Final Report

Project Name

Doodlenaut

Team Members

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Application overview

Our application is a character customization interface for a game that allows players to customize a character's personality. We have created a web-based application targeting young children from ages 6-12 with the goal of just providing a fun and simple game for them to play. We imagine that players will want something to wind down with after school or after homework. Through the application, players are guided through the website to achieve their goal of customizing their character's personality. This includes the landing page, optional quiz page, character customization page, and completion page.

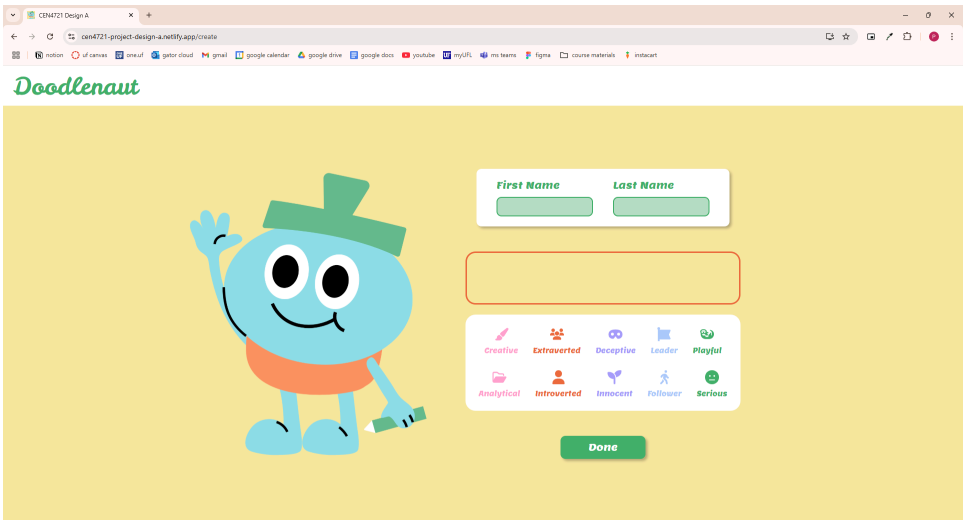
Implementation

To develop this application, we used React.js in the VS Code IDE and collaborated with GitHub. This utilized Javascript to build the site and CSS to customize the UI. We installed various libraries to create a functional site for each design. Some of these helped to create easy navigation through the site and assisted in the creation of character customization components for the different design variations.

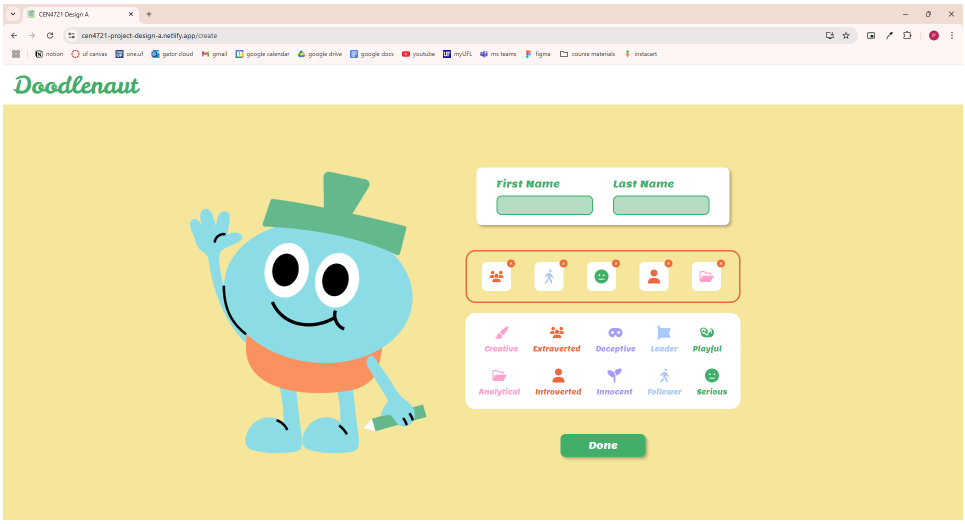
Design variations

Design A

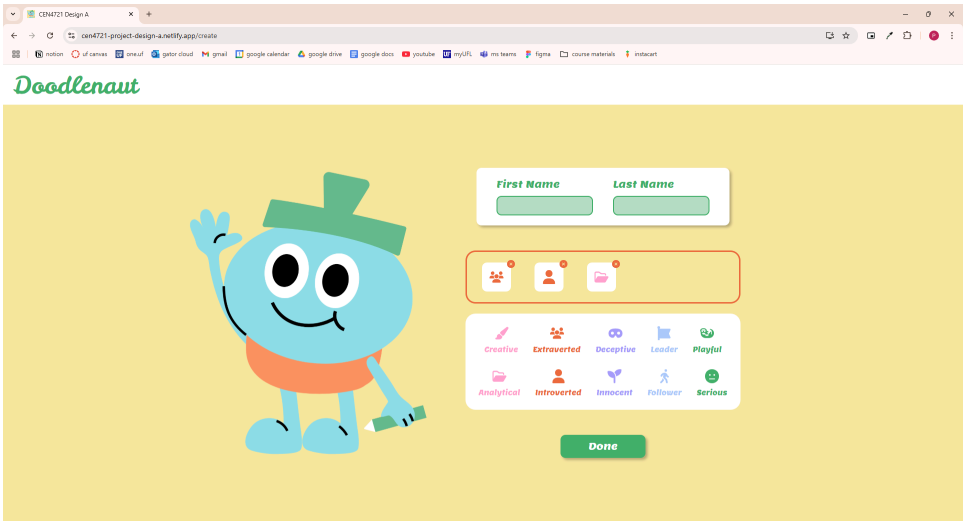
On the character customization page, Design A features a grid of traits that a player can select from. There are ten traits offered: Creative, Extraverted, Deceptive, Leader, Playful, Analytical, Introverted, Innocent, Follower, and Serious. Players are able to select any five of the ten traits.



When the player selects a trait from the grid, its icon will show in the red outlined box in the order that they select. Once they select 5 traits, the program will not let you click on any of the traits from the grid.



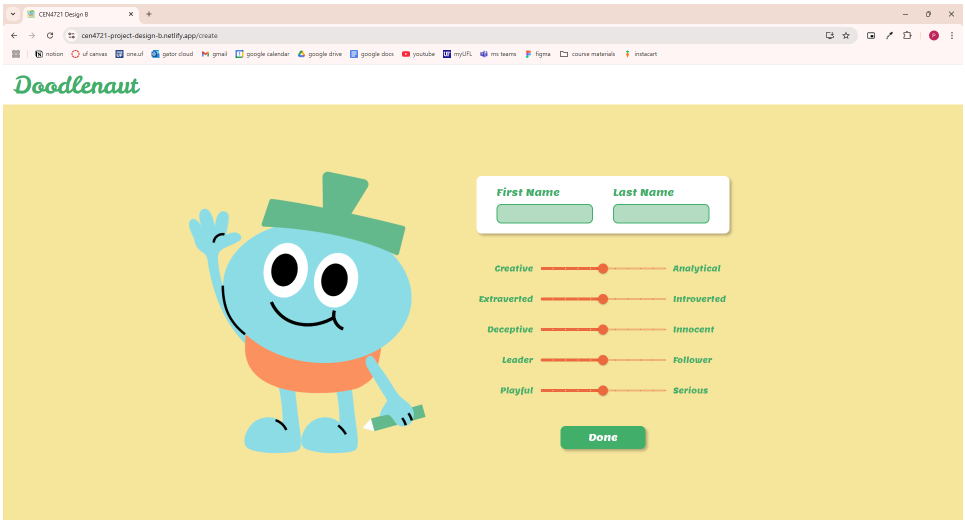
These selected traits will have an ‘X’ button in the corner that players can click to remove this trait. Removing a trait will cause that icon to disappear from the box.



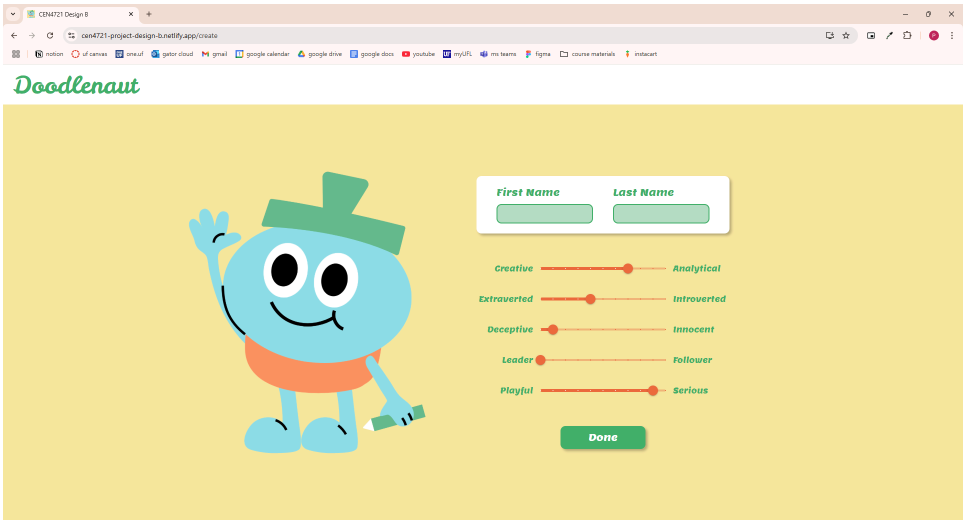
The player can remove and add traits as many times as they would like, as long they stay within the limit of five. Once they finish, they will click the ‘Done’ button.

Design B

To adjust for our independent variable – the level of character customization complexity, Design B features a group of sliders between two opposing traits. The groups are as follows: Creative or Analytical, Extraverted or Introverted, Deceptive or Innocent, Leader or Follower, and Playful or Serious.



Players are able to move each slider to determine the degree to which their character has each trait per group. They are able to adjust the sliders as many times as they want until they are satisfied. Once they finish, they will click the ‘Done’ button.



User study 1 (Usability Tests)

We conducted a usability test for our application Doodlenaut, a character customization game. The study focused on evaluating the ease of use, task efficiency, and overall user satisfaction with the design.

Participants and Recruitment

- **Number of Participants:** 6

- **Demographics:** College students aged 18–22, representing diverse genders and races.
- **Recruitment Method:** Participants were selected from a classroom setting during our scheduled CEN4721 session.

Study Procedure

The study took place in a typical classroom environment (PSY0130, UF campus). The participants interacted with the application on a laptop while their actions, thoughts, and task performance were observed and logged by a facilitator and a notetaker.
Key steps included:

1. Participants provided verbal consent to participate in the study.
2. A brief explanation of the application and the "think-aloud" protocol was provided.
3. Participants completed three tasks using the application.
4. Post-task surveys and a final satisfaction questionnaire were collected.

Tasks

Participants were asked to complete the following tasks:

1. **Task 1:** Start customizing their character, skip the quiz, and proceed to the full customization page.
    - Objective: Click 'Create Character,' bypass the quiz using the 'Skip Quiz' button, and proceed to the customization page.
2. **Task 2:** Add five specific traits (Extraverted, Deceptive, Creative, Leader, Playful) and randomize the character's name.
    - Objective: Select and add traits from the available options and randomize the character's first and last name.
3. **Task 3:** Replace the "Creative" trait with "Analytical" and finish customization.
    - Objective: Remove the existing trait, add a new trait, and click "Play" to complete customization.

Data Collected

1. **Task Completion Data:**
    - Success rates and time-to-completion for each task.
2. **Error Rates:**
    - Observations of user errors or misclicks during tasks.
3. **Subjective Feedback:**

    - Surveys measuring user satisfaction with metrics such as ease of use, clarity of instructions, and organization.
4. **Think-Aloud Comments:**
    - Insights into user expectations and confusion points during tasks.

Analyses Performed

1. **Descriptive Statistics:**
    - Mean and standard deviation for usability metrics such as satisfaction, clarity, and efficiency.
2. **Error Analysis:**
    - Identification and categorization of usability issues based on observation logs.
3. **Think-Aloud Protocol:**
    - Analyzed participant feedback to uncover usability challenges and user expectations.

Results

1. **Task Completion:**
    - 100% completion rate across all tasks, indicating high functionality.
2. **Usability Metrics:**
    - High ratings for interface pleasantness (7.0), overall satisfaction (7.0), and ease of finding information (7.0).
    - Lower scores for error messages (5.5) and clarity of instructions (5.67).
3. **Errors Observed:**
    - Misclicks (e.g., clicking on trait boxes instead of icons).
    - Confusion regarding the functionality of certain buttons (e.g., "Play").
4. **Insights:**
    - Participants found the layout of traits and information overwhelming.
    - Trait organization caused confusion, with comments about improving the order and grouping.

Design Changes Suggested

1. **Error Messaging:**
    - Add pop-ups or tooltips to guide users after incorrect actions.
2. **Trait Layout:**
    - Reorganize traits for better visual clarity and logical flow.
    - Introduce grouping or subcategories for traits to reduce clutter.
3. **Streamlining Screens:**

    - Split the customization screen into multiple steps to prevent information overload.
4. **Visual Cues:**
    - Highlight selectable items with hover effects or icons to enhance usability.

Conclusion

The study revealed that while the application is functional and visually appealing, issues with layout clarity, error feedback, and task flow need improvement. By addressing these challenges, the application can provide a more seamless and intuitive user experience.

User study 2 (A/B experiment)

We conducted an A/B experiment for the Doodlenaut application, a character customization game designed to explore usability differences between two interface designs. Design A uses a grid-based trait selection system, while Design B incorporates sliders for customization. The goal was to evaluate which design provided a better user experience.

Independent and Dependent Variables

Independent Variable:

- **Customization Complexity:**
    - Design A: Grid-based selection of traits.
    - Design B: Slider-based customization for precise control.

Dependent Variables:

1. **System Usability Scale (SUS):**
    - A post-test questionnaire measuring overall system usability.
2. **Customization Complexity Perceived Ease:**
    - Likert scale (1–7) assessing how easy users found the customization process.
3. **Task Completion Time:**
    - Time taken to complete the tasks in each design.
4. **Perceived Satisfaction:**
    - Likert scale (1–7) measuring how satisfied users were with their customization results.

Metrics

1. **Usability Metrics:**
    - SUS scores to evaluate overall usability.
2. **Effectiveness Metrics:**
    - Likert scale scores for ease of customization (1 = Very Difficult, 7 = Very Easy).
    - Likert scale scores for satisfaction with the customization process (1 = Very Dissatisfied, 7 = Very Satisfied).
3. **Efficiency Metric:**
    - Time-to-completion for customization tasks.

Data Collection

1. Observers recorded:
    - Task times using a stopwatch.
    - Misclicks or errors during task execution.
2. Participants provided:
    - SUS scores for overall usability.
    - Responses to Likert-scale questions about ease of use and satisfaction.
3. Post-interview questions captured qualitative feedback on user experiences.

User Tasks For Both Designs:

1. **Task 1:** Start character customization and skip the quiz.
    - Objective: Click "PLAY" on the landing page and select "Skip Quiz" to proceed to customization.
2. **Task 2:** Customize the character with a name and traits.
    - **Design A:** Type a name and select any five traits from the grid.
    - **Design B:** Type a name and adjust sliders for traits as desired.
3. **Task 3:** Replace one trait.
    - **Design A:** Remove a selected trait and add a new one.
    - **Design B:** Adjust a slider in the opposite direction for one trait.

Post-Interview Questions

1. What was your first impression of the application?
2. Did you encounter any challenges while completing the tasks?
3. After completing all tasks, how would you summarize your overall experience with the application?

Participants

1. **Number of Participants:** 16

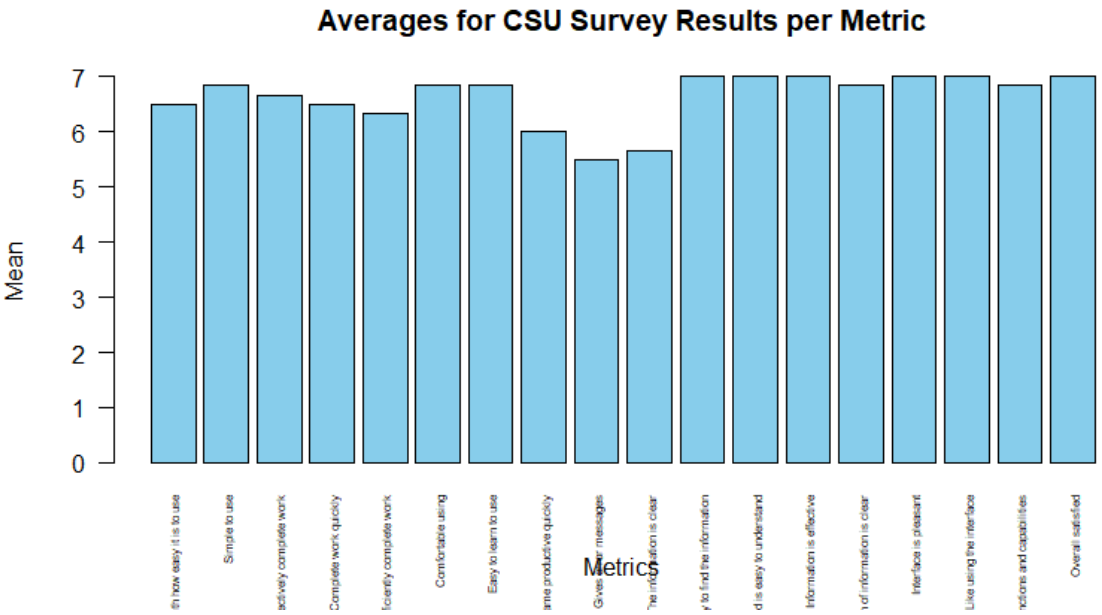
2. **Demographics:**
    a. College students aged 18–22.
    b. Varied genders and racial backgrounds.

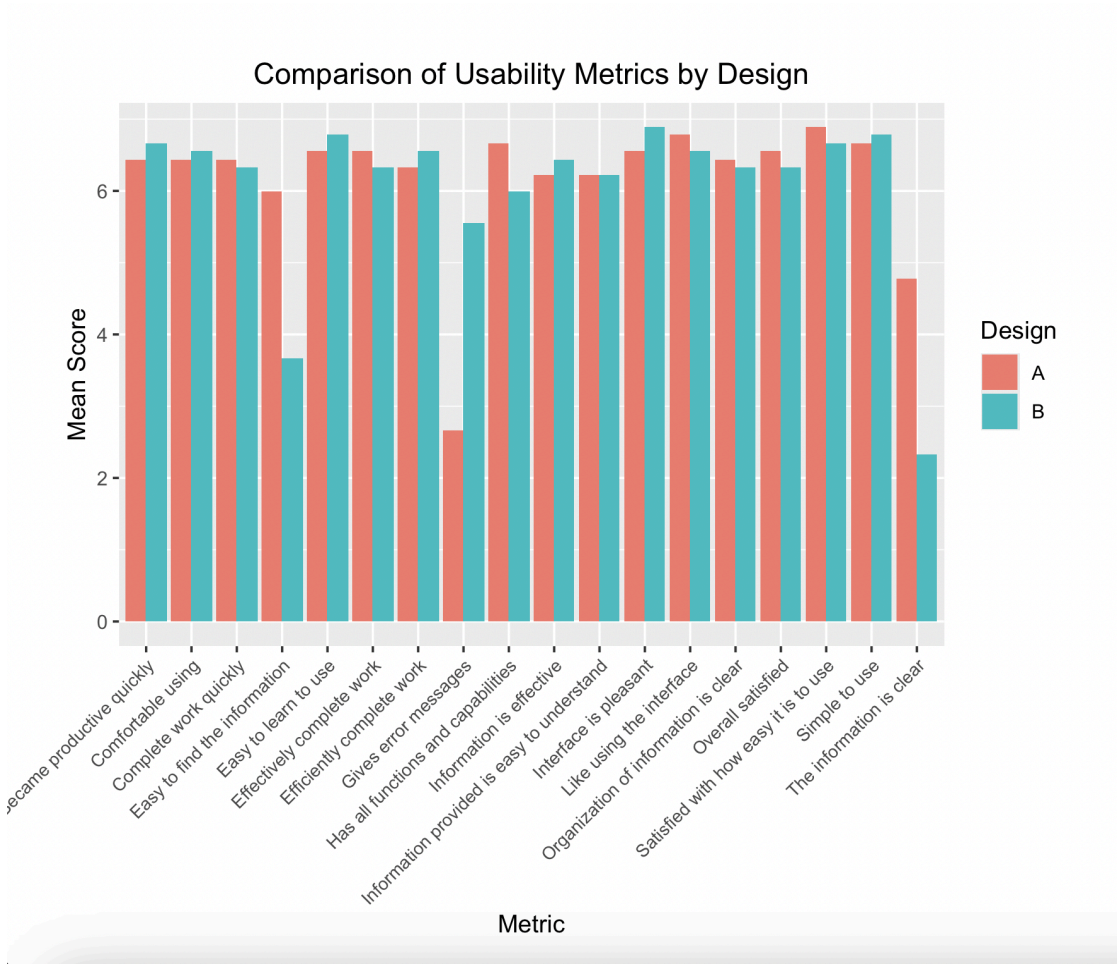
User study 2 data analysis:

The first hypothesis we made was that the second design will achieve a higher usability rating due to its intuitive use of sliders and straightforward layout that makes the application's functionality immediately clear to the user. The sliders guide users naturally, allowing them to adjust settings with ease. This is predicted to enhance the overall user experience. On the contrary, the first design relies on colored drag-and-drop elements that, while visually engaging, may require users to spend additional time understanding how to interact with the application. This slight learning curve could impact the perceived usability, as users may initially find it less intuitive than the slider-based design.

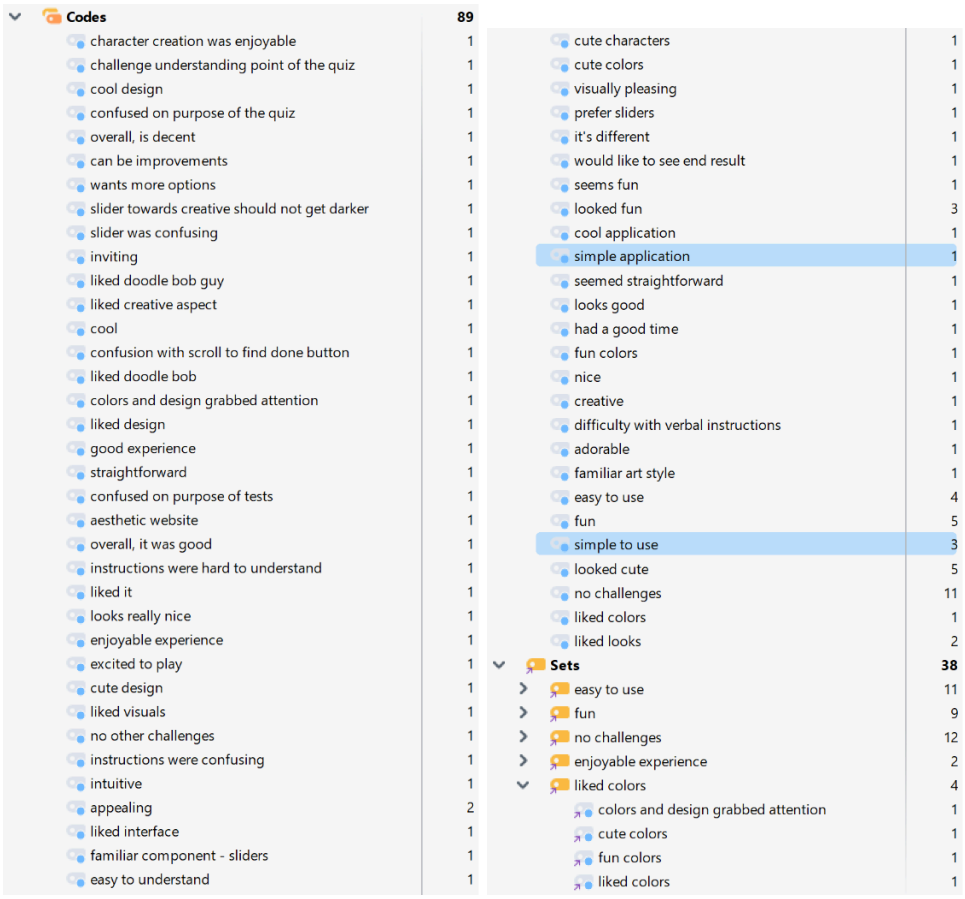
The second hypothesis we made was that the second design variation will have a higher overall system effectiveness rating than the first. We said that although the first design was likely to score higher on Metric 3 due to its more streamlined customization process, we believed the second design will excel in other metrics due to its increased range of options. Specifically, for Metric 2, we expected users to find it easier to achieve their desired character personality with design 2, as its broader range of sliders and options allows for more precise customization. Furthermore, we anticipated that design 2 would outperform Metric 4 because its enhanced depth of customization should lead to greater satisfaction in achieving a character personality that aligns closely with the user's intent. We also predicted that, while the first design may be more aesthetically appealing, the increased flexibility and precision offered by the second design should have led to higher effectiveness scores across these critical metrics.

For the quantitative analysis, we used R to analyze the data and create visualizations. We analyzed the survey results to view a summary of our application's performance. With R, we calculate the mean for each usability metric, derived from the Computer System Usability Questionnaire. In each bar chart we can see the direct comparison of the averages for each metric. The bar chart titled: "Comparison of Usability Metrics by Design" shows this analysis for each design. For our usability testing 1, we can see that our averages are very high for each metric. For our usability testing 2, the data shows us that our two design variations had very similar performances, but Design B is proven to have been rated slightly higher for the metrics pertaining to use and satisfaction.


Averages for CSU Survey Results per Metric
Mean
0
1
2
3
4
5
6
7
Metrics


Comparison of Usability Metrics by Design
Mean Score
0
2
4
6
Design
A
B
Became productive quickly
Comfortable using
Complete work quickly
Easy to find the information
Easy to learn to use
Effectively complete work
Efficiently complete work
Gives error messages
Has all functions and capabilities
Information is effective
Information provided is easy to understand
Interface is pleasant
Like using the interface
Organization of information is clear
Overall satisfied
Satisfied with how easy it is to use
Simple to use
The information is clear
Metric

For our qualitative analysis, we used MaxQDA to annotate the usability testing 2 post-interview transcript with codes. With this program, we went through the document with phrases as our unit of analysis and assigned codes. With these codes, we are able to form categories and gain a deeper understanding of these interview answers. From this qualitative analysis, we found a few themes: Users found the application simple and enjoyable to use. They really liked the design aspects of the interface, which includes the character design, colors, and art style. There were some critiques about providing better instructions for tasks. Users also thought there were a few features that were hard to understand their functionality, like the quiz or sliders.



Codes	89
character creation was enjoyable	1
challenge understanding point of the quiz	1
cool design	1
confused on purpose of the quiz	1
overall, is decent	1
can be improvements	1
wants more options	1
slider towards creative should not get darker	1
slider was confusing	1
inviting	1
liked doodle bob guy	1
liked creative aspect	1
cool	1
confusion with scroll to find done button	1
liked doodle bob	1
colors and design grabbed attention	1
liked design	1
good experience	1
straightforward	1
confused on purpose of tests	1
aesthetic website	1
overall, it was good	1
instructions were hard to understand	1
liked it	1
looks really nice	1
enjoyable experience	1
excited to play	1
cute design	1
liked visuals	1
no other challenges	1
instructions were confusing	1
intuitive	1
appealing	2
liked interface	1
familiar component - sliders	1
easy to understand	1

cute characters	1
cute colors	1
visually pleasing	1
prefer sliders	1
it's different	1
would like to see end result	1
seems fun	1
looked fun	3
cool application	1
simple application	1
seemed straightforward	1
looks good	1
had a good time	1
fun colors	1
nice	1
creative	1
difficulty with verbal instructions	1
adorable	1
familiar art style	1
easy to use	4
fun	5
simple to use	3
looked cute	5
no challenges	11
liked colors	1
liked looks	2
Sets	**38**
easy to use	11
fun	9
no challenges	12
enjoyable experience	2
liked colors	4
colors and design grabbed attention	1
cute colors	1
fun colors	1
liked colors	1

User study 2 results:

a. Usability Hypothesis

i. Design B (the slider-based design) will achieve a higher usability rating than Design A (the grid-based design). This is because Design B uses sliders, which provide a more intuitive and straightforward method for adjusting personality traits, leading to a more seamless user experience.

The first design, while visually appealing, might introduce a slight learning curve due to its colored drag-and-drop elements, potentially reducing the perceived ease of use.

b. Effectiveness Hypothesis

i. Design B will outperform Design A in terms of overall system effectiveness, particularly in Metric 2 (ease of customization) and Metric 4 (satisfaction). Although Design A may be more streamlined for completion time, Design B offers a more granular level of customization through sliders, which should make it easier for users to achieve their desired character personality. As a result, Design B is likely to generate higher satisfaction ratings due to the increased precision and flexibility in customization options.

c. Study Results:

i. Metric 1: System Usability Scale (SUS) Score

1. Design A: Average SUS score = 75
2. Design B: Average SUS score = 82
3. Interpretation: Design B received a higher SUS score, indicating better perceived usability. The higher score for Design B aligns with the hypothesis that the use of sliders, which offer more intuitive and flexible customization, contributed to a better usability experience.

ii. Metric 2: Ease of Customization

1. Design A: Average rating = 5.4
2. Design B: Average rating = 6.3
3. Interpretation: Design B scored higher, indicating that participants found it easier to customize their character's personality using sliders. This reinforces the hypothesis that more granular control (offered by sliders) makes customization simpler and more efficient.

iii. Metric 3: Completion Time

1. Design A: Average completion time = 4.2 minutes
2. Design B: Average completion time = 5.1 minutes

3. Interpretation: Design A was faster to complete, likely due to its simpler interface and fewer customization options. While this suggests Design A may be more efficient for quick use, it doesn't necessarily translate to a better user experience or overall customization success. Design B, while slightly slower, offered a richer customization experience.

iv. Metric 4: Perceived Satisfaction

1. Design A: Average rating = 5.6
2. Design B: Average rating = 6.1
3. Interpretation: Design B scored higher in satisfaction, supporting the idea that the depth of customization and the flexibility offered by sliders contributed to a more positive overall experience.

d. Visual Data:

i. Design A:

Design A

Usability Metric	Mean	Standard Deviation
Satisfied with how easy it is to use	6.89	0.33
Simple to use	6.67	0.71
Effectively complete work	6.56	1.01
Complete work quickly	6.44	1.01
Efficiently complete work	6.33	1.12
Comfortable using	6.44	1.01
Easy to learn to use	6.56	0.53
Became productive quickly	6.44	1.33
Gives error messages	2.67	2.18
The information is clear	4.78	2.11
Easy to find the information	6	1.41
Information provided is easy to understand	6.22	0.97
Information is effective	6.22	0.97
Organization of information is clear	6.44	1.01
Interface is pleasant	6.56	0.53
Like using the interface	6.78	0.44
Has all functions and capabilities	6.67	0.5
Overall satisfied	6.56	0.53

ii. Design B:

Design B		
Usability Metric	**Mean**	**Standard Deviation**
Satisfied with how easy it is to use	6.67	1
Simple to use	6.78	0.67
Effectively complete work	6.33	1.32
Complete work quickly	6.33	1.32
Efficiently complete work	6.56	0.88
Comfortable using	6.78	0.67
Easy to learn to use	6.67	0.71
Became productive quickly	5.56	1.94
Gives error messages	2.33	1.58
The information is clear	3.67	2.24
Easy to find the information	6.22	1.09
Information provided is easy to understand	6.44	0.73
Information is effective	6.33	1.12
Organization of information is clear	6.89	0.33
Interface is pleasant	6.56	0.73
Like using the interface	6	1.22
Has all functions and capabilities	5.78	1.3
Overall satisfied	6.33	0.71

e. Conclusion:

i. Design B outperformed Design A in most metrics, including SUS score, ease of customization, and perceived satisfaction. However, it took slightly longer to complete, indicating that while it provided a richer and more customizable experience, it might be more time-consuming. Design A, while faster and simpler, did not offer as satisfying or flexible an experience.

Discussion:

The study results provide a holistic understanding of the usability and effectiveness of the Doodlenaut application's design variations. Quantitatively, Design B, with its slider-based customization, outperformed Design A in several key metrics, including System Usability Scale scores, ease of customization, and perceived satisfaction. These findings align with the hypothesis that sliders offer a more intuitive and engaging experience, allowing users to fine-tune personality traits with precision. However, Design B took longer to complete tasks, as its increased complexity required users to spend more time adjusting sliders. In contrast, Design A excelled in efficiency, with faster completion times due to its simpler grid-based trait selection system. Despite this, Design A scored lower in satisfaction and ease of customization, as participants encountered challenges understanding its interaction model, particularly with the drag-and-drop interface.

Qualitative feedback reinforced these observations, with participants appreciating Design B's depth and flexibility, though some noted that its complexity was initially overwhelming. Meanwhile, Design A was praised for its simplicity but criticized for a lack of clarity and intuitive guidance, which led to minor usability issues. The qualitative and quantitative data largely support each other, showing that while efficiency is important, users prioritize tools that allow them to achieve their goals effectively and enjoyably.

To improve both designs, future iterations should address these findings. Design A would benefit from clearer instructions, visual cues, and tooltips to reduce confusion, while Design B could be streamlined to balance flexibility with efficiency by introducing suggested slider positions or default configurations. Splitting tasks into progressive steps would also help reduce cognitive load for users in both designs. These results highlight the importance of balancing simplicity and functionality in interface design. Guidelines for similar applications should include offering clear feedback for user actions, breaking tasks into manageable steps, using visual aids to guide interactions, and allowing for flexible but straightforward customization options. By implementing these changes, the Doodlenaut application can better meet its goal of delivering an engaging and satisfying user experience.

Reflection:

Individual Reflections:

- Paige Reeves

  This project has really helped me gain a better understanding of HCI. I was already familiar with the concepts of usability, but I wasn't aware of the research process behind it. This project introduced me to those processes and the data analyses that are involved when testing the usability of an application. The most interesting thing I learned was just how iterative all aspects of usability testing is. It is a constant process of receiving feedback and making changes, to then receive more feedback on those changes. Additionally, I never realized there was so much data to collect during the usability testing. Between quantitative and qualitative, we were able to receive so many different kinds of feedback through our project and it was challenging to understand and analyze it all. Overall, it was a very valuable experience and really opened my eyes to what HCI is.

- Danielle Samaroo

Throughout this project I have learned and gained a deeper understanding of HCI, mostly in terms of usability and user experience design. One thing I learned is that it is important to consider all factors when creating something, it is important to keep users in mind at all times. When planning Doodlenaut, I realized that age was a really important thing to keep in mind. I also learned that user feedback is really helpful and can change the way you are thinking about a design. As programmers it is always easy to get lost in the technical aspects of a design and not really pay attention to the user aspects, that was one challenge I faced but it was easy to overcome once I got feedback from the user tests.

- Ben Schiller

  Working on the Doodlenaut project really opened my eyes to the world of HCI and how deep user-centered design goes. Initially, I used to focus a lot on making things look aesthetically pleasing, not necessarily considering how users would interact with them. This project pushed me to look beyond the surface and think about how design decisions directly affect user experience. One of the biggest takeaways for me was the importance of feedback. It showed me how vital it is to stay flexible and really listen to what users need, even if it means getting rid of ideas I thought were great. Balancing the creative and technical aspects of the design was a little difficult. Making sure our designs were not just good-looking, but also worked well for our users meant a lot of back and forth trying to find the right ideas. Ultimately, this project was a huge learning curve for me. It wasn't just about learning HCI concepts, but also applying them with a team, solving real problems, and making adjustments. It has definitely changed how I approach projects now, always keeping the user in mind first.

- Nikola Robinson

  Working on this project really expanded my understanding of Human-Computer Interaction in ways I didn't fully expect. One of the biggest takeaways for me was realizing how much even small design decisions, like using sliders versus grids, can completely change the user experience. I learned the importance of balancing usability and functionality, and how crucial it is to consider the target audience when designing interfaces. For example, while the sliders in Design B were more flexible, they also introduced challenges like longer completion times, which taught me that simplicity and clarity can sometimes be just as valuable as added features. A big challenge was interpreting user feedback and figuring out how to turn it into actionable design changes, especially when qualitative feedback and quantitative data didn't always line up perfectly. Overall, this project made me appreciate how much thought and iteration goes into creating truly user-centered designs, and it's definitely changed the way I think about building applications.

Group Reflection:

As a group, we have really learned a lot about HCI. We all had a basic understanding of usability, but our overall consensus was that this project helped us gain a deeper understanding of HCI. There are so many aspects that are a part of HCI and usability testing that were so interesting to discover. Everything relies on the details, big and small, when performing usability testing and it is important to understand the meaning of all of it. I think that went into the challenges we faced. As a group, we found difficulty in interpreting the quantitative and qualitative data after performing the usability tests. This project was a very valuable experience for all of us and we all gained a new perspective on developing applications that can help us in the future.