TLEF Project – Final Report

Report Completion Date: (2019/04/26)

1. PROJECT OVERVIEW

1.1. General Information

Project Title:	A GitHub-based learning technology for promoting student engagement and version control proficiency		
Principal Investigator:	Michael Gelbart		
Report Submitted By:	Michael Gelbart		
Project Initiation Date:	2017-04-01	**Project Completion Date:**	2019-04-15
Project Type:	☐ Large Transformation ☒ Small Innovation ☐ Flexible Learning ☐ Other: [please specify]		

1.2. Project Focus Areas – *Please select all the areas that describe your project.*

☐ Resource development (e.g. learning materials, media)

☒ Infrastructure development (e.g. management tools, repositories, learning spaces)

☐ Pedagogies for student learning and/or engagement (e.g. active learning)

☐ Innovative assessments (e.g. two-stage exams, student peer-assessment)

☐ Teaching roles and training (e.g. teaching practice development, TA roles)

☐ Curriculum (e.g. program development/implementation, learning communities)

☐ Student experience outside the classroom (e.g. wellbeing, social inclusion)

☐ Experiential and work-integrated learning (e.g. co-op, community service learning)

☐ Indigenous-focused curricula and ways of knowing

☐ Diversity and inclusion in teaching and learning contexts

☒ Open educational resources

☐ Other: [please specify]

1.3. Project Summary

GitHub is the world's largest hub for source code, and fluency with git/GitHub is an increasingly important skill for computer science (CS) graduates. We proposed enhancing a git/GitHub-based learning technology prototype that was developed by the PI. The technology promotes git/GitHub fluency for students by becoming a part of their standard course workflow and learning activities. Since the proposal, this tool has evolved into the *Classy* software package, maintained by the UBC CS department. During the TLEF we added several new features to Classy, most notably the ability for its use with manually graded (as opposed to auto-graded) student work. This improvement significantly widens the range of courses that can use Classy – from a few courses to the majority of CS undergad courses. The system was successfully piloted in CPSC 340 in 2018W1, and we expect its adoption to increase widely in the coming years; part of this success is a result of the TLEF project. However, due to some unforeseen circumstances along the way, not all goals of the TLEF project were met.

1.4. Team Members – *Please fill in the following table and include **students**, undergraduate and/or graduate, who participated in your project.*

Name	Title/Affiliation	Responsibilities/Roles
Michael Gelbart	Instructor, Computer Science	Principal investigator
Noureddine Elouazizi	Strategist, CTLT	Co-applicant
Jonathan Budiardjo	Undergraduate student	Software developer

1.5. Courses Reached – *Please fill in the following table with **past**, **current**, and **future** courses and sections (e.g. HIST 101, 002, 2017/2018, Sep) that have been/will be reached by your project, including courses not included in your original proposal (you may adapt this section to the context of your project as necessary).*

Course	Section	Academic Year	Term (Summer/Fall/Winter)
CPSC 340	103	2018	Fall
CPSC 340	101	2018	Fall
CPSC 532M	101	2018	Fall

2. OUTPUTS AND/OR PRODUCTS

2.1. *Please **list** project outputs and/or products (e.g. resources, infrastructure, new courses/programs). Indicate the current location of such products and provide a URL if applicable.*

Product(s)/Achievement(s):	Location:
New fork of Classy software that allows for manually graded student work	https://github.com/cpsc340/classy

2.2. Item(s) Not Met – *Please list intended project outputs and/or products that were not attained and the reason(s) for this.*

Item(s) Not Met:	Reason:
Using the software to facilitate peer review	From a software engineering perspective, the project was much more difficult than intended. This was due, in large part, to the coincidence of our efforts and those of the CS department technology group, who were building a similar took. We elected the best long-term solution, namely to join forces, which resulted in a major short-term setback in terms of software development time, as we needed to integrate our systems with each other. As a result, we did not get as far as we had hoped in terms of the system's functionality. While we completed the main features necessary to pilot our improvements in CPSC 340 in 2018W1, the experience for the students with Classy was roughly the same as the student experience with the previous (moribund) prototype software discussed in the TLEF proposal, which predated the TLEF project. In other words, our main accomplishment was getting the new, sustainable, system to function in the same way as the old, unsustainable system. Thus, we were not yet able to facilitate peer review or evaluate the pedagogical impact on students, since the student experience was not materially different than before the TLEF project. Over the coming years, however, students will benefit greatly from the groundwork laid by the TLEF project.
Evaluate the pedagogical uses of the technology	See above.

3. PROJECT IMPACT

3.1. Project Impact Areas – *Please select all the areas where your project made an impact.*

☒ Student learning and knowledge

☐ Student engagement and attitudes

☒ Instructional team teaching practice and satisfaction

☐ Student wellbeing, social inclusion

☐ Awareness and capacity around strategic areas (indigenous, equity and diversity)

☒ Unit operations and processes

☐ Other: [please specify]

3.2. What were you hoping to change or where were you hoping to see an impact with this project? – *Please describe the intended benefits of the project for students, TAs, instructors and/or community members.*

First, proficiency with git and GitHub is a big asset for our graduates when entering the software industry. The benefits extend beyond the software engineering industry. For example, academic researchers are increasingly using git/GitHub to keep track of their work.

Second, peer review is beneficial to both the student reviewers and the student reviewees. For the reviewer, it is an opportunity to engage with a potentially different approach to a homework problem that they have already thought deeply about. Often there can be many approaches that achieve a working solution, and the reviewer now has exposure to different ways of thinking. For the reviewee, they get additional feedback on their work on top of what would normally come from the TA. This additional feedback comes from a new perspective (fellow student rather than TA/instructor).

Third, having a unified "course home" for all interactions with the course (and, hopefully, a large subset of a student's courses) reduces mental clutter and saves time.

Finally, in addition to the above benefits for students, the new system is more convenient for TAs while grading, and for instructors in terms of viewing student work. This saves time, which can then be allocated to other instructional activities.

3.3. Were these changes/impacts achieved? How do you know they occurred? – *What evaluation strategies were used? How was data collected and analyzed? You are encouraged to include copies of data collection tools (e.g. surveys and interview protocols) as well as graphical representations of data and/or scenarios or quotes to represent and illustrate key themes.*

N/A; see section 2.2.

3.4. Dissemination – *Please provide a list of **past** and **upcoming** scholarly activities (e.g. publications, presentations, invited talks, etc.) in which you or anyone from your team have shared information regarding this project.*

Tiffany Timbers presented on this work at a symposium on higher education, organized by UBC CTLT and UBC Open data group in May 2018.

4. TEACHING PRACTICES – *Please indicate if **your** teaching practices or those of **others** have changed as a result of your project. If so, in what ways? Do you see these changes as sustainable over time? Why or why not?*

They have not changed as a result of the project per se, but they are certainly changing in general as we move towards git/GitHub based course delivery, a movement which this project contributes to. Perhaps most importantly, through these systems we can provide help to students on code-related projects, which has historically been difficult except during in-person office hours. Overall, instructors can spend less time on admin overhead and more time helping students with the course material. This change will certainly be sustainable; see section 5 below.

5. PROJECT SUSTAINMENT – *Please describe the sustainment strategy for the project components. How will this be sustained and potentially expanded (e.g. over the next five years). What challenges do you foresee for achieving the expected long-term impacts listed above?*

See section 2.2; unbeknownst to us when submitting the proposal, the timing of the project coincided with the CS department's efforts to build a new tool, called Classy, for the same purpose as the TLEF project. Rather than lead two separate efforts, we joined forces. Thus, our work product took the form of a fork of the Classy software on GitHub (see Section 2.1), which continues to be developed in the CS department. From the sustainability perspective, this is excellent, as the work done as part of the TLEF project will live on as part of Classy; in fact, the CS department just hired a new technology staff member who will work primarily on Classy starting July 2019.