

Multidimensional Rasch Analysis for Vocational Education Assessments

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The rating for Final Year Project/Industrial Attachment in most of the Universities and Vocational Education are Dichotomous data with either a “Pass” or “Fail” Grade. In the career world, organizations expect a candidate be armed with soft skills at a higher priority than academic achievement. These soft skills (Grant, Malloy, Murphy, Foreman & Robinson, 2010) generally include, but are not limited to: project management, teamwork, and presentation and communication skills. Polytomous data with scores in marks is better for distinguishing the ability between students.

Rasch analysis (Doyle, Hula, McNeil, Mikolic & Matthews, 2005) is a well-studied measurement approach that models the relationship between item difficulty, person ability, and the probability of a given response. It permits one to examine the dimensionality of latent constructs and establish equal interval units to quantify such constructs. The Rasch model (DiStefano & Morgan, 2010) produces scores for each person and each item on a common, interval-level scale, called a logit scale. The Rasch Rating Scale Model is used when polytomous data is present.

In this study, the Rasch Analysis with Unidimensional Latent Regression approach will be applied. Two classes of students are identified where one has the initiative to work in industry and the other prefers to stay in house to complete their final year project. Both classes of students will return to college on Saturdays to study the module Engineers in Society. The latent trait of “Motivation” is under test by latent regression rather than two stages approach due to the stronger in effect size. Students will be assessed under 5 items, 280 samples of data will be transformed and processed by the software ConQuest.

The results show that the class willing to work in industry achieved 0.293 logit scores better than the “stay in house” class with the residual variance of 0.055. The reliability is relatively low while unidimensional procedures are statistically inefficient when data is truly multidimensional (Cheng, Wang & Ho, 2008) because of the use of Unidimensional Item Response Theory models that may not adequately describe the data.

The construct of “Motivation” found in the module of Engineers in Society together with other constructs such as the “Communication Skills” could be applied under the within-item Multidimensional Model in order to increase the reliability and validity of the test. The insight is to extend the application of the within-item model to within-module model. This is of great interest in the applicability to reduce the number of assessments to students for the outcome-based curriculum design.

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