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

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What is RBSEU?

RBSEU is Research-Based Science Education for Undergraduates, a multi-institutional project led by faculty at University of Alaska, Anchorage and Indiana University.

Project goals include ...

- Have intro-astro students engaged in genuine research experiences as an integrated part of course requirements.
- Make easy-to-adapt curricula so other instructors may incorporate research experiences into their existing courses.

... even though many intro-astro instructors are NOT research astronomers.

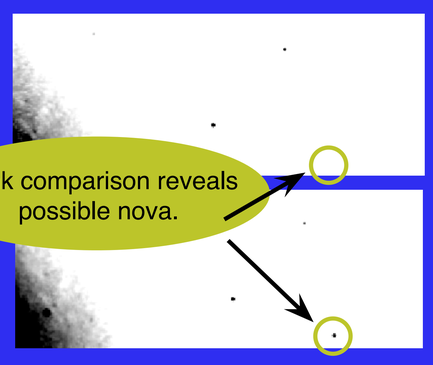
RBSEU Nova Search

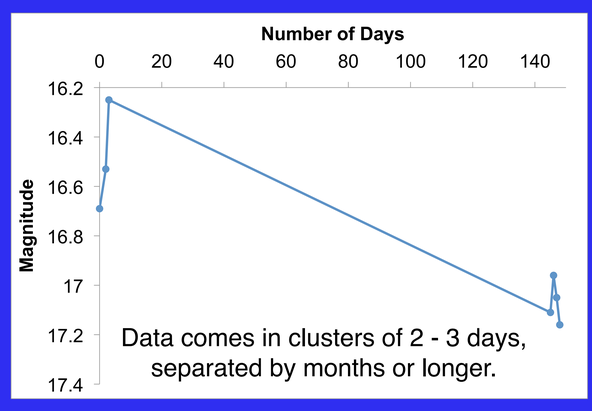
Students use real data and make true discoveries of new novae.

Students ...

- discover novae by blinking time-separated images,
- measure apparent magnitudes of novae candidates,
- analyze rates of decay for their discovered novae,
- self-assess the quality of their analyses,
- grapple with limitations in the data sets.

Students search for novae in Andromeda, using data provided by U. of Alaska astronomer, Travis Rector.





Why have Intro Astro students engaged in undergraduate research?

- Increased satisfaction with undergraduate experience.
- Improved verbal and written communication skills.
- Increased retention and completion rates - especially for low-acheiving students.
- Improved critical thinking skills.
- Better understanding of scientific process.

Some hints say "Yes", but more work needed.

And the earlier the better! Just keep details age-level and skill-level appropriate.

Bauer K.W., et al. Journal of Higher Education 74: 210-230 (2003).
Seymour E., et al. Science Education 88: 493-534 (2003).
Alexander, B. et al. Council on Undergraduate Research Quarterly 20(3): 127-133 (2000).
Nagda B., et al. Review of Higher Education 22: 55-72 (1998).

Tips for Implementing Undergraduate Research in a Course for Non-Majors

Inspire

- Share the story of how people collected the data.
  e.g. Staying awake all night on a mountain top, hoping for good skies and cooperative equipment.
- Discuss the research objectives.
  e.g. Do novae occur more frequently in different types of galaxies? What is the rate of novae production per year? etc.
- Emphasize physical meaning of data.
  e.g. A new dot on your screen is a star that has exploded!

Motivate

Explain to students how their contributions are ...

- Legitimate.
  e.g. Students are really discovering novae that no one else has seen before.
- Meaningful.
  e.g. Student efforts will be used in real research by real astronomers.
- Not Busy Work!
  e.g. The human brain is still faster than a computer in certain tasks.

Guide

- Project must be divided into smaller activities.
- Each activity must be tightly scripted and/or template driven.
  i.e. Questions can be open-ended, but process cannot be.

Example of responses from TMCC students.

"The project makes it [lecture notes] *make more sense"*

"I like that it's hands-on."

"I wish the whole class could be this way."