

CHALLENGES IN INCORPORATING NEW TECHNOLOGIES TO THE MATHEMATICS CLASSROOM

Sonia Ursini & Ana Isabel Sacristán

Department of Mathematics Education, Cinvestav

We present issues arising from a national project [1], which aimed to incorporate new technologies to the middle-school (12-15 years olds) mathematics curriculum of Mexico. The use of Spreadsheets, Cabri-Géomètre, SimCalc, Stella and the TI-92 calculator were researched with nearly 90 teachers and 10000 students, over more than 3 years. The project incorporated results from international research in computer-based mathematics education, to the practice in the "real world". In particular, the pedagogy underlying the design of mathematical microworlds (Hoyles & Noss, 1992) was considered in the design. The computational instruments were conceived as mediational tools for students' construction of concepts. The setting and classroom structure were also emphasized (Ursini & Rojano, 2000): from the physical set-up of the equipment, to the collaboration between students, to the role of the teacher, to the pedagogical tools (e.g. worksheets). The project was evaluated considering the role of teachers, headmasters and parents; and students' learning and use of tools. Although it was groundbreaking in changing the role of the teacher and the traditional passive attitude of children, opening the door for richer ways of incorporating technology in schools, the project had challenges and difficulties. Factors not present in laboratory settings come into play, when implementing a project such as this one, "out in the real world". The more outstanding issues were: lack of adequate mathematical preparation on the part of the teachers; lack of experience working with technology by both teachers and students; difficulties in adapting to the proposed pedagogical model; teachers' lack of free time to prepare anything outside the established curriculum (all of these factors contributed to make the activities much more directed than we would have liked); bureaucratic difficulties: teachers and schools had to be provided with permits to fit in the project activities to the curriculum; and lack of communication between the different levels of authorities. We believe that a fundamental facet to emphasise for overcoming many of the above issues, is in the training and continuous support of teachers: to implement a project such as this one requires long-term training in the use of technology, in linking mathematics and technology, in the pedagogical approach expected; as well as creating a support link between teachers and experts.

Hoyles C and Noss R (1992) A Pedagogy for Mathematical Microworlds.
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Ursini S and Rojano T (2000) *Guía para Integrar los Talleres de Capacitación EMAT* SEP-ILCE, Mexico.

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