

Learning and Teaching Project
Due Monday, October 25, 2010

This project explores learning and teaching from two perspectives. How can you embed the mathematics that you learn in your classroom? Does there exist a relationship between how well you understand the mathematics and how successful you can be as a teacher of that mathematics?

On the back side of this page is Habits of Mind Problem #2 (Crossing the River). For the Learning and Teaching Project, think of this both as a mathematical task for you and as an opportunity to transfer mathematics that you are learning into the elementary school classroom. For this project you will work in pairs and select one student to "teach." By "teach" we mean that you should plan and offer the student a rich learning experience in mathematics. Remember that giving the student a rich learning experience is more important than whether the student obtains a complete answer. Audiotape or videotape this teaching experience so that you have a good record you can review when writing your report. You do not need to submit this tape with your report.

While you may want to adjust your "plan" after you begin to work with your student, here are some questions you may want to consider:

- How will you present this task to the student with whom you will work?
- How will you set the stage for the student to gain an understanding of this problem?
- Will pictures, graphs, manipulatives, etc. help the student's exploration?
- If your student is able to solve one case of the problem, will (s)he be able to explain why the solution works?
- Is the student able to generalize her (his) solution and thus solve another case more quickly?
- How will you help the student create a record of what (s)he has learned?

Remember that you want your student to discover as much as possible for herself (or himself). But there may be some critical points where you need to guide the student over an intellectual "bump" so that (s)he can move on to the next part of the problem.

Your Learning and Teaching report should be organized around the following sections.

Your Mathematical Solution. Provide a complete, well written solution to the problem. Generalize the problem and provide a solution to the more general problem. Don't just attach your previous solution.

Analysis of Mathematical Task Does this task address one or more of the NCTM Standards? Which Standards do you see it addressing? Discuss whether this problem is (or is not) a good task for using at your student's grade level. What was reasonable to expect a student at this grade level to accomplish?

Analysis of Teaching this Task What did you do to prepare for your work with a child on this task? Did your understanding of mathematics have any impact on your ability to use this task to you're your student a rich learning experience? Describe a point in your work with the child when you felt confident. Explain why you were feeling this way. Describe a point when you were feeling uncertain in your role. Explain why you were feeling this way.

Analysis of the Student's Success How did your student do? Did anything surprise you? What do you think the child fully understands? What do you think the child has partial understanding of? What do you think the child has little understanding of? For each statement you make about what the child does or does not understand, connect it to some evidence from your teaching experience that indicates this.

Reflections on the Experience How could you improve the learning experience if you did it again? Consider the task and your preparation as well as your role and the student's role during the interview.

Student Work Turn in a record of your student's work. Include anything they make or draw.

Habits of Mind #2

Crossing the River

A group of adults (teachers and parents) go on a camping trip with a group of 4th grade students. On the first day, the campers (adults and students) come to a river. It's not a very wide river, but it is too deep to wade across. Fortunately, the campers find a canoe. Unfortunately, the canoe is not very big. Even more unfortunately, the adults are rather big and only one adult can fit in the canoe at one time. Fortunately, the 4th grade students are quite small, small enough that the canoe will hold any two of the students. It is not possible to fit one adult and one child in the canoe at the same time. Fortunately, the students have experience with canoes and can all safely row across the river by themselves.

- (a) Suppose that there are four adults and two students on the camping trip. Is it possible to get the entire camping group across the river? If yes, how many one-way trips across the river will it take to get all six people across the river?
- (b) What if there were 5 adults and only one student on the trip? Is it possible to get the entire group across the river? If yes, how many one-way trips will it take?
- (c) What if there were 5 adults and 2 students? Is it possible to get the entire group across the river? If yes, how many one-way trips will it take?
- (d) What if there were 4 adults and 6 students? Is it possible to get the entire group across the river? If yes, how many one-way trips will it take?
- (e) How can this problem be generalized? That is, how can you solve the problem for any number of adults and any number of students? If there is no general solution, then can you solve any special cases?

Due Date: At the beginning of class on Wednesday, September 8.