

**Meeting:** 1003, Atlanta, Georgia, MAA CP O1, MAA Session on Teaching and Assessing Problem Solving

1003-O1-1104      **Kyoko Suzuki\*** (ksuzuki@ge.ce.nihon-u.ac.jp), Aza-Nakagawara 1, Tokusada,  
Tamura-machi, 963-8642 Koriyama, Fukushima, Japan. *Measuring the Process of Thinking in  
Problem Solving: The Use of MARC (Mathematical Reasoning and Communication) Scale.*

A new measurement instrument called MARC (Mathematical Reasoning and Communication) scale will be introduced in terms of how the scale was constructed to quantify the qualitative traits of cognitive levels with global standards as well as how the score can be interpreted to provide the information about teaching and learning. Cognitive constructs and skill-level continua in the MARC are determined based on the data collected from more than 1000 high school or college students. Categories as dimensions in the scale are identified by well-known literature. Tasks are taken from algebra at the precalculus level. Participants include 234 college students in the Midwestern USA and 200 in northern Japan. The MARC scoring grid consists of five categories by four skill levels. The categories include conceptual knowledge, procedural knowledge, reasoning and strategies, maturity, and communication. This scale can differentiate the middle levels of solvers with multiple aspects, which diagnose students' understanding levels. Japanese students tend to be polar, versus American students distributed widely. (Received October 04, 2004)