

Mathematical Experiences in Technology Integration: Focus on Learning

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Questions I have

- ◆ How do I know my students are learning (mathematics)?
- ◆ What is an external manifestation of learning?
- ◆ Did this teaching approach improve student learning?
- ◆ Did this resource enable learning?
- ◆ Did the technology I used enable learning?

Measuring Learning

- ◆ Obvious ways--standardized tests (achievement and diagnostic)
- ◆ Teacher-made tests--formative and summative
- ◆ Performance appraisals
- ◆ Anecdotal, portfolio, conversational, and other ongoing formative measures

The Brain and Learning

- ◆ Brain Research (Bender 2002)--brain needs meaning, relevance, emotion, novelty
- ◆ “If learning is what we value, then we ought to value the process of learning as much as the result of learning” (Jenson, 1998).
- ◆ Marzano (1992) believes that the “heart of the matter” for educators lies in the “complex systematic and dynamic relationship between how teachers teach and how children learn.”

The Curriculum Context

- ◆ Curriculum Worlds (Aoki)
 - ◆ The 'provincial' planned or mandated curriculum
 - ◆ Designated in advance; considers current learning theory; determines type/amount of content for approximate ages/grades; based on general trends in student ability/achievement at different ages
 - ◆ The 'lived' curriculum
 - ◆ Considers unique needs and learning styles of individual children; considers context, background, experience, culture, and interests of individual children

The Lived--Actualized-- Classroom Curriculum

- ◆ What good teachers do
 - ◆ Identify 'big' ideas--the essence of the PC
 - ◆ Consider student learning styles, special needs, the 'ingredients' for optimal brain activity, different learning contexts and relevant learning environments, and the cultural backgrounds, experiences, language, history, and interests of the children
 - ◆ Design optimal rich learning experiences--microworlds of exploration

Back to the Future

Imagine a surgeon and a teacher 100 years ago being suddenly transported into a corresponding work environment of today.

Not Much has Changed!!

- ◆ Curriculum today is conceptualized, organized, implemented and actualized much as it was 100 years ago.
- ◆ New resources tend to be 'tacked on' rather than integrated with the ideas of the curriculum--it looks like we're doing new things--but we're doing old things with new toys.

Do we need to Change?

- ◆ Can the Education System of today meet the needs of the new generation of learners?
[Did it ever meet learner needs?]
 - ◆ The new n-geners--characteristics: social, connected, multi-tasking, hyper text-type learning; games and simulations, IMing
 - ◆ Classroom learning environments need to address and reflect how learners of today are finding meaning in the world
 - ◆ Gary Flewelling--Rich Learning Tasks
 - ◆ Seymour Papert (Mindstorms)--Microworlds (also Daiyo Sawada--U of A--Microworlds)

Impact of Technology on Learning

- ◆ MSET 1999--San Antonio--Math Central research on impact of web resources on math learning
- ◆ Wrong questions/weak study--impossible to isolate variables
- ◆ We felt that MC was making a difference to how mathematics was being learned--but what was that difference? What was happening?

The Role of MC in Mathematics Learning

- ◆ It created a unique environment for learning-- appealed to the instant knowledge needs of n-geners
- ◆ It provided novelty--a different way of learning mathematics
- ◆ It connected interesting ideas and tasks to curriculum topics--helped students and teachers make sense of the big ideas
- ◆ Learners had an emotional connection to the medium 'conveying' the message
- ◆ MC contained the ingredients for learning to occur

Technology as lever

- ◆ Technology (in this case MC) became the vehicle through which students engaged with the powerful ideas of mathematics
- ◆ MC, we believe, has made a huge impact on how teachers teach mathematics (not just in SK--only 2% of hits daily from SK)

Passive vs Active (Interactive) Technology Use

- ◆ MC--mainly a teacher tool--passed on to learners
- ◆ Evergreen Curriculum
- ◆ Initial research on networked classroom computer pods (Vi/Nancy/Beth)
- ◆ Beyond the Mouse and Modem; School Plus
- ◆ BrainBinder Research; i-TeacherED Research; Journal Zone Research
- ◆ 3 networked Fac. of Ed classrooms, wireless technology, i-book cart
- ◆ Local school boards--networked classrooms

i-Teacher Ed Project

- ◆ Using technology in pre-service teacher education to enable pst to think about curriculum in contextually relevant, meaningful, emotionally charged, and novel ways--to embrace BBL.
- ◆ To conceptualize curriculum in integrated ways, using appropriate technologies

Creating Curriculum through use of Appropriate Technologies

- ◆ See <http://uregina.ca/maeers> for articles/presentations on integration
- ◆ Grids and co-ordinates--Battleships
- ◆ Pattern
- ◆ Rational numbers
- ◆ Symmetry
- ◆ Math Trails (see <http://cmste.uregina.ca>)
- ◆ Journal Zone
- ◆ All of above were first conducted with pst, then with children in schools; all involved multiple resources (multiple 'hooks' to learning), different learning styles, and all provided a rich learning environment for exploring a variety of concepts.

Technology can Indeed be a Lever

- ◆ What is 'good' teaching?
- ◆ Can technology help improve teaching?
How?
- ◆ "If you're headed in the wrong direction, technology won't help you get to the right place."
- ◆ We need to continually focus on the most appropriate technology to use to provide added value to the learners.

A Work in Progress

- ◆ I'm continuing to explore rich learning environments, possible microworlds for exploring 'big' (mathematical) ideas.
- ◆ Technology is evolving, learners are also evolving in their capacity and sophistication in using technology.
- ◆ How can teachers harness the power and possibilities of the new technologies and use them in meaningful classroom learning environments?

Thank you

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