Validity and reliability of multiple-choice Biology test: a rasch analysis perspective

ABSTRACT

Concerns about the accuracy of multiple-choice tests for assessing biology knowledge have led to an increased emphasis on validating these tests using sophisticated analytical techniques like Rasch analysis. A 22-item multiplechoice cell division test was administered to 35 Form Four students in Kota Kinabalu, Sabah and validated through Rasch analysis, with MNSQ item values falling within the acceptable range of 0.79 to 1.24 logit. Additionally, the ZSTD components of Infit and Outfit showed favourable logit values aligning positively with the intended measures. Overall, the results indicated that item fits were within an acceptable range and PTMEA-CORR values measured what was intended to assess. Meanwhile, the Cronbach's alpha was a good value at 0.65, with person reliability of 0.72 and item reliability of 0.76. The person separation was observed at a value of 1.62 while the item separation considered acceptable at a value of 1.80; indicating good measurement capability which supports its use in evaluating students' comprehension of biological concepts. Applying the Rasch model demonstrated consistent and reliable test enabling assessment of students' achievement in biology; contributing towards continuous improvement in teaching and learning biology.