

The teachFASTly.com resources are not intended as a complete curriculum. The activities are designed to be woven into your existing teaching. This Quick Stop Lesson Plan is therefore not a single lesson plan, but rather a quick way of exploring the themes of an activity map. It includes one Discover activity, one Delve activity, and one Debrief activity. Together, these may take more than a class period, and you may want to add other activities between them. For more information visit www.teachfastly.com.

Labs and Community

One of the stereotypical images to emerge from Victorian times is that of the lone scientist laboring in the laboratory. In reality, science is usually collaborative and depends on mutual trust and constructive working relationships. For students who will work in the sciences, collaboration is part of their future. Yet the way we work with and treat others is also part of live faith in the present, right in the midst of learning. In schools, too, the competitive pressure of individual grades can lead to an emphasis on individual performance that overshadows the creation of a learning community in which the virtues that sustain relationships are exercised so that all can thrive. This activity map focuses on practicing relational virtues now in the science classroom as a part of present discipleship and a foreshadowing of future collaboration in the workplace and beyond.

Teaching FASTly includes making relational virtues an explicit part of planning and a focus of reflection for students. This will help them see their present science learning as connected to their moral and spiritual growth, and also help them to see how this relates to the nature of scientific practice itself.

This activity map engages students in reflection and builds classroom practices around the intersection of scientific practice and supportive relationships with others. It helps students connect science learning with community, both conceptually and through intentional practices. Working in community can cultivate virtues such as patience, humility, and diligence within students. This collection of science-related activities can be used throughout the year to emphasize the need to learn and work in community.

It is recommended that work on this topic be coordinated between science and Bible teachers, and that good communication with parents be practiced.

This Quick Stop Lesson Plan on **Labs and Community** contains the following activities and attachments from www.teachfastly.com, which are combined for your ease of use in a downloadable ZIP file:

DISCOVER Activity: Lab Groups and Patterns

Activity Attachment

- *Lab Groups and Patterns Handout*
- *Virtues List Handout*

DELVE Activity: Group Challenges

Activity Attachment

- *Virtues List Handout*
- *Physics Challenge Handout*
- *Technology Challenge Handout*
- *Biology Physics Handout*
- *Chemistry Challenge Handout*
- *Group Challenges Handout*

DEBRIEF Activity: Closing Questions

Activity Attachment

- *Closing Questions Handout*
- *Virtues List Handout*

DISCOVER

Activity: Lab Groups and Patterns

Time: 20 Minutes

In Brief

Forming lab groups that work together for an extended period of time can help build community within a science class and also provide a context within which to focus on the virtues that sustain relationships. Teaching FASTly leads us to focus not only on the content of science, but on the virtues developed as we engage in science with others. This activity offers a way to form initial lab groups that will help students see the way they relate to others as part of science learning. This work is licensed under a Creative Commons Attribution 4.0 International License.

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<https://fnoschese.wordpress.com/2011/08/07/subversive-lab-grouping-game/>.

Goals

Students will begin to reflect on the virtues needed to collaborate well in the science classroom.

Students will articulate goals and desired virtues for their lab groups.

Thinking Ahead

A science classroom is not a church, yet the Christian calling to live together with others in ways that demonstrate Christ-like character applies in science classrooms too. Consider how to give more than lip service to the virtues that help us relate well to one another in science learning. A focus on building community will be learned most effectively if it is not just a stated value at the beginning, but is followed through in assigned work that is genuinely collaborative in nature, and in a continued, formative focus on how students collaborate with, and respect one another, as the semester progresses. In other words, it will be necessary to develop classroom practices that genuinely focus on community, and to engage students in both action and reflection related to living well in community. It is helpful to keep students in the same lab group for a long enough period that they get to know each other and build strong relationships.

Preparing the Activity

You will need note cards with words on them, one per student. A master copy for printing the cards is found in **Lab Groups and Patterns Handout**. You also will need a copy for each student of **Virtues List Handout**.

Teaching the Activity

As students enter class, give each one a card from **Lab Groups and Patterns Handout** with a word printed on it (see below) and allow them to sit wherever they choose. On the back of the card, have them write their name, one thing they consider themselves to be experts at, one thing they still struggle with, and one thing they consider an important value or virtue for working together in the science classroom. It may help to display or give students a list to choose from. A sample list and explanation is provided in the **Virtues List Handout** in the files section. If there is different information that you wish to gather about your students you could have them include that as well. Having students write on the card prevents them from swapping later on when they are getting in groups.

Without revealing the categories, tell students to find three people to form groups of four based on the words that were printed on their cards when they received them. For a smaller class omit some categories. As students try to find their groups, they will discover they need to ask questions to clarify what categories a word belongs to. For example, "Is Mercury a planet, a car, or an element?" Initial groups may need to reform as more groups fall into place.

Sometimes when the class gets stuck, one or two students emerge to take leadership roles and start writing groupings on the board, or laying all the cards out so that they can all be seen at once. Let the students figure things out on their own with as little interference as possible. The goal is to create an initial experience of collaborative investigation.

One Possible Grouping

There are other equally correct groupings since some cards can go in multiple categories:

Presidents: Lincoln, Bush, Washington, Clinton
Disney Characters: Minnie, Mickey, Pluto, Donald
Cities: New York, Cadillac, Charlotte, Austin
Elements: Mercury, Oxygen, Cobalt, Neon
Planets: Venus, Mars, Saturn, Jupiter
States: Florida, California, Texas, Iowa
Cars: Ford, Honda, Dodge, Volvo
Names: Grant, Dallas, Lily, Brooklyn
Virtues: Charity, Courage, Hope, Justice

Once groups have been established and everyone is sitting back down, discuss the following ideas and how they relate to the scientific learning community of your classroom. You may wish to display a possible solution, such as the one above and compare it to what emerged, to make clear that there are multiple possibilities.

- Like this exercise, many scientific questions have more than one right answer or more than one pattern that could fit the data.

- To arrive at a final solution everyone's data was needed; this was not a task to solve alone. Science is often like that.
- Finding a pattern does not necessarily mean having found the answer. One or two data points do not make a pattern, and an initial pattern might not fit all the data later. Even after we have an initial pattern we keep investigating.
- The answer evolved over time as more data came into view and different patterns were tried. Again, science works like this.
- Very human feelings can become involved in investigation as we become attached to an initial pattern and don't want to dissolve it, or feel as if our piece of the data is not being taken seriously in the whole.
- How are virtues such as humility, courage, and kindness relevant here? Humility is involved in being willing to reconsider a position already taken. Leaving the security of a provisional solution for renewed inquiry requires courage. Kindness can create a context in which risks are more easily taken.
- How did the way the group worked help or hinder arriving at a solution that everyone is happy with? Communication, attentiveness to others, sharing information, and listening well are all important. Treating each person's information as important was part of arriving at a solution.
- Is arriving at a solution all that matters or does it matter how we worked together to reach it? How might the way we interacted make it easier or harder to work successfully together on future problems?

Finally, ask students to read over the explanation of virtues in the **Virtues List Hand-out**. Discuss briefly how, even though the classroom is not a church, the virtues that underpin Christian community are relevant there. Tell students that they will continue to work in these groups in the coming weeks. Have students share the virtue they included on the back of their card with the rest of their group. Give each group a large note card and have each group decorate the card with their team name and three or four key words that describe the core goals or values of the group that will inform how they work together. As students work, walk around and collect each student's card so that you can get to know her or him better through the information on the back. Make time as the semester proceeds to return to these for brief group self-evaluations based on the stated values – has any growth taken place? While the groups will stay the same for several weeks the teacher can change where each group sits by placing the group name note cards at various tables each day before class starts.

DELVE

Activity: Group Challenges

Time: Extended

In Brief

These activities can be completed by individual lab groups or as whole class challenges. These challenges can be guided or very open-ended depending on the level of the students, time available, and the amount of challenge desired. The goal is to improve collaboration among students and help students to reflect on how faith, character, and collaboration are connected.

Goals

Students will work collaboratively to solve a group challenge.

Students will reflect on the connection between collaboration and virtues.

Thinking Ahead

Select a topic from those provided or revise a lab activity that you have used in past years so that it is framed as a challenge. Using groups or whole class challenges repeatedly throughout the year will allow students to build their collaborative skills and also put into practice the specific actions and ideas that they reflected on after previous activities. Use the **Virtues List Handout** to connect the activity explicitly to Christian virtues, encouraging students to make connections between faith, virtue, and collaboration as a frame for the whole activity. If this is not done explicitly, students may not reflect on the deeper “why” of the activity, as their focus will be on solving the challenge. Use the ideas provided as well as your own to come up with a series of challenges to use throughout the year. It will be important to help students see that rather than collaboration being an obstacle to individual achievement (“others are dragging me down”), the task is to learn effective and gracious ways of collaborating with one another. A science classroom is not a church, yet the Christian calling to live together with others in ways that demonstrate Christ-like character applies in science classrooms too. Consider how to make this emphasis clear as you frame the activity for students.

Preparing the Activity

Have necessary supplies ready for students as well as any handouts that students might need - several versions of the activity are provided:

Biology Physics Challenge Handout
Chemistry Challenge Handout

Physics Challenge Handout
Technology Challenge Handout

Prepare copies of the **Virtues List Handout** if students do not have them from previous activities. If you choose to do the challenge as a whole class, read through the accompanying instructions for whole class challenges in the **Group Challenges Handout** for more details on how to best facilitate that.

Teaching the Activity

Begin by introducing the idea of a group challenge to the class, and make explicit that the goal is to grow in how we relate to one another as well as learn science. Point out that in order to be successful the students will need to collaborate and draw on the gifts of each group member, and that this will demand practicing the virtues. Refer students to the **Virtues List Handout**. Working in community means not only that you are with each other and supporting each other, but also that you are going somewhere together. This is where the challenge comes in. Make clear that the goal is not simply to arrive at a result, but to get better at collaborating. Introduce the specific lab challenge to the students and assign groups as needed.

Once students are aware of the guidelines of the challenge, as well as any time or material constraints, let them begin. As students work, circulate and listen in. If any groups are not collaborating well, remind them that working on the collaborative process is part of the goal. If you overhear a key idea or helpful piece of information you may ask that group to share it with the class. For whole class challenges, see the additional guidelines included in the **Group Challenges Handout**. Without including names, take mental or written notes of how you see students working together well and not so well. You may wish to reference these examples at the end of the challenge.

When the challenge is complete, give time to reflect. Have students begin by journaling, using any or all of the following prompts and referring to **Virtues List Handout**. If you plan to complete multiple challenges throughout the year, you may wish to use a different set of prompts after each one.

- As we worked, how did I help or hurt the community by what I said?
By what I did?
- What did I contribute to the community?
- What could I do differently next time?
- What qualities were needed by members of the group to collaborate well together? How did I contribute to this? How could I have done better?

Have students share their reflections with their group/class if appropriate. Then give one or more of the following prompts for group reflection.

- For the next challenge, what three goals for improvement does your group have?
- One thing we did well together was....

Collect these reflections from each student/group and have the students refer to them before the next challenge.

DEBRIEF

Activity: Closing Questions

Time: 5 Minutes

In Brief

This brief closing activity allows students to reflect on the virtues and scientific concepts covered during a class period. Engaging students in brief reflection both on the ideas in the class and on the virtues relevant to the classroom process, helps students see how science learning and virtue can be connected.

Goals

Students will learn the habit of reviewing their lab work in terms of virtues as well as scientific concepts.

Thinking Ahead

Consider using this activity repeatedly throughout the year as both a means for student reflection as well as an opportunity for formative assessment. Think about how the formational goals you have for your students relate to your classroom practices, such as the questions you ask students to think about – do you make space for student reflection on affective responses, faith questions, or virtues and vices as the year progresses?

Preparing the Activity

You will need one half-sheet handout with questions per student. A template is provided in the **Closing Questions Handout**. It is helpful to have a stack of these ready to pass out at fitting moments. Alternatively, students could submit their answers electronically using Survey Monkey, Google forms, email, etc. You may wish students to have access to the **Virtues List Handout**.

Teaching the Activity

At the end of class have each student individually answer the following questions. If needed, they can refer to the **Virtues List Handout** used in preceding activities. Their answers will inform you as the teacher as to the key ideas they are taking from the lab and can also inform where to begin the lesson or discussion the next day.

1. What was the main idea of today's lab?
2. What is one thing you learned or realized through today's lab?
3. What is one question you have about this topic—either something you are confused about, or a question that delves deeper into the topic?

4. What is one positive contribution made by another person in your lab group?
5. What is one virtue that was relevant to how you worked as a group?

Alternatively, you can simply tweak any lab that you currently use in your class so that students are given opportunity to concretely show gratitude for a lab partner. Have students work through the lab activity as usual. At the end of the lab handout that you will be collecting from students, add this final reflection question:

- What is one positive contribution made by another person in your lab group?

Once you collect the handouts, note what students have shared about their peers. Consider sharing a few positive examples, without including names, with the whole class, or individually tell the student who was written about what his or her classmate appreciated. Repeat this practice throughout the year. As students get better at it you may consider having them tell their lab partner in person what they appreciated about their contribution to the group rather than simply writing it down.

