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## Rasch多向度模式檢核「國小數學問題解決態度量表」(MPSAS)之心理計量特性

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### 摘 要

「數學問題解決態度量表」係以連結數學課程中問題解決能力為目的，依據「古典測驗理論」編製之工具，惟有鑑於「古典測驗理論」建構之量尺在達到客觀測量上有其限制，故本研究以Rasch多向度模式重新檢驗「數學問題解決態度量表」之計量特性。研究對象為參與數學實作評量計畫之275至323位國小三、五年級學童。研究者從向度結構、評定等級結構（等級之階層、間距及契合）、測量恆等性（性別、年級及實驗處理「差異試題功能」、實驗前後構念結構一致性）、試題契合與適切、與外在變項關係（聚斂／區辨相關、實驗研究）及信度等，分析「數學問題解決態度量表」之計量特性；結果顯示，在五因素相關模式、四等級量尺及PCM估計參數的情形下，數據支持「數學問題解決態度量表」建構之變項符合客觀測量特性，且具理想信效度。本文對量表之應用與修訂、後續心理計量研究、Rasch與「古典測驗理論」之實徵比較提出討論與建議。

**關鍵詞：**數學問題解決態度量表、Rasch 多向度模式、信度、效度

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## **Using the Multidimensional Rasch Model to Examine the Psychometric Properties of Mathematics Problem-Solving Attitude Scale (MPSAS)**

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### **Abstract**

MPSAS, designed directly to measure the important aspects of problem solving specified in the mathematics curriculum, was developed with the CTT approach. Despite the satisfactory reliability and validity of the instrument, rating scale constructed by CTT has often been criticized for lacking the desired properties of an “objective measurement” therefore, the psychometric properties of MPSAS were re-examined with the multidimensional Rasch model. The sample of this study was 275 to 323 primary students who participated in a three-semester Mathematics Performance-and Portfolio-Assessment Project. Evidences regarding factor structure (comparison of various competing factor models), rating scale structure (hierarchy, distance, and fit of rating categories), measurement invariance (gender, grade and treatment DIF; stability of factor structure before and after the assessment experiment), item fit and item appropriateness,

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relationship with external variables (convergent/discriminant correlations, experimental study), and reliability were collected, and the results supported that the underlying trait defined by MPSAS holds the characteristics of an “objective measurement.” Discussions and suggestions with respect to scale application and revision, future research on psychometric properties, and empirical comparison between CTT and Rasch model were provided.

**Keywords:** mathematics    problem-solving    attitude    scale    (MPSAS),  
multidimensional Rasch model, reliability, validity

