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Starving Steve Project

I. Introduction

Starving Steve is an infinite runner game with an exploratory type of interaction which means users navigate the virtual environment through their curiosity. [1]. The game is centered around the cartoon character Steve, who is constantly hungry, has to survive by jumping on platforms and eat healthy food to avoid starving to death. If he eats healthy food, his energy increases; however, if he eats unhealthy food, his energy level decreases. Additionally, the ultimate goal of this game is to try to achieve the longest run time. Starving Steve cures users of boredom and is a fun game to play and develop.

II. Product Description

The program Starving Steve is designed to be an endless runner game that has the main character Steve jumping on platforms and eating healthy food to avoid starving to death. The program is built to encourage users to try to keep Steve alive for as long as possible by implementing a scoring system. The product has many features including, a tutorial, the ability for the user to make Steve jump, and various power-ups that affect Steve's energy level.

A. Tutorial and Navigation

Starving Steve has many interface features that were added to make the game easier to navigate and understand. The navigation features within the game include buttons, animations, and pop up blocks. To make navigation easier within the game, each button has a unique icon to indicate the action that the button performs, each button also gives visual feedback when it is hovered over to show the user that the program is responsive to their inputs, and finally when any button is pressed an audible sound is played to indicate to the user that their choice has been selected. Within the main menu of the game, I added a small animation of Steve running across the screen to make the interface of the game more interactive. Another feature that was added to the interface was the option to prevent the tutorial from popping up every time the user restarted the game.

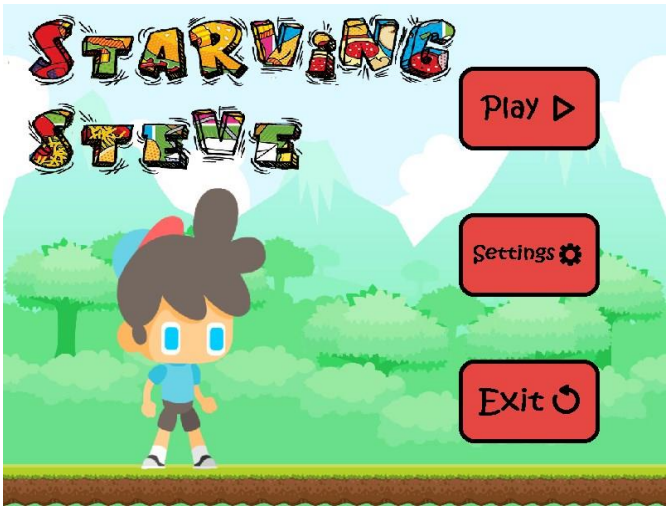

Fig. 1. Main Menu

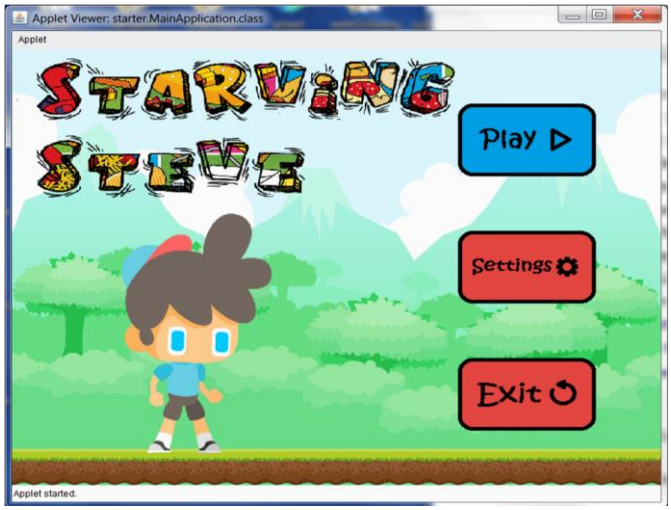

Fig. 2. User feedback when mouse is hovering over play button

To help users understand how to play the game, a tutorial feature was implemented into the game and shown to the user before they were able to start the game. The tutorial clearly stated the controls, described the goal of the game, and the collection of power-ups. The tutorial had visual buttons for the controls and had a feature to prevent users from seeing the repetitive information every time they started a new game.

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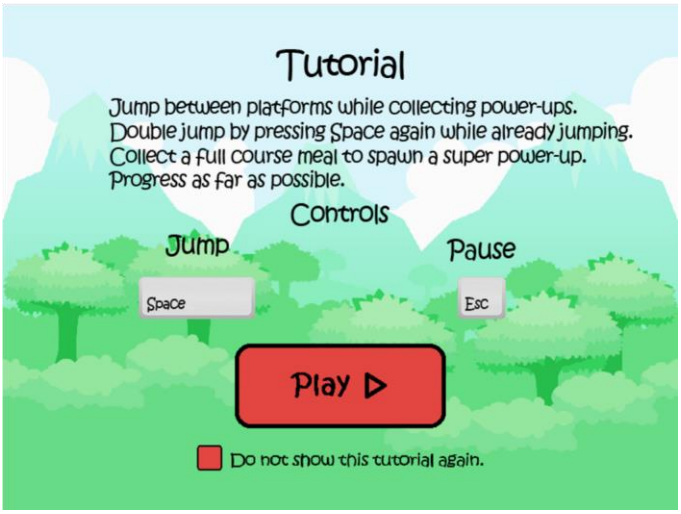

Fig. 3. Tutorial screen to inform users of controls and gameplay

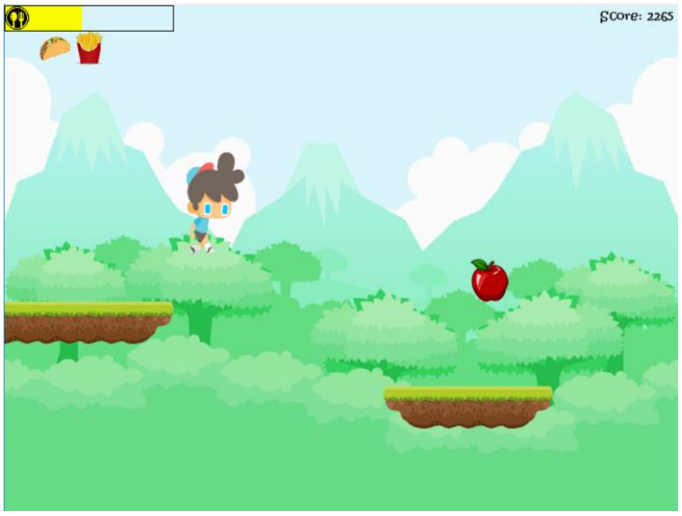

Fig. 5. Steve jumping to the next platform

B. Jumping and Moving

When users enter the game, they start on a large platform with Steve running constantly towards the right of the screen. When the first platform ends, the user has to make Steve reach the next platform by using the jump feature within the game. The jump feature is implemented to allow Steve to jump to the next platform preventing him from falling out of the screen and starving to death. Some platforms are too far to have Steve jump to them with a single jump, so a double jump feature was added to the game to allow Steve to jump to any platform. This is activated by pressing the spacebar twice.

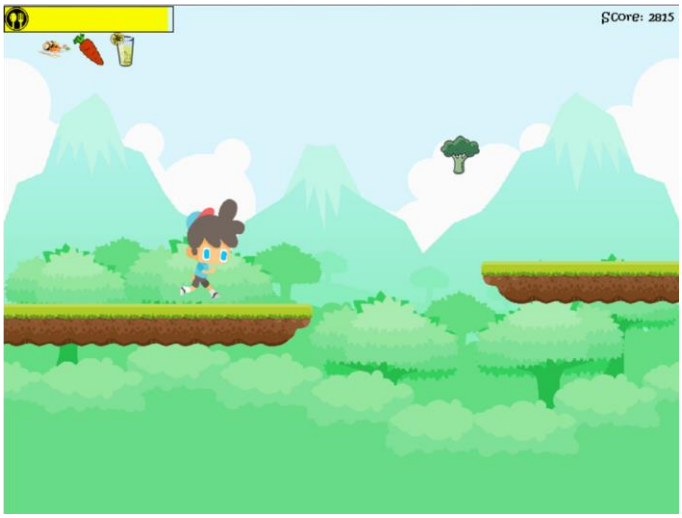

Fig. 4. Steve running on a platform

C. Collecting Power-Ups

Another major feature within the game is power-ups that prevent Steve from starving to death. Steve starts with the maximum amount energy and slowly starts to starve. While running across platforms, random food power-ups spawn that Steve can collect. Each food type has a unique value that positively or negatively impacts Steve's energy level based on if the food is healthy or unhealthy. Another feature is that if Steve collects five specific foods consisting of a starter, main dish, side dish, drink and dessert a super power-up will spawn. This super power-up if collected will set Steve's energy back to the beginning maximum amount.

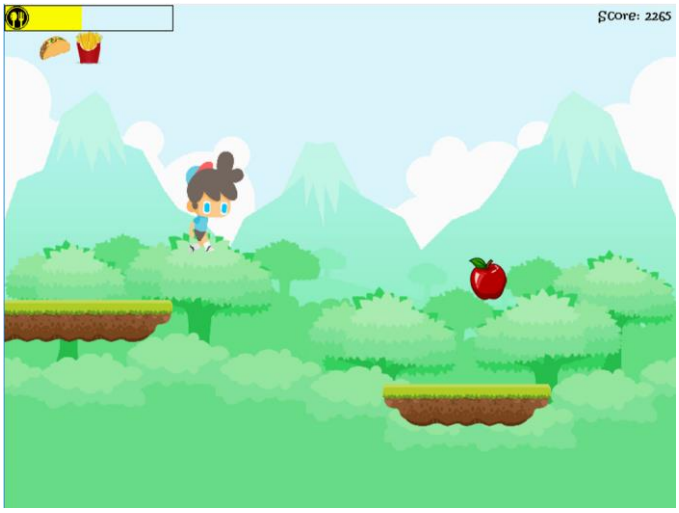

Fig. 6. Steve collecting power-ups

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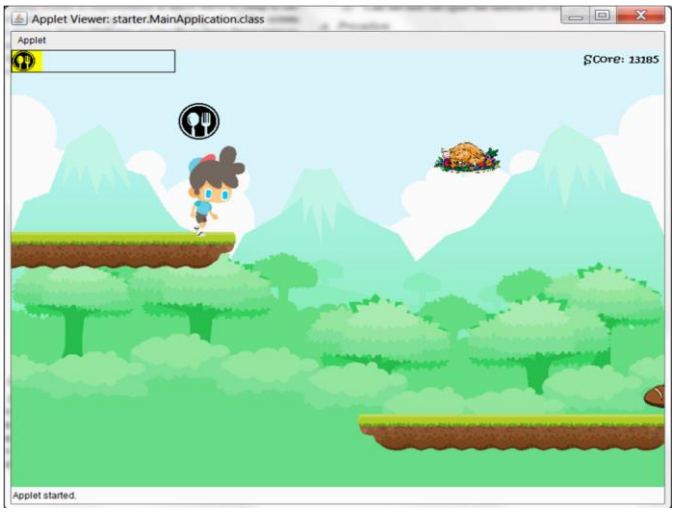

Fig. 7. Spawning the Super Power-Up

III. Evaluation

For the evaluation, I conducted a usability test to determine whether the game worked and was playable. To start, I wanted to find out whether the subjects were able to play the game and understand its features without requiring assistance from me a developer of the game. The objective of this research was to answer five specific questions:

1. Can the users make Steve jump?
2. Can the users collect food power-ups?
3. Do users understand how food power-ups affect Steve's energy level?
4. Do the users understand how to play the game after reading the tutorial?
5. Can the users navigate the interface of the game?

A. *Procedure*

To answer these questions, I developed a detailed evaluation procedure which allowed me to collect both quantitative and qualitative data. The procedure consists of two parts which utilize different research methods. For part one of the study, the descriptive and observational research method was used. Here I observed the participants as they played around with the software while I collected quantitative data based on their performance. For the second stage I used a case study research method. During this phase, users were given a questionnaire which inquired about their personal experience interacting with the software. The study consists of seven students who were registered for the course Human Computer Interface Design.

Presented below are the steps of my procedure.

1. Each subject was given one minute of verbal instructions in which the researcher read the following script:

"Today you will be participating in a study involving a software program. The point of the study is to determine if users can easily achieve desired functionality in the game Starving Steve. The study will consist of two parts

In the first part of the study, I will have you interact with the software for five minutes, and once that period is over, I will start the second part of the study.

In the second part, I will ask you to sign a consent form which outlines all the rights you have as a participant in my study. These rights include, but are not limited to, confidentiality and the right for you to withdraw from the study at any time for any reason. Please read this consent form. (Hand form to participant) Do you have any questions?"

2. Each subject was given the following scripted instruction:

"You are now going to be given the software to play the game Starving Steve. You will have five minutes to play and navigate the software. Once you start using the software, I will not be able to give you any verbal instructions because I do not want to influence your experience. During your time with the software, I would like you to think out loud. If you need anything or want to withdraw yourself from the study, simply raise your hand and I will assist your needs accordingly. However, if there is a question about the software, I will be unable to answer the question until the study has been completed. Do you have any questions before we begin?"

The participant was then given the software and was told to proceed.

3. Subjects were then told to stop playing the software after the duration of time had elapsed. They were told the following script:

"Please stop playing, navigate to the home screen and press the 'exit' button. I will now begin the second part of the study in which you will be filling out a short questionnaire."

4. The subjects were then handed the questionnaire and verbally instructed as follows:

"Please fill out the entire questionnaire. If you have any questions or would like to withdraw from the study, please raise your hand and I will assist you accordingly. However, keep in mind that I will not be able to clarify any questions on the questionnaire."

5. Once the subjects had finished the questionnaire, they were debriefed with the following script:

"Thank you for participating in my study. All of the questionnaires will be left anonymous and the data collected will be used to determine if the software is usable. Furthermore, the data and questionnaire responses will be used in my final report and project presentation. The study is now over, if you have any comments, concerns or questions regarding the study, please ask them now. Everything will be addressed with full transparency."

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B. Data Collection

I observed each subject as they interacted with the software, for approximately five minutes, while I took notes on their performance relating to the five research questions being evaluated. I also had each subject fill out the questionnaire via Google Forms after they had finished interacting with the software. The questionnaire questions are as follows:

1. Were you able to navigate through the interfaces to start a game? Why or why not?
2. Did the tutorial screen provide adequate information for you to understand how the game should be played? How could this pop-up be improved?
3. How do you make Steve jump?
4. Were you able to collect a power-up?
5. "I understand how collecting food affects Steve's energy level." Please select an option which best describes you.
    1. Strongly Agree
    2. Agree
    3. Neutral
    4. Disagree
    5. Strongly Disagree
6. To the best of your knowledge, please explain how food affects Steve's energy level.
7. Were you able to toggle the sound within the game? Why or why not?
8. Were you able to toggle the sound within the game? Why or why not?
9. Did you find any aspect of the program confusing? Why or why not?
10. Were you able to determine how to pause the game? Why or why not?

Below is the data compiled from the user evaluations.

TABLE I. MADE STEVE JUMP

Participants	Results
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes

TABLE II. COLLECTED FOOD

Participants	Results
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes

TABLE III. UNDERSTOOD HOW FOOD AFFECTED ENERGY

Participants	Results
1	Yes
2	No
3	Yes
4	Yes
5	No
6	Yes
7	Yes

TABLE IV. COMPREHEND HOW TO PLAY GAME AFTER READING TUTORIAL

Participants	Results
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes

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TABLE V. NAVIGATE INTERFACE

Participants	Results
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes

TABLE VI. SUPER POWER-UP

Participants	Results
1	Did not unlock
2	Did not unlock
3	Did not unlock
4	Did not unlock
5	Did not unlock
6	Did not unlock
7	Did not unlock

C. Analysis

Based on the observational data, I answered each research question with either a yes or no for each subject. I then calculated overall yes and no percentages for each question. For our questionnaire data, I calculated percentages for each closed-ended question and identified common themes within the open-ended question responses. Lastly, I identified which research question each questionnaire question related to.

1. Research question #1: Can the users make Steve jump? To determine if users could make Steve jump, I observed each participant and recorded if they were able to make Steve jump during their time playing the game. On the questionnaire I also asked the question: "How do you make Steve jump?" to determine if they could recall the control to make Steve jump. Based on the results from these questions and observations, I could determine the percentage of users that could make Steve jump.
2. Research question #2: Can the users collect food power-ups? To determine if users could collect all types of food power-ups I observed each participant and recorded if they were able to collect a power-up and whether they were able to collect a super power-up. On the questionnaire I had two questions regarding the collecting of power-ups. The first question asked the user: Were you able to collect a power-up? This question gave me direct feedback on the number of users that could collect a power-up. The second question was as follows: Were you able to make a complete meal by collecting five specific power-ups? Why or why not? This question is more complex because it asked users about a power-up that was very difficult to achieve. Based on the results from these questions and observations, I could determine the percentage of users that could collect a regular power-up and the percentage of users that could collect a super power-up.
3. Research question #3: Do users understand how food power-ups affect Steve's energy level? To determine this research question, I asked two questions on the questionnaire. The first question was "I understand how collecting food affects Steve's energy level." Please select an option which best describes you: Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree. For this question users who answered agree or strongly agree were counted as understanding and all other responses were counted as not understanding. The second question I asked to answer the research question was the following: "To the best of your knowledge, please explain how food affects Steve's energy level." The results from this question are qualitative and I determined if a user stated anything about unhealthy food hurting the energy level and healthy food increasing the energy level, they understood how power-ups affected Steve's energy level. All other responses I counted as not understanding the energy level. From these questions from the questionnaire I was able to determine the percentage of users that understood Steve's energy level.
4. Research question #4: Do users understand how to play the game after reading the tutorial? To determine if users could understand the game after reading the tutorial, I asked two questions on the questionnaire. The first question being: "Did the tutorial screen provide adequate information for you to understand how the game should be played? How could this pop-up be improved?" This question on the questionnaire directly answers the research question, so the users that answered yes were counted as users that understood the tutorial and other responses were counted as not understanding the tutorial. I was then able to answer the research question by determining the percentage of users that understood the tutorial.

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5. Research question #5: Can the users navigate the interface of the game? To determine if users could navigate the interface of the game, I asked two questions on the questionnaire. The first question that helped me answer the research question was “Were you able to navigate through the interfaces to start a game? Why or why not?” The answers that responded that they were able to start the game were counted towards being able to navigate the interface of the game and other responses were counted as not being able to navigate the interface. The second question was “Were you able to toggle the sound within the game? Why or why not?” This question is more complex than the first question because the sound was located within the settings menu, so it was more difficult for users to find the setting. Responses that claimed that they were able to toggle the sound were counted as being able to navigate the interface and other responses were counted as not being able to navigate the interface. From these questions I was able to determine if users were able to navigate through the interface of the game.

IV. Results

To answer our research questions, I used a minimum success rate of 71.4%. Which means at least 5 out of 7 subjects determined that the feature was useful and usable.

The observations showed that 100% of the subjects were able to make Steve jump. 71.4% of questionnaire respondents correctly identified spacebar as the control to make Steve jump. This suggests that users are able to make Steve jump.

71.4% of the subjects stated that they were able to collect a food power-up while the remaining 28.6% were unsure what a food power-up was. I observed 100% of the subjects collect food power-ups. No subject was seen collecting a super power-up despite one subject responding in the questionnaire that they did so. This suggests that users are able to collect food power-ups, but not super power-ups.

42.9% of the subjects understood how collecting food affects Steve’s energy level and 42.9% recognized how healthy and unhealthy food affects Steve’s energy level. This suggests that users do not understand how food power-ups affect Steve’s energy level.

28.6% of the subjects felt that the tutorial screen provided adequate information on how the game is played. One subject mentioned that “it was a wall of text” and that they felt overwhelmed. This suggests that users do not understand how to play the game after reading the tutorial.

100% of the subjects were able to navigate through the interfaces to start a game. “The play button was easy to see” stated one of the subjects. 71.4% were able to toggle sound within the game. This suggests that subjects were able to navigate through the interface of the game.

Below are our questionnaire results.

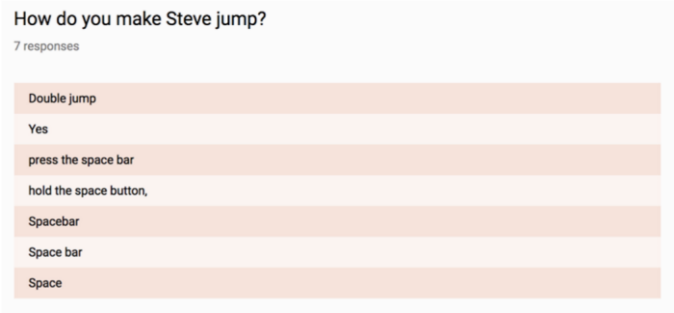

Fig. 8. To answer research question 1

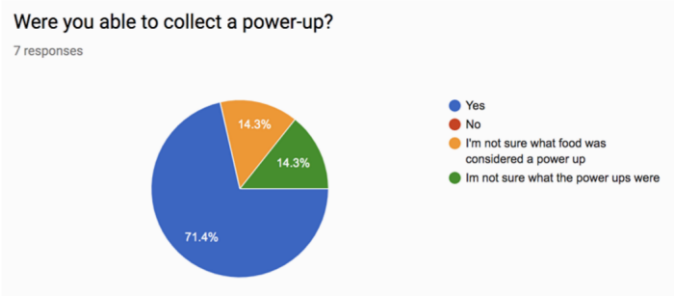

Fig. 9. To answer research question 2

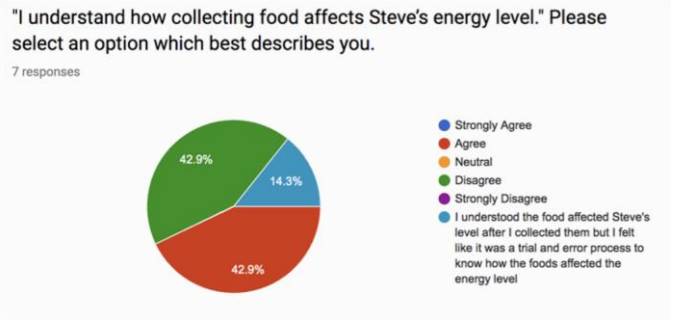

Fig. 10. To answer research question 3

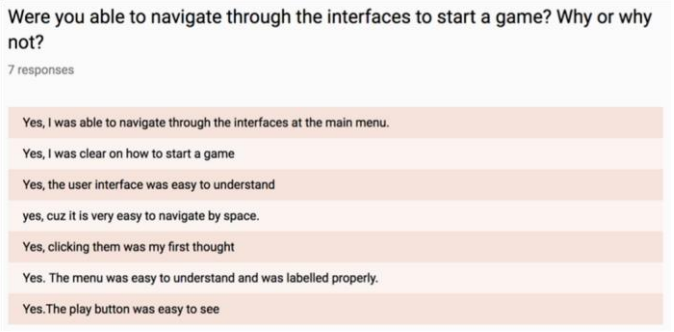

Fig. 11. To answer research question 5

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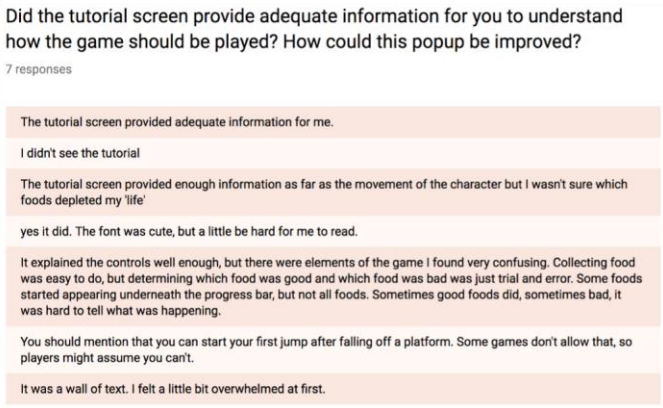

Fig. 12. To answer research question 5

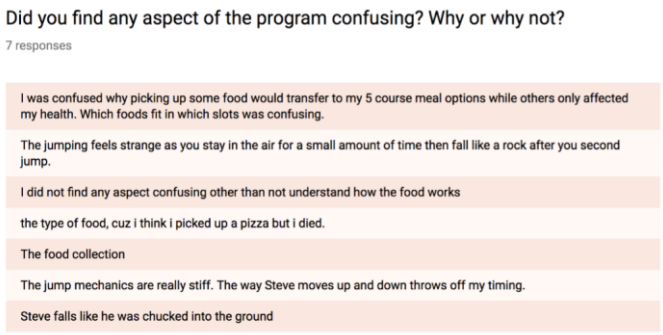

Fig. 13. Applicable to all research questions

V. Conclusion

In summary, Starving Steve was a fun game to develop and play. At the start of the project, I determined three key features the game needed to have. These features include the tutorial and navigation, jumping and moving, and finally collecting power-ups. The tutorial and navigation allowed users to learn how to play and move around in the game without confusion. The jumping and moving allowed the users to control Steve and collecting food allowed users to keep Steve fed and alive. To determine if the game is working, I conducted a usability test to see if users were able to successfully navigate, move and jump, and collect power-ups. The test consisted of an in-depth procedure which spells out exactly how I conducted the study to ensure reliability and repeatability. Once evaluations were finished, the data was then collected and compiled for analysis. From the analysis, I determined the final answers to my research questions with evidence provided in the form of quantitative numbers, received through our observations, and qualitative data, received through the questionnaire. The results show users were able to make Steve jump and collect food power-ups. On the other hand, although all participants were able to collect the food, only 57% of them understood how they affect energy levels. Additionally, although the participants understood how to play the game after reading the tutorial, they were unsure of other aspects of the game such as double jumping and pausing. However, when considering navigation, participants were able to navigate the interface without problems.

One valuable lesson I have learned from this process is to be more prepared to analyze the data before it is collected. A good way to prepare would have been to first identify what type of data I would be collecting and second think of a plan of action which tells what I will look for in the data to analyze. Another lesson I learned was that it would have been helpful if I had done low-fidelity prototype testing before starting to code. This would have allowed me to make any changes or accommodations to the game design without having to make any major time-consuming changes.

Finally, my future plans involve incorporating more detail into my tutorial to better explain the double jump ability and how food affects Steve's energy levels. Furthermore, although this was not something I evaluated, three participants had a difficulty grasping how Steve moves; therefore, I can improve Steve's movement to make it more natural. Additionally, I can make the super power-up easier to acquire because according to my results, no one was able to activate it. With the changes made according to suggestions from the participants of the usability test, Starving Steve will be on its way to becoming a great game where players will have little to no questions on how to play, how to navigate, and the different features provided.

References

[1] Y. Rogers, H. Sharp, and J. Preece, "Exploring" in *Interaction Design beyond human-computer interaction*, Wiley, 3rd ed., pp. 53, M