UNIVERSITÄT SALZBURG | School of Education
Didaktik der Mathematik

Spatial Ability and Spatial Skills. Invited Talks

Datum:	12. März 2020
Zeit:	11.00 - 13.00 Uhr
Ort:	Universität Salzburg, NAWI, Hellbrunnerstraße 34, 5020 Salzburg
Hörsaal:	HS 413 (1. Stock)

Um Anmeldung wird gebeten bei Frau Probst unter rosemarie.probst@sbg.ac.at bzw. telefonisch unter +43 662 8044 7310.

Gavin Duffy
Technological University Dublin,
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Electronic Engineering

Sheryl Sorby
University of Cincinnati,
Department
of Engineering Education

Spatial ability is a key cognitive factor in the representation of word problems in mathematics among STEM students

Beginning with a general introduction to the research field of spatial ability in STEM learning, Gavin Duffy will present empirical findings from a study of spatial ability in problem solving among engineering students. In this study, three instruments – a spatial ability test, a set of math word problems and an accompanying math ability test – were administered to two samples of first year engineering students in two different countries. Data were analyzed at the test level to evaluate the relationship of spatial ability to problem representation and solution. A detailed item level analysis was conducted to compare approach to problem solving with spatial ability level. Spatial ability was found to be significantly related to problem solving but not to the math ability test indicating the relationship was limited to the problem representation phase and not the solution phase. Problem solving can be considered to consist of two cognitively distinct phases: problem representation and problem solution. Spatial ability plays a key role in STEM education that is not limited to visualization of imagery but extends to thinking during problem solving, a non-routine activity that requires mental representation.

Gateway to STEM: Improving 3-D Spatial Skills

The ability to visualize in three dimensions is a cognitive skill that has been shown to be important for success in engineering and other technological fields. For engineering, the ability to mentally rotate 3-D objects is especially important. Unfortunately, of all the cognitive skills, 3-D rotation abilities exhibit robust gender differences, favoring males. The assessment of 3-D spatial skills and associated gender differences has been a topic of educational research for nearly a century; however, a great deal of the previous work has been aimed at merely identifying differences. For more than two decades, Sheryl Sorby has been conducting research aimed at identifying practical methods for improving 3-D spatial skills, especially for women engineering students. This presentation details the significant findings obtained over the past several years through this research and identifies strategies that appear to be effective in developing 3-D spatial skills and in contributing to student success.

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