

Final Report

Chemistry Inquiry Activities

1. Description

The goal was to create Inquiry-based Learning (IBL) activities for the four topics in the Chemistry program: gases, energy, reaction rate and chemical equilibrium. A teacher guide and student material would also be created for each lesson.

It was decided that each inquiry lesson would have three phases:

- 1) Exploration – where students experience a concept to gain familiarity;
- 2) Concept Development – students' understanding is examined and further processed and terminology is explored;
- 3) Application – the concept is practiced and applied in a new way.

One of the challenges we encountered was time, or the lack thereof. The days provided to create the lessons were more or less sufficient. However, the time required to fine tune the details, e.g. to test the equipment took longer than expected. There were also some modifications that needed to be made to the objects once they were developed. Finally, we were only able to create 3 out of the 4 proposed activities, which is great, but more time was required to do complete all 4. We developed activities for the following topics: energy, reaction rate and chemical equilibrium. However, we did not have enough time to work on the topic of Gases.

Another challenge was the school year was cut short due to the pandemic, there was no possibility of testing the activities. I was unable to get feedback from students and see if the activities were indeed effective.

A last challenge was that, once again because the year was cut short, we were unable to validate the any of the three activities. It would have been beneficial to have a member that did not develop the activities, provide feedback and suggestions on how to improve them. However, this was not possible due to school closures.

More time was needed to truly develop and test out the Inquiry activities. I know that it takes a lot of time to complete the activities under normal circumstances, so it is unfortunate that we did not have a fair chance to do so.

2. Goal

The main goal was to develop 4 IBL activities, each one reflecting one of the 4 main topics in the Chemistry program.

I am happy to say that we achieved 3 out of the 4 activities. We completed activities for the following topics: energy, reaction rate and chemical equilibrium. Therefore, this part of the goal was indeed met. Although we were able to develop the Exploration activity for the Chemical Equilibrium topic, we had

insufficient time to develop an Application activity. Although we were able to develop the Exploration activity for the Chemical Equilibrium topic, we had insufficient time to develop an Application activity. Another issue was that we had decided to work on the activities for Gases at the end of our project, but unfortunately, we did not have sufficient time to do so and we did not work on this topic at all.

Overall, the development of activities took longer than expected. However, the time required for malfunctioning equipment and the development of new tools had not been factored into the original request. This caused us to be behind schedule.

The main reason why our goal was not met was because the schools were closed due to the pandemic and our team was no longer able to meet and continue developing the activities. We needed more time to create the IBL activities and we did not have the opportunity to validate them or test them on the students.

3. Outcomes

Validation process:

Unfortunately, due to the pandemic, we were unable to undergo the validation process.

It would have been helpful that another member who did not develop the lessons could provide feedback and suggestions.

Gains of PDIG:

The core members of the team (two teachers, lab technician and consultant) have learned a great deal by participating in this PDIG. The core team members worked well as a team; each bringing different skills to the table.

Previous experience in the development of inquiry activities was very helpful in the creation of new ones. There was more of an ease at implementing inquiry activities as professionals because of previous knowledge of the IBL approach.

In addition, having built a relationship amongst the team members during previous projects enabled us to get to the job of creating faster as trust issues and understanding of everyone's roles was already established and accepted."

We learned as a team that we must always test out our ideas to make sure that they work. Sometimes we have a great idea in theory, but it doesn't always work as well when put into practice. In saying that, having a team of members with various roles enriches the procedure as each person can bring something different to the table.

We were hoping to help students feel more comfortable with IBL activities in order to better prepare them for critical thinking-based activities they will soon be exposed to on a more normal basis in CEGEP next year.

Due to these unforeseen events, we would have liked to continue improving our IBL lessons, however since our next school year is still uncertain, we would eventually like to submit a new proposal in the future for another PDIG to continue our work.

4. Reinvestment

My team and I have developed several successful IBL activities for our secondary 3 students in the past and we were able to see their many benefits. We were truly hoping to do the same for the Chemistry students in preparation for CEGEP. We were hopeful that the students would have further developed their critical-thinking skills when exposed to these new activities.

We would have been happy to share our work with other teachers because we have seen these activities improve our students' problem-solving skills and we believe that all schools should have the opportunity to help their students develop a stronger foundation in this area.

Finally, given that we have seen how IBL lessons enriched students' overall comprehension in past projects, we would like to continue working on IBL at the secondary 5 level, and complete the development of the projects in the future.