

Suggestions for Whole Class Inquiry Challenge

Thinking Ahead

The activity presented below is more of a style of teaching than one activity. It requires thoughtful preparation and should be integrated into classes several times over the course of the year, as this will most effectively allow students to build their collaborative skills. Several examples of this type of activity are available in the files section of this activity map. However, the challenges should be adjusted to fit a particular classroom's curriculum and student ability.

The teaching style used is whole class inquiry (adapted from *Whole Class Inquiry: Creating Student Centered Science Communities* by Dennis Smithenry and Joan Gallagher-Bolos). It is recommended that this book be read for a complete understanding of this teaching style. Its advantages include:

- Students take charge of the science they are learning - they own it.
- Students learn to work in a community and grow by using their gifts to help the community.
- Third, students enjoy doing science this way—perhaps not at first, as it is much harder work to learn this way than by standard methods, but they often come to enjoy the challenges and growth.

In this approach, students are given a challenge that they must meet as a whole class, related to the topics that have been covered in class. This leads to one product/presentation turned in by the entire class, without the help or assistance of the teacher. There is a time limit and the class must collaborate to complete the challenge, relying on all class members to contribute in order to be successful. The nature of the challenge is such that students are forced to work in community and rely on each other. It is also structured so that they begin to recognize their own strengths as scientists and are encouraged to participate as a community and for the good of the group. These features of the approach lend themselves to explicit connection to Christian virtues.

Preparing the Activity

You will need:

- A challenge with all boundaries and expectations written up on a handout to be passed out as students enter the room

- All equipment necessary for students to complete the challenge
- A disguise for the teacher

Teaching the Activity

1. Create a challenge for the class.

- It should be related to material covered recently in class.
- It should require students to look back at material they have already learned—preferably labs from the most recent unit.
- It should be challenging enough that even the best student will have to work to solve it. It should not be easy. Do not be afraid of students just coming close to the goal or even failing to meet the challenge. Everyone in the class should have to struggle with the material a bit, but not be entirely discouraged. On their own, no one student would be able to tackle it, but together, it is achievable. It may be helpful to take a lab that the students have already completed and then add a challenging twist to it - perhaps they would need to go back and remember what they did in that lab to figure out how to accomplish the current challenge.
- Add some visual/presentation component to the challenge. It could be that the data must be presented neatly and clearly on one sheet of paper, or it could be that a PowerPoint presentation must accompany their work. The point is to make the challenge broad enough that all students' gifts are needed for completion - organizing, managing, engineering, building, writing, measuring, computer work, calculations, artistic presentation, etc.
- Take safety seriously when choosing a challenge. Your role as teacher will be to let the students struggle through on their own, but safety is always top priority. Choose a challenge where there are not large safety concerns that require your frequent input.
- You will also need to decide how involved you will be with help on the challenge. There may be times when you allow three questions or there may be times you allow no questions at all. Just decide ahead of time what is appropriate to keep students safe, challenged, and encouraged to keep struggling.

2. Create a reason for the challenge.

Humor can go a long way in gaining students' participation. Come up with a humorous, light-hearted reason for the challenge - perhaps pretending that there is a national search going on for the answer to the problem, or a company is doing a search for scientists and they have heard of your school's scientific community so they are coming to test them to see if they are worthy of some honor. The examples provided in the files section of the activity map offer a few ideas.

3. Come up with a time boundary for the challenge.

Set a time that the challenge must be completed in. Choose an appropriate time limit but keep in mind that students are rarely asked to work together without step-by-step instructions and this will most likely be a completely new experience for them. It will take them much more time to accomplish the task than one would think, as much of the challenge is working in community with each other - a large task for high schoolers.

4. Provide yourself with a disguise.

A disguise does not need to be elaborate. Students need to know that you are not acting as their regular teacher during this time and a visual reminder can be helpful. Just a different lab coat or a pair of crazy glasses can be enough to let students know that something is different on this day and you are not acting as their regular teacher.

Give yourself a different name, such as your name spelled backwards or the topic spelled backwards. Write your new name on the board as a visual reminder that you are not their teacher today.

5. On the day of the activity:

- Have all equipment out and ready to go.
- Have your disguise on before the students enter the room.
- Do not answer to your name. Say, "*Mr./Ms. Smith* is not here today. I am sure you can ask that question tomorrow when she returns."
- Stand at the door and pass out the instructions to the challenge.

- Begin class by stating that *Mr./Ms. Smith* is gone, introducing yourself, and reading over the challenge. Wish them luck and immediately move to the back of the room and sit down appearing to be very busy at your laptop.

6. Your primary job during the activity (besides biting your tongue to keep from taking back control of the class) is to stay in character while taking notes.

Leave students to work alone. Let them struggle. Let them argue. Let them learn how to be a community. It is a struggle for any teacher to relinquish control of their class, but in this case, students will grow by letting them have ownership of the process. There will be some students at first who appear to waste time. Allow them to make huge mistakes - only step in if safety is a concern or to encourage them to remain engaged, but not to solve problems for them.

Stick to your commitment about how much help you give the class. If someone has a question, remember to stay in role. If someone asks to go to the bathroom you may tell them you have no idea, they should talk with their team, or announce to the class that one of their three questions has been used and then reply, "Yes, you can go to the bathroom." Stay in character and do not allow them to goad you into helping them more than the boundaries allow for. Struggle is a good part of the process and as a teacher, remind yourself that they can live without your input for just this one day.

7. You do have a very important job of taking precise notes on what is happening during the challenge. In order for students to grow through this type of learning, they will need feedback, so your primary job is to observe their behaviors and participation so you can give them input they can use. You should be paying very close attention to three things:

- An outline of exactly what they accomplished each 5-10 minutes. Avoid using names, as you are trying to evaluate them as a whole class, but do write down what they accomplish. For example, "First 5 minutes - many students reading over the challenge, several students talking to friends, a few students instantly began assembling a ramp for the challenge, 2 students sitting at their desks looking out the window or drawing pictures." Be very matter-of-fact without judgement, simply stating what you see happening. Try to keep a running record every 10-15 minutes of generally what the class is doing during that time period.
- Keep an eye on safety. Safety should be included as a large portion of the evaluation grade as the students need to understand right from the beginning of these challenges that their safety is important and that they are responsible for the safe-

ty of the entire class. Take notes on anything positive or negative in this regard. For example, “One student very carefully returned unused chemicals to the waste beaker in the back of the room. One student was swinging a meter stick around.” Again, provide matter-of-fact observations with no names. Do step in as a teacher if there is something that would endanger safety of the class but otherwise, take notes and remain silent.

- Keep a list of interesting quotes from students. Some of these are simply entertaining but others will play a role for the students in identifying where they need to grow as a community. Simply record any quote that catches your ears as you listen carefully for helpful statements.

8. At the end of the allotted time, quickly ask for the results from the class and dismiss them.

9. The most significant introspection takes place when the students are given feedback the next day. It is here where they can take a step back and look at how they did. Sometimes it is difficult for students to see their shortcomings and gifts. This part of the activity is essential and allows them to reflect on how they did as a class and also what they did as individuals to help their community. It is recommended that they take notes on the suggestions portion so that they can come back to this section of their notes and read these same suggestions right before the next whole class challenge. Prepare a PowerPoint with the following for them to digest:

- Quotes from the Day: Alternate light-hearted, fun quotes with quotes that will get them thinking about what they did well and what they need to work on. As you are preparing the presentation, pare these down to the ones that are going to be the most beneficial for them to hear and think about, along with ones that will make them laugh.
- What They Accomplished: Divide this into 10-15 minute segments and walk them through what you observed happening. It can be very eye-opening for students to realize how much they accomplished but also stare in the face how much time they wasted being unhelpful to each other.
- Suggestions for Next Challenge: Do not require changes for these challenges - it is their class and their community. Do, however, emphasize that there is always room for growth, and because you were observing from the back of the room and not at all involved with the process, you have some suggestions that may help them in their next challenge. Recommend that they take notes and pay serious at-

tention to these suggestions for improvement for the next time. Start with three or four areas that the class can improve on and as more challenges are completed add more and more suggestions for their growth. One example might be: “Utilize everyone in the class to complete the challenge.” Among these suggestions, make specific mention of the relational virtues that are the focus of this activity map. Encourage the class to consider the different ways that individuals can contribute and how different jobs could be assigned. The teacher’s role here is to guide the students into growth as a community not by isolating individuals but by encouraging the class as a whole and offering very specific suggestions as to how they could become a better Christian scientific community.

- A grade for the class as a whole: they receive a group grade for their challenge, worth 30 points. 10 points for safety, 10 points for science, 10 points for community. The grade should not be large enough to affect their overall individual grades in the class, but as a reference so that they can see their growth from challenge to challenge.

10. Do not give up. The first challenge will most likely be a difficult thing to watch but it is the process of transformation that you are after—not just one successful class. The growth comes because of the difficulties that the students have to struggle through from these challenges. Though the first challenge for a class may seem like a disaster, by the end of several challenges, introspective feedback, and opportunities to practice being a true scientific community, your class can be transformed. You may find them capable of collectively working together and manage an even larger project.

11. After a year or semester of whole class challenges, discuss how Christian faith and the relational virtues that should grow from it play a role in learning science together. Discuss the following questions:

- How are Christian communities and scientific communities similar and different?
- How can these whole class challenges help us grow in virtues?
- How can Christian faith and the virtues that it fosters help sustain learning together?