MSP-Motivation Assessment Program (MSP-MAP)

Tools for the Evaluation of Motivation-Related Outcomes of Math and Science Instruction

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www.mspmap.org

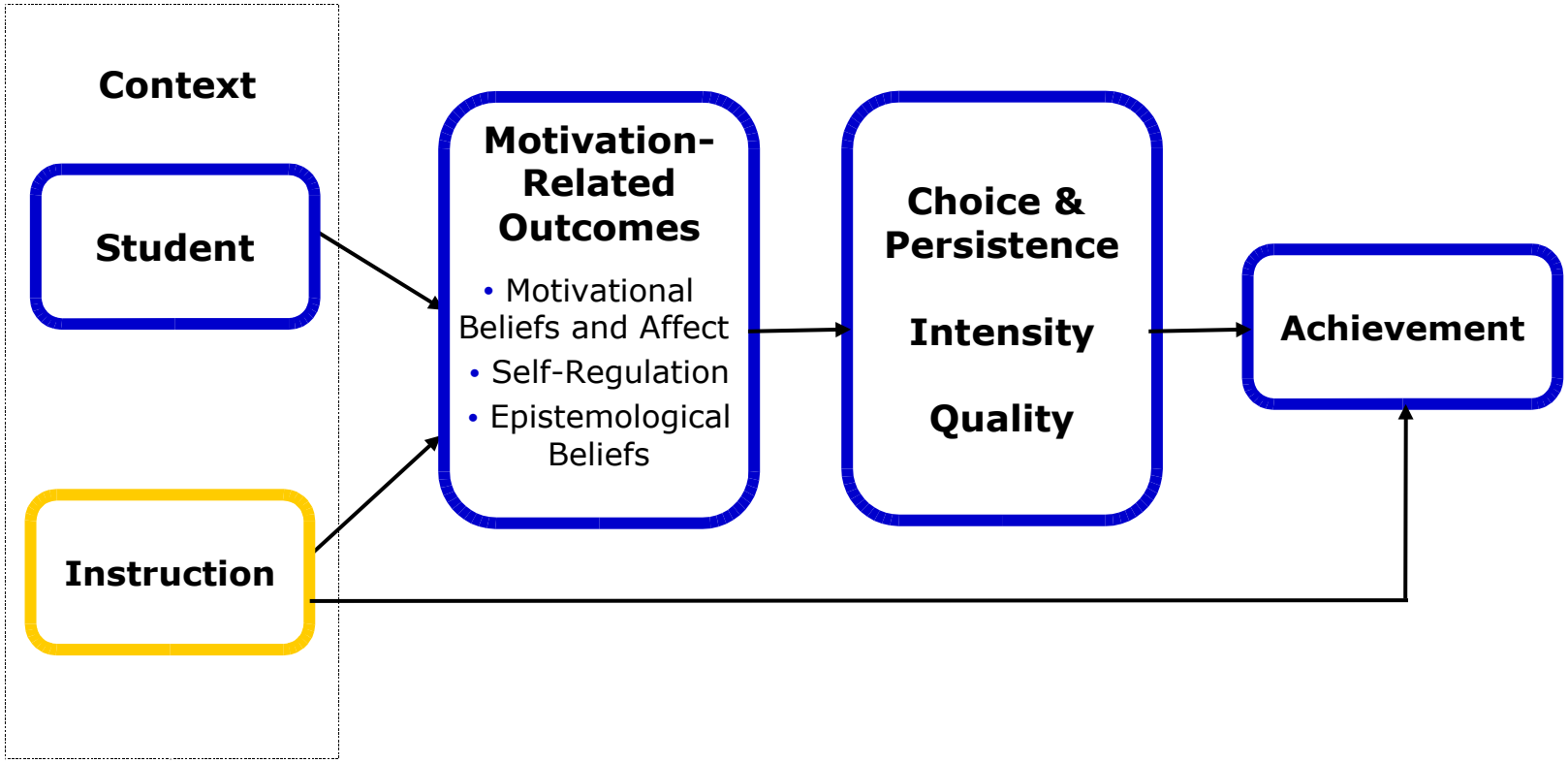
MSP-MAP Goals

- Develop and make available reliable, valid, and practical tools to assess a variety of motivation-related student outcomes in math and science
- Increase MSP and teacher understanding of how motivation-related outcomes contribute to student achievement in math and science
- Assist teachers and MSPs by providing information about how these outcomes may vary depending on students' gender, age, ethnicity, or economic circumstances

Outline

- General approach to motivation
- What are "motivation-related" student outcomes?
- Why are they important?
- What is their connection to math and science and MSPs?
- MSP-MAP
  - Timeline
  - Advisory structure
  - Possible future directions

General Motivational Framework



Why Motivation-Related Student Outcomes?

- Motivation-related beliefs and strategies can influence learning and achievement
- Changes in motivation-related outcomes can precede changes in student achievement
- Motivation-related outcomes can affect students' persistence and pursuit of careers in math and science
- The effectiveness of instructional interventions may not be fully recognized when motivation-related outcomes are not assessed

Motivation-Related Outcomes

- Motivational Beliefs and Affect
- Self-Regulation
- Epistemological Beliefs

Motivational Beliefs and Affect

- Competence-Related Beliefs
- Task Value Beliefs
- Interest
- Achievement Goals
- Positive & Negative Affect

Competence-Related Beliefs

- Students' judgments about their ability and confidence to perform adequately
  - in school
  - in math and science
  - on specific math and science tasks
- Consistently found to positively predict learning and performance outcomes even after controlling for prior knowledge

Task Value Beliefs

- Includes students' beliefs about the *utility* and overall *importance* of math and science as an area of study
- Shown to positively predict future course enrollment, pursuit of math and science-related careers

Interest

- An individual's attraction to, liking for, and enjoyment of a specific activity or domain (e.g., math & science)
- Related to deeper cognitive engagement, self-regulation, achievement, and career choice

Achievement Goals

- Represent individuals' purposes when approaching, engaging in, and responding to math and science instruction
- *Mastery* goals
  - Focus on learning and understanding
  - Positively related to use of deeper cognitive strategies, higher levels of interest
- *Performance* goals
  - Focus on outperforming others
  - Generally less adaptive, can result in poor study strategies, self-handicapping, defensive attributions

Positive and Negative Affect

- Positive affect
  - E.g., happy, calm, excited, joyful
- Negative affect
  - E.g., anxiety, fear, hopelessness, sad, tired

Self-Regulation

- Self-regulating students
  - Reflect on their own thinking
  - Make goals and plans for their learning
  - Monitor their progress towards goals
  - Adjust or regulate their thinking and learning
- Includes
  - Cognitive and metacognitive strategies
  - Strategies for regulating motivation
  - Strategies for regulating behavior/context

Epistemological Beliefs

- Core beliefs about the nature of knowledge and the process of knowing
  - Simple vs. complex
  - Stable vs. changing
  - Justification of beliefs
  - Authority
- Nature of Math and Science
- Related student beliefs about learning and teaching (e.g., Is learning quick and easy?)

MSP-MAP
Research Methodology

- Appropriate survey and sampling techniques
- Scaling techniques (e.g., Rasch modeling, exploratory and confirmatory factor analyses)
- Multivariate correlational designs and analyses
- Structural Equation Modeling (SEM)
- Hierarchical Linear Modeling (HLM) where appropriate

Year 1

- Instrumentation
  - Review and analyze existing instruments
  - Adapt existing instruments to the needs of MSPs
  - Create new instruments as needed
- Establish partnerships with MSP sites
- Join and interact with the MSP network
- Build infrastructure and capacity for Year 2 data collection and Year 3 dissemination

Year 2

- Test and validate measures with a large sample of students across three general age/grade ranges: upper elementary (grades 3-5), middle school (grades 6-8), and high school (grades 9-12).
- Collaborate with MSP sites and their evaluation programs
- Archive data

Year 3

- Disseminate the toolkit of instruments and scales to MSPs
- Work with MSPs to create customized hardcopy scannable forms they can duplicate, administer, and return to MSP-MAP for processing, scoring, and feedback
- Host online web versions of surveys

MSP Capacity Building

- Improved tools for the assessment of motivation-related beliefs capable of national (and international) dissemination
- Personnel capable of providing technical assistance with motivation in mathematics and science
- Technological systems for efficient processing and dissemination
- Data archiving

Local Advisory Personnel

- Mathematics
  - Ed Silver - *University of Michigan*
  - Joanne Caniglia - *Eastern Michigan University*
- Science
  - Elizabeth Davis - *University of Michigan*
  - Brian Coppola - *University of Michigan*

Possible Future Directions

- Improved measures of instructional contexts
  - Simple classroom observation systems
  - Student perceptions of the learning environment
- Teachers' beliefs about teaching, learning, and student motivation
- Student identity (e.g., as mathematician or scientist)

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