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**Examining Pedagogical Beliefs About Teaching for Creativity: Converting STEM to
STEAM Classrooms**
by

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Abstract

This research brief describes a proposed research study on STEAM teachers' creative mindsets and the implications for teaching creativity in the classroom. This research brief includes a review of existing literature on STEAM education and creative mindsets, and introduces a proposed mixed methods design to examine the relationships among teachers' creative mindsets, pedagogical methods, and learning environments in STEAM classrooms.

Aim

The purpose of this research brief is to provide an overview of a proposed research study on the implications of teachers' creative mindsets on pedagogical approaches to teaching in STEAM classrooms. The study will examine the relationships among STEAM teachers' creative mindsets and the methods employed in the classroom to teach creativity and develop a creative learning environment.

Background and Problem

With global competition rising, educators have been expected to increase student interest in science, technology, engineering, and mathematics careers, as well as develop necessary 21st century skills like creative problem solving and critical thinking (National Academies of Sciences, Engineering, and Medicine, 2016; Partnership for 21st Century Learning, 2011). As a result, a new pedagogy has developed that aims to integrate the arts with science disciplines, introducing a new acronym known as STEAM (science, technology, engineering, ARTS, and mathematics) (Daugherty, 2013). Although some STEAM programs have shown to be successful in areas of student engagement, interest, and some 21st century skills, this ambiguous term has led to a variety of interpretations and a wide range of frameworks, structures, pedagogies, and learning goals (Liao, 2016).

Van Driel, Bulte, and Verloop (2007) explain that teachers' pedagogical beliefs impact their interpretations of curriculum, teaching methods, learning goals, and subsequent actions in practice. Established pedagogical beliefs do not change easily or quickly, resulting in many ineffective professional development trainings that introduce innovative teaching methods, theories, or new curricular designs (Van Driel, et al., 2007). Therefore, it should be no surprise that the introduction of the STEAM concept has propagated a variety of interpretations (Liao, 2016).

Contributing to the confusion is the concept of creativity as both a teaching methodology and a learning outcome of STEAM education (Jeffrey & Craft, 2004; Liao, 2016). Jeffrey and Craft (2004) explain that there are distinctions between teaching *creatively* (using materials and approaches to engage students) and teaching *for* creativity (developing students' own creative thinking abilities through interactions). While the

methods are not dichotomous, teaching *for* creativity is directly linked to developing student creativity by allowing the students to model the teacher's creative behavior in the classroom (Jeffrey & Craft, 2004; O'Brien, 2012). Teachers' behaviors are connected to their pedagogical beliefs about the process of learning, approaches to teaching, and development of a supportive learning environment (O'Brien, 2012). Therefore, in order to encourage and support student creativity in the classroom, teachers must be self-aware of their pedagogical beliefs about creativity.

STEAM is in its early stages of development with much confusion and disagreement over terminology and meaning of its intended design (Liao, 2016). Extant research explores creative mindsets, teaching for creativity, developing creative learning environments, and developing creativity through the arts; however, there is limited research that examines these combined concepts in STEAM education (Herro & Quigley, 2016). New research is needed to explore and identify teachers' interpretations of the STEAM approach, and understand the ways in which teachers' pedagogical beliefs are impacting the development of students' creativity and other 21st Century skills.

Methodology

Research Questions

1. What is the relationship between STEAM Teachers' creative mindsets and their pedagogical approaches to teaching creativity?
2. How do STEAM Teachers' creative mindsets impact the creative learning environment?
3. How do STEAM Teachers' creative mindsets influence students' creative mindsets?

Design

This proposed study will use a convergent mixed methods design in order to merge and interpret results from both quantitative and qualitative data (Creswell, 2015). A convenience sample of STEAM teachers will complete the Beliefs about Creativity Survey (BACS) in order to obtain scores on four factors: creative self-efficacy, creative identity, mindset about creativity, and desirability of creativity for academic and workplace success (Hass, Katz-Buonincontro, & Reiter-Palmon, 2016). A convenience sample of students will also complete the BACS, and appropriate statistical analyses and comparisons will be conducted (Creswell, 2015).

Qualitative data will be collected through classroom observations, semi-structured interviews with select STEAM teachers, and student focus groups from select STEAM classrooms (Creswell, 2015). The data will be coded and analyzed to determine the types of pedagogical approaches used in STEAM classrooms and structure of the learning environment.

The quantitative and qualitative analyses will be merged (Curry & Nunez-Smith, 2015) in order to understand the impact of teachers' pedagogical beliefs about creativity on STEAM teaching methods and learning environments.

Significance

In order for STEAM to evolve, research must explore the current interpretations of STEAM education, current teaching methods, and intended learning outcomes (Liao,

2012). As part of the process of growth, research is necessary in order to advance the quality of education in our schools. This study will provide the insight necessary to understand the impact of teachers' pedagogical beliefs on teaching creativity, the learning environment, and students' creative mindsets in STEAM classrooms. Further, this study will contribute to the limited research on STEAM, and begin to address the misconceptions of teaching creativity in STEAM classrooms.

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Author Biography

Elaine Perignat is a second-year doctoral student in the Educational Leadership Development and Learning Technologies program with a concentration in STEM education. Her research interests explore creative cognition and critical thinking, teaching for creativity, and pedagogical methods in STEAM education. She has recently completed a critical book review on STEAM instruction (in press) for the *Arts Education Policy Review*.