Special Seminar

presented by

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3:30 pm

Room 1315 Chemistry

Integrating Authentic Research Experiences into the Undergraduate Chemistry Curriculum: The Impact on Students' Affective Domain

Attrition rates in science, technology, engineering and mathematics (STEM) in the United States (U.S.) continue to be a national concern. Documented reasons for attrition include, but not limited to: content relevance, lack of interest in STEM courses, and the use of expository teaching method. To promote content relevance, nanoscience concepts were integrated into a Quantitative Analysis Chemistry Laboratory Course. The course is taken by STEM majors across different years—Freshmen to Seniors. The nano-chemistry modules were designed around guided inquiry-learning approach, collaborative learning, and real-world contexts.

A follow-up study examined 1) how students' perceptions about chemistry and science, their confidence in undertaking various chemistry tasks, and their perceptions about the learning environment and organization of the course changed as a result of the intervention modules; and 2) factors associated with the perceptions and the attitudinal change. A mixed methods explanations-model design was employed. Data were collected through questionnaires, classroom observations, and semi-structured interviews. Results showed significant improvement on students' perceptions and attitudes toward chemistry on specific items; more positive perceptions about the learning environment—favoring inquiry-based learning; and a significant improvement on general perceptions about the organization of the laboratory—favoring the nano-chemistry modules over the traditional experiments. Key factors that boosted students' perceptions and attitudes included novelty of the experimental topics, relevance of the nano-chemistry modular concepts to daily experiences, inquiry instruction, and integration of a wide array of chemical instruments. Detailed results and implications for practice will be discussed.