

# TYPES OF REPRESENTATION USED IN THE PRESENTATION OF TRIGONOMETRY IN A TEXTBOOK

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This study reports on how representations are used in the presentation of trigonometry in a textbook written for upper secondary school. It is an analysis of how a tripartite use of representation is used in the presentation of the topic.

Representation is a complex concept used in different contexts. In proportion to learning and teaching there is a main partition between external and internal representations (Goldin & Kaput, 1996). In my work the focus was on external representations. One motivation for applying a tripartite view on mathematical topics came from the introduction of “The Rule of Three” in an American calculus reform in the 1990’s. The main idea here was to emphasise a balance between numeric, algebraic and graphic representations in the teaching and learning of calculus (Hughes Hallet, 1991). Lesh (1999) uses a model for transfer between five types of representation in the learning situation, which is an extension of Bruner’s enactive, iconic and symbolic representation forms.

The main aim of my study was to explore how concrete, visual and symbolic representations were used in the presentation of trigonometry. Part of the work was to adjust and define the difference between concrete, visual and symbolic representation, and especially what concrete representation is in the context of a textbook. My research questions were: What kinds of representations are used; in which order do they occur; and what connections are found between and within the different representations.

Visual and symbolic representation dominated. When concrete representation was used, it was so strongly connected to visual representation that it was difficult to separate them. Even if the three representations were used, pairs of representation forms appeared simultaneously. Generally there was a bipartite approach and not a tripartite approach to the topic that dominated. The order of the representation was mainly from visual to symbolic except from the graphic representation of the functions.

## References

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