

# On categories of research in mathematics education

The great variety of the types of research reports that are submitted to a journal like NOMAD makes the life of the editors both interesting and difficult. On one hand, it provides exciting reading with many different starting angles, on the other hand, it clearly shows the importance of not being too restrictive in the criteria that are applied to judge the quality of the submissions.

It is common to distinguish between two main categories of research, basic research and applied research, both of which are relevant to mathematics education. Sometimes the borderline is not very clear, and it is evident that some authors want to contribute to basic knowledge as well as the development of practice, occasionally even very locally. Referees are not always in agreement about to what extent a specific paper has a clear aim and what it is.

It is perhaps time to question the dichotomy and to find another basis for categorizing journal articles in mathematics education. It was therefore very refreshing to listen to the plenary presentation given by Margaret Brown at CERME4 in February. She chose to distinguish between three kinds of research, based on their aims. (Each category is in itself extremely heterogeneous, when other characteristics are put in focus.)

The first category, *basic research*, is concerned with development of theoretical knowledge. It is potentially influential on practice, but not immediately. In mathematics education research the outcomes of such research include some impressive theoretical structures (theories of conceptual fields, mathematical objects and processes, affect in mathematics education, etc.) as well as single, not necessarily minor, contributions to theory by individual researchers.

The aim of the second category, *strategic research*, is to inform practice and policy. It provides a basis for teachers' decision-making in their classes, for administrators' provisions of funds and for decisions regarding national policy for the teaching of mathematics. Much of the research on learning mathematics, some classroom studies, comparative studies (including teaching experiments) taking into account a variety of variables, assessments of achievement as well as large-scale international comparative studies (TIMSS, etc.) fall into this category.

Margaret Brown chose to label her third category *applied research*. Most of her examples, however, were concerned with development of practice; so to avoid confusion with the dichotomy mentioned above, I will call it *developmental research*. It involves the development of products, artifacts and processes, which have immediate use (e.g., curricula, textbooks, software, teaching units). Some of the research is characterized by very specific research methodology (e.g., didactical engineering).

The categories of research are interdependent, so that research in one category can initiate research in another. A well-balanced program of research, e.g. at a national level, provides opportunities for all to flourish. The first category differs from the other two in that its immediate benefits for society are minimal, whereas the latter two are policy-related and can get significant support from, or even be initiated by, agencies in society. The balance can then easily shift, with obvious consequences for what will constitute research in mathematics education.

It is my hope that NOMAD can contribute to a healthy balance between different categories of research (and different varieties within those categories), by providing a forum where they are all visible. This involves nurturing each of them and relating the quality of the research reports to scientific criteria that are somewhat different for the three categories. But it also puts an emphasis on safeguarding the academic integrity of research and the research programs given publicity in NOMAD. This is a common responsibility for the authors, the editors, and the editorial committee.

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