

Chapter 31

Using Technology to Support Algebra Teaching and Assessment: A Teacher Development Case Study

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EXECUTIVE SUMMARY

The current reform agenda in mathematics education promotes the view that mathematics should be taught and assessed in a variety of meaningful and authentic ways, including incorporating technology in the mathematics classroom. However, the incorporation and sustained use of technology into mathematics classrooms presents technological, content, and pedagogical challenges to teachers and students. As the necessity and availability of technology in mathematics classrooms increases, so must supporting technology usage in teachers' content delivery and assessment practices and their professional development (Roblyer & Edwards, 2000; Newby, Stepich, Lehman, & Russell, 2000).

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This empirical case study reports on the advancement of 8th grade Algebra I teachers' mathematical assessment practices of technology-based activities and classroom artifacts during a two year professional development program. As a part of the professional development program, participating teachers documented their use of examining and assessing algebraic work on a handheld Computer Algebra System (CAS).

BACKGROUND INFORMATION

This two-year professional development initiative offered professional development to twenty 8th grade mathematics teachers from six urban schools in a tri-county region of Texas. The professional development sessions guided teachers in using technology to explore elements of teaching, learning, and assessment in Algebra I. Goals of the professional development program included: (1) enhancing participating teachers' formulation and communication of algebraic content, pedagogical, technological, and assessment knowledge; and (2) using technological tools to develop, support, and assess teacher and student algebraic thinking.

Prospective teachers interested in program participation were required to apply for the program via an online program application. Approximately 70% of the applicants were accepted as program participants. Three of the participating teachers had three or fewer years of teaching experience, eight had been teaching for at least 10 years, and the remaining teachers had teaching experience ranging from three to 10 years. With the exception of one participant, all teachers were teaching at least one 8th grade Algebra I course with an average of 21 students per class. All participating teachers possessed general middle school teaching certifications. No participating teacher held a secondary mathematics certification.

All participants were paid a small stipend for program participation and were provided with materials and supplies to supplement their mathematics teaching. At the completion of the two-year project, each participant received 240 professional development hours including 60 hours of summer professional development per year and 60 hours of academic year professional development. Summer sessions focused on conceptual knowledge while the academic year agenda targeted pedagogical techniques for developing and implementing effective Algebra I classroom activities and instruction for students in urban schools, particularly those from underrepresented groups.

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