

# EDUCATION INNOVATION HACKATHON

PRESENTED BY DEVNQ

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## Problem Statements

### **Engaging students by linking live research projects to the classroom**

Students of all ages and experiences learn and engage best by doing, trying, playing and visualising. For the sciences particularly, students having real-time access to experiments, live data feeds, researchers themselves, cameras and more provides an engaging experience that goes far beyond the confines of the classroom. At present, projects like Classroom on the Reef, an attempt to connect high school students to Orpheus Island in real-time, has required a large scale effort of coordinating technologies both physically on the Island but also in the classroom, where tools, dashboards and interfaces need to suit students and how they learn. This work to date has been bespoke, a tailor-made solution for this one high school and research station -- but is there a better way? Perhaps a plug-and-play model where any classroom can access the same data feeds, cameras and study content, or perhaps a self-contained "kit" that schools or researchers themselves can deploy to start hacking on their own data collection and monitoring projects.

### **Automated assessment for coding assignments**

For technology based subjects, a major issue is ensuring that the code a student writes is able to be run correctly and passes a suite of tests. In the software development world, this would be considered Test Driven Development, where the teacher provides a set of tests that the students' code must be able to satisfy -- which is what's being achieved in some instances now with supplied unit tests. The challenge here is that students may be just learning to program for the first time and TDD is far beyond the realm of the basics of syntax and "hello world". Similarly, for more experienced students in later classes, providing the unit test code they need to run (eg in Python) means that the student can easily 'hack' their way to making the tests pass by just supplying the bare essentials of what the tests are checking for. Is there a way of solving these or other problems, and making it so that the teacher doesn't need to manually run 30 or 300 sets of tests to get the grades of all the students in their class?

## **Automated plagiarism detection for assignments**

Cheating is a major challenge for teachers to attempt to detect, especially for subjects with 1000s of students (such as in MOOCs (Massive open online courses)). There are some automated solutions out there, but they face challenges when it comes to comparing students' work, especially on these larger scales. Perhaps there's a better and more user-friendly way of checking how students' code relates to one another or to code sourced from "elsewhere" on the Internet -- something that requires less human intervention and in the cases where cheating *does* happen to be detected, a more student-friendly way of asking them to "please explain".

## **Authenticating academic qualifications; using microcredentialing/badging across different levels of study**

Microcredentials are digital representations of educational achievements and are also known as badges. Educational organisations provide these microcredentials after a learner has completed a set of requirements to attain that badge; and are typically awarded after a student has completed or mastered a very specific skill or competency. At present, technologies for assigning, issuing and displaying microcredentials are still in development and they're being used by a small subset of educational institutions. Projects like OpenBadges (<https://openbadges.org/>) is supported by key organisations like Mozilla, but there is much more to be done in terms of integrating this technology with 'real-world' learning, and integrating these concepts at teaching organisations like primary and secondary schools, Universities and TAFE. Likewise, there's always the question of authenticating these types of digital academic qualifications and helping future employers understand and prove that I did graduate from XYZ High school, have a Bachelors degree in Science from ABC University, and that my grades were in fact what I claim they are.

## **Using phones as tools in the classroom**

In classrooms, phones are far under utilised as teaching tools for a variety of reasons. In primary and secondary schools, phones are understandably looked upon as a distraction, with many schools banning their use within school hours (including during breaks). However, is there a simple, clean way in which students can be taught about technology, using these devices to the advantage of students and teachers? Can the attention grabbing nature of apps like Snapgram, Facechat and Instabook be replaced with something similarly engaging during class time? Perhaps a solution is to find a way of motivating student engagement through gamification.

## **Achieving more effective communication between teachers and students**

On both sides of the fence, both teachers and students are time poor and need the right information at the right time. Students have many different pressures on their time such as multiple assignments, multiple subjects, work or family commitments and more and lack the time and inclination to micro-manage their learning. Similarly, teachers have similar concerns about time management, but also face a challenge of how to effectively communicate subject matter, requirements, advice, and personalised help to their students. Technology can bridge this gap but how does one do it in a way that doesn't impose still-higher attention requirements or cognitive load on students and teachers. Simple solutions *might* be an app where these two groups can communicate, but when there's multiple classes/subjects/assessment items, this 'solution' could easily turn into yet another attention-grabbing, notification-nightmare where messages get ignored. What else can we do?

## **Quickly putting together content for very large classes**

For teachers, there are a variety of challenges when working with large classes, such as MOOCs (Massive open online courses) or the more traditional in-class teaching. For a single teacher, putting together engaging content that works for these differing audiences is hard, and making it relevant such that it translates across technology platforms is harder still. Is there a technological solution for allowing a teacher or lecturer to easily piece together content such that it looks amazing, feels professional, and captures students' attention? Perhaps the same solution might be able to be applied to helping teachers design flexible assessment pieces that go beyond the traditional multi-choice exam or essay questions.

## **Teaching and assessing in remote locations**

There are many challenges in delivering education to remote locations and this is particularly an issue here in Australia where distances are vast and we can be separated from experts not only within our country but across the world. Technology is bridging this gap thanks to the Internet and associated communications technologies like the NBN, but there's still a ways to go in terms of how this is applied or integrated into education. For instance, there are challenges in providing content and getting active class participation in remote areas where Internet connections might still be unreliable or people's schedules might differ. Likewise, there are questions of how does an educational organisation assess students reliably if they're located in remote areas -- the standard process of an in-class tutorial or exam doesn't quite fit. Technology can provide a solution, but how can it work in a reliable, user-friendly fashion?