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# Make a Paper Airplane

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## Framing the Active Learning Classroom

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### Objectives

To build community in an active learning classroom by asking students to work together to build a paper airplane. The purpose is to give students a chance to practice discussion without the pressure of “learning physics.” This is part of a Modeling classroom, which focuses on how we create and interpret models in an intensely collaborative environment.

### Activity

Students create instructions on how to make a paper airplane.

- 1) Give each group of students 3 pieces of blank printer paper. Their instructions are to write directions (to be exchanged with another group) on how to create a paper airplane. 1 sheet of paper is for writing out the instructions, 1 sheet of paper is for practice, and 1 sheet will be used in the future to follow another group’s instructions.
- 2) Collect instructions from groups
- 3) Distribute those instructions to other groups, and tell them to follow the instructions exactly. Where the instructions are unclear, they must interpret the best that they can.
- 4) Optional, you may slip in “Weird paper airplane” instructions (see end of document) to some groups.
- 5) Circulate while students make their airplanes.

While circulating:

- 1) Immediate questions often arise, such as “can we use pictures?” “Does the plane have to fly?” “Do we have to write it down? Answer all questions the same way, by repeating the charge to create instructors to make a paper airplane. Tell students to decide themselves what that means and act accordingly.
- 2) While students are working on creating/following instructions walk through the room suggesting the following to various groups:
  - a. Suggest diagrams to some groups when creating instructions.
  - b. Try following the instruction literally (e.g. what does “longways” mean?)
- 3) As students are making their instructions, ask various questions to students to get them to think at a meta-level about what they’re doing:
  - a. What characteristics define an airplane?
  - b. Why would we have you do this activity?
  - c. What is a model? (e.g. are these paper airplanes models of real planes? Why or why not?)
- 4) As students are following instructions to make an airplane, ask questions to help them identify their assumptions in their interpretations of instructions:
  - a. If the instruction says “fold the paper lengthwise,” what edge is the length and what edge is the width? Why? What if you print in landscape mode?
  - b. As students realize that instructions can be interpreted many different ways, they often create airplanes that in no way resemble what was intended.

### Author

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### Materials & Resources

WeirdPaperAirplane.mp4

Handout (see below)

Desbien, D., 2002, "Modeling discourse management compared to other classroom management styles in university physics," Dissertation, Arizona State University.

### Classroom Context

Modeling classroom

### Time Requirement

Varies

### About this Project

This is one of a set of materials compiled for instructors to draw upon in order to frame non-traditional modes of classroom teaching for their students. Our hope is that these materials can help reduce any student resistance to such techniques.

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Other materials available online at [www.colorado.edu/sei/fac-resources](http://www.colorado.edu/sei/fac-resources)

## Follow-up Discussion

Discussion is best in groups of 20-30 students; for larger groups, consider breaking into multiple groups. Bring students into a circle, and explain that this will be the standard mode for class discussions (if indeed it is). The instructor remains outside the circle, occasionally joining the circle to interject a question but otherwise remaining outside the discussion. This way the instructor is seen as part of the circle, not the leader of the discussion. You may ask students to prepare presentation boards (e.g., 2x3 foot whiteboards) to answer the questions below.

1. What was difficult in making the paper airplanes?  
Instructor Note: encourage different presentations from a group that followed the instructions very literally; one group that was successful, but made assumptions; and one group that used diagrams.  
What was difficult in making the airplane? What terms were ambiguous? What assumptions did you need to make?
2. Why did I give you this activity?  
What is to be learned from this? What role does this activity play for the rest of the classroom discussions?  
Students typically comment that the class must define terms, that it's important to identify assumptions, that pictures are often better than words (i.e., the importance of multiple representations), and that participation and communication are key to all of these elements.
3. What makes a model a model?  
You can use the "weird paper airplane" to focus the discussion. Is this a model? Why or why not? The model represents the physical reality but is not the same as the physical reality. For an airplane to be a successful model, it should fly, and have the characteristics of an airplane. This discussion is useful in classrooms in which modeling plays a key role.

## Results

Desbien (2004) states: The entire activity described above is completed on the first day of class to get the learning community started. The reader should note that several other modeling discourse management techniques were introduced, including seeding, creation of shared meaning, and inter-student discussion. A critical component of the modeling discourse management style is to *lay the foundation of a learning community early and continue to build the community throughout the semester*. Students are reminded of basic rules throughout the semester. The most common reminders are that only one person should talk at a time and that evaluation of other student work must be done in a positive manner. “

## How to Make a “Weird” Paper Airplane that Flies:

- 1) Fold an 8”x11” sheet of paper just off the diagonal to make two side-by-side triangles
- 2) Flip over
- 3) Fold up the long-edge to make a small band
- 4) Repeat step (3) two or three times until the band is longer than the triangles
- 5) With the band on the outside, form the band into a circle
- 6) Tuck in the pointy end of the band into the other side
- 7) Throw by holding the triangle-tips and gently push

Credit: Dwain Desbien, Estrella Mountain Community College