LOOKING AT A SQUARE THROUGH ANOTHER LENS: A SQUARE AS A LOCUS

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Locus is a salient mathematical concept that reflects one of the basic and general ideas of modern mathematics. Thus, the aim of our study was to identify sites in the geometry curriculum where the notion of locus can be interwoven, in particular with respect to definitions of geometric objects. There are various ways of defining geometric concepts (Shir and Zaslavsky, 2001). The most common way of defining a geometric object in school mathematics, as appears in most textbooks, is by a structural definition, namely, by characterizing properties of the object. Another way to define a geometric object is by a common property of its points, namely, as a locus.

There are several geometric objects that are usually associated with the notion of locus. Some are actually defined as a locus (e.g., a circle) while others are not ordinarily defined as locus, however, are looked upon as locus in terms of a unifying property of their points (e.g., a angle bisector, and a mid-perpendicular of a segment). On the other hand, most geometric objects are not normally associated with locus at all, let alone defined as one.

A square is an example of a concept that is not usually treated as a locus, although it can be defined as one. In our study we examined how mathematics educators (teachers, graduate students and researchers) think about the possibility of defining a square as locus. More specifically, we studied the following three questions: 1. To what extent do they think that it is possible to describe a square as a locus of points? 2. For those who think it is possible, to what extent can they describe a square as a locus? 3. To what extent is a (given) statement describing a square as a locus acceptable as a definition of a square?

Data was collected through written questionnaires and group discussions. There were a total of 74 participants in our study, who worked in two groups in two separate workshops. Our findings point to the reluctance to accept the proposed definition of a square as a locus, mainly for the participants' unfamiliarity with such approach and for their views of the notion of locus as an abstract concept not within reach for students. In our presentation, a detail account of the findings will be reported. In addition, implications to teacher education and curriculum development will be discussed.

References

Shir, K. & Zaslavsky, O. (2001). What Constitutes a (Good) Definition? The Case of a Square. In M. van den Heuvel-Panhuizen (Ed.), *Proceedings of the 25rd Conference of the International Group for the Psychology of Mathematics Education, v.4,* 161-168.