CPSC 210: a study of student engagement in a course project through the development of cell phone applications

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CPSC 210

The goal of CPSC 210 is to provide students with the ability to recognize, analyze and use abstraction and decomposition to construct software systems that solve real problems.

CPSC 210 will be replacing CPSC 211.

January – April, 2010 was the first offering of CPSC 210.

CPSC 210's Approach

First month: focused on analysis where the students learn how to read existing code, extract models and reason about an existing system.

Second month: focused on construction where the students learn to write code that fits into an existing system.

Third month: focused on a synthesis of analysis and construction where the students write code to solve a particular problem in the context of using existing code libraries.

Course Project Overview

The last six weeks of the laboratory section of CPSC 210 stressed synthesis as the students worked on a project to build a non-trivial extension to an existing system.

In contrast, in CPSC 211 the students build a small software system from scratch.

We hope that requiring the CPSC 210 students to read, understand, and integrate with pre-existing code written by someone else will better prepare them for our upper-level courses and for co-op or other work experience.

Course Project Details

The students added a feature to GeoBeagle, an open source[1] Android geocaching[2] application. Android is Google's open source operating system for mobile phones.

The students' projects had to integrate with the existing GeoBeagle code and had to be consistent with the Android framework.

The students were able to test their projects on an Android emulator and, during lab sessions and office hours, Android cell phones that were provided by Google.

Student Comments

Did you like the fact that the project targeted a cell phone platform? Why or why not?

- "I thought it was very valuable to learn to program on other platforms than simply Windows/Mac/Linux."
- "I did like the cellphone targeted project, it was relevant and interesting and good experience."
- "Sure, since mobile technology appears to be very popular, it is relevant and up to date."
- "No, development tools were slow and flaky."

Student Comments

Would you prefer to have built a project from scratch rather than adding a feature to an existing application? Why?

- "I prefer adding a feature to an existing application because I think this is what most people do in this field."

- "I think using an existing application is much better for several reasons 1) gives automatic examples for functionality ... 4) simulates real world where much addition of features uses existing code"

- "No, although the existing application should be considered more carefully next term"

- "Prefer from scratch, or implementing a feature that had more room for our design choices."

Student Comments

What did you learn from working on the project?

- "To have a detailed plan (UML diagram) about what people should do is important."

- "I improved in thinking like a computer scientist more so after working on the project. It made me sit down and think about what I'm doing."

- "I learned that finding out what code does is quite difficult and time consuming, but learned in general how a program is put together."

Student Comments

Did you prefer to test the application on a real Android device rather than the emulator? Why or why not?

- "Real device simply because it's so much faster."
- "No. They are actually same to each other."
- "Yes!!! much faster and more responsive"
- "I prefer working on the emulator because it made it easy to switch back and forth to adjust things."

Lessons Learned

The feature we assigned was small, but required the students to spend a lot of time understanding the existing code. Some students struggled with this and would have benefited from additional scaffolding to get them started.

The students would have benefited from having more access to the phones because it was easier and faster to test with the phones. Once we have more students and more TAs we can provide far more office hours where the students can use the phones.

2. Geocaching is is an outdoor activity in which the participants use a GPS receiver to hide and seek containers (called geocaches or caches).

1. Open source software is available in source code form for which certain rights normally reserved for copyright holders are provided under a software license that permits users to study, change, and improve the software.