

## **Assignment: Statistical model for your example**

### **Statistical Modeling in MSPAP**

- What are the student model variables in the measurement model?

MSPAP have six content areas: Reading, Writing, Language Usage, Mathematics, Science and Social Studies. Each content area has several outcome scores concerning different aspects of that content. The nature of skill and knowledge being assessed in MSPAP constitute these 28 variables, which are referred as Maryland Learning Outcomes. The scale scores for these variables are categorized into 5 Proficiency Levels, which describe what students at a particular level generally know and can do in relation to the Maryland Learning Outcomes. I think the Outcome variables and the Proficiency variables are all SM variables. Scale scores are not comparable across grade levels or content areas while Proficiency level descriptions were developed to help bring meaning to scale scores and to guide interpretation for school performance and improvement

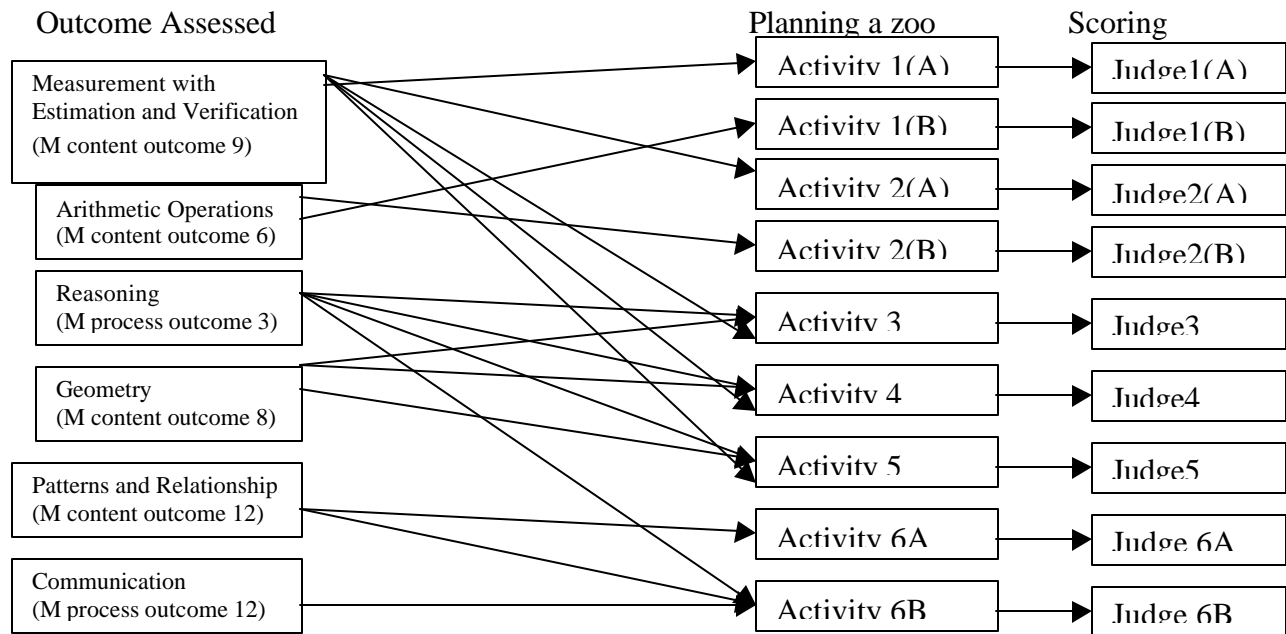
- What are the observable variables?

Since MSPAP are open-ended tasks, teachers score the questions by catching key points and reasonable explanations for each question. Tasks in MSPAP require students to respond to questions or directions that lead to a solution of a problem, a recommendation or decision, or an explanation or rationale for the responses. Some tasks assess one content area; other tasks assess multiple content areas. Examinee's work product are captured by the scorer and processed to get a value for each given question. (The highest score point is reserved for excellent responses. A score of "1" always means "at least satisfactory." while 0 represents not yet satisfactory). The evidence-accumulation is adding up these related values through the Bayes mechanism.

- Example--- Planning a zoo

The task "planning a zoo" asked the students to do 9 activities, creating an opportunity for them to demonstrate their abilities of applying Math knowledge to real problem and

their “high-order” mathematical thinking process. Their counterpart variables in student the model are 6 Math content outcomes, shown as follows.



Notes: M means Maryland Learning Outcomes

The scoring accuracy is taken into account in MSPAP, shown in the graph as variables “judge”. So the observable variables are Judge1(A) ...Judge 6B for respective questions. Knowing the scorers’ accuracy parameter, we can get a value about the student performance for each activity. Through the Baye’s network, we can infer (reason backward) the outcome score for certain kind of “high-order” math ability based on the value we believe the students achieve for their performance.

- How is SM variables in MSPAP related to the psychological model?

The nature of skills or knowledge being assessed in MSPAP is the quality of students’ cognition, not just tapping the “facts” in their mind. Thus, the SM variable in MSPAP concerns with “How much they can apply what they know to solve problems, reason, explain, recommend, and displaying other “high order” thinking skills”, not only “How

much they know the facts”. Based on that, SM variables need evidence from student’s work product to demonstrate such abilities. They require constructing a test with richness of process, with questions tapping high level thinking skills in addition to basic knowledge and with scoring tools looking at the features that provide such evidence to us. From identification and accumulation of such evidences, we are able to make inference about SM variables.