

Online Assessment of Early Numeracy and Reasoning

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Abstract: With the recognized importance of the first school years and the successful beginning of schooling, we have also seen a growing need for instruments to diagnose and monitor students' development in this crucial period. The purpose of this study is to develop easy-to-use online instruments to assess children's numeracy and reasoning skills at the beginning of schooling and to determine the psychometric characteristics of these skills. A representative sample of 4,996 first-graders was composed for a new cohort of the *Hungarian Educational Longitudinal Program*. An early numeracy test comprising six scales (number word sequence, relations, basic counting, magnitudes and number words, numeral recognition, and magnitudes and numerals) and an inductive reasoning test with three scales (figural series, figural analogies, and classification) were devised and administered online via the eDia assessment platform. Results indicated that students were able to work with the computerized instruments without any problem. The tests proved to be reliable: Cronbach's alpha was .89 for the numeracy test and .90 for the inductive reasoning test. Confirmatory factor analyses were conducted to test the underlying measurement models for both tests. Based on the subtests, the six-dimensional model showed an acceptable model fit for the numeracy test, and the three-dimensional model did so for the inductive reasoning test. These results indicate that the instruments may be used both for research purposes (serving as the first wave of data collection in the longitudinal program to ascertain students' initial cognitive level) and as a diagnostic tool to support teachers' developmental work.

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