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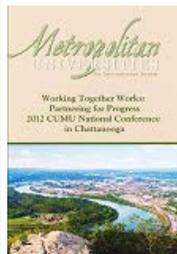
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Volume 24, Issue 1

17.4 - STEM Innovation and Dissemination: Improving Teaching and Learning in Science, Technology, Engineering and Mathematics

Just-in-Time Teaching

Gavrin, A.

Just-in-Time Teaching (JITT) is an innovative pedagogy that enables faculty to increase interactivity in the classroom and engage students in learning. By creating a feedback loop between students' work at home and the classroom setting, time on task is improved in both quality and quantity. This paper includes an introduction to JITT and evidence of its effectiveness. It concludes with a discussion of our efforts to disseminate JITT since it was developed in the 1990s.

Peer-Led Team Learning

Varma-Nelson, V

This article describes the Peer-Led Team Learning (PLTL) model of instruction and the critical components for its successful implementation and dissemination. It speculates about the future of PLTL and reflects on the lessons learned by the PLTL coalition as it evolved from a small consortium to a national network of about 160 faculty, fourteen hundred peer leaders and over fifteen thousand students from several disciplines, institutions and states.

The Case Study Method in the STEM Classroom

Freeman Herreid, Clyde

"Active learning" where students are required to do something in the classroom rather than simply listen to a lecture has been repeatedly shown to be superior to the lecture method in advancing student learning. The use of case studies in the classroom is one of the most successful active learning methods of teaching science, technology, engineering and mathematics (STEM). How this method evolved and is currently revolutionizing teaching has major implications for metropolitan universities where many students are non-traditional and at risk.

Process-Oriented Guided Inquiry Learning: POGIL and the POGIL Project

Moog, Richard S.

Recent research indicates that students learn best when they are actively engaged and they construct their own understanding. Process-Oriented Guided Inquiry Learning (POGIL) is a student-centered instructional philosophy based on these concepts in which students work in teams on specially prepared activities that follow a learning cycle paradigm. The POGIL Project is a professional development effort providing various types of support for undergraduate instructors interested in implementing a more student-centered approach in their classrooms.

Using Workshops to Improve Instruction in STEM Courses

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Connolly, Mark R.

Workshops are currently one of the most popular ways for instructors in STEM fields to learn more about teaching and learning. Yet research shows we often do not know what participants gain from attending. This article suggests ways of measuring impact of instructional improvement workshops that will help not only workshop providers with designing better workshops but also prospective participants with choosing workshops wisely.

Disseminating STEM Teaching Practices: The Role of Centers for Teaching and Learning

AhYun, Kimo

Centers for Teaching and Learning (CTLs) are established to promote teaching excellence. While CTLs are effective at fostering teaching excellence in the main, they have provided little attention to addressing potentially unique needs of STEM faculty. This article proffers explanations as to why CTLs do not focus on promoting STEM pedagogies and suggests ways that CTLs can assist in the dissemination of STEM best teaching practices.

Diffusing STEM Pedagogies: The Role of Opinion Leaders

Larson, R. Sam

Faculty may learn of new pedagogies through mass communication channels such as Web sites, journals, and workshops. Faculty are likely to be persuaded to try these new pedagogies, however, by interpersonal communication with an opinion leader. Using literature and exploratory data we contrast awareness and persuasion and suggest that opinion leaders in departments can play a critical role in the diffusion of STEM pedagogies. We conclude with actions administrators can take on their own campuses to promote adoption of STEM pedagogies.

Joining Evidence-based Innovations with Evidence-based Dissemination

Dearing, James W.

One of the benefits of an applied research funding program such as those within the National Science Foundation's Directorate for Education and Human Resources is the reading and referencing across fields of study and application of ideas from diverse literatures for common social good such as STEM teaching and learning. This benefit resonates across the articles in this issue of Metropolitan Universities. Chemists learn from education scholars and medical educators. Physicists learn from chemists and math education researchers. Education scholars learn from management scientists. Communication scientists learn from sociologists and cognitive psychologists. While specialists routinely build upon the work of others within their specialty, the present collection of articles reflects interdisciplinary sharing to a commendable degree.