Black Bear Calorie Counter Usability Study

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Introduction

Black Bear Calorie Counter is a calorie- and macronutrient-tracking application developed by team Segmentation Fault for COS 420 at the University of Maine. Though we plan the inclusion of water and food logging, the application currently only allows users to calculate a calorie goal based on age, weight, height, sex, activity level, and goal (to lose, gain, or maintain weight).

A usability test is intended to determine the extent an interface facilitates a user's ability to complete routine tasks. Typically the test is conducted with a group of potential users either in a usability lab, remotely (using e-meeting software and telephone connection), or on-site with portable equipment. Users are asked to complete a series of routine tasks. Sessions are recorded and analyzed to identify potential areas for improvement to the application.

Our team conducted an onsite usability test using a version of Black Bear Calorie Counter running within the Android emulator on Android Studio. (Last minute technical difficulties prevented a live demonstration on a Google Pixel XL.)

Executive Summary

Chris Vogel, a member of the Segmentation Fault Team, conducted onsite testing at a private, outdoor gathering of student--veterans and their families at a residence in Glenburn, Maine, on 1 May 2021. The attendees of the gathering were asked if they would like to participate, and roughly ten said they would. Since our usability study requires a maximum of six, those six participants were selected in a way to maximize diversity in age, gender, and occupation. The purpose of this test was to access the usability of the calorie calculator within Black Bear Calorie Counter.

Original plans called for performing usability testing on the Google Pixel XL. However, the study facilitator realized at the gathering that the Pixel XL did not present the user with a calorie count. Since the Android emulator within Android Studio did not suffer that limitation, the plans were altered to present testers with a laptop running the emulator on the GNOME desktop within Debian GNU/Linux. To offset potential confusion, testers were briefed about the purpose of an

emulator and how touchpad actions translate to touchscreen actions on an actual Android smartphone.

Participants were interviewed individually for roughly five minutes each. The interview consisted of a review of the consent form, some brief demographic questions, and a request to complete three tasks related to the calorie calculator. Participants were encouraged to voice any concern, criticism, and suggestions. After the tasks, users were asked how difficult the tasks were to complete and whether they had any other thoughts. Participants who were health professionals or studying to become health professionals were asked to offer suggestions from a health perspective. In general all participants suffered difficulty in using the calorie calculator. The test identified some major issues, including:

- Lack of account information to enter a username and password.
- Lack of content in the ``Home'' section once login information is entered.
- Lack of instruction on how to get to the calorie calculator
- Confusion as to whether “lose weight,” “gain weight,” or “maintain weight” is a goal or a problem that one is trying to solve

This document contains the participants’ feedback, satisfaction, task competition rates, time on task, mistakes made, and recommendations for improvements. In the Attachments section there are the script and a directory of external content, which includes consent forms, audio interview recordings, and video screen captures.

Methodology

Once agreeing to take part in the usability study, willing participants were taken individually from the private gathering to a secluded outdoor spot on the same property. Participants were asked to sit on a lawn chair roughly six feet from the test administrator, who was also sitting in an identical lawn chair to put the subject at ease. US CDC, Maine CDC, and UMS COVID-19 guidance was observed at all times. The test administrator thanked the participants for their time and informally requested that they give honest evaluations. The administrator then walked them through the consent form, gave them time to read it themselves, and then verified that they signed and dated the form correctly. The test administrator then used a mobile phone to begin recording the conversation. This phone was held between the test administrator and the

participant for the entirety of the interview. Screen capture happened transparently to the user, and the user was instructed not to enter a real username and password. The script (see Attachment A) was read almost verbatim to each participant, with only slight changes based on occupation or education. (For example, if participants indicated that they were students, the test administrator asked for a year and major.) At all times, the test administrator attempted to maintain a neutral tone.

Demographic information was collected to measure how representative the data collected is to the general population. Some information was also collected to pinpoint issues affecting certain subgroups, e.g., those who do not use Android phones or those who learned English as a second language.

Tasks were selected to be quick, utilize all fields in the calorie calculator, and satisfy user stories. Some tasks were merged together when they were individually too similar to previous tasks. For age, height, weight, and gender, the participant was allowed to enter self-selected data. No user changed this data after the initial task. There was no difficulty rating after each task, though the participant was encouraged to voice any concerns or suggestions at any time. When the tasks were completed, the participants were asked to rate overall difficulty non-quantitatively and give any final thoughts.

Participants

There were six participants, all of whom participated sequentially over the span of one hour. Four participants were friends with the test administrator; two were spouses of a friend of the test administrator. Five were male, and one was female. Of the five participants who were students at the University of Maine, all were “non-traditional.” All participants had a connection to the UMaine veteran community, either as veterans themselves or as spouses, and all participants spoke English as a native language.

Evaluation tasks

Test participants were presented with start-up screen of the Black Bear Calorie Counter application and asked to complete the following tasks (see Attachment A for full script):

- Tell me how many calories you must consume to maintain your current weight.
- Tell me how many calories you must consume to lose weight.
- Tell me how many calories you must consume to gain weight if your activity level changes.

The first task required navigating the login screen and entering a username and password. Due to neglect on the part of the test administrator, this was not added as an explicit task. However, since participants were encouraged to voice their concerns at all times, some participants did give feedback on the login screen, and that feedback is incorporated into the document.

In the third task, a changing activity level was defined as simply a different activity level than what the participant self-selected in the previous task.

Results

Five of the six participants successfully completed Tasks 1 and 3. All participants completed Tasks 2.

	P1 (DL)	P2 (JB)	P3 (KA)	P4 (MR)	P5 (MS)	P6 (RM)
Task 1	✓	✗	✓	✓	✓	✓
Task 2	✓	✓	✓	✓	✓	✓
Task 3	✓	✓	✓	✓	✓	✗

Time on task

Time on task was measured from the end of the task prompt from the test administrator to the clicking of the “Calculate” button within the calorie calculator. Task 1 included logging into the application. Participants were allowed to stay logged in for Tasks 2 and 3.

	P1 (DL)	P2 (JB)	P3 (KA)	P4 (MR)	P5 (MS)	P6 (RM)	Avg. TOT
Task 1	230	42	87	125	178	55	119.5

Task 2	10	20	12	13	6	9	11.7
Task 3	12	28	15	15	12	20	17

Recommendations

Based on feedback and observed behavior from the participants, the test administrator has suggested the following feedback:

Change	Justification	Severity
• Remove the login screen from Black Bear Calorie Counter.	Participants were unsure what their usernames and passwords were, how to register, or what the purpose of the login screen was. The login screen currently accepts any well-formed e-mail address as a username and any string as a password. It does not serve a practical purpose in Black Bear Calorie Counter.	High

Change	Justification	Severity
• Move the calorie calculator to the starting page so long as it is the sole feature.	Participants were unsure how to find the calorie calculator once they logged in to Black Bear Calorie Counter. One participant suggested that the home screen should not be blank and “left a lot to be desired.”	High

Change	Justification	Severity

• Add a heading to the goals section to make it clear that losing, maintaining, and gaining weight are goals.	Participant JB failed Task 1 because, since he tends to lose weight easily, he thought maintaining his current weight would involve “gaining” weight. He believed the radio buttons indicated actions he must take to reach a goal, not the goal itself.	Medium

Conclusion

Despite all participants having at least some degree of difficulty using Black Bear Calorie Counter, there was widespread agreement that the calorie calculator was useful and that the application more generally showed promise. We will continue to collect user feedback and conduct further research into making Black Bear Calorie Counter as user-centered as possible.

Attachment A: Script

1. Thank you for participating in this usability study of the Black Bear Calorie Counter Android application. Could you state your name?
2. Could you confirm that you have signed the consent form regarding this usability study?
3. Do you have any questions about the consent form?
4. I'm going to ask some basic demographic information.
    a. What is your age?
    b. What is your occupation?
        i. If student, what is your year and major?
    c. What is your gender?
    d. Are you a native English speaker?
        i. If no, how fluent are you in reading English?
    e. What general area were you born? For example, what state or province?
    f. Would you rate your tech savviness compared to the general population as *low*, *medium*, or *high*?
    g. Do you own an Android smartphone?
    h. Are you a healthcare professional or an aspiring healthcare professional?
5. Now we're going to move on to complete a task in the Black Bear Calorie Counter. This is an open-ended conversation. Please feel free to make suggestions for improvements or ask clarifying statements. However, I cannot tell you how to complete the task. Failure to complete the task is okay.
    a. Tell me how many calories you must consume to maintain your current weight.
    b. Tell me how many calories you must consume to lose weight.
    c. Tell me how many calories you must consume to gain weight if your activity level changes.
6. How hard were these tasks to complete?
7. Do you have any additional thoughts?

Attachment B: External resources

All external resources for this report are found within the `/usability-study/` folder of our GitHub repository, located at:

https://github.com/Group1-SegmentationFault/BlackBearCalorieCounter

- `consent-forms-signature-redacted.pdf` contains consent forms for all participants with the signatures removed. According to the terms agreed to in the consent form, Dr. Sepideh Ghanavati may request the full consent forms – with the signatures intact – at her request.
- `/screencaptures/` contains a series of MP4 videos recording the screens of each of the participants as they attempt to complete the tasks. These videos do not have audio.
- `/interviews/` contains a series of MP3 audio files capturing the conversation between the test administrator and each participant. These recordings were captured from a mobile phone placed between the test administrator and the participant.