

Adapting the RBSEU Nova Search Project for Use in Intro Astronomy at Truckee Meadows Community College: A Case Study

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Abstract. This poster summary describes how the RBSEU Nova Search project was adapted for use in the introductory astronomy course at Truckee Meadows Community College. The summary discusses what the RBSEU Nova Search project is, motivations for including undergraduate research experiences in a non-majors astronomy course, and “lessons learned” in successfully implementing this project.

1. Summary of Poster C32

RBSEU is Research-Based Science Education for Undergraduates, a multi-institutional project led by faculty at University of Alaska, Anchorage and Indiana University. RBSEU goals include 1) teaching that the objective of science is discovery of new knowledge, 2) developing students critical thinking skills, and 3) positively impacting student attitudes about the role of scientific thinking in society.

Towards these ends RBSEU has created several projects that engage intro-astro students in genuine research experiences as an integrated part of their course requirements, and are easily adaptable by other instructors for their existing intro astronomy courses even though many intro astronomy instructors are NOT research astronomers.

What is the benefit of having students in introductory astronomy engaged in RBSEU projects? A decade of studies across STEM disciplines appears to indicate that students engaged in undergraduate research experiences have increased satisfaction with their undergraduate experience(1),(2), improved verbal and written communication skills(1),(2), and have increased retention and completion rates(1),(3) especially for low-achieving students(4).

In addition, students engaged in undergraduate research also appear to have improved critical thinking skills and a better understanding of the scientific process(1),(2). However, more work needs to be done to verify whether or not these last results are conclusive.

Given both the clear and potential benefits to students, the Council for Undergraduate Research advocates that all undergraduates have exposure to authentic research experiences and the earlier in a students undergraduate career, the better.

For my intro astronomy course at Truckee Meadows Community College (TMCC), I chose to adapt the RBSEU Nova Search project. In this project students search for novae in Andromeda, using new data generously provided by U. of Alaska astronomer,

Travis Rector. Specifically, students 1) discover novae by blinking time-separated images, 2) measure apparent magnitudes of novae candidates, 3) and analyze rates of decay for the discovered novae.

In doing so, students must self-assess the quality of their analysis and also grapple with the limitations in the data sets. For example, the reality of observational astronomy means that the supplied data sets come as clusters of two to three nights of sequential imaging separated by gaps of months or longer before the next round of imaging. And as a result, students must learn not to overstate conclusions suggested by a casual inspection of magnitude over time for their discovered novae.

To signal the importance of the RBSEU project to students, I weighted the Nova Search project at 20% of the final course grade. However, to really sell my students on earnestly participating in this project, I also spent time providing context to inspire and motivate students. For example I showed photos of Travis Rector working the night shift at Kitt Peak, gathering the data students would be using. I discussed the research objectives for looking for novae in nearby galaxies. And I emphasized the physical meaning of their data i.e. a new dot on their computer screens is a star that exploded.

I also emphasized for students that their efforts in the Nova Search project were legitimate and meaningful. For example, I made clear to students that they really were discovering new novae, and that their measurements would eventually go back to Travis and his team to use in his research. I also took time to explain how blink-comparison is still a place where the human brain can process data significantly faster than a computer can.

Finally, I took care to divide the overall project into smaller, more manageable activities for students, and made sure each activity was clearly defined often providing excel templates for students to complete. Intro level students appear able and willing to address open-ended research questions as long as the process for doing so is clearly defined.

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