POTENTIAL AND PITFALLS OF TECHNOLOGICAL TOOLS IN LEARNING MATHEMATICS: INTRODUCTORY REMARKS

Research Forum Coordinators: Carolyn Kieran and Rina Hershkowitz

For the past two decades, various computer and calculator technologies have been making their way into the teaching and learning of school mathematics. Much of the theoretical and empirical research that has been carried out with these new environments has tended to look for the value-added component provided by the technology. However, there are research works that show that this value-added component is not easily achieved and that, in certain contexts, the use of technology may block learning processes such as problem solving, justifying, and so on. The aim of this research forum is to present a balanced picture of the role being played by technology in the teaching of mathematics, while considering, in particular, the issue of the potential and pitfalls of technological tools in learning mathematics. Two main papers and two related commentaries discuss this issue from various perspectives and approaches.

In many respects, the two main papers are quite different. One is a meta-study drawn from a corpus of 662 research papers and is led by the goal "of building tools for understanding" the integration of technological tools in the classrooms. The other is a case study investigating a special situation of such integration in a particular classroom and is led by the goal of better understanding the cognitive and contextual aspects in such a situation of mathematical learning.

Nevertheless, as is expressed in the commentary papers, there are several threads that tie the contributions together. Both of the main papers are aware and even fascinated by the potential of the technological tools in learning mathematics but argue that this potential has to be investigated deeply and massively in order to be able to use them properly. Both differentiate between the potential of the tool itself and the mental structure that is built by the learner with the mediation of the tool. The meta-study paper emphasizes that "the instrumental dimension of the IC Technologies distinguishes a technological artefact and the instrument that a human being is able to build from this artefact." The case study paper follows the ways in which students produce and use, or try to use, technological artefacts (the representatives) in order to construct mathematical meaning while investigating a problem situation.

Finally, the authors of both papers and both commentaries believe that, without understanding the ways in which technological artefacts mediate the construction of the learner's mental structures, our considerations and decisions about technology-based mathematics learning might be ill-founded, and potentials might become pitfalls.