

## **Revising a Large Question Pool for an Astronomy Class: A Collaboration Between Instructional Design Researchers and Astrophysicists**

We will begin our presentation by providing a brief overview of a collaborative research effort between instructional design researchers and instructors of a large-enrollment hybrid-format (with both F2F and online components) introductory course in astronomy at a large northeastern land-grant university. The goal of this collaboration is to develop a model that can be used to explain the relationship between learner variables (e.g., motivation, attitude toward science and astronomy, prior knowledge, achievement) and instructional variables (e.g., face-to-face v. online mode of delivery).

As a part of this project, instructional design researchers and astrophysicists from the astronomy and astrophysics department have been involved in comprehensive analysis of the questions that are used in this course. In particular, this team of researchers carried out comprehensive reliability analysis for all the instruments — a pool of questions that contains over a 1000 questions distributed over 12 quizzes and 5 exams. On the basis of this analysis the team prepared detailed reports with recommendations for the instructor for improving the quality of the instruments used in the course. During our presentation we will share the procedure that we developed to carry out this analysis. We will also share specific examples of questions that we identified as being poor. With the help of these examples we hope to be able to make a compelling case for item-level analysis. We believe that such procedures should be considered an integral part of the development of course material across all subject areas. During our presentation, we will also share the impact our intervention had on the overall quality of the instruments.

Finally we will report on an approach that we are developing to analyze and categorize the questions in the question bank. We have been using the revised Bloom's taxonomy and cognitive task analysis as a starting point for this analysis. Although this sort of analysis could be time consuming, it has instructional benefits which we will highlight during our presentation.