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Doctor of Philosophy in Education
(Mathematics Education)

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Assessing Dyscalculic Tendencies Among Children through a Mobile Application Screening Tool

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ABSTRACT

This study aimed to develop and validate the psychometric properties of the first Philippine mobile application screening tool for dyscalculic tendencies and establish norms and cut-off scores for Grade 3 pupils. Additionally, it investigated the weaknesses of at-risk pupils and compared them to the different core deficit hypotheses of dyscalculia. Also, the study assessed the experience of children in using the mobile application. The screening tool consisted of 11 tasks divided into arithmetic calculation, basic number skills, and other cognitive tasks. The norming group is comprised of 248 Grade 3 pupils. The findings revealed that the screening tool has an excellent level of face and content validity and an acceptable to excellent level of internal consistency and test-retest reliability. This suggests that the screening tool is a valid and reliable instrument to identify children with dyscalculic tendencies. The study provided stanine norms and cut-off scores that can be easily utilized by teachers, parents, and other researchers. In terms of the analysis of weaknesses, children with dyscalculic tendencies obtained relatively lower scores in arithmetic calculation, number line estimation, and verbal Arabic matching tasks. These weaknesses favored the approximate number system (ANS) deficit and access deficit hypotheses of dyscalculia which supported the assumption of multiple deficit hypothesis. To add support, using the K-means clustering approach, five distinct profile clusters of children with dyscalculic tendencies were identified. Finally, in terms of children's experience in the use of the mobile application, the children had high level of engagement and overall satisfaction as indicated by their enjoyment and interest in completing all the

tasks. Likewise, the app quality in terms of functionality and aesthetics were evaluated to be very good. Hence, resulting in an overall positive experience. The use of the mobile application screening tool is highly recommended to mathematics teachers and parents for the initial identification of dyscalculic tendencies among children. To strengthen the psychometric properties and the quality of the instrument, measures of concurrent and predictive validity, sensitivity, specificity, and continuous norming and testing in a larger population could be explored.

Keywords: dyscalculia, dyscalculic tendencies, mobile application, screening tool