Overview:
The PSU College of Education recently awarded an internal grant to Brian Belland, in collaboration with Becky Passonneau, that will enable the preparation and analysis of pilot data related to our goal of automating meta-analysis using natural language processing and machine learning. For this project, we will hire one or more undergraduate students who will help us convert an existing meta-analysis dataset based on manual coding sheets to labeled data for training machine learning algorithms (Belland, B. R., Walker, A. E., Kim, N. J., & Lefler, M. (2017). Synthesizing results from empirical research on computer-based scaffolding in STEM education: A meta-analysis. Review of Educational Research, 87(2), 309–344. https://doi.org/10.3102/0034654316670999). The selected undergraduate student(s) will work together with Dr. Brian Belland, Associate Professor of Educational Psychology, and Dr. Rebecca Passonneau, Professor of Computer Science & Engineering, as well as graduate students from computer science and educational psychology. Belland and Passonneau have a strong track record of working with undergraduate research assistants, including co-authoring multiple journal articles and major conference presentations with multiple undergraduates.

Duties:
Converting pdfs of articles to plain text using existing software
Identifying sentences or sections in articles that provide evidence for meta-analysis coding decisions
Data cleaning by creating special-purpose scripts
Organizing and documenting the data format

Qualifications:
Minimum: Proficiency with excel; experience reading journal articles; strong work ethic; eagerness to learn

Preferred: Experience conducting meta-analysis or other systematic literature review approaches; experience coding data; experience presenting papers and/or publishing journal articles; experience with or interest in use of python for processing text

Semester:
Spring 2022

To apply:
Please send your resume and a cover letter, along with the names and contact information for three professional references (e.g., advisor, professor, supervisor) to Dr. Brian Belland at bbelland@psu.edu. Applications are reviewed as received and position is open until filled.

Grant abstract:
Meta-analysis is a critical tool to help synthesize the literature. It is also expensive and laborious, and produces effect size estimates that are outdated quickly, and which often do not reflect research on underrepresented populations. Our long-term goal is to create an automated meta-analysis system that can automatically search for literature,
screen, apply inclusion/exclusion criteria, code, and calculate effect sizes and run moderator analyses. In this pilot project, we want to determine optimal methods to create labeled data from an existing meta-analysis coding dataset that can be used to train natural language processing algorithms to code for education population, which can lead to faster dissemination of information critical to inclusiveness and interventions that benefit under-represented groups. Once the algorithms are trained, we will test their accuracy in coding articles when compared to how human coders coded the same articles. The pilot data will be discussed with a National Science Foundation program officer with whom I have already been in contact, and used to forge a $1.5 million proposal to NSF. Related proposals building out other components of the proposed automated meta-analysis system will be submitted, resulting in a total of $10-12.5 million in submissions resulting from this line of work.