

Postdoctoral Research Fellow

Theory-based Computational Analysis of Classroom Audiovisual Data

The Tennessee STEM Education Center (TSEC) at MTSU invites applications for a full-time, 2-year, postdoctoral research fellow. We seek a junior scholar with experience in in-depth qualitative analysis of video data and expertise in current research on mathematics education. Ideally, we would like a scholar with expertise in research on visuospatial and/or auditory aspects of STEM learning and interest in machine learning or computational methods.

The scholar will join a research project focused on developing new methods of analyzing video of STEM classrooms, funded by a National Science Foundation grant (DRL-1920796), Theory-based Computational Analysis of Classroom Audiovisual Data project - T(CA)². This grant project is a collaboration between the University of Illinois Urbana-Champaign (PIs: Drs. Stina Krist, Cynthia D'Angelo, Nigel Bosch), University of Tennessee Knoxville (PI: Dr. Joshua Rosenberg), and Middle Tennessee State University (PI: Dr. Elizabeth Dyer).

Project Description

The T(CA)² project aims to develop new methodological approaches to studying the visuospatial and auditory dimensions of mathematics classrooms and learning using video data, such as gesture, embodiment, movement, discursive tone, and prosody. The project will incorporate machine learning techniques (e.g., automatic detection of gesture, gaze, tone, speech, associating speech with specific speakers), computational methods (e.g., social network analysis, cluster analysis, classification), and human-centered analysis (e.g., qualitative coding, micro-analysis of video records, cross-case comparison) within the *computational grounded theory* methodological framework (see Nelson, 2017). A large-scale dataset of videotaped reform-oriented high school mathematics lessons from 10 teachers (with variation in pedagogical style, math content, and student population) will be used to develop these methods. The project will test the usefulness of these new methods by investigating empirical research questions, such as the nature of student-teacher interactions in math classrooms or the nature of student collaboration.

Job Responsibilities

The scholar will join a research team at MTSU led by Dr. Elizabeth Dyer. The position's main responsibilities will be to lead the human-centered analysis of mathematics classroom video and disseminate empirical research findings. This work will involve crafting empirical research questions about visuospatial and auditory dimensions of math classrooms, developing human-centered analysis procedures (e.g., qualitative coding schemes), and leading a team of research assistants to complete this analysis. Additionally, the scholar will collaborate with researchers leading the machine learning and computational methods components to provide feedback on the analysis plans and interpret analysis output to answer the empirical research questions. The scholar will be expected to lead the dissemination of empirical research findings about math classrooms and learning through conference presentations and peer-reviewed journal articles.

This position provides opportunities for the scholar's professional development and funded travel to present at national and/or international conferences. The position would also have the opportunity to participate in TSEC activities, including developing grant proposals and designing STEM outreach programs.

The position is a full-time, 12-month appointment with a salary of \$50,000 and benefits. Initial appointment is for one year with the possibility of extension for 1 additional year depending on continued interest, performance, and available funding. The position start date is flexible, sometime between March 1 and September 1, 2020.

Minimum Qualifications

- Terminal degree (e.g., PhD) in Mathematics Education, Learning Sciences, Educational Psychology, or a related degree by the time of appointment

Desired Qualifications

- Experience with detailed qualitative coding of video data
- Expertise in current research in mathematics education
- Expertise in visuospatial and/or auditory aspects of STEM classrooms or learning
- Interest in machine learning or computational methods
- Experience supervising or mentoring junior research assistants
- Experience presenting research at national conferences and writing manuscripts for peer-reviewed research journals in mathematics education

How to Apply

Applicants should submit a cover letter explaining interest in the project and relevant experience, a detailed CV, and one writing sample where the applicant is the primary author. The writing sample may include, but is not limited to: manuscripts, dissertation chapters, conference papers, book chapters, monographs, and research proposals. Reference letters will be solicited after applicants are selected for interviews.

Application review will begin December 6, 2019 and will continue until the position is filled. Applications must be submitted at: <https://mtsujobs.mtsu.edu/postings/8975>

If you have position specific questions, please contact Dr. Elizabeth Dyer at edyer@mtsu.edu.

About TSEC and MTSU

The Tennessee STEM Education Center (TSEC) is a research center aimed at improving K-20 STEM education. The center conducts STEM education research and fosters partnerships among educators, education researchers, STEM researchers, and policymakers through research and outreach projects in STEM education. In addition to full-time center directors and staff, the center supports MTSU faculty fellows and associate directors, postdocs, PhD students in the Math and Science Education program, and both graduate and undergraduate research assistants.

Middle Tennessee State University serves approximately 22,000 students and is located about 35 miles southeast of Nashville. It is a vibrant hub for educating students who are accomplished, civically engaged and globally responsible; an engine for research, innovation, and entrepreneurship; and a nexus of cultural, social, and artistic expression. The Mathematics and Science Education Program, housed in the College of Basic and Applied Sciences, has a strong track record of Discipline-Based Education Research (DBER) and houses the PhD program with concentrations in biological, chemical, mathematics, and interdisciplinary science education.