ABSTRACT

This master's thesis focuses on one of the non-Euclidean geometries known as Taxicab geometry, providing material suitable for studying this subject without imposing significant demands on the reader's mathematical knowledge. It is akin to Euclidean coordinate geometry.

Existing research indicates that by observing the properties of shapes and formulating hypotheses in non-Euclidean geometries, students can develop a better understanding of Euclidean geometry. It is also known that, in mathematics, definitions are integral parts of understanding its concepts, and yet students often use them incorrectly. Therefore, this thesis examines and provides evidence of how students transfer their existing knowledge into the realm of Taxicab geometry and analyzes how this activity could potentially contribute to a better understanding of concepts and definitions, taking into account frequent misconcepts students encountered therein. Additionally, it provides evidence that by adapting and transferring knowledge between Euclidean and Taxicab geometries, students engage in interaction between their existing and newly acquired schemas. This connection can support the development of more coherent and better structured cognitive schemas, which are fundamental for achieving a more advanced mathematical thinking and being able to apply acquired knowledge in different contexts. The design of suitable pedagogical activities drew upon APOS theory and theoretical frameworks for schema interaction.

The results of the thesis demonstrate that integrating Taxicab geometry into mathematics education can enrich students' learning experience and contribute to the enhancement of their mathematical thinking and understanding of geometric concepts.