The Dynamic Math Classroom 1.0: What is it?

By Ihor Charischak, Stevens/CIESE
August 6, 2011

Have you ever walked into a classroom where you immediately sensed that good things were going on? It may have been a class discussion where children were interested and participating in a group project or a game. Or maybe it was a particularly charismatic teacher (like the Richard Dreyfus character in the movie Mr. Holland's Opus) doing something dramatic to capture the children's imagination? Most likely it was many factors that contributed to making the class exciting. Wouldn't it be great if there were a way to bottle these attributes and give them out the first day of school to teachers so they can have great classes anytime they wished? This may sound far-fetched, but there is some reality to it. Good teaching (which translates into good learning) is only partly a god-given talent. Mostly, it is something that can be learned. The Dynamic Classroom is a place where the discourse between teacher and students in the context of using rich resources produces engagement and learning. Success depends on what the teacher does, the script or action plan that she or he creates, how it fits in with the needs of the students, and the quality and utilization of resources. What follows are some attributes of a teacher in a dynamic classroom as I see it. This workshop will hopefully help you to come away with them. The implications are that teachers to be successful in their work with children need to continue to learn and grow in each of these knowledge domains.

WHAT IS THE DYNAMIC MATH CLASSROOM?

It is a place where the discourse between teacher and students produces engagement and learning. Success depends on what the teacher does, the script or action plan that she or he creates, how it fits in with the needs of the students, and the quality and utilization of resources. *Read article for more detail.*

Six Important Domains of Teacher "Know How" as applied to teaching and learning math with technology

1. **Knowing about & how to use electronic Resources**. Teachers need to continue to develop their knowledge base, ability and comfort level in using resources such as computers, software, calculators, hand-held devices, and the Internet. This is the part that teachers like the best, not only because it offers them a knowledge base of what they can do with students, but it also enhances their personal and professional understanding of important aspects of our modern world. Becoming e-mail proficient offers opportunities for gaining confidence in using the technology, while the World Wide Web offers unlimited possibilities for classroom resources. In the resource pages teachers can explore a core of tool software programs that are judged to be versatile, rich, and which enhance

opportunities of effective inquiry teaching and learning. Software packages include: Geometer's Sketchpad (geometry), spreadsheet programsTinker Plots (data analysis), Green Globs, and Microworlds. Graphing calculators and computer based labs (CBLs) will offer an alternative approach to teaching algebra. Internet applications that help teachers find interesting projects as an example of real-data analysis.

2. Creating Learning Environments. First and foremost the classroom needs to be learner focused. How do you set up your room to maximize learning? Teachers need to think ahead to adapt their classroom environment to accommodate these new resources and facilitate their experimentation in the classroom. Some common approaches include: Using projection tablet to lead a discussion. Students work in a computer lab-at least one computer per two students. One computer for each student is advantageous for learning computer skills, but two students to a computer is optimal for solving mathematical problems. Four to five computers are available in a classroom. An effective strategy for working in this classroom lab environment is to have groups of students work on problems where the computer is just one of the tools that students can access.

3. Mathematical Learning. The use of various technologies offers opportunities for teachers to explore topics in more depth. For example, middle school teachers can review and strengthen their understanding of algebra by using the Green Globs program. Though their students may only use it to investigate linear relationships, the teachers can learn about and offer more complex functions as a challenge to the students because the technology makes these ideas more comprehensible for students. High school teachers discover new approaches to solving geometry problems using the Geometer's Sketchpad and adopt alternative and interesting classroom strategies.

4. Teaching Strategies. Using computers and calculators challenges teachers to reflect on how they should teach in these new environments in order to encourage active learning. Here teachers add new roles to their repertoire. They become coaches, resource managers, master learners, discussion leaders, and observe/evaluators and will continue to refine their didactic strategies.

5. Personalizing the Curriculum. Since for most teachers the textbook defines the curriculum, the adoption of technology encourages teachers to modify and replace lessons from their text with more interesting technology based lessons. In this way, teachers are taking an more active role in modifying, directing, and personalizing the content of the curriculum. Teachers are creative action planners; that is, they create interesting contexts for learning. Their plan is a free flowing action plan which (1) has an interesting context, (2) stimulates engagement between students and teachers and (3) encourages students to use and explore resources (books, maps, games, computerized materials, etc.) Contexts can be mysteries, stories, problems, puzzles, or games. The curriculum gets after

powerful ideas from all subject areas and the learning of necessary (or basic) skills are built into the fabric of the activity and are learned in the process of doing the activity. Teaching objectives (the kind that are usually written on the board) rarely motivate students to learn. What does is the activity itself; that is, if its interesting. The challenge to educators is to create learning environments that are interesting to children and, at the same time, are rich in learning.

6. Developing Assessment Strategies that go beyond quizzes and tests. There are lots of alternatives. For example, students can share what they have learned by exhibiting their knowledge to their classmates and the larger community. Students and teachers may, over time, develop a portfolio of their accomplishments.

Putting it all together
When teachers are able to apply these knowledge domains in the classroom the result is a dynamic learning environment. The first three areas - resources, teacher's knowledge and interest in math, and the way the room is set up for classroom activities - is the "background" for the classroom event that will take place. The well thought out lessons provide a script based on Standards - either very specific or in broad strokes - that suggests to the teacher what is important for students to know and what overarching questions they need to have their students understand. The curriculum may offer suggestions as to the kind of discourse that students have with their teachers and each other. It would include guidelines for assessment to determine whether the mission of the school is being carried out. The resources, teacher's math knowledge, and the learning environment set the stage, while the dynamics of the curriculum (context), the discourse (engagement in the activity), and assessment (reflection) determine the success of the lesson or activity.