The handwritten drawings and notes on the prototypes.

3. Two Interaction Designs

For this project, two user interfaces were created to support the task of SQ3R annotation. These two interactive designs had to incorporate the client's needs while also expanding upon those needs to enhance the usability. The final two designs are the dual-screen annotation website and the annotation software for the tablet. While these designs incorporate the basic needs of SQ3R such as highlighting, notetaking, and underlining; they differ in the UI (user interface) and additional features. A paper prototype and storyboard were created for each of these UIs to show how the product works.

3.1 Dual-screen annotation website

This website has a simple UI with a limited number of tools: highlighting, underlining, bolding, searching, commenting, and note-taking. The purpose of this is for enhanced learnability. The user is not required to have a high level of previous knowledge and experience to be able to use this website. If the user has experience with text editors such as Google Docs or Word, then they should have no issue with this site. The website has a dual screen with the left side of the screen displaying the reading and the left side showing the SQ3R requirements and notes. An add-on to the simple annotation requirements is that flashcards are generated using the user's questions and answers for ease of reviewing the material.
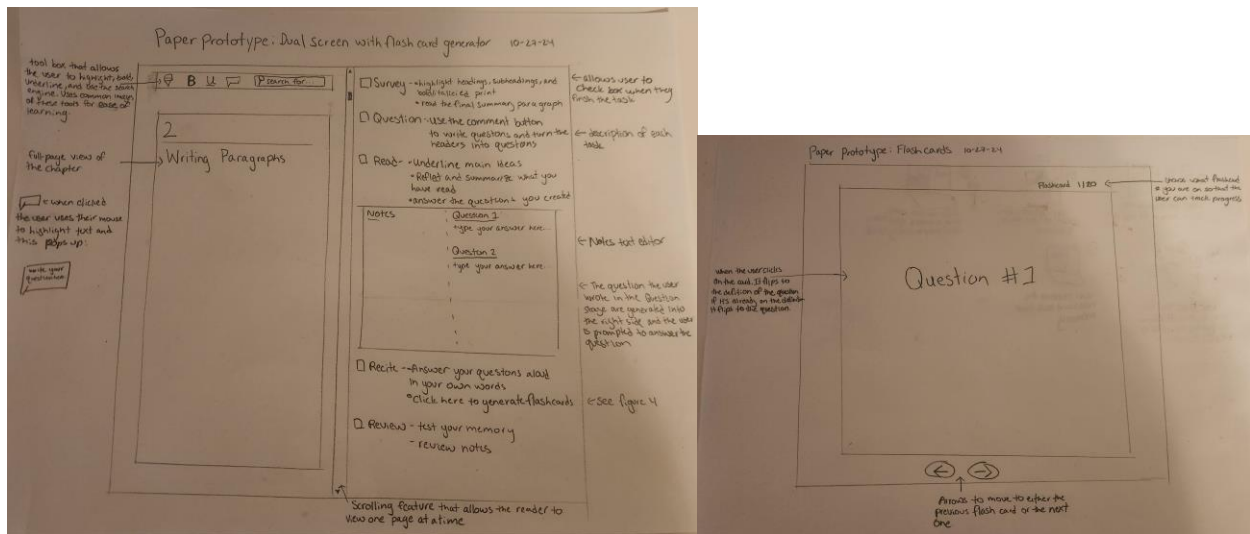
Figure 3. Paper prototype of the dual-screen website with a flashcard generator. Created
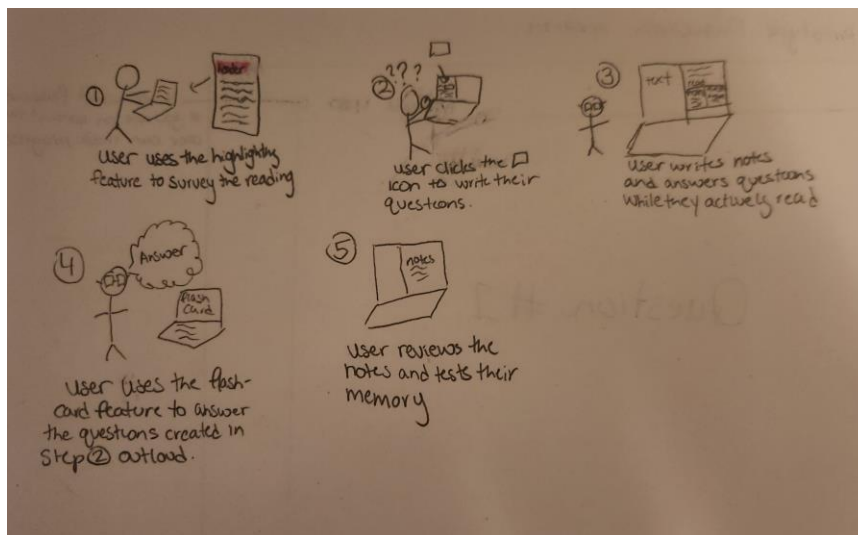
10/27/2024 by Amelia Bates.

Figure 4. Storyboard of the dual-screen website with a flashcard generator. Created 10/27/2024

by A.Bates.

3.2 Step-by-step annotation software on the tablet

This software is intended to be used on a touch-tablet by students looking to study a chapter of text. The user is only shown a single passage at a time and given step-by-step instructions on how to annotate and read the passage. Prompts are given during each step. When the user is ready to move to the next step, they either use the arrow buttons or use their fingers to swipe on the tablet.
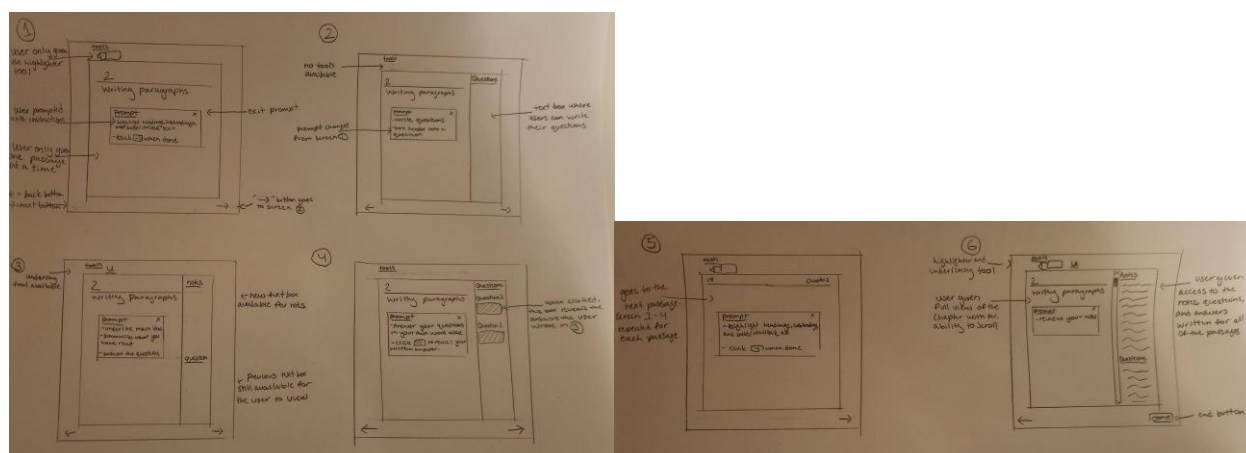

Figure 5. Paper prototype of the tablet annotator. Created 10/28/2024 by A.Bates.

Similar to the Dual-screen annotation website, the UI is designed to be simple to increase the efficiency and effectiveness of the software. This is done by only giving the user the necessary tools for each step.
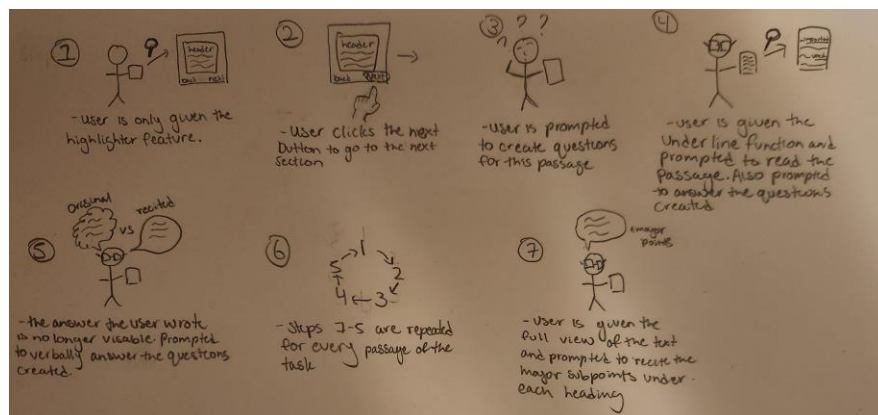
Figure 6. Storyboard illustrating how the user will use the tablet annotation software. Created 10/28/24 by A.Bates.

4. Formative Evaluation Report

4.1 User Observations

Participants: Two non-computer science individuals were recruited to test the paper prototypes of the dual-screen annotation website and the step-by-step annotation software for the tablet. These individuals are not a part of CS 443, nor were they involved in the creation of the prototypes.

Task: Both participants were given a summary of the SQ3R method and shown the paper prototypes of the designs. They were then given the task of following the instructions that the different designs give: to follow the checklist on the right screen of the dual-screen site and to follow the prompts given on the tablet application. The Apple Human Interface Guidelines were implemented in conducting the user observations and the participants were given instructions to use the think-aloud protocol. I provided visual feedback after each user action; however, no verbal guidance was given once they began their task.

Notes for Step-by-Step Annotation Software for Tablet:

- One participant noted that the software lacked the ability to upload/change the

      document. A PDF upload button would be beneficial.

- Participants intuitively used the swiping and arrow buttons

Notes for Dual-Screen Annotation Website:

- One participant noted that the software lacked the ability to upload/change the

 document. A PDF upload button would be beneficial.

- One participant showed confusion about the usage of the flashcard generator. Additional

guidance on the usage of this feature could be beneficial.

4.2 Reflection of User Observations

Conducting the formative user observation study for the dual-screen annotation website and the

step-by-step annotation software for tablets revealed key insights into how users interact with

study aids. Observing the users, without offering guidance, highlighted several practical

challenges that were not apparent during the design phase.

One of the primary challenges observed was the absence of a tool allowing users to upload or

change the document being annotated. This feature is especially important in annotation software

as users may want to apply the SQ3R method to different study materials. Including a PDF

upload or document change function in future iterations could enhance usability and address this

foundational need for adaptability.

The dual-screen annotation website demonstrated strengths in usability due to its simple layout

and tools that are familiar to users of standard text editors. However, the participants were

confused when using the flashcard generation feature. Without clear instructions, one participant

was uncertain about how to utilize the flashcards. This finding reveals the importance of

providing users with a form of guidance or prompt. Adding tooltips, a brief introductory guide,

or visual hints could make this feature more accessible and easier to use.

For the step-by-step annotation software on the tablet, the observation showed a positive

response to the navigation features, with both participants naturally using swiping gestures and

arrow buttons to progress. This reinforces the value of touch-based navigation on tablets, where intuitive interactions like swiping can improve useability. However, one participant noted that the sequential nature of the interface, while helpful for structured learning, was bothersome as it was more time consuming than the other design. While this was useful feedback, the design is meant to slow the reader down, so they are required to consume the material better. However, in future versions, allowing the user to see an overview of the reading may provide better user satisfaction.

Overall, the user observation study highlighted areas for improvement and reinforced the importance of simple UI and helpful guidance within annotation tools. Moving forward, I plan to implement an upload feature, enhanced tool guidance, and improved visual cues to support the ease of usability. I would also like to enhance the quality of the prototype through the addition of colors and using design software. Through the insights found during the study, future prototypes can better align with user expectations, offering an interface that is both powerful and easy to use for learning tasks like SQ3R.

5. Reflection

This project taught me the importance of user-centered designs. Building and testing the paper prototypes allowed me to see the difference between the creator's ideas and the actual usage of the product when in the hands of the user. When designing without user feedback, it's easy to assume certain features will be clear and useful, but real-world testing often uncovers errors, usability challenges, or even essential features that the creator hadn't initially considered. For example, I hadn't initially considered the need for document upload or change options, but user

feedback revealed this as an essential feature that added value to the interface. Furthermore, this project deepened my appreciation for simplicity in UI design. Observing user interactions showed how familiar layouts and guided steps can support learnability, especially when working with complex methods like SQ3R.

Beyond the UI and feedback skills, I also found it beneficial to learn about the SQ3R method and then have to teach it to the participants in the observational study. In the past, I have often struggled with studying and reading textbooks as my attention often drifts away. Learning this structured approach and applying it here inspired me to integrate the SQ3R method into my own studies. In doing so I hope to enhance my comprehension in my courses and future projects.

Overall, this project equipped me with practical skills in user testing, formative evaluation, and new study methods. Moving forward, I plan to integrate these skills into future work, keeping the user's perspective at the center of my designs to create solutions that are both effective and intuitive.