

Investigating students affective states in CS1 labs using affective survey software

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1 Status report

1.1 Proposal

1.1.1 Motivation

Students' introspection in introductory programming courses such as CS1 has demonstrated a discrepancy between their perceived ability and how they are genuinely performing [1]. Students in this study by Gorson and O'Rourke showed that a more frequent negative self-assessment due to programming "moments" deemed negative can lead to a more negative self-efficacy. This can be reflected in their affective state. This can reduce their motivation and work ethic which is proven to have an impact on students' academic performance [3]. This is manifested into affective responses becoming a predictor of achievement in CS1 [2].

1.1.2 Aims

The aim of this project is to create an application that can make students aware of their standing in the course. Students will be able to self-report how they are finding labs and after doing so, see how their peers found the same lab. As a result, they will become more aware of their relative programming abilities at an earlier stage, before examination. This is in order to mitigate the discrepancies between perceived performance and actual performance. As affective state is proven to be a predictor of performance in introductory programming courses, monitoring it will allow students to mediate their progress.

1.2 Progress

- Written dissertation Introduction
- Written background including review of existing applications and justification for choices
- Written up and refined project requirements according to evaluation of CS students with MoSCoW prioritisation
- Written up Design including sitemap and prototypes with survey created to evaluate
- Writing up Implementation
- Decided on React Native, JavaScript, Expo to implement front end

- Using Firebase for backend of project
- Firebase authentication set up
- User interface has been built including most screens and navigation working, icons and splash screen
- GitHub for application set up, with GitHub actions confirming build

1.3 Problems and risks

1.3.1 Problems

- Not well versed on Firebase and as such spending more time than I would have liked working on this
- Messaging between tutors and students will require extensive backend work
- A lot of unneeded packages installed at start of project using unnecessary space
- App needs something to make it more individual comparatively to other affective survey applications
- hoping to achieve this with notifications

1.3.2 Risks

- Firebase not providing the query functionality the application may need for a database as complicated as I have designed **Mitigation:** ensure database design is appropriate before working on this further
- Not worked on tests for the application yet **Mitigation:** work on this over Christmas
- More limited on time than I had hoped for building the application according to my Gantt chart plan
Mitigation: spend more time working on project over Christmas

1.4 Plan

Week 1

- Have main functionality of application completed
- **Deliverable: Have a prototype application for use**

Week 2-4

- Clean up application, work on test suite
- **Deliverable: Have a test suite to run**

Week 5-6

- Complete application and begin working on evaluation plan
- **Deliverable: Evaluation plan and instruments**

Week 7-11

- Finish evaluation with participants
- Finish working on Dissertation and complete GitHub documentation
- **Deliverable: Completed dissertation**

1.5 References

- 1 Jamie Gorson and Eleanor O'Rourke. 2020. Why do CS1 students think they're bad at programming? *Proceedings of the 2020 ACM Conference on International Computing Education Research* (2020). DOI:<http://dx.doi.org/10.1145/3372782.3406273>
- 2 Ma Mercedes Rodrigo, Ryan Baker, Matthew Jadud, Anna Christine Amarra, Thomas Dy, Maria Beatriz Espejo-Lahoz, Sheryl Ann Lim, Sheila AMS Pascua, Jessica Sugay, and Emily Tabanao. 2009. Affective and behavioral predictors of novice programmer achievement. *Proceedings of the 14th Annual ACM SIGCSE conference on innovation and technology in computer science education*. (2009)
- 3 Parneet Kaur, Harish Kumar, and Sakshi Kaushal. 2020. Affective state and learning environment based analysis of Students' performance in online assessment. *International Journal of Cognitive Computing in Engineering* 2 (2021): 12-20.