

## **ABSTRACT**

### **Spatial Abilities and Performance in Mathematics Among a Select Group of Hearing Impaired Adolescents**

**Iris Soutar**

This study examined spatial abilities and performance in mathematics among a select group of hearing impaired adolescents. Based on the reliance of hearing impaired persons on the visual sense for information gathering, processing and storage and the spatial nature of their most dominant mode of communication, it was assumed that they would demonstrate high spatial abilities. Previous research has established a positive correlation between spatial abilities and mathematics performance, however hearing impaired students have traditionally demonstrated low performance levels in mathematics. This study sought to examine factors which may contribute to our understanding of this phenomenon.

Designed as a co-relational ex post facto research, a group of hearing impaired students were observed in the classroom situation, using a researcher designed observation schedule to analyse the instructional experiences provided in a series of mathematics lessons. The group was then tested using other researcher designed instruments and their performance scores on spatial abilities and mathematics problem solving correlated. A subgroup was re-tested eighteen

months after using the same instruments and their performance compared. Vocational training, age of entry in school, years of special education and gender were also compared for any effect on performance.

The main findings of this research were that hearing impaired students did not perform as expected with overall high scores on a test of spatial abilities, but instead demonstrated a marked weakness in spatial reasoning skills at the higher cognitive levels of operation. Spatial Abilities were found to have a moderate positive correlation with mathematics performance, and especially with maths items high on visual processing. Weaknesses in test performance were found to be similar to deficiencies noted in learning experience and these persisted in a subgroup even after eighteen months of additional stimulation. Pre-school stimulation was found to have a significant effect on spatial abilities performance, but there was no significant difference in performance associated with vocational training, gender or years of special education stimulation.

This research corroborates previous research which found a relationship between spatial abilities and performance in mathematics. It raised questions about the effectiveness of the instructional methodology currently employed for this group of hearing impaired students, for the development of mathematical concepts and spatial abilities. The findings also have implications for curriculum content and teacher competence, if improved levels of performance on spatial abilities and mathematical problem solving are to be achieved among hearing impaired students.