

## Session Information

# C<sup>3</sup>: Comparing, Contrasting, Connecting.... the NCTM Principles/Process Standards and Process Education

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**Session Type:** Interactive Paper Dialogue

### Abstract:

The National Council of Teachers of Mathematics (NCTM) Principles and Process Standards (1989) were based on similar beliefs about effective teaching and learning, and motivated by the same theories on teaching and learning that gave rise to Process Education (1994). A cursory survey of the NCTM principles and standards will reveal that they are similar, different and in places, embedded in Process Education. The NCTM Principles are intended to guide the instruction of teachers, especially their pedagogical attitudes and skills, and their classroom practice and include: (a) High expectations for all students; (b) A coherent, focused curriculum; (c) Learning presented as understanding as well as fluency with skills based on prior knowledge; (d) Effective mathematics teaching; (e) Assessment geared towards improving performance; and (f) Technology primarily used to develop understanding not simply to perform calculations. The basis for Process Education is reflected in items (a), and (d) of the NCTM Principles. Process Education is a philosophy that is based on the notion that learning is a process – a process all learners can improve. The NCTM process standards are (a) problem solving, (b) reasoning and proof, (c) connections (d) communication, and (e) representation. The process of learning is supported by both the NCTM Principles/ Process Standards and the Process Education philosophy. This qualitative study will use a Lesson Study Format to explore, examine trends and patterns in how teachers compare, contrast, and apply their understanding of, these critical principles and standards to improve videotaped lessons presented to them in small groups and in one of three academic content areas.

### AUDIENCE

This session will be valuable for any instructor considering infusing the tools and resources implicit in the essential use of the NCTM Principles/ Process Standards, such as effective questioning and formative and summative assessments, in improving and reflecting on lessons they will teach. Moreover, this session will be valuable to any participant wishing to learn how these process standards might be adapted in their discipline to promote conceptual, factual and procedural knowledge for their students

### THEME CONNECTION

Process Education is a philosophy that is based on the notion that learning is a process – a process by which all learners can improve. The process of learning is supported by both the NCTM Principles/ Process Standards and the Process Education philosophy. Learning to Learn, the heart of Process Education, focuses on how instructors can create environments, curricula, and activities (lessons) that students will find coherent, challenging, focused on understanding as a path to long-term learning and where assessment is intended to improve performance, not to punish or reward.

## OUTCOMES

The proposed key outcomes of this interactive session are:

1. The use of effective questioning as a reflective practice to advance research and performance.
2. The use of a professional learning community to support and promote growth in practice and research.
3. The use of the NCTM Principles/Process Standards to improve teaching across the curriculum

## SESSION PLAN

1. Welcome and Introduction - participants will take (a) a researcher-modified **TEACHER BELIEFS AND PRACTICES PRE-SURVEY** and (b) will be presented with a problem emanating from a mathematics classroom and begin to share some ideas about how the lesson could be improved in their own classrooms.
2. Some of the major tenets of Process Education will be elicited from the participants, then the session facilitators will provide an orientation to the principles and standards of NCTM and Process Education.

### THINK----- PAIR----- SHARE

3. Compare and Contrast - groups will report out the results from their efforts to compare and contrast the NCTM Principles/Standards and Process Education.
4. Lesson Study - groups will collectively review one of three video taped lessons and discuss ways to use the NCTM Principles/Standards to improve the lesson along the lines of the goals of Process Education.
5. Closure and Feedback - Large group discussion about how, NCTM & PE principles and practices were used to improve their lessons. Due to time constraints the re-teaching characteristic of Lesson Study research will not take place, rather the group report out will have to be used as an indicator of the potential effectiveness of the 'changes'.
6. Individual prompts will take a researcher-modified **TEACHER BELIEFS AND PRACTICES POST-SURVEY** and provide responses to 3-4 journal prompts of their reflections on the use of the standards.

### I. WELCOME – Pre survey (10 minutes)

### II. GROUP EXERCISE : C<sup>3</sup> - (10 minutes)

Read over the attachments and in your group and compare and contrast the NCTM Principles & Standards with the tenets of Process Education. Select one person to report your findings. Use the form on the following page.

### III. GROUP EXERCISE part II (20 minutes)

**Scenario:** Look at the video-taped lesson on the iPad that you have been assigned.

**Implementation Plan:** As a group pose additional questions and activities to the lesson you have viewed that infuse the NCTM Principles and Process Standards into the lesson, so that the goals of PE can be obtained.

### IV. REPORT/ REFLECT (30 MINUTES)

**Report your findings to the attendees** (10 minutes)

Reflection/Post Survey (10 minutes)

**Questions/Answers:** (10 minutes)

NCTM Principle/ Process Standard	Tenets and Specifics of Process Education	
PRINCIPLES	Compare	Contrast
Equity		
Curriculum		
Learning		
Teaching		
Assessment		
Technology		
PROCESS STANDARDS	Compare	Contrast
Problem Solving		
Reasoning & Proof		
Connections		
Communication		
Representation		