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Examining Validity of Diagnostic Classification Models Using Artificial Neural Networks

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Abstract

With the wide array of the available DCMs, i.e., compensatory, noncompensatory, and additive, selecting the most appropriate model for any given assessment situation has become a challenge (Ravand & Robitzsch, 2018). Choice of the best DCM has either been taken for granted or been driven by fit indices. Nonetheless, the issue of fit in DCMs is in its inception and under-researched. Validity of DCM profile scores can also be examined by providing evidence as to their relationships with some other external criteria. However, there is a dearth of studies showing that diagnostic information is related to other external criteria. Regarding the inconsistent findings of the previous studies as to the use of fit indices and consequently the mixed recommendations of the researchers as to the choice of the right DCM, the present study intends to carry out model selection by comparing diagnostic information provided by several DCMs in terms of their potential to predict performance on an external criteria. Specifically, attribute mastery probabilities of about 1000 Iranian test takers from a reading comprehension test were used to predict reading comprehension performance of the same test takers on another reading comprehension test using artificial neural networks. The results showed that attribute mastery probabilities obtained from the G-DINA predicted performance on the reading comprehension test the best followed by those obtained by additive models. The implication is that attributes underlying reading comprehension interact in an additive way.

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