RUN LEARNING AND TEACHING AWARDS 2023

Name: Christopher Cummins, Matthew Collins & Matilda Thiele

Institution: Charles Sturt University

Title: Constructing & adopting a virtual observatory to connect the stars and improve student outcomes

Abstract: Physics education is centred on modelling the universe using mathematics. However, students in our Bachelor of Science program come from diverse backgrounds, resulting in varying levels of mathematical literacy and approaches to studying physics. This capstone subject challenges students with real-world physics examples, requiring them to apply advanced mathematical models to complex data. Assessments and feedback revealed that many students struggled to connect these mathematical concepts with physics and experimental data, often becoming overwhelmed.

To address these challenges, especially in an online setting where students lack regular access to physical telescopes, we introduced a “virtual observatory.” This included simulations that model varying equations and custom computer programs that allowed students to capture night sky images, access live data from databases, and analyse the collected. This suite of tools enabled students to connect theoretical concepts with practical applications.

The changes led to increased student engagement and a deeper understanding of stellar and galactic evolution, improving progression rates to 90.9% and positive student feedback to 95.8%. Students highlighted the virtual observatory as a key factor in achieving the learning outcomes.