

REPORT ON THE ICMI STUDY : «WHAT IS RESEARCH IN MATHEMATICS EDUCATION, AND WHAT ARE ITS RESULTS?»

Autor(en): **Kilpatrick, Jeremy / Sierpinska, Anna**

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COMMISSION INTERNATIONALE
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ON MATHEMATICAL INSTRUCTION)

A REPORT ON THE ICMI STUDY :
« WHAT IS RESEARCH IN MATHEMATICS EDUCATION,
AND WHAT ARE ITS RESULTS ? »

by Jeremy KILPATRICK and Anna SIERPINSKA

In 1993, *L'Enseignement Mathématique* published a Discussion Document for an ICMI Study on the nature and results of research in mathematics education [1]. The study had been proposed to the ICMI Executive Committee and approved in 1992 largely because of a perceived need for information about and analysis of the research enterprise in mathematics education. The community of mathematicians, in particular, seemed to have little knowledge and understanding of such research. Many people were asking for guidance on how to understand the nature of research in mathematics education and how to use its results. Such research was growing in volume — dramatically in some countries — and was beginning to play a larger role in discussions of school mathematics.

Addressing the need for more information and analysis was not an easy task. Mathematics educators from around the world meeting at an International Congress on Mathematics Education (ICME) rarely agree on the nature of their field or of the research within it. They use different standards of scientific quality and criteria for publishing research papers in their journals. But the ICMI Study was intended neither to reconcile these varying views and provide a final definition of the field nor to present a report on the “state of the art” in mathematics education research. Instead, it proposed to clarify ideas concerning research perspectives, goals, problems, and methods so that mathematics educators, as well as others concerned with mathematics education, would have a better understanding of the meanings people have for *research in mathematics education*.

The Discussion Document raised five questions:

1. What is the specific object of study in mathematics education?
2. What are the aims of research in mathematics education?
3. What are the specific research questions or *problématiques* of research in mathematics education?
4. What are the results of research in mathematics education?
5. What criteria should be used to evaluate the results of research in mathematics education?

These questions served to organize both the Discussion Document and the Study Conference, which was held in Washington, DC, from 8 to 11 May 1994. At the conference, 81 invited participants from 23 countries spent time in working groups on the five questions. They also attended plenary presentations and paper sessions on such topics as the problems of balancing theory and practice in research, the training of researchers, and the views of mathematics education research held by mathematicians.

Preliminary results from the study were presented at the International Congress of Mathematicians in Zurich in 1994, where further attempts were made to clarify for the mathematicians in the audience some of the differences between doing research in mathematics education and undertaking related activities such as popularizing mathematics, teaching in an innovative way, or writing textbooks. At a subsequent presentation and discussion at ICME-8 in Seville in 1996, a large group of mathematics educators heard details of the study and the book that would result from it, discussing issues raised by both. Interestingly, members of the audience saw the study as aimed at informing mathematics educators themselves and not members of other scientific communities (mathematicians, psychologists, or general educationists).

The book itself [2] is not a set of Study Conference proceedings. First, not all of the conference resulted in publishable papers; second, some chapters are by people who did not attend the conference; and third, the book could not be organized, as the conference was, around the five questions. Some authors address all five questions; some focus on other questions than these — questions such as whether mathematics education is or could be a science, whether it is in any sense a discipline, and what accounts for its specificity.

The book not only raises a multitude of questions but also attempts to provide a range of possible answers. Authors note that the dual theoretic-pragmatic character of research in mathematics education makes it difficult to classify within existing disciplines and leads to eclectic approaches. It seems to probe a variety of objects of study, pursue a variety of goals, address a variety of research problems, and employ a variety of research methods. One of the book's singular contributions is the identification of different research paradigms and directions in mathematics education, providing readers with a better grasp of the multifarious nature of the field. Another is the articulation of criteria for the evaluation of research papers, a task that, though never complete or final, always needs to be addressed. And a third comprises the several proposals for classifying results of research in mathematics education. Moreover, the index furnishes a helpful compilation of the vast terminology used in the field. The book is primarily a useful source of information for graduate students and a resource for their supervisors.

The chapters dealing with the theory-practice interface are divided on whether theory and practice can be merged or must remain sharply separated. Much of that difference of opinion appears to hinge on the questions "What is research?" and

"What is mathematics?" In contrast to the common view of mathematics as eternal and universal, mathematics education seems very much a local enterprise, bound by the customs and usages of the educational system in which it takes place. That provincialism works against orthodoxy, against global definitions, widely accepted assumptions, and unified theories. It has produced a field of scholarship without common criteria for doing research or common structures in which that research is done. But it has also produced a field in which serious international discourse is both possible and productive and in which collaborative work is increasing both locally and across national boundaries.

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Jeremy Kilpatrick
Department of Mathematics Education
105 Aderhold Hall
University of Georgia
Athens, GA 30602-7124
U. S. A.
e-mail: jkilpat@coe.uga.edu

Anna Sierpinska
Concordia University
Department of Mathematics and Statistics
7141 Sherbrooke St. West
Montreal, Quebec, H4B1R6
Canada
e-mail: sierp@vax2.concordia.ca

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