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Online Short Spatial Ability Battery (OSSAB): Psychometric Norms for Older Students

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Abstract

The need for STEM specialists is growing in current technologically-oriented economy. This calls for new approaches in evaluation and development of relevant abilities and skills. However, the current educational systems might miss some students who have high potential for this field or who can develop such potential. For example, according to the results of one Russian study, gifted children may be missed by existing methods of talent search, partially due to the lack of standardised psychometric tests, especially of abilities beyond verbal and numerical abilities. One important predictor of STEM, often neglected in education, is spatial ability. Recently an online short spatial ability battery (OSSAB) for use in adolescent popula- tions was developed. However, no published norms are available.

The aim of this study was to develop normalised thresholds for spatial ability testing using OSSAB battery with Russian 13-17 year old schoolchildren. Schoolchildren from the Sirius Educational Centre, demonstrating high achievement in 3 different areas: science (N = 640; 238 females), sports (N = 436; 67 females) and art (N = 260; 204 females), and schoolchildren (N = 752; 350 females) from general education schools of the Russian Federation participated in the study. Age of participants: 13-17 (M = 15.01; SD = 1.18).

The study identified thresholds for 8 spatial ability levels: from Very low ability to Extraordinary giftedness. These thresholds can be used by teachers and school psychologists to determine the level of spatial ability in schoolchildren of 13-17 years of age. Based on individual students' current levels of spatial ability, teachers can provide individual support and recommendations. For high performance recommendations may include additional clas- ses in STEM or natural sciences, for example, electronics, robotics, programming, physics or chemistry. For lower performance recommendations may include computer games containing spatial components; sports; playing musical instruments; origami classes; and studying the Chinese language. More broadly, school curricula in different subjects should include more spatial elements, such as: inclusion of stereometric tasks in learning materials; computer pro- grams for modelling in teaching geometry and other subjects; adding visualizations (graphs and tables) when explaining material.

Overall, the results of this study suggest that a significant number of children have very low or very high level of spatial ability in both mainstream schools and in educational centres for high-preforming students. The norms developed in this study can be used for identification and individualized support in all educational settings.

Keywords: spatial ability; norming; psychometric tests; recommendations; talent develop- ment programmes; giftedness.

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