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TRAINING PROGRAM FOR SPATIAL SKILLS DEVELOPMENT OF ENGINEERING STUDENTS: DESIGN AND IMPLEMENTATION

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Several research findings suggest that visuospatial information processing and spatial representation are key objectives for development in many educational disciplines. The importance of spatial thinking seems to be most obvious in science, technology, engineering and mathematics (STEM) fields. [3] [4] For engineers, the ability to visualize and mentally transform and rotate objects in space has been found particularly important. [1] [2]

In this presentation, we will explore potentials of using creative 3D modelling for the development of spatial abilities. The aims of the project were (1) to investigate the efficiency of our spatial training programs, (2) to reveal factors that influence the natural growth and the educational enhancement of spatial skills, (3) to compare two learning environments (real and virtual spaces), (4) to analyze visuospatial information processing and problem solving strategies of engineering students.

The experiment was carried out with architecture and civil engineering students in the first and second study year at the Szent István University. The developmental program was introduced as an elective seminar. Students of the same study year who did not attend the spatial development program constituted the control groups. The measurement tools and the program focused on frequently used skill components, generally underdeveloped even in adults. Task types involved (1) basic mental operations: mental analysis, (observation of hidden spatial structures), mental synthesis (compositions), and (2) complex mental operation tasks: mental rotation and transformation and construction of mental spatial images.

In the presentation, we will discuss factors influencing the perception and interpretation of space and show strategies of engineering students in solving spatial problems. Post-test results of the experimental groups were significantly higher than control group ($t[226]=-4,70$, $p<0,001$) and the effect size of the developmental program was $d=1,07$. Research has proven that the development of spatial abilities through creative, open-ended tasks in three-dimensional environments are equally beneficial as traditional tasks based on representational conventions.

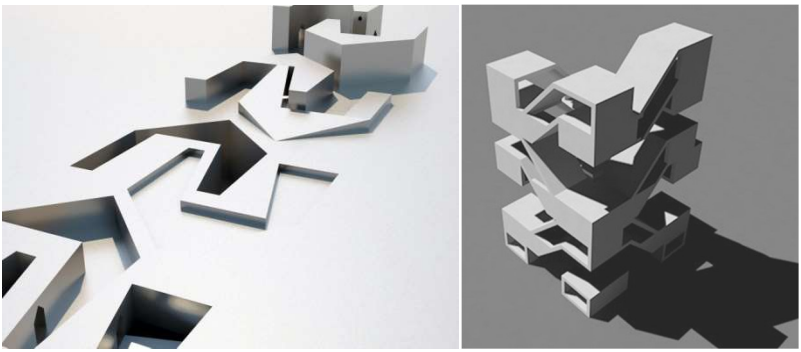

Fig. 1 and 2 An open, creative task of spatial modeling by Nóra Kőhalmi and by Dániel Ocsenás, architect students (in virtual space)

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