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Project Number: 736952
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Institution: Michigan State University
Title: Analyzing Constructed Responses: Using Linguistic Software to Understand Students' Conceptions in Science
Type: Phase 1/Type 1 - Exploratory
Target Discipline: Interdisciplinary
Focus: Assessing Student Achievement

Goals & Intended Outcomes: We are exploring the use of computerized lexical analysis of students writing in large enrollment undergraduate biology, geology and chemistry courses as an alternative to multiple choice items to assess student thinking in these disciplines.

Methods & Strategies: We are pursuing multiple approaches to using linguistic analysis software for identifying conceptual categories in students' written responses and using that data to build statistical models of students' explanations.

Evaluation Methods & Results: We have multiple experts score student writing using rubrics appropriate to the questions and create statistical models from the lexical data to predict expert scoring. Across multiple studies, the models have inter-rater reliability (IRR) with human raters comparable to human-human IRR, generally in the .8 - .9 range. The lexical categories identified by the statistical models are consistent with the categories used by experts to rate the responses.

Dissemination: Four peer-reviewed conference papers, multiple poster sessions and 2 journal articles in preparation. http://aacr.crcstl.msu.edu to distribute the assessments, libraries, sample data, and tutorial materials.

Impact: The project is R&D to determine the feasibility of these techniques. We believe that the best way to broaden impact is to provide constructed response versions of Concept Inventories, since they address key disciplinary ideas identified by the disciplinary communities. We have pending proposals to provide a web portal where instructors can upload their students' responses to be analyzed and receive reports without learning these techniques.

Challenges: Developing the resources is time-consuming, but we are learning how to do so more efficiently by having weekly meetings with all of our researchers to compare challenges and document solutions. We are also developing shared resources and training materials for new researchers who join the project.

Breakout Session Topics: Introduction to Lexical Analysis of student writing. Looking for collaborators who are developing or using Concept Inventories or similar instruments who would be interested in using these techniques either as part of their initial inventory development or as an alternative to multiple choice inventories. Will share current results and lessons learned.

Breakout Session Category: Research and Assessment