**Provide a brief summary of the purpose of the study.**

The purpose of this study is to assess the usability of the application Code Girl, developed by the researchers to interest girls ages 5 to 8 in computer science, and to receive feedback that can be used to improve the application.

**What does the Investigator hope to learn from the study.**

The researchers hope to learn how usable Code Girl is. The researchers also hope to learn what challenges potential users face or what suggestions users have in order to uncover both how the application currently meets research goals and how it can be improved to better meet the goal of interesting girls ages 5 to 8 in computer science.

**Describe study procedures**

1. Introduction

Before the study begins, participants will be asked to supply the informed consent forms signed by their parent or guardian. Participants that do not supply this form will be removed from the study.

The two investigators will introduce themselves before welcoming the participants and thanking them for their participation. The participants will be informed of their rights and the purpose of the study and their assent will be obtained via the verbal assent form.

1. Usability evaluation

The usability evaluation will be conducted in one of the computer labs in the Santa Clara University Learning Commons. Participant activity will be recorded using QuickTime Player’s Screen Recording, for capturing how the girls interact with the application. No other audio or video recording will be used.

The participants will be introduced to Code Girl. They will be instructed to begin using the application and play until they have reached level 3 of the application. They will be given 30 minutes to complete this task, but encouraged to continue playing if they finish the task before the time is up. Participants will be informed that they can ask questions if they do not know what a word means, if the instructions are unclear, or if they need assistance completing a task. Questions will be noted, but not associated with participants. Each participant’s time on each level and challenge will be measured, as well as the number of errors they make.

After 30 minutes are up, all participants will be given the anonymous usability evaluation survey and given 15 minutes to fill out the survey.

1. Focus Group

The girls will be split up into 2 groups, each with an equal number of participants. Each investigator will then conduct a focus group in a separate room in the Santa Clara University Learning Commons lasting approximately 1 hour with one of the groups. Each focus group will be recorded using QuickTime Player’s Audio Recording.

The investigator will give the predefined introduction and then progress through the list of questions, using the created slideshow as a supplement so participants can refer back to the questions during the course of the discussion. Group discussion among the participants will be encouraged. The investigator will act as a moderator, prompting participants to share their opinions and feelings, managing the time, making sure some participants do not dominate the conversion, and asking for further explanation or clarification if necessary.

1. Conclusion

Participants will be thanked for their participation and encouraged to contact the investigators if they have further questions or would like to know the results of the study. The participants will then be given a small gift for their participation.

**State if audio or video taping will occur.**

Each participant’s use of the application will be recorded, using QuickTime Player’s Screen Recording, during the usability evaluation portion of the study. The focus groups will be recorded on audio using QuickTime Player’s Audio Recording. The video and audio files will be stored on the primary investigator’s laptop. A backup copy of the files will be stored on a USB flash drive that will only be accessible to the investigators. The audio and video recordings will not be shown to other people, and will be permanently deleted from the computer and USB flash drive after the thesis has been accepted.

**State if deception will be used.**

Deception will not be used in the study.

**Describe past findings leading to the formulation of the study.**

Women are the minority in computing, and more needs to be done to increase their involvement in this rapidly growing field, such as by introducing them to programming early on and inspiring them to continue pursuing this field. [1] Game-based learning through applications such as Scratch and Alice has been proven effective in teaching children computer science concepts and skills. [2] Bell and Gibson identify three criteria that determine if an application will be engaging to children, and they are: active/passive, flow, and longevity. [2] Researchers also recommend creating girls-only groups for activities or interactions typically dominated by males, such as gaming or computing, to better engage girls and effectively reduce the gender divide that exists in these areas. [3] The study was thus designed to assess if Code Girl meets these criteria by actively engaging users in the learning process, maintaining their interest in the activity through the use of story-telling, providing sufficient challenges and accessories to keep users playing, and appealing to the girls’ interests and perspectives.

To assess whether Code Girl is effective at introducing and engaging users in computer science topics and skills and is usable by our target age group, we chose to conduct a usability evaluation study followed by a focus group. Usability evaluations give insight into user’s behaviors when presented with the application, and focus groups give insight into user’s perceptions and attitudes toward the application, providing both qualitative and quantitative data about Code Girl’s usability. Both can be also be used to identify ways the application can be improved. We chose these research methods after consulting User Experience Research method guides to determine which methods would be most appropriate for the age range of our participants. Participants will be between the ages of approximately five to eight, putting them in the Intuitive Thought, and perhaps Concrete Operations, stages of cognitive development, in which user testing and small focus groups are recommended research methods. Additionally, due to the young age of the participants, the questions asked during the study use vocabulary suitable to their level of education. [4] Additionally, it is recommended that rating systems use visual scales instead of numbers or words when working with elementary school children, so the usability evaluation survey incorporates a visual scale for the Likert-type scale questions so participants can more easily understand and answer them. [5]

**Approximately how many subjects will you need to complete this study?**

Approximately 20 participants will be needed to complete this study.

**Briefly describe the characteristics of the subjects (e.g., age, gender, race/ethnicity)**

The participants will be females, between the ages of approximately five to eight. Due to geographic constraints, participants will be from the surrounding area and thus live in Silicon Valley. They will likely have diverse ethnic backgrounds.

**How will subjects be selected, enlisted or recruited? Describe the subject recruitment strategies you will use for each group of subjects. Address who will approach subjects to take part in the study. Attach advertisements, flyers, contact letters, telephone contact protocols, etc. Also attach letters of cooperation from schools and if applicable, other agencies or institutions involved in subject recruitment.**

There will only be one group of subjects for both the usability evaluation and the focus group. Participants will be recruited from local Girl Scout troops and selected if they are in the correct age range of the application’s target user group. The researchers will contact the Program Director of Partnerships for Girl Scouts of Northern California, who will put the researchers in email contact with a local Girl Scout troop leader. The troop leader will be provided with the Recruitment Flyer and Parental Consent Forms, which she will then distribute to potential participants.

**How will subjects be informed of procedures, intent of the study, and potential risks to them? Submit written copy of what the subjects will receive.**

The parents or guardians of participants will be informed of procedures, intent of the study, and potential risks via the informed consent form and the participants will be made of aware of these things during verbal assent process and introduction to the study, before the usability evaluation and focus groups are conducted.

**How will subjects be informed they may withdraw at any time without penalty? Submit written and/or verbal instructions that the subject will receive.**

Participants and their parents or guardians will receive verbal and written instructions respectively informing them that they may withdraw at any time without penalty in the informed consent form and in the verbal assent process.

**Will you give subjects gifts, payments, services without charge, or extra course credit?**

Yes, participants will receive a small gift, such as an “I ♥ Bronco Engineering” pin or lanyard, as an incentive for participating in the study. Participants will be reminded that they will still receive the incentive even if they decide to withdraw from the study before it is completed.

**Describe all known risks, discomforts associated with study procedures, whether physical, psychological or social (e.g., pain, stress, invasion of privacy, breach of confidentiality), noting probability and magnitude of potential harm.**

This study does not pose any physical risk to participants. Psychologically, participants might experience stress during the usability evaluation, as they are told to complete a task within a limited time frame. The probability of the time limit causing stress could be high, but will be minimized to reduce harm by telling participants that although the goal is to complete the task in a certain time, they are encouraged to play at their own pace and ask questions if they need to. Participants may also experience stress or similar discomfort during the focus group when prompted to share their thoughts and ideas if they are shy or self-conscious. The probability of this is discomfort is less, given that the group of participants will likely have many participants who are comfortable sharing. The magnitude of this potential harm is not significant because moderator will foster an open, judgment-free environment for the group discussion and participants will informed that they can always refuse to answer a question if they want to, without fear of reproach or needing to explain themselves. Even though the Code Girl application requires a user to create an account and login in with Gmail to access the games, which could be a minor breach of confidentiality issue if the email could be associated with the participant, the probability of this occurring is zero because all of the participants will be signed in to the application using a test account.

**Explain how subject privacy will be protected and how confidentiality of subject information will be mainained. Discuss who will have access to study records/specimans and how the records will be secured.**

The usability evaluation and follow-up survey will be anonymous. Participants will not be asked to supply any personal information, such as their name or email address. Participants will be asked to introduce themselves in the focus group, which will be recorded on audio, but the recording will be kept secure. No other personally identifiable information will be collected or recorded. Both the focus group audio recordings and the screen recording from the usability evaluation will be stored in an encrypted folder on the primary investigator’s laptop. A backup copy of these files will also be stored in an encrypted folder on a USB FlashDrive. The password to this folder will only be shared with the primary investigator, co-investigator, and thesis advisor. No other people will have access to the recordings. Additionally, the Girl Scout Troop Number(s) participants come from will not be recorded or reported, so participants cannot be identified via this information. Only the investigators and advisor will have access to the Girl Scout Troop Number and associated information for coordination and follow-up purposes.

**Will subjects be asked to give permission for release of identifiable data (e.g., information, videotapes), now or in the future? If so, explain here and include appropriate statements in consent materials.**

No, participants will not be asked to give permission for release of identifiable data now or in the future because the audio recordings will only be used for collecting data anonymously. The audio recordings will never be shared with people other than the investigators or thesis advisor.

**Will data be collected anonymously (i.e., no identifying information from subjects will be collected/recorded that can be linked to the study data)? (NOTE: Data is not collected anonymously if there is a code linking it to personally identifiable information).**

The usability evaluation survey asks participants for their age, but this age will not be associated with any information that could connect a participant’s age with her identity, such as name or Troop Number. The audio recordings made during the focus group will include participant’s first names; however, the data gathered from these recordings will be anonymous. Participants are only asked to give their name to make them feel more comfortable sharing during the focus group, and their names will in no way be associated with any of the responses they give. Only the responses will be collected as data. No personally identifiable information will be included in the reported findings from either the usability evaluation and follow-up survey or the focus group.

**If using existing data/biological specimens, will the researchers have access to a code linking the data to personally identifiable information?**

N/A

**If identifying information will be collected and linked to data/specimans, explain at what stage identifiers will be removed from the data/specimans. If identifiers will be retained, explain why this is necessary and how confidentiality will be protected.**

Identifying information will be collected in the focus group recordings, but never linked to data collected from the recordings. Personally identifiable information will be removed as soon as the recordings are listened to and the responses to the research questions (listed in the Focus Group Questions document) are transcribed. The responses gathered and associated findings will not be linked to any personally identifiable information about the participants, such as their name. Only the responses and subsequent findings will be reported.

**If data is coded, explain where the key to identifiers will be stored, how it will be protected, and who will have access to it.**

Data collected from the usability evaluations, the follow-up survey, and the focus group recordings will not be coded.

**Indicate whether research data/specimens will be destroyed at the end of the study. If data will not be destroyed, explain why, where, in what format, and for how long it will be retained.**

The screen recordings from the usability evaluation and the audio recordings of the focus group will be destroyed once the primary investigator’s thesis is approved to protect participant’s privacy and ensure confidentially. The survey responses and transcribed focus group responses will not be destroyed so further research can be conducted and the results can be compared against an early usability evaluation so see how the usability of the system changed. The data will be stored in text format in an encrypted folder on a USB FlashDrive and retained until the application is no longer being worked on or supported.

**Explain how data collection instruments, audiotapes, videotapes, photographs, etc. will be stored and who will have access to them. Indicate at what point they will be transcribed and/or destroyed (if ever).**

Both the focus group audio recordings and the screen recording from the usability evaluation will be stored in an encrypted folder on the primary investigator’s laptop. A backup copy of these files will also be stored in an encrypted folder on a USB FlashDrive. The password to this folder will only be shared with the researchers and thesis advisor. The recordings will be transcribed within a week of the study being conducted, and will be destroyed once the primary investigator’s thesis is approved.