

symposium. These papers share in common the advancement of new knowledge in using Rasch models for the development of measurement scales. The paper by Wang, Zheng, and Wang, and the paper by Cheng and Lam are concerned with the development of psychological scales, namely Emotional Intelligence Scale and General Self-Efficacy Scale in the first paper by Wang and associates, and Teacher Motivation Scale in Project Learning in the second paper by Cheng and Lam. The other three papers are concerned with theoretical issues in the development of scales for measuring academic outcomes. Both the paper by Lee, and the paper by Mok, Yan and Lau focus attention on measurement issues in the building of vertical scales across grade levels, including item calibration, test invariance, linkage methods, and sample size considerations. The paper by Tam, Mok, Lau and Wu is an exploration of using user-defined fit statistic to analyse two-tier items in the context of mathematics assessment. Analyses of the three theoretical papers are based on large scale empirical data as well as simulated data. All papers in the symposium are innovative and expected to contribute to new knowledge of testing.

Paper 1

“Rasch model analysis of the Emotional Intelligence Scale and the General Self-Efficacy Scale”

Wang, Li-Jun (Zhejiang Normal University & The Hong Kong Institute of Education, Hong Kong SAR, China)*

Zheng, Xian-Liang (Shanghai Normal University, China)

Wang, Wen-Chung (Assessment Research Centre, & Psychological Studies Department, HKIEd, Hong Kong SAR, China)

Mok, Magdalena Mo Ching (Assessment Research Centre, & Psychological Studies Department, HKIEd, Hong Kong SAR, China)

Although support has been found for the psychometric properties of the Emotional Intelligence Scale (EIS) and the General Self-Efficacy Scale (GSES) using classical test theory approaches, these two scales have not yet been analyzed with Rasch models. The aims of this study were to use Rasch analysis to assess the psychometric properties of the EIS and the GSES, to investigate the relationship between them, and to examine group differences in emotional intelligence and self-efficacy. The Chinese-version of the EIS and GSES were administered to 299 college students. The Rasch partial credit model was fit to the data using the ConQuest software. Differential item functioning (DIF) was assessed. The correlation between these two latent traits was investigated. Latent regression was performed to examine group difference. The revised scales show a good model-data fit and a high reliability. A two-dimensional Rasch partial credit model was fit in order to yield a more accurate estimate of the correlation between the two scales. The correlation was .53, suggesting a moderate relationship between them. The latent regression revealed that family atmosphere and teacher-pupil relationship had a significantly positive regression weight on emotional intelligence, and that gender, family atmosphere, mother's education level, teacher-pupil relationship, student cadre had a significantly positive regression weight on self-efficacy. Rasch analysis is powerful in assessing psychometric properties of a scale, revealing current validity, and examining group difference. It is recommended that Rasch analysis be routinely applied in test development.

Paper 2

“Using user-defined fit statistic to analyze two-tier items in mathematics”

Tam, Hak-Ping (National Taiwan Normal University, Taiwan)*

Mok, Magdalena Mo Ching (Assessment Research Centre, & Psychological Studies Department, HKIEd, Hong Kong SAR, China)

Lau, Doris Ching Heung (Assessment Research Centre, HKIEd, Hong Kong SAR, China)

Wu, Margaret (Assessment Research Centre, University of Melbourne, Australia)

The two-tier item format is relatively new and is gradually gaining popularity in some areas of educational research. A two-tier item is made up of two portions, with the first portion assessing whether students could identify the correct mathematical concept with respect to the information stated in the item stem, while the second portion examines the reason they supplied to justify the concept they chose. Since the data thus collected are related in a certain way, they pose challenges regarding how analysis should be done to capture the relationship that exist between the two tiers. The present paper attempts to analyze such data by using a user-defined fit statistics within the Rasch approach. The kind of information that can be gathered will be illustrated by way of analyzing a data set in mathematics.

Paper 3

“Development and validation of Teacher Motivation Scale in project learning”

Cheng, Rebecca Wing-Yi (Assessment Research Centre, & Psychological Studies Department, HKIEd, Hong Kong SAR, China)*

Lam, Shui-fong (The University of Hong Kong, Hong Kong SAR, China)

According to self-determination theory (Ryan & Deci, 2000), different types of motivation can be placed on a continuum according to the extent they reveal self-determination. From the least self-determined to the most self-determined motivation are (a) external regulation (doing a task for external monitoring), (b) introjected regulation (doing a task for approval from others), (c) identified regulation (doing a task for its importance), and (d) intrinsic regulation (doing a task for enjoyment or interest). Based on this theoretical framework, we developed a scale to measure teachers' motivation in implementing project learning activity. The scale consisted of 20 items grouped in 4 subscales (i.e., external, introjected, identified and intrinsic). Confirmatory factor analysis on data from 182 Chinese teachers from eight secondary schools in Hong Kong supported the four-factor structure of the scale. Results of 1-dimensional Rasch analysis using the Winsteps programme suggested that the response categories functioned well and there was more than one dimension to the data. When the data were subjected to a 4-dimensional Rasch analysis using the Conquest programme, it was found that the data fitted the model well. Overall, the teacher motivation scale was found to be reliable and valid. This instrument provides important resources for the schools that implement project learning activity.