

An Approach to Teachers' Knowledge about the Mathematical Concept of Volume

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In Mexico, the study of the concept of volume forms part of the program of studies for primary education. In accordance with Freudenthal (1983) the objective of mathematical education should be the forming of rich, well founded mental objects, related with the concepts of mathematics, nevertheless, experience in workshops with teachers of elementary school indicate that on occasion these “mental objects” of teachers are very limited. On the other hand, the participants in these workshops have pointed out volume as one of the thematic contents in which they found more difficulties for the learning of the children.

These considerations motivated an investigation project whose principal objectives to characterize beliefs and knowledge of the teachers related with the concept of volume and its teaching. The theoretical and methodological frameworks, as well as some preliminary results, have been commented on Saiz & Figueras (1999 and 2000).

Evidences that teacher beliefs and knowledge affect the way they teach have been obtained in different studies (Thompson, 1992). The work reported herein fits in this line of investigation, now that it focuses attention on the beliefs with respect to a mathematical concept and its teaching. A group of elementary school teachers were video and audio taped during a workshop designed to permit teachers spontaneously comment and share their ideas with their peers when working with tasks related to the concept of volume.

Some segments of these tapes' transcriptions have been analyzed. Until now, some results related to the teachers' subject-matter knowledge have been obtained: a) Teachers define volume as the place occupied by a body in space; nevertheless they themselves use this term, at times, as a synonym of capacity. b) They relate the raising in the level of liquid upon submerging an object to the weight, not to the volume. c) They believe that the lateral area is directly related to volume, that is, they believe that the greater the lateral area, greater volume and vice-versa. d) They have problems with the conversions between distinct units. e) They believe that enlarging the linear dimensions of a solid in k times gives place to k times enlargement in volume.

As collateral results of this investigation some are found that point toward the formation and actual circumstances of the teachers. When they work in groups and confront designed didactic situations –with the purpose that they themselves discover misconceptions and erroneous beliefs– they reconsider their own knowledge. They think over the difficulties that the children can confront, which will cause them to reflect about their role in the classroom, as it has been the situation in the workshop herein commented.

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