Abstracts of Selected Papers from the Annual Conference of Didactics of Mathematics 1997

Backe-Neuwald, Dorothea

Paderborn, Germany

Teaching Geometry in Elementary Schools
Results of the evaluation of an inquiry on teachers and teaching post candidates

Winning a snapshot of the actual educational classroom practices in geometry teaching was the goal of the evaluation of an inquiry. The inquiry was distributed 1995/96 to teachers and teaching post candidates of elementary schools in North-Rhine-Westfalia.
The lecture reports on selected results of the evaluation. For example: Which items of geometry are the most important for the teachers? Which items are realised in practice? How do the teachers rate the school book used in the classroom? From the teacher´s point of view, will teaching of geometry be neglected? Which geometrical activities are articulated in other teaching disciplines?

Biehler, Rolf

Bielefeld, Germany

Students' difficulties in practicing computer-supported data analysis - some hypothetical generalizations from results of two exploratory studies

The context and methodology of the studies

In this paper, I will report and summarize some preliminary results of two ongoing studies. The aim of this paper is to identify problem areas and difficulties of students in elementary data analysis based on preliminary results from the two ongoing studies.
The general idea of the two projects is similar. Students took a course in data analysis where they learned to use a software tool, used the tool during the course, and worked on a data analysis project with this tool at the end of the course. The course covered elementary data analysis tools, such as variables and variable types, box plots, frequency tables and graphs, two-way frequency tables, summary measures (median, mean, quartiles, interquartile range, range), scatterplots, and line plots. The grouping of data and the comparison of distributions in the subgroups defined by a grouping variable was an important idea related to studying the dependence of two variables. The methods for analyzing dependencies differed according to the type of variables: for example, scatterplots were used in the case of two numerical variables, and two-way frequency tables and related visualizations were used in the case of two categorical variables. [...]

Brandt, Birgit

Berlin, Germany

Reconstructions of "Possibilities" for Learning with Respect to the Participation in Classroom Interaction

This paper is a contribution to an interactional theory of learning and teaching in mathematic classrooms. Differences in the structure of participation in classroom interaction and the possibilities for learning of the participating children are shown. The special purpose is to describe the responsibility and autonomy of children in classroom interaction.
Concerning the interpretative classroom research, two videotaped and transcribed classroom activities are presented. The responsibility and influence of the persons involved in the interaction are worked out by the analyses of the speakers' status. GOFFMAN's (1981) *decomposition model* of the speaker and the hearer is used as theoretical background. Finally, the speakers' roles in the two whole-class interactions are compared with respect to the learning possibilities for the children involved in the interaction.

Dettmer-Kratzin, Christian

Dortmund, Germany

"You can use the empty numberline like a ruler, but it's not as precise." – Analysis of mathematics lessons on the use of the empty numberline

Within the scope of a qualitative research project we video taped some mathematics lessons on the introduction and the use of the empty numberline in grades 2-4. The epistemological analysis of some transcribed teaching episodes shows how the children by themselves – parting from the introduced conventions and rules for this reproduction of the standard numberline which is not faithful to the scale but which observes the order of numbers – develope a specific interpretation for this new means of representation of the natural numbers. In a constructive process the children learn to shape actively the structure and the mode of use for the mathematical symbol "empty numberline" and to adjust them to specific tasks in a flexible manner.

Franke, Marianne

Giessen, Germany

Problem Solving Behaviour of Primary School Students in Real-Life Situations Presented with Poster and Text
- Results of an Empirical Investigation -

The paper describes an investigation about problem solving strategies in real-life contexts. 8 to 9 year old children were offered multiplicative problems in three different contexts - „buying goods for a classroom party", „buying bottles of juice for a punch", and „buying tiles for a doll house" - which were presented in different forms: as poster task (poster with picture and text), as project, as simulating role-play, and as word problem. The results of this qualitative analysis show a great variety of pattern and arithmetic strategies among the students, differences in familiarity with the contexts and dependency on the form of presentation. This paper concentrates on arithmetic strategies in the first situational context presented as poster task and uses other results by way of comparison.

Graumann, Günter

Bielefeld, Germany

Mathematical Views of Pupils and First-Year-Students

Beliefs concerning mathematics education are important for better understanding the process of learning of mathematics. A questionaire constructed ten years ago by E.Pehkonen and B.Zimmermann was used among other things with seventh grade pupils in Finland and Germany. A comparison of pupils beliefs in Helsinki and Bielefeld give a first impression of different beliefs as indicator for different cicumstance in teaching mathematics. Between different cities in Germany (Aschaffenburg in Bavaria and Bielefeld in Northern Germany) there are also interesting differences to be seen. Finally the questionaire was developed further for first-year-students. Especially the differentiation between the experienced that "is-state" and the wanted "shall-state" give noticable conclusions.

Griesel, Heinz

Kassel, Germany

Scientific Orientation of Mathematical Instruction

History and Chance of a guiding principle in East and West Germany

The choice of the subject of the present address

The opening address to the conference on mathematical education in Leipzig is meant to consider – in accordance with the wishes expressed by the organizing body – the evolution of mathematical education in East and West Germany throughout the last 30 years.
Among the large number of components that influenced the historical evolution of mathematical education, scientific orientation was a very powerful one.
We are going to deal only with this subject in the present address. [...]

Schneider, Edith

Klagenfurt, Austria

Changes of Teaching Mathematics by Computer algebra Systems (CAS)

Computers and especially computer algebra systems are able to do almost everything that in a operative way is normally asked for in mathematics teaching and that in most cases, is also extensively practiced. Thus, using CAS in mathematics teaching can and will change essential parts of the traditional, computerless mathematics teaching in an effective way. With these changes not only innovative progress, but also undesirable developments can be expected. These changes offer chances as well as dangers; great hopes are linked to them but considerable fear also arises.
In this paper I will outline some problems and questions that arise as soon as we consider changing mathematics teaching by using computers or CAS with regard to its *goals*, to its *contents*, to its *methods* and to the *social behaviour and teaching manners* (cf. Peschek 1997).

Weigand, Hans-Georg

Giessen, Germany

Changes of working styles while using a computeralgebra system - the case of functions

Computers and functions

The possibilities of concept formation in a computer supported environment are very often discussed in connection with the function concept. On the one hand, *new contents* were proposed:
Starting a computer-supported approach to the function-concept with real-life-models: E. g. the CIA-(Computer-Intensive Algebra)-Project of Heid (1996) or the ACT-(Applications, Concepts and Technology)-Project of Mayes a. o. (1996).
Looking for a better basis for the concept development while working with different representations.: E. g. the 'Functional Approach to Algebra' of Kieran a. o. (1996), Demana a. Waits (1997), the Austrian or the French 'Derive-Project' (Heugl a. o.1996, Hirlimann 1996).
Getting a new approach to functions with two variables: E. g. Weigand a. Flachsmeyer (1998) or Neveling (1996).
On the other hand, classroom experiences in computer-supported environments claim for *new teaching methods*:
There is a possibility to switch between numerical, graphical and symbolical representations while only pressing a button: Heugl a. o. (1996) speak about the 'Window-Shuttle-Principle' (p. 196ff).
Working with modules gains importance, because you may see functions as objects or modules on the computer screen: Terms can be substituted (e. g. $T(x) \rightarrow T(x+c)$) or changed, graphs can be transformed, reflected, dilated and functions can be added, multiplied or iterated (See Borba a. Confrey 1996).
Working experimentally and doing conjectures about solutions through systematic search processes gains prominence (See Heugl a. o. 1996).
We gain the opportunity to pose more problems with open-ended approaches (See Mayes u. a. 1996).
Of course, these proposals and expectations are not new. They have been discussed for many years in mathematics education. But, what is really new is, that nowadays we have a technological tool, which provides hope, that we will be able to fulfill these demands in a better way than in the past. [...]