Facilitating the abstraction of the limit in a quasi experimental design

In educational context mathematics is considered to form a hierarchical structure that allows students to step by step enrich their knowledge. The difficulties students have in learning some advanced concepts in mathematics suggest that this is not always possible. One of the main reasons seems to be that the students' prior knowledge is in sharp contrast with the abstractions to be learned (Lehtinen, Merenluoto & Kasanen 1997; Merenluoto & Lehtinen, in press). For the learner two objects or relations are seen as similar to the extent that they fit the same abstraction; to fit something to an abstraction the learner must already possess that abstraction. In the classical view, generality is the product of learning. It is suggested, however, that abstraction is a prerequisite for learning (Ohlsson & Lehtinen 1997) and that the students’ attention is deliberately focused to the essential features of the abstraction (Dreyfus 1991).

Based on the theoretical framework and earlier studies a quasi experimental design with pre and post tests was designed and carried out in upper secondary school calculus course. The subjects involved where a test group (n = 26) and two control groups (n =16 and n=31). All groups used the same text book in their study of calculus course. The students in the test group were taught the abstraction of limit on the number line (a 3 hour intervention) in the beginning of the calculus course whereas the students in the control groups had their traditional calculus course. There were significant difference in the post test where the students of the test group gave fewer primitive level responses than in the control groups. The results from the experiment are promising for planning better learning environments for learning the abstract concepts of mathematics.

References

