A DESIGN OF USEFUL IMPLEMENTATION PRINCIPLES FOR THE DIFFUSION OF KNOWLEDGE IN THE MATHEMATICS CLASSROOM

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In many classrooms, students are introduced to new ideas through the teacher's presentation of them to the entire class. Likewise, students are often introduced to new tools such a computer programs and graphing devices through some form of direct presentation. This study investigates classrooms where students are introduced to new tools, tool-related practices, concepts, facts, and problem solving strategies through the spread of student-initiated ideas throughout the classroom. The purpose of this design study is to develop a set of design principles for teachers to use for diffusing innovative mathematical ideas in a mathematics classroom. In this paper, principles are defined as general guidelines that establish a basis for reasoning, suggest a distinctive method, and describe a mode of action. These implementation principles will guide teachers in modifying the classroom environment for the diffusion of knowledge. They were developed using the theoretical frameworks of diffusion theory (Rogers, 1995) distributive cognition (Hutchins, 1994) and communities of practice (Wenger, 1998).

The effective of the principles is tested using the premise of a new type of design research that is modeled after design research in the applied fields such as engineering. During each testing iteration, the principles are revised and tested again until a satisfactory set is constructed. The principles will go through a set of four iterations. This poster explains the resulting preliminary principles from the first testing iteration.

1. The problems or tasks that students work on should require them to share their ideas, strategies, or design with other students.
2. The classroom environment should require students to develop a community of practice where students come to shared understandings of a common problem, students build on one another's ideas, and students' ideas are viewed as communal products.
3. Students should be given the opportunity to experiment with, reflect on, test and revise their new ideas.

References

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