

**Stony Brook University
The Graduate School**

Doctoral Defense Announcement

Abstract

Factors that Influence Physics Participation throughout the Pipeline

By

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This dissertation consists of three studies that examined factors that influence physics participation throughout the pipeline. A qualitative phenomenological case study methodology was employed to analyze this problem through the lens of sociocognitive theoretical frameworks. Recommendations to inform policy and educational reforms are discussed.

Urban high school physics teachers in the U.S. are often in a position of isolation within their schools, due to limited physics access and participation. The first study explored the question of professional isolation and how it impacted two novice physics teachers during their induction years in urban schools. The development of their professional practice was analyzed over a seven-year timeframe. Data were collected through a series of interviews, observations, and informal discussions. The teachers reported pervasive feelings of isolation, minimal perceived success, limited professional agency, and a desire for collaboration. They also reported a lack of administrative support and meaningful feedback and mentoring. They sought their own networks for collegial planning and transitioned to new urban schools for improved conditions.

The second study focused on six undergraduate women to analyze factors that influenced their attraction and retention in the physics major. Participants were recruited from a university in the Northeast U.S. Factors that contributed to their self-determination and persistence included mentoring, introductory physics courses that focused on modern topics, research opportunities, and socialization. Conversely, negative gender stereotypes, expectancy of brilliance, lack of appropriate lab resources, and few female professors in the physics department emerged as hindrances that potentially influenced women's choices to participate in physics.

The third study examined the academic and career experiences of professional women physicists to propose strategies to recruit, prepare, and retain women in the physics community. Subjects included seven career women physicists with master's degrees in physics and doctorates in physics-related fields. Various latent constructs related to career interest and retention were identified, including early interest in physics and mathematics, recognition of the societal value of physics, and positive experiences with role models. Tensions in their career pathways were related to pervasive feelings of inadequacy, lack of social support, negative stereotypes, awareness of minority status, and struggles with work-life balance.

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