

PDIG Final Report 2021-2022

Project-Based Situational Problems

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Project Description

Describe/show to what degree the project was carried out as planned. Include what went well and what proved to be a challenge.

Include a synthesis of your journal entries.

Our goal was to create a series of unit-based situational problems for secondary mathematics. The purpose behind this goal was to create tasks that looked different from the traditional end-of-year situational problems that often gets misattributed as to what a situational problem is supposed to look like. We set out to create tasks that can be used at various points during the learning process.

We were able to create the following tools:

Tool Title	Grade Level	Tool Type	Topics Covered
Let's Play Bingo	Sec. 1/2	<ul style="list-style-type: none">• Formative activity	<ul style="list-style-type: none">• Order of operations• Integers
Promotional Infographic	Sec. 1/2	<ul style="list-style-type: none">• Formative activity• End-of-unit	<ul style="list-style-type: none">• Geometry• Fractions• Percentage
Stock Market Project	Sec. 1/2	<ul style="list-style-type: none">• Project-based assessment	<ul style="list-style-type: none">• Order of operations• Percentage• Statistics
Busy Bees	Sec. 2	<ul style="list-style-type: none">• Formative activity	<ul style="list-style-type: none">• Algebra
Eastern Wolf Nature Sanctuary	Sec. 2	<ul style="list-style-type: none">• End-of-unit	<ul style="list-style-type: none">• Polygons• Rates
Old MacDonald Had a Farm	Sec. 2	<ul style="list-style-type: none">• End-of-unit	<ul style="list-style-type: none">• Geometry• Rates
Intro to Trigonometry	Sec. 4	<ul style="list-style-type: none">• Introduction activity	<ul style="list-style-type: none">• Trigonometry
Pinball	Sec. 4	<ul style="list-style-type: none">• Formative activity• End-of-unit	<ul style="list-style-type: none">• Trigonometry
Selling on Commission	Sec. 4	<ul style="list-style-type: none">• Formative activity• End-of-unit	<ul style="list-style-type: none">• Functions
Investing for the Future	Sec. 5 CST	<ul style="list-style-type: none">• Formative activity• End-of-unit	<ul style="list-style-type: none">• Financial mathematics

Originally, the plan was to create three unit-based situational problems for a specific topic throughout three grade levels (Sec. 1, 2, and 4). However, due to changes in the team and participation issues stemming from the pandemic, alterations were made to the plan to ensure that the amount of proposed content would still be produced (nine situational problems total), even if it wasn't strictly to the plan.

The team was originally split into three groups: Sec. 1, 2, and 4. Halfway through the project, the two teachers who were working on the Sec. 4 material were no longer participating. Since my role was to work alongside the Sec. 4 teachers, I shifted work on completing other tasks as well as supporting the Sec. 1 and 2 teams to help them complete theirs. The original plan for the *Pinball* project was for it to be a project-based assessment where students would build a working tabletop pinball machine out of cardboard. However, since those involved were no longer able to participate, we had to adjust that project to something more pen-and-paper based.

Despite limitations during the winter due to the pandemic, we were still able to field test two of the projects: *Let's Play Bingo* and the *Stock Market Project*. Both activities went well (details found in the journal reports section).

Journal Reports and Class Demo Sessions

Meeting #1 – November 23, 2021

Members Present: Ayesha Anwar, Claudia Anzovino, Vanessa Brittain, Carl Brown, Kristeen Carson, Carlo Chechile, James Gore, Alexandra Kindrat, Leah Lobaton, Timothy Lyons, Ryan MacKenzie

During our first meeting, we had a brief discussion about situational problems and looked at how they've traditionally been presented and how that differs from the QEP. We split into three groups by grade level and we set forth to create three situational problems per group: one introductory activity (for example, a rich task), one project-based activity that would span an entire unit (or more), and one traditional end-of-unit task.

At the end of the meeting, all groups were well on their way to developing their first activity; although within one group, they had trouble reaching a consensus as to what their first activity should be.

Meeting #2 – February 21, 2022

Members Present: Ayesha Anwar, Carl Brown, Kristeen Carson, Carlo Chechile, James Gore, Leah Lobaton, Timothy Lyons, Ryan MacKenzie

During this meeting, the lead consultant for the Sec. 1 project (Claudia), a teacher from the Sec. 1 group and a member from the Sec. 4 group were absent. The other Sec. 4 teacher and I worked with the Sec. 1 group to help develop their first project (*The Stock Market Project*). The Sec. 2 group worked to complete their first project (*Busy Bees*)

Class Demo Session #1 – March 9, 2022

Members Present: Carl Brown, James Gore

During this session, Carl introduced *the Stock Market Project* to his class. The reception to the activity was well received, and the students remained on task throughout the entire class period. Carl reported afterwards that his students were very motivated and interested in the project during subsequent period dedicated to the project. The project served to explore order of operations and statistics with the students but also introduced the students to using a spreadsheet and using its tools to display information graphically.

Meeting #3 – March 22, 2022

Members Present: Claudia Anzovino, Carl Brown, Kristeen Carson, Carlo Chechile, James Gore, Alexandra Kindrat, Leah Lobaton, Timothy Lyons, Ryan MacKenzie

Originally intended to be our final meeting, the entire team was extremely motivated to develop their projects. Despite losing the two Sec. 4 teachers that were part of the project, the team carried on and had ideas in place for an additional six projects. Because everyone was starting to see the fruits of their labour, the team decided to meet one more time so that they could further refine their projects.

Meeting #4 – March 31, 2022

Members Present: Claudia Anzovino, Carl Brown, Kristeen Carson, Carlo Chechile, James Gore, Alexandra Kindrat, Leah Lobaton, Timothy Lyons, Ryan MacKenzie

During this meeting, we were able to finalize several projects, including *Let's Play Bingo*, *Old MacDonald Had a Farm*, and *Eastern Wolf Nature Sanctuary*. We had discussed the possibility of field testing these projects prior to the submission of the final report for this project, but aside from one possible session, we weren't able to schedule anything.

Class Demo Session #2 – March 9, 2022

Members Present: James Gore

During this session, I worked with an Academic Consolidation group (students who are in high school but are not quite ready for Sec. 1) to work on the *Let's Play Bingo*. The activity was adapted as it focuses on integers which the students were not ready to work on. The activity went well and while this group struggles to stay on task for an extended length of time, they spend the entire class period focused on the activity and were talking about math strategies with their peers. Despite the original activity designed for students at a higher skill level, it was easily adapted to suit the needs of the students.

Review Session – May 4, 2022

Members Present: James Gore, Matt Leduc

Matt joined me to review the work the team had done over the year. We validated some of the projects that had been developed. Since many of the projects had yet to be field tested, Matt gave some insight as to what may or may not work in a classroom. Since he was not part of our regular meetings, his outsider prospective provided a different glimpse to our projects and help us improve our final product.

Project Goals

- *Describe/show to what degree the goals of the approved project were met.*
- *If the goals were only partially met or not met at all, describe the reasons for this.*

For the most part, we did achieve our objective in developing several unit-based assessments. It may not have been exactly to plan (three assessments for a specific topic for three grade levels each). However, we were still able to produce more than objective number of situational problems (we had originally set out to produce nine but created ten). We also were able to complete our goal of making different types of situational problems that ranged from being accessible to students before the start of a unit to serving as summative assessment for the end of a unit.

Project Outcomes

- *Describe/show the gains that the participating teachers achieved through this project.*

During the project, the teachers involved got a better understanding of what a situational problem can be. Many teachers believe that the situational problem component of Math is supposed to look like an end-of-year exam. However, the QEP clearly states that a situational problem can look like any type of task and can be an activity done during any time during the learning process. At first, teachers had trouble wrapping their heads around this ambiguity. However, as our projects developed, they gained a better understanding and appreciation as to what is possible regarding situational problems.

Teachers also got more comfortable developing situational problems without worrying about the time aspects of a situational problem. When asked about situational problems, many teachers complain that they take too long to create, too long to do in class, and too long to correct. With some of the activities created, they took less time than expected to produce, but also to use with the students and assess their work. For example, the *Let's Play Bingo* activity came together fairly quickly and there was no correction guide to assess student work (the assessment came from observing student discussion and work). While I don't think that by the end of the project that all the teachers involved will switch to using rich-tasks and project-based assessments for all their formative assessments, it was eye-opening for some as to what is possible beyond the traditional pen-and-paper tasks.

Reinvestment

- *Clearly describe how the resources created and/or the learning achieved by the participants can be of benefit to the educational community at large.*
- *If applicable, comment on whether or not this project should be carried out by other teams and if so, how it could be improved.*

Despite a concentrated focus on using tasks that promote reasoning and problem solving, there's still a consensus within the Secondary Math teaching community that it's difficult to create and implement these tasks. The connection between having the students thinking about abstract problems or using rich tasks to produce concrete understanding of concepts and success on final exams appears to be broken by those who are weary of using such tasks.

These activities are designed to bridge that divide and show how it can be possible to use non-traditional tasks to create discourse to develop better understanding of mathematical concepts. These tasks are intended to allow students to make connections with their knowledge of math and how it can be used to solve any problem they face, whether it be a situational problem or an application question on an exam.

The activities designed by this team are easy to use in any classroom setting and get students thinking and talking about math. In turn, it keeps them engaged and receptive to further mathematical instruction. Teachers can use several of these activities either formatively to assess student progress through a unit, or summatively to assess how much knowledge they've acquired by the end of the unit.

Because these tasks were designed to be simple in nature, the hope is that teachers will see these activities and be tempted to create their own without reservation about the time it takes to create something new. Although our group took a while to get going, once the teachers got a better understanding on how to create these tasks, they were able to design and construct them quickly.

Since we weren't able to work on all grade levels (Sec. 3 and 5, in particular) or cover all the topics within the grade levels we did work on (for example analytic geometry in Sec. 4), we would like to see this project continue in the future as the feedback that we've seen from the projects we've created and used in the classroom has been very encouraging.