

THE IMPORTANCE OF TEACHERS' ATTITUDES FOR THE USE OF NEW TECHNOLOGIES IN MATHEMATICS CLASSROOMS

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We will present results from an on-going research studying the implementation of technological tools in middle-school (children 12-15 yrs. old) mathematics classrooms, focusing in particular on the importance of the teachers' role for students learning. This research is part of a national project sponsored, since 1997, by the Mexican Ministry of Education. The project, known as EMAT (Teaching of Mathematics with Technology), by incorporating results from international research in computer-based mathematics education to the practice in the "real world", has implemented and researched the use of several open tools (e.g. Spreadsheets, Cabri-Géomètre, and Logo) with hundreds of teachers, over several years. Much of the philosophy and pedagogy underlying the design of mathematical microworlds (Noss & Hoyles, 1996) was incorporated into the project. A pedagogical model was designed putting emphasis on changes in the classroom structure and teaching approach and an extensive amount of computer-based activities were developed for each of the tools, covering the different themes of the middle-school curriculum.

The research evaluating the project has been carried out on many levels. In particular we evaluated: (i) The ways in which the student and teacher materials are used; (ii) teacher's attitudes, use of the proposed pedagogical model and ability to link the technology-based activities with mathematical knowledge; (iii) children's attitudes (though direct observation and interviews) and (iv) children's mathematical performance both in standardized tests and through their academic scores. Although the project has been successful on many levels (see SEP-ILCE, 2000), some teachers have difficulties in adapting to the proposed pedagogical model, lack experience working with technology, and often lack adequate mathematical preparation. These teacher deficiencies have shown to have an impact on students' learning. In one research phase, we correlated case studies of 12 teachers during Logo sessions with the data collected from over 1000 of their students. We found a strong correlation between teachers' performance and children's mathematical scores and appreciation of the technological tools. These results are not surprising –Noss & Hoyles (1996) emphasise the influence of the setting on children's performance and mathematical behaviour– but they provide solid evidence of the importance of teachers' attitudes and pedagogical implementation of the materials, for students' learning.

References:

- Noss R and Hoyles C (1996) *Windows on Mathematical Meanings: Learning Cultures and Computers* Kluwer Academic Publishers, Dordrecht.
- SEP-ILCE (2000) *Avance de resultados de evaluación del Proyecto Enseñanza de la Física y las Matemáticas con Tecnología en la Escuela Secundaria*. Internal Document.