

Mathematics Teaching-Research Journal On-Line

A peer-reviewed scholarly journal

Editors: Bronislaw Czarnocha (Hostos Community College)

Vrunda Prabhu (Bronx Community College)

Anne Rothstein (Lehman College)

City University of New York

Volume 2 Date March 5 2007

An Introduction to the Ethics of Mathematics Teaching-Research.

B. Czarnocha

Introduction. (How People Learn?,1999) is the document produced by the collaboration of the National Research Council of U.S. with its National Academy of Sciences, which contains the full description of the research knowledge on the subject of learning at the end of the twentieth century. Its subdocument, How People Learn, Bridging Research and Practice considers the question: “what would be required for insights of research to be incorporated into classroom practice?”

Unusually long time of the integration of educational research into teaching practice is considered to be one of the essential obstacles in the progress of the reform in education. (How People Learn?, 1999) observes that, despite formidable obstacles, this slow process has been punctuated by moments of direct influence of research, which has taken place “...when teachers and researchers collaborate in design experiments, or when interested teachers incorporate ideas from research into their classroom practice. “

Whereas, we have certain number of reports of such collaborations between teachers and researchers in the literature (Kelly and Lesh,2000), we have very few accounts of single teachers doing classroom research necessary for the effective process of introducing research results into classroom practice. Those few that remain offer some striking differences on the attitude to and principles of integrating research and teaching practice.

The Improvement of Classroom Practice Principle. One of the central differences between Teaching-Research practiced by the classroom teachers on one hand, and teacher educators leading collaborative teams of teacher and researchers is the attitude towards the improvement of teaching in one’s own classroom. (Raymond and Lienenbach, 2000) state in the section Goals of Collaborative Action Research:“*A primary goal of the collaborative action research identified by many is to bridge the gap and strengthen the relationship between universities and schools. Collaborative research between university researcher and classroom teachers present opportunities for a more action-oriented approach to teacher enhancement. As teachers are encouraged to reflect upon and systematically examine aspects of their classrooms, they are likely to make changes based on observations that lead to the improvement in their classrooms*“. In other words the classroom improvement of learning might possibly be a by-product of the researcher-teacher collaboration, whose main goal is to bridge the gap between university and schools. In order to bridge that gap so that both teachers and researcher receive appropriate satisfaction and fulfillment of their professional goals, we have to see very clearly what are the expectations and conditions of work of each professional community.

Readers are free to copy, display, and distribute this article, as long as the work is attributed to the author(s) and **Mathematics Teaching-Research Journal On-Line**, it is distributed for non-commercial purposes only, and no alteration or transformation is made in the work. All other uses must be approved by the author(s) or MT-RJoL. MT-RJoL is published jointly by the Bronx Colleges of the City University of New York.

Mathematics Teaching-Research Journal On-Line

A peer-reviewed scholarly journal

Editors: Bronislaw Czarnocha (Hostos Community College)

Vrunda Prabhu (Bronx Community College)

Anne Rothstein (Lehman College)

City University of New York

Volume 2 Date March 5 2007

For example, Jim Minstrell, the classroom teacher of mathematics states, on the other hand, that “...*the more immediate of the two is the improvement of the teaching practice. That is, when teachers engage in research on their teaching, they do so to get better at what they do. The second purpose is to seek an improved understanding of the educational situations in which they teach so that they could become the part of the knowledge base of teaching and learning* (Feldman and Minstrell, 2000). In other words the likelihood of classroom improvement is not enough for the classroom teacher; instead it is his or her primary goal with reflection and examination of the classrooms as the tools for that improvement.

Differences in Interest. These subtle differences in Teaching-Research approaches are, of course, natural; while educational reserchers’ primary concern is the investigation of teaching and learning processes in their generality, the task of the teacher is to investigate the most effective methods of improving learning in his or her mathematics classroom, and beyond. Similar subtle differences between the classroom research approaches of a researcher and a teacher point to significant differences in the formulation of the research questions. (Cobb & Steffe, 1983), assert that the primary interest of a experimenter engaging in a teaching experiment lies in “*investigating what might go in children’s heads*” and in “*hypothesizing what the child might learn*”. (Czarnocha, 1999) responds that „*In contrast to the interest of the experimenter, the teacher’s interest here is to find means and ways to foster what students need to learn in order to reach a particular moment of discovery. Since however such moments can occur only within the students’ autonomous cognitive mathematical structures, the teacher has to investigate these structures during a particular instructional sequence. In this capacity he or she acts as a researcher.*“

Ethical Differences. While abstractly these differences are simply changes of emphasis between the two components forming Teaching-Research, yet the same differences have strong ethical implications as to what kind of research should or should not be conducted in the classroom. (Pawlowski, 2003), one of the few teacher voices exploring the ethics of classroom research offers following suggestions on the matter: „*A professional investigator has as its responsibility to explore a research problem in its entirety, to grasp as many as possible of its aspects, continuously doubt and concientiously document its investigations. A teacher, responsible for children, pupils in his classroom, has as its primary responsibility to use the best available to him or her methods. All the doubts that the teacher has the right to, must be decided with the help of the criterion of its responsibility to children undertaken in the best of faith; his right to planned meandering*

Readers are free to copy, display, and distribute this article, as long as the work is attributed to the author(s) and **Mathematics Teaching-Research Journal On-Line**, it is distributed for non-commercial purposes only, and no alteration or transformation is made in the work. All other uses must be approved by the author(s) or MT-RJoL. MT-RJoL is published jointly by the Bronx Colleges of the City University of New York.

Mathematics Teaching-Research Journal On-Line

A peer-reviewed scholarly journal

Editors: Bronislaw Czarnocha (Hostos Community College)

Vrunda Prabhu (Bronx Community College)

Anne Rothstein (Lehman College)

City University of New York

Volume 2 Date March 5 2007

or to conduct the control measurements is strongly restricted. The teacher has no right to conduct the „negative“ experiments directed to show that some configuration of factors leads to worse results. If the teacher had found by [experience] that some didactic procedure is better than a standard one and knows about (because of course he or she has the right and responsibility to rely on one's own memory), but did not collect yet an adequate documentation to provide the evidence for its observations, nonetheless he doesn't have right to return to the method recognized as less successful – to return only in order to document its observations.“

He follows these remarks in a similar vein to Minstrell's, saying „*The main goal and the decisions criterion for the teacher must be, correctly diagnosed well-being of the student for whom the teacher is responsible. Only in the second instance, its goal can be the usefulness of the observation from a general, objective point of view. It is the objective investigative constraint, and not as one can think in a simplified manner, the limitation concerning only teacher-researchers, who are involved in other tasks. That's why didactic investigations are governed by a rigid system of values which must be respected during any such investigation independently of who is conducting them.*“

We would like to pause and reflect upon the last statements of Pawlowski, because of the seriousness of their implications for the methodology of classroom research. For, if we accept Pawlowski's statement that the ethical considerations of classroom research constitute objective constraints upon it, which needs to be fulfilled not only by a teacher-researcher but by any investigator doing action research in the classroom, then we have a strong criterion with respect to which the design of any teaching-research collaboration needs to be judged. In particular, the length of the teaching-research cycle of the design, implementation, assessment and analysis, followed by the redesign has to be carefully measured relatively to the time a particular cohort of students is in a particular grade or a course, which in general have the length of a semester or a year.

Ethics of the Teaching Experiment in the Classroom.In a recent paper, (Czarnocha and Prabhu, 2006) offered the following principled considerations governing the structure of the classroom Teaching Experiment

Ethical Principle

Those students who were the subjects of the Teaching Experiment leading to the increase of knowledge about their learning, should be the first beneficiaries of the new understanding.

Readers are free to copy, display, and distribute this article, as long as the work is attributed to the author(s) and **Mathematics Teaching-Research Journal On-Line**, it is distributed for non-commercial purposes only, and no alteration or transformation is made in the work. All other uses must be approved by the author(s) or MT-RJoL. MT-RJoL is published jointly by the Bronx Colleges of the City University of New York.

Mathematics Teaching-Research Journal On-Line

A peer-reviewed scholarly journal

Editors: Bronislaw Czarnocha (Hostos Community College)

Vrunda Prabhu (Bronx Community College)

Anne Rothstein (Lehman College)

City University of New York

Volume 2 Date March 5 2007

The ethics of the classroom teaching experiment formulates strong conditions upon the length of the Teaching Experiment, which require classroom ingenuity of the Teacher-Researcher to satisfy. The Teaching Experiments need to be so situated within the regular cycles of work so that the students who were the subject of investigation are also its immediate beneficiaries. In simple cases, one can state as a guide a minimum of two cycles per unit of the classroom instruction, a semester or a year. Two cycles assure the refinement of instruction based on the qualitative or quantitative analysis, and hence its improvement through incorporation of results of investigation. However one can bypass this simple condition in special circumstances which still allow for the satisfaction of the ethical principle. For example, if a teacher teaches the same cohort of students the next unit cycle in the school then he/she has the opportunity to introduce the results of research after one unit and still fulfill the requirement. Or as a teacher, TR apprentice in one of the TR teams of the Socrates Project describes her way of dealing with the problem of the control group through the parallel class taught by the same teacher. The ethical problem teachers encounter here is that in reality it is impossible to have two parallel classes and to implement new instruction one believes in, in only one of them and not both. In other words she doesn't want the control class, whose students are used as object of comparative assessment, not to receive the benefit of the Teaching Experiment conducted in the parallel experimental class. The TR apprentice had divided the teaching experiment into parts within the year and having received the confirmation or rejection of her hypothesis in one class in a given part of the curriculum, she immediately was introducing the improving technique to the other class, but only for that part. This way she was able to assess the effectiveness of the innovative instruction in its components, and at the same time to satisfy the ethical principle.

References

- Cobb & Steffe, 1983. The Constructivist Researcher as Teacher and Model Builder. *Journal for Research in Mathematics Education*. 14(2) pp.83-94;
- Czarnocha, B. (1999); El Maestro Constructivista como Investigador. In *Educacion Matematica*, vol.11(2) p. 52-63 Mexico,
- Czarnocha, B. and Prabhu, V. 2006 Teaching Experiment/NYCity Model. *Dydaktyka Matematyki*, #...

Readers are free to copy, display, and distribute this article, as long as the work is attributed to the author(s) and **Mathematics Teaching-Research Journal On-Line**, it is distributed for non-commercial purposes only, and no alteration or transformation is made in the work. All other uses must be approved by the author(s) or MT-RJoL. MT-RJoL is published jointly by the Bronx Colleges of the City University of New York.

Mathematics Teaching-Research Journal On-Line

A peer-reviewed scholarly journal

Editors: Bronislaw Czarnocha (Hostos Community College)

Vrunda Prabhu (Bronx Community College)

Anne Rothstein (Lehman College)

City University of New York

Volume 2 Date March 5 2007

Raymond, A. and Lienebach, M. 2000, Collaborative Action Research on The Learning and Teaching of Algebra: A Story of One Mathematics Teacher Development. *ESM* 41:283-307,.

Feldman, A. and Minstrell, J. 2000 Action Research as a Research Methodology for the Study of the Teaching and Learning Science in Kelly, A. and Lesh, R. (eds) *Handbook of Research Design in Mathematics and Science Education*, Lawrence Erlbaum Associates

Pawlowski, M. (2001) Badac jak uczyc, *Nauczyciele I Matematyka* v.38, pp 22-25

Readers are free to copy, display, and distribute this article, as long as the work is attributed to the author(s) and **Mathematics Teaching-Research Journal On-Line**, it is distributed for non-commercial purposes only, and no alteration or transformation is made in the work. All other uses must be approved by the author(s) or MT-RJoL. MT-RJoL is published jointly by the Bronx Colleges of the City University of New York.