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**Sex difference in spatial ability for college students and exploration of measurement invariance.**

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Summary: This study investigates psychometric evidence for a spatial ability instrument with a focus on measurement invariance and sex difference in this domain. The Purdue Visualization of Rotations (ROT) test was administered to science major students enrolled in a college chemistry course to measure mental rotation ability. Confirmatory factor analysis (CFA) was used to evaluate the fit of three alternative models. A bi-factor model is a better fit for the data than other models (1-factor, 4-factor 2nd-order), which indicates that the probability of answering a test item correctly is affected not only by student ability but also by an item-writing pattern. Results from multiple-group CFA support the measurement invariance of the bi-factor model between sexes and the outperformance of males over females with medium to large effect sizes. In conclusion, the ROT is appropriate to measure student mental rotation ability in college classrooms and to detect a difference between sexes.

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*Keywords:* spatial ability; measurement invariance; confirmatory factor analysis; gender gap  
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