

PD 37860: Designing Alternative Assessments for Chemistry Project Report

Project Description

This project provided the opportunity for two chemistry teachers, along with two consultants, to collaborate and develop alternative assessments for secondary 5 chemistry. This collaboration took place throughout 6 half-day meetings as well as throughout conversations between meetings.

The discussions and work during our first two meetings focused on some of the challenges of teaching and learning for the secondary 5 chemistry curriculum, current assessment practices, and what could be involved in alternatives to traditional assessments. We set some goals for our continued work: developing tasks that centered on concrete phenomena in chemistry. Our hope is that these task would challenge students to apply their knowledge in chemistry to solve aa complex problem.

The next two meetings, together with several conversations between meetings and independent work for each of the teachers, focused on developing our first task that targeted Energy Changes in Chemical reactions: The analysis of a Flameless Ration Heater. Developing this task involved a substantial amount of research and preparation that occurred both during the meetings and between the meetings. The task was field tested with students in two different schools and we reflected on the important features of the tasks that supported student learning.

Our final two meetings involved brainstorming, research, and preparation for a final project based task that required students to apply learning related to different concepts in chemistry and physics. During the design of this task, the nature of the task evolved considerably. What started as the development of a specific task that involved students using a teacher developed system to activate an airbag to a more open ended task in which students are required to use physics and chemistry concepts to design and analyze a self propelling car with a safety feature. This task will be field tested in late May and final documentation will be shared at this time.

One of the highlights of this project was the opportunity for the secondary 5 chemistry teachers to collaborate. Given that the chemistry teachers involved in this project were the only chemistry teachers in this school, this opportunity to collaborate was particularly important. This collaboration was crucial in mediating one of the challenges of this project: designing tasks with procedures we have not tried before requires creativity, troubleshooting, and problem solving. It was a time consuming process that was facilitated by the rich discussions and reflection throughout this project.

Project Goals

This project had two goals: 1) to develop alternative assessment tasks that include a project-based summative assessment as well as smaller tasks for each of the concept areas in chemistry that could be integrated into the project-based assessment and 2) To provide the opportunity for chemistry teachers to collaborate and reflect on their assessment practices.

The first goal was partially met. We developed a project based summative assessment and a smaller task that incorporated knowledge of two areas of chemistry. Our preliminary discussions about classroom constraints and student needs, in addition to our brainstorming led to a shift in some of our goals. We quickly realized that an alternative task for each topic area may not be achievable, a realization that was reinforced by the amount of time required to iron out the details of the first task. Also, the number of both teacher and student absences due to the viruses circulating during the fall posed challenges in consecrating enough teacher meeting time and class time for developing and field testing these alternative assessments.

The second goal was fully met and will be one of the enduring outcomes of this project. The teachers on this project had not previously met and have now formed an ongoing working relationship for chemistry. The teachers' reflections on alternative assessment included the importance of having a concrete phenomenon that supported the application of concepts from chemistry, opportunities for student collaboration to push further learning, consideration of appropriate scaffolds for students, and opportunities for immediate feedback on learning (observation of the phenomenon confirms or negates a students' initial solution).

Project Outcomes

The outcomes of this project are described below.

1) Increased expertise in the desired outcomes for chemistry and increased expertise in designing and implementing assessments for these outcomes

Teachers had the opportunity to examine the observable elements for the competencies in chemistry and the competency scales. By doing so they were able to reflect on to what extent the tasks and assessment tools they were developing allowed for demonstrating competency. For example, while using the competency scales to develop rubrics, the teachers observed that their tasks needed to be adjusted in order to allow for the observation of certain aspects of the competency.

2) Increased knowledge of different strategies to assess student learning in chemistry

An example of the increased knowledge of strategies to assess student learning is provided below occurred when the teachers implemented a type of two stage collaborative assessment for one of the tasks. Teacher reflection on this task led to the learning that allowing students to collaborate for a portion of the task can provide the opportunity to increase student learning and then an individual portion was important for assessing what students could independently do.

3) Increased teacher collaboration

The collaboration established between the members of this teacher team has already continued beyond the structure of this project. Given that the teachers involved are the only chemistry teachers in their schools, this opportunity to network and share with other teachers is invaluable.

Reinvestment of Learning

The resources developed can be shared with other chemistry teachers. The consultants will share the tasks through their school board website for secondary science & technology and with their colleagues at MaST. In addition, the teacher's reflections on the value and important features of alternative assessments will inform our future work with students and teachers.

Although the resources and the sharing of our learning can be reinvested by other teachers, the value of the learning that occurred while collaborating on the resources can not be overstated. This process challenged us to further our understanding of the teaching and learning of chemistry. As such, we recommend other teams to embark on such a project.

Click [here](#) to view a website that shares our resources

Respectfully submitted,

Katherine Davey, LBPSB

May 1, 2023