Final PDIG Report 2021/2022

Project Name: Math summative projects for Secondary 5 (11CST)

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Project Description

The underlying rationale of our project was that the use of authentic, self-directed learning experiences and project-based learning increases student engagement and enhances student learning in the classroom. Our goal was to create resources for implementing some project-based learning in our Grade 11 CST math classes in the form of two summative tasks.

We intended to meet over 4 days, moving from discussions of the concepts, creating rubrics, student guides and teacher guides for the two tasks, and time for reflection after piloting the project in our classrooms. In the end, we were able to meet 4 times. We had three full days for planning and task design, and one-half day to write up the final report. Due to the constraints of the pandemic, we only piloted one of the two projects in our classrooms at the time of this report. The first project, entitled Superfan, was piloted at the end of January 2022. The second project, Dragon's Den, will be piloted a few weeks after this report has been submitted.

Project Timeline

Day 1 (December 2021)

We spent our first dedicated project day planning and designing the student guide and rubric for a summative task that would draw on three distinct units from the Quebec Progression of Learning (Graph Theory, Optimization, Decision Making and Critical Paths). Since the 2021-2022 school year has been split into two terms, we planned to have students complete this assignment during the end of January as a mid-year assignment.

In addition to producing an idea for the task, we created a list of required elements for students to include in the assignment and designed a first draft of the student guide and an assessment rubric that would inform students how their final product would be evaluated.

Day 2 (March 2022)

Our second meeting occurred after the implementation of the first project in our classrooms. We began our day by reflecting on what went well, student feedback and brainstormed on how we could make improvements to the documents created as guides for students and fellow educators.

The remainder of the day was used for the creation of the second summative task, entitled Dragon's Den. We created a detailed student instruction handout and a detailed marking rubric to accompany the instructions. For this student task, we pulled concepts from the Financial Math and Probability units from the Quebec Progression of Learning. In addition, we also researched several additional audio/visual activities that teachers could use to support the implementation of the summative assessment in the classroom.

We also planned out an extra-curricular enrichment activity for students interested in extending their learning beyond the classroom. Students would be able to pitch their project ideas in a competition to a small panel of volunteer judges.

Day 3 (April 2022)

This meeting day was dedicated to the creation and editing of Teacher Guides for both projects.

In reflecting on the first task, a shared observation was that students struggled to manage their time while completing the assignment. We edited and improved our student instructions and the rubric based on the frequently asked questions from students. We also realized that having a timeline for students to follow would be helpful for time management, and so we improved the teacher's guide with a suggested timeline for students, including daily goals and important reminders. We also spent time putting in supplemental teaching materials to support the project.

Day 4 (April 2022)

This half day was dedicated to producing the final report and all project materials to be submitted to the LCEQQ to share with other educators.

What Went Well and Challenges

The creative process was extremely fun. Collaborating with another teacher to create summative projects inspired us to create interesting tasks based in a real-world context that still allow students to demonstrate the required mathematical learning.

Another teacher in our school was able to also benefit from the project and use the summative assignment in their own classroom.

The student assignments were setup to be run as end of term summative assessments. We really wanted to implement the second project before the end of the PDIG so we could also reflect on implementation and improve teacher guides and the rubrics. However, we were not able to schedule it until after the final report submission deadline.

Project Goals

We achieved our primary goal in this project, which was to create two summative tasks and implement them within our 11CST classrooms. The first task, entitled Superfan, required students to plan a month-long dream vacation to follow their favorite band or entertainment act on tour. This task incorporated concepts from Financial Mathematics, Graph Theory, and Statistics (Voting Procedures). The second task, Dragon's Den, required students to design a carnival-style game of chance, and create a prototype and business plan to market their game. This task incorporated concepts from both Probability and Financial Mathematics. As an extension activity, students will be invited to compete in a friendly competition, in which they pitch their business plan to a panel of judges. The top two teams will be rewarded with a small prize.

For each of the tasks, we created a complete set of instructions and guidelines for students and a detailed rubric for evaluation for teachers. In addition, we wrote a teaching guide for each task which suggests how to structure class time and lessons leading up to and during the completion of the project. For the first summative task, Superfan, the teaching guide was created after we had piloted the task

within our classrooms in January. In this way, we were able to incorporate our ideas for how we would improve or change the delivery of our lessons into the suggested teaching practices. The second summative task, Dragon's Den, is being implemented in our classrooms at the time of authoring this report, and as such the teaching guide we have created reflects our ideas and expectation for how it will unfold in practice.

The summative tasks and accompanying teaching resources we have created will be made available to other educators through our board wide document sharing portal.

Student feedback was collected informally through group discussions in class instead of using a formal feedback survey. Overall, students responded positively to the task. Many expressed that they enjoyed the opportunity to do "something different" in their math program. The work we saw from our students showed diversity and creativity in how they approached the task. Having students present their work to the group as part of the task also offered them an opportunity to see and name the differences in their peers' approaches.

Project Outcomes

By working together on this project, we were able to combine our individual strengths in creating a comprehensive teaching guide, student instruction booklet and marking rubrics. We both gained valuable experience in designing and implementing a project-based learning scenario in our mathematics classroom. We also gained useful resources for teaching in the form of two ready-made summative projects. The activities themselves can be easily modified by teachers based on the needs of their students.

Creating a student-centered learning experience was a key goal in this project, and the tasks we have created are designed to allow students the freedom to develop their ideas relating to a topic of their choice. The diversity and creativity of student work is evidence that these tasks did indeed offer authentic, self-directed learning experiences. Furthermore, in addition to applying their mathematical learning to a real-life scenario, students engaged in many other forms of cross-curricular learning while completing their project. These include research skills, synthesizing and summarizing information, creating spreadsheets, visualizing data, digital graphic design, and oral presentation skills.

Although we anticipated that offering authentic, student-centered learning experiences would be beneficial to our students, we also noticed that the experience was beneficial to us as teachers in unexpected ways. The nature of traditional mathematics classrooms and activities is not one where students express themselves creatively or share much of themselves in the class (as compared to, say, English Language Arts or other creative disciplines). As such, it takes a greater effort on the part of the teacher to get to know their students' interests and passions and build meaningful relationships. This project offered us an opportunity to see a side of our students that we do not often get to observe in math class, and we valued that.

As mentioned earlier the Dragon's Den student task will offer an optional extension activity for competing for prizes. We have approached colleagues in the English department to offer cross curricular opportunities for the evaluation of this project. Although we envisioned having live presentations to a small panel of judges, for this year with the pandemic we have decided to have students participating in the contest create a video to pitch their business plan to the judges.

Reinvestment

The project documents we produced will be shared with the LCEEQ as well as the WQSB math consultant. We are also bringing what we have learned, and the framework, into our own department meetings as a basis for increasing student engagement in our school classrooms.

Teacher teams need to work to achieve so much more than simple activities, field trips and fundraisers. Student success is at the heart of what we do. Working together and sharing resources with other teachers is rewarding knowing we can help others in the educational system.