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B 6.2

DISCUSSION-SUMMARY BY THE COORDINATOR

In the first session of section B6, the trend report on B6 was given by *Dr. Pollak*. In addition to the written version of his report (see above) Dr. Pollak stressed that we all know too little about the classroom reality concerning applications of mathematics.

Afterwards the panel members gave short comments and additional statements to this report. Obviously there are interdisciplinary approaches to bridge the gap between several disciplines; we have to distinguish between an approach by common elements (concepts or processes or languages) and an approach by real life situations. One can show three ways of looking at the problems of linking mathematics with applied fields: from the point of view of mathematics, of the applied fields, and interdisciplinarily; there are biological examples for the difficulties arising with this. Really there is another point in the list of forces that hinder applications of mathematics given by Dr. Pollak: The teachers' fear of 'open' situations.

One of the panel members spoke about the 'beauty' and the 'power' of mathematics and about some motivations that applications can

provide. The Coordinator gave a brief survey on the recent literature in the German speaking countries, concerning applications of mathematics, beginning in 1970. He mentioned his classification scheme: external discipline; branch of mathematics; level of application; kind of reality; intention. Though he could find an obvious trend in the recent literature towards more applications, he doubted whether one could speak of a similar trend in the actual classroom situation.

In the subsequent *plenary discussion* many different items were discussed, but no main issues could be recognized. One of these items was the problem of whether it is just the point of view of a mathematician when beginning a report with a definition of what is 'applied mathematics'. Another item was the difference between the two guiding questions 'how best to use mathematics' and 'how best to teach mathematics'. Some classroom experiments concerning the interaction of mathematics and other disciplines were discussed, for example a linking of mathematics with music. Several possibilities for organizing the interaction of mathematics with other school subjects were discussed, for example the idea of a course with a core of pure mathematics and a variety of applications round about.

During the *Poster-Session* the following authors presented their papers:

U. Beck (FRG); J. Chabrier (France); B. Dudley (GB); W. Flemming (GB); P. Häußler (FRG); S.W. Hockey (GB); P. Holmes (GB); W. Münzinger (FRG); A.D. Turner (GB); Z. Usiskin (USA).

There were lively discussions with the authors, especially concerning concrete examples for interactions of mathematics with other subjects.

In the *second session* of section B6, *P. Häußler* spoke about 'Investigations of Mathematical Reasoning in Science Problems', concerning an investigation about operations which are used by students (age 13 - 16) in order to recognize functional relationships underlying measurement data presented to them. The author further discussed the effects of two alternative treatments aiming at a general increase of recognizing functional

relationships. *Z. Usiskin* told of his ideas and experiences concerning 'Curriculum Development in the Applications of Mathematics'. To change curriculum by means of applications, Prof. Usiskin demanded that one should know which applications are important. He himself had searched for so-called *basic* applications; he mentioned some examples and discussed *powering* in detail. *U. Dudley* gave a brief report on the work in a Congress Working Group continuing EWG 6: 'Links of Mathematics with Other Subjects'. *P. Bhatnagar* spoke about 'Concept of Integrated Curriculum in Mathematics'. He started with the 'axiom', that mathematics has two aspects: beauty and power, and stated several types of integration.

Finally *U. Beck* reported on his 'Computer- und graphenorientiertes Verfahren zur Bestimmung chemischer Summenformeln'. He gave an example of cooperation between didacticians of mathematics and chemistry. The solution consisted of four steps: qualitative analysis, quantitative analysis, determination of the mass of the molecules, chemical sum formulas by means of the theory of graph methods. It was stressed that the economic aspect of mathematics could help the chemistry teacher.