IMPLEMENTING COMPUTER PROGRAMMING ACTIVITIES FOR MATHEMATICAL LEARNING IN MEXICAN SCHOOLS

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Since 1997, the Mexican Ministry of Education has been sponsoring a national project [1] aimed at incorporating computational technologies to the mathematical curriculum of secondary schools (children aged 12 to 15 years old). The project incorporated results from international research in computer-based mathematics education, to the practice in the "real world", and in its first phase researched the use of Spreadsheets, Cabri-Géomètre, SimCalc, Stella and the TI-92 calculator with nearly 90 teachers and 10000 students, over more than 3 years (see Ursini & Sacristán, 2002). Despite its success, both national and international advisors pointed out that there was still the need for some form of expressive _e.g. programming_ activities, on the part of the students. Thus, since early 2001, a new research phase was undertaken to explore the integration of Logo programming activities into the project. Much of the philosophy and pedagogy (see Hoyles & Noss, 1992) underlying the design of mathematical microworlds was incorporated into the project, although we were constrained by having to comply as much as possible with the present Mexican mathematics national curriculum. We put emphasis on changes in the classroom structure and teaching approach and have developed an extensive amount of worksheets for structuring mathematical microworld activities covering the different themes of the 3-year secondary school curriculum.

We have now tried out the materials and implementation with approximately 1000 students and 12 teachers in Mexico City and have trained close to 70 teachers and regional instructors in several locations around Mexico. The project has been received with enthusiasm by both teachers and students, and our initial results have shown improvement in the mathematical reasoning abilities of the students participating in the project when compared with control groups. However, we have also observed that most teachers have difficulties in adapting to the proposed pedagogical model, lack experience working with technology, and many times even lack adequate mathematical preparation. This has lead to a more difficult and slower implementation of the programming activities than was expected.

References

Hoyles C and Noss R (1992) A Pedagogy for Mathematical Microworlds. *Educational Studies in Mathematics* 23 (1) 31-57

Ursini S and Sacristán, A.I. (2002) Challenges in Incorporating New Technologies to the Mathematics Classroom. *Proceedings of PME26* Norwich, UK Vol. 1-325.

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