

INTERCULTURAL VALIDATION OF A MATHEMATICS COMPETENCE TEST FOR GRADE 1 CHILDREN

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Keywords: mathematical key concepts; Rasch-analysis; intercultural adaptation

Aim: This paper presents the translation and adaptation process of a mathematics test (MARKO-D) for the acquisition of mathematical key concepts by children from 4-8 years. A conceptual model of mathematics hierarchical competence development forms the theoretical foundation of the test. Each step is marked by the forming of a specific concept, which build on one another in an accumulative way.

To make this test applicable (usable) in other languages, we had to make sure that the test measures the same concepts in each language as it does in its original language. We addressed three research questions: (1) Do all the items in each language form a one-dimensional hierarchical scale like the one in the German test? (2) Is the hierarchical scale of the different concepts identifiable and does the sequence of the concepts correspond to the sequence in the German test? (3) How do ‘misfitting’ items, which are allocated to another conceptual level, show up upon examination?

Methods: Data analysis was based on item-response theory (IRT). If the construct in question is uni-dimensional (in this instance, mathematical competence), the one-dimensional (1PL) Rasch model is appropriate.

Results: In several pilot studies in the years 2011–2013 we tested over 1,600 children with the MARKO-D in four languages: English, Sesotho, IsiZulu and Afrikaans. In each language we could more or less validate the model (research question 1), and most of the items were allocated to the appropriate level (research question 2). But in every language there were some items, which didn’t fit as expected. So our next step was to find explanations for the ‘misfitting’ items (addressing research question 3).

Importance and future implications Based on these results, we can now go on to norm the tests in the four languages. These will be socially-oriented norms, according to South African norms. In addition to this, qualitative information will be given by the allocation of a child to a specific level, that can be of help to teachers and therapists who assist children with learning support and remediation.

References

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