

Enabling Academic Excellence in Middle Schools through Computer-Mediated Learning

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This presentation discusses Rose-Hulman Institute of Technology educational outreach program to increase middle school children's competencies in science, mathematics, and pre-engineering by using advanced computer technologies as enablers inside and outside the classroom. This three-year program began in January of 1999 and is funded by a one-million dollar grant from the Eli Lilly Endowment.

The program is based on four fundamental objectives:

1. To increase the number of Indiana students who are academically prepared to pursue careers in mathematics, science, engineering, and associated technologies by integrating computer-enabled learning into the 6th, 7th, and 8th grade classroom in the Vigo County school system.
2. To mediate knowledge transfer, professional renewal, and curriculum reform by establishing working partnerships between Rose-Hulman faculty and 6th - 8th grade teachers.
3. To enable the student to achieve by sponsoring activities that build academic competencies as well as strengthening self-confidence and self-motivation. These programs will take place both inside and outside the classroom.
4. To sustain these efforts beyond the 3-year grant period by actively marketing demonstrable successes and by taking a leadership role in establishing an alliance for education among local and state-wide constituencies.

In preparing the grant proposal, Rose-Hulman held a working symposium consisting of pre-collegiate and collegiate teachers to determine how best to match our Institute's' acknowledged strengths with the demonstrated needs of public educators in preparing student for high education. From these discussions, we constructed a program centered on two thematic clusters of activities:

- *Technology-Enabled Education and Student-Centered Outreach:* Three sets of activities facilitate the integration of advanced computer technologies into the classroom:
 1. a program to transition approximately 100 used laptop computers from Rose-Hulman to middle schools per year,
 2. summer workshops (for teachers and students) on the effective use of computers in education, and
 3. support for programmatic innovations using advanced technologies through pairings of Rose-Hulman and middle school faculty to support curricular reform and to enhance student motivation.
- *Co-ordination and Advocacy:* All grant proposals include an evaluation/assessment component and an administrative/oversight element. While important, in many cases, such activities are tacitly

considered as passive overhead. We have re-defined the function of these mandatory components by extending responsibilities to include actively soliciting funding for continuation by setting up liaisons with business, government agencies, parents, and foundations. Thus, the ultimate extension of these activities is to set up a coordinated "alliance" and to leverage gains through unification.

This approach allows us to capitalize on Rose-Hulman's demonstrated strengths in the integration of computers into curricula and our emergence into web-based educational applications, web-delivered learning resources, and virtual learning communities. More importantly, in the implementation of the project, we address two critical issues of "knowledge transfer":

- Emerging computer technologies are enticing, but middle schools face two major hurdles:
 1. infrastructure and getting enough machines to make a difference,
 2. learning how to effectively integrate computers into the curriculum and using adaptive pedagogy to accommodate the new resource.
- Collegiate faculty can become insular and fail to understand the changing realities of the pre-collegiate world that shapes their entering freshmen.

The focus of the talk is "lessons learned" from the planning, implementation, and assessment of this large-scale outreach effort.

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