Virtual Math Teams

Can the collaborative power of the Internet be used to help students learn mathematics?

Context

Advances in information technology are transforming work, social life, and education. The U.S. has a remarkable record of leadership in science and technology but effective math and science education for all are essential for this leadership to continue. Unfortunately, performance in mathematics and problem solving of American students is lower than that of the average student in many countries around the world.*

* 2003 Program for International Student Assessment (PISA) international study of 15-year-old students in 30 countries.

Virtual Teams, Real Math!

The Virtual Math Teams (VMT) project is an NSF-funded research program that investigates the innovative use of online collaborative environments to support effective K-12 mathematics learning.

Research Questions

- How can groups be formed and nurtured for effective online collaboration and learning?
- How can rich mathematical problems be structured to foster collaboration and deep mathematical reasoning?
- How can the online collaborative experience be effectively structured and supported with the appropriate tools?
- How can researchers better study the forms of collaboration and reasoning that take place in these environments?

Preliminary findings

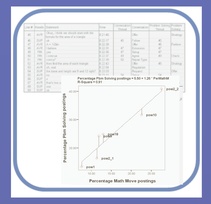
Preliminary findings point to unique features of collaborative interactions such as: multidimensional aspects of participation, the use of expository and exploratory talk; and challenges of coordinating participants' perspectives, resources & strategies.

Understanding Collaboration

VMT implements a multidisciplinary approach to research and development that integrates research and development approaches:

- **Quantitative modeling and analysis of students' interactions online:**

  What are the formal structures of collaborative interactions? Content analysis of chat transcripts is achieved through multi-dimensional coding, statistical analyses, and data-mining techniques.

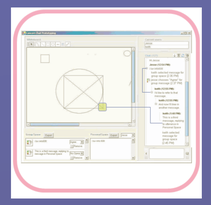


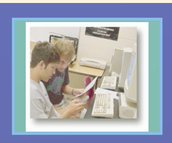
- **Ethnographic and conversation analytical studies of collaborative problem solving:**

  How can the patterns of interaction visible in collaborative work help us understand joint problem-solving? Qualitative analyses help us describe in detail the procedures that participants collectively use and orient towards.

- **Iterative processes of software design:**

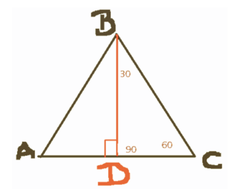
  Exploring face-to-face collaborative problem-solving and a diverse array of computer-mediated environments (e.g AIM, chat-based environments, shared whiteboards, etc.) VMT guides a process of design, prototyping,user testing, and adoption of electronic supports.





1. Mod: If two equilateral triangles have edgelengths of 9 cubits and
2. ALR: 12 cubits, what's the edgelength of the equilateral
3. PIN: triangle whose area is equal to the sum of the areas of
4. ALR: the other two?
5. ALR: hmmm interesting
6. PIN: very
7. ALR: I think we can crack it, though
8. ALR: **begins to scribble on paper**
9. ALR: or should I not do that?
10. PIN: doesnt matter
11. ALR: Okay, I think we should start with the formula for the area
12. SUP: of a triangle
13. ALR: ok
14. PIN: A = 1/2bh I believe
15. PIN: yes i concur*
16. ALR: then find the area of each triangle
17. SUP: oh, wait
18. ALR: the base and heigth are 9 and 12 right?
19. SUP: no
20. ALR: o
21. SUP: that's two separate triangles
22. SUP: ooo ok
23. ALR: right
24. PIN: i know how
25. ALR: how?
26. SUP: right
27. SUP: proportions?
28. ALR: ...

[Edited transcript of an collaborative "Problem of the Week" session hosted online at The Math Forum, Spring 2004.]



Principal Investigators: Gerry Stahl, Stephen Weimar, Wesley Shumar
Researchers: Jan-Willem Strijbos, Stefan Trausan-Matu. Fatos Xhafa, Alan Zemel
Doctoral Students: Murat Cakir, Johann Sarmiento, Ramon Toledo, Nan Zhou

The Math Forum @ Drexel University
Drexel University College of Information Science & Technology

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