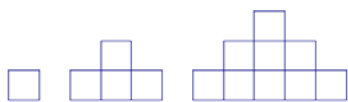


AN ADIDACTICAL MILIEU THAT FAILS TO PREPARE FOR AN INTENDED STATEMENT OF EQUIVALENCE

Heidi Strømskag Måsøval
Sør-Trøndelag University College, Norway

An *adidactical milieu* is a subset of the students' environment with only those features that are relevant with respect to the knowledge aimed at by the teacher (Brousseau, 1997). The concept of milieu models the elements of the material or intellectual reality on which the students act and which may be an obstacle to their actions and reasoning. The research question addressed in the project is: *What features of the milieu constrain students' establishment of algebraic generality in a given shape pattern?*

Research participants were two groups of students (three in each group) and a teacher of mathematics. The data are transcripts of students' (video-recorded) collaborative engagement with a task on algebraic generalisation of a shape pattern. The students were given the following task (made by the teacher):



- How many cubes will there be in the fourth shape? And in the fifth?
- How many do you think there will be in shape number 10? And in shape number n ?
- What kinds of numbers are present in these shapes? In each row, and totally in the shape?
- Express as a mathematical statement what the shapes seem to show, in words and in symbols.

The teacher's aim with the task was to express in natural language, and transform into algebraic notation, the mathematical statement that the sum of the first n odd numbers is equivalent with the n -th square number (possibly represented by $\sum_{i=1}^n 2i - 1 = n^2$). The students, however, produce a formula for the numerical value of the n -th element of the shape pattern: $F(n) = n^2$ (Group 1) and $a_n = n^2$ (Group 2).

The incomplete achievement in the situation of formulation can be explained by two features of the milieu. First, there is a problem with the design of the task: It does not provide the students with knowledge that enable them to formulate a conjecture about equivalence of two different expressions for the numerical value of the general element of the shape pattern. Second, there is a problem with the concept of a mathematical statement: The teacher's meaning of this concept (a theorem) is different from the students' interpretation (a statement about the numerical value of the n -th element).

References

Brousseau, G. (1997). *The theory of didactical situations in mathematics: Didactique des mathématiques, 1970-1990* (N. Balacheff, M. Cooper, R. Sutherland, & V. Warfield, Eds. & Trans.). Dordrecht, The Netherlands: Kluwer.