

FIGURAL AND CONCEPTUAL ASPECTS IN IDENTIFYING POLYGONS

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The argument that definitions and some special examples play an important role in concept learning is long standing in the psychological and educational research literature (Schwarz & Hershkowitz, 1999; Vinner, 1991). During the mental process of recalling and manipulating a concept, some special examples, particularly figures in the case of geometry, are brought into play, consciously and unconsciously affecting the meaning and usage. These special examples are often called prototypes. The prototype is a result of our visual-perceptual limitations that affect the identification ability of individuals, and individuals use the prototypical example as a model in their judgments of other instances (Hershkowitz, 1989, 1990; Schwarz & Hershkowitz, 1999).

According to the general reference frame of the theory of 'figural concepts' (Fischbein, 1993), geometry (in elementary, Euclidean terms) deals with specific mental objects, "figural concepts", which possess, at the same time both conceptual and figural aspects. These aspects are usually in tension, so that geometrical reasoning is characterized by a dialectic between them.

We studied three eighth-grade students identified by their mathematics teacher as having 'above average ability', 'average ability', and 'below average ability' in mathematics. We sought to observe, using face-to-face interviews, the process of interaction between figural and conceptual aspects in identifying polygons. Twenty four problems on polygons, angles and lines were posed to the students to answer them orally. Here in this paper the two problems related to square and rectangle were examined. Analysis of the results revealed that (a) students often use prototypic figures but do not consider them as exclusive, and (b) non-critical attributes of a concept given in a figure leads to difficulties in identifying concept examples. All these mentioned above are quite prevalent among all levels of students in concept learning.

References

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