

# SPATIAL ABILITY & GEOMETRY LEARNING

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Spatial ability is regarded to be an important part of mathematical competence. In particular, research studies have shown that spatial ability is positively related to achievement in mathematics (e.g. Fennema & Sherman 1977). Other studies gave evidence of transfer effects between a training of spatial ability and problem solving competence (e.g. Souvignier 2000). Moreover, transfer effects between spatial ability training and the enhancement of mathematical skills is discussed.

Our research contributes to the role of spatial ability in geometry problem solving processes. We present two studies concerning

- (1) the effects of computer presented spatial geometry problems on spatial ability,
- (2) the influence of spatial ability on geometry performance, and
- (3) the differences between low-achievement and high-achievement students with respect to the training effects.

The sample comprised 63 elementary school children (study I) and 110 students in special education (study II). The students were assigned to one of two groups. Students of the experimental group took part in a computer-based training of spatial ability. All students took part in a series of regular geometry lessons. Both groups were presented questionnaires with items concerning their spatial abilities and their geometry performance as pre-test and as post-test.

Our results show that spatial ability can be enhanced in particular with respect to specific items closely related to the training environment (study I: Mann-Whitney-U-Test  $p = .000$ , Cohen's effect size  $d = 1.1$ ; study II:  $p = .014$ ,  $d = .404$ ). We did not identify a significant effect concerning the influence of spatial ability on geometry performance. These results confirm results of former studies with secondary school students (Hartmann & Reiss 1999).

Our study-in-progress aims at refining the results of previous studies: In particular, we will consider content, environment and duration of training as important components influencing the effectiveness of training.

## References

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