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hopes of today and of days to come. NCTM has opened the door to an enlightened approach to teaching and learning mathematics with the ...STANDARDS-a pathway to better teaching and understanding of mathematics and an avenue to evalutate your success."

From reading this ad you would think that the STANDARDS is the best thing since sliced bread! Putting aside the hype for a moment, I thought about what real contribution the STANDARDS will (and can) make and how this relates to what CLIME is all about...or at least tries to be.

Clearly the intent of the Standards is to help improve the quality of mathematics education. For example, Standard 1 says that the central focus of the study of mathematics should be problem solving. (p. 23) That certainly is obvious to me, but probably needs to be stated. The author continues by giving some examples of problems that encourage problem solving. Example (page 24): I have some pennies, nickels, and dimes in my pocket. I put three of the coins in my hand. How much money do you think I have in my hand? This is a reasonable problem; definitely encourages some thinking, trial and error strategies, etc. But I have a concern. How might an average, hard working non-math oriented teacher react to this problem if she read the Standards? She might say: "If this is important, how come this problem is not in my textbook?" Anyway, my kids ARE problem solving. They do problems in their textbook every day! One of the problems is that problem solving can mean different things to different people. For example, there is a third grade teacher in my school district (who is new to teaching) that follows her math textbook faithfully. While observing her one day, I discovered that she thinks that the children are problem solving when they are doing exercises like 23x4. What was interesting is that some of her student's did not know the rule for doing this type of calculation and were trying to figure out the answer by using cuisenaire rods which they learned how to use in the second grade. The teacher told them that it was much easier to do this sort of thing using paper and pencil and asked them to sit down at their seats. What a lost opportunity for her to connect the rods to the paper exercises! For me it was an excellent opportunity to discuss with her the distinction between an exercise (where the answer is just a matter of course) and a "real" problem where the answer is not obvious). My point is that as long as most teachers follow the textbooks as their bible, the chances of them getting kids to do real problem solving is low.

(SOMEONE PLEASE EXPLAIN TO ME BECAUSE I DON'T GET IT DEPARTMENT: Why is it that some of the leaders in the educational community who helped to make the Standards reality are also the authors of these textbooks that encourage the unsuspecting teacher to fail Standard One?)

Back to 23x4. Here's another thought that muddies the waters a bit more. Granted the problem stated before was a good problem, but 23x4 does not always have to be a boring exercise, it can also be a real problem if the context is changed. For example, what would 23x4 equal if you lived in a town where the town officials declared that only the Roman system of numeration is allowed? Or if you lived in Disneyland and you were the same species as Micky Mouse which meant that you only had only 4 fingers on each hand. Would 23x4 mean the same to you? (I'm assuming of course that you have 5 fingers and use the base 10 system just like I do! Actually sometimes reality is stranger than fiction. In 1897, the Indiana legislature tried to legislate the value of pi to be 3, because its irrationality bothered them. For a more detailed description see Petr Beckman's wonderful book History of PI (Golem Press, 1971)).

So whether 23x4 is a "real" problem or an exercise depends on the context in which the question is raised and the skills and knowlege that students bring to the activity.

(Notice that I'm just discussing Standard 1 in this article. For homework I want you to read the others and give me your reactions. Yes, this assignment WILL count!)

What would be most valuable for this third grade teacher is to experience some real problem solving by doing some mathematics herself. This is where Logo is invaluable because its such a good problem solving environment. With the guidance of good lead teacher most teachers can appreciate not only the power of Logo, but also what its like to be a mathematician.

When it comes to evaluating the experience of using Logo to learn math, I'm not always sure that my students are learning what I would like them to learn. But I can usually tell if what's going on in the classroom is conducive to learning. And that's usually good enough for me. For example, I have a Geometry microworld which makes it easier for students to draw geometric shapes. If they wish to draw a square, they type SQUARE 50 which draws a square that's 50 turtle steps on each side. (Other words that have meaning are TRIANGLE, PENTAGON, RECTANGLE and CIRCLE). I ask the students to draw some pictures with these procedures. One of these pictures is a scale drawing of a room. What frequently happens is that they want to draw their room. So to do it more accurately they go home and measure their rooms. When they come back to class, they ask me how to convert their measurements to turtle steps, how to draw different shapes, etc. What's interesting for me is that I never asked them to do this research! The questions come naturally out of the project. Even on occasion the most reluctant learner

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