Teacher Guide
Year 10 Science

AstroQuest is a citizen scientist research project designed in a gaming format. By participating, teachers and students will not only gain an insight into galaxies that populate our Universe, they will assist astronomers with an extensive research project.

Vast numbers of images are produced from largescale sky surveys - too many for the scientists to check manually. Computer algorithms are developed but they need to be taught how to read the images correctly.

Citizen scientists will assist astronomers in examining images to check on the results provided by the computer. The astronomers will use the results to refine the computer models used in the AstroQuest project leading to improved models of star formation and galaxy evolution. The evidence gathered will allow astronomers to further refine the story of the origin and formation of the Universe from the Big Bang to the present day.

See overleaf for links to the Australian Curriculum: Science (Year 10).

Purpose

- To engage students in a citizen science research project
- To expose students to the nature of science as human endeavour

Outcomes

Students:

- understand that different parts of the electromagnetic spectrum carry different information about the galaxies that make up the Universe
- understand that galaxies undergo evolution in the Universe and that this process continues today
- recognise that evolutionary processes such as collisions disrupt galaxies
- assist astronomers in inspecting far-away galaxies
- gain an appreciation of the large distances involved in the Universe
- appreciate the amount of data and the number of scientists and engineers involved in the AstroQuest project.

Getting started – Information for teachers

- There is comprehensive information and help available on the website.
- Once registered, you'll be presented with a short video tutorial by Dr Luke Davis. Luke is one of the many project scientists for AstroQuest. He provides a valuable insight into the project. From there, follow the prompts.
- Each webpage has helpful tutorials and information available via the 'i' icon.
- Click on the Help button in the top menu bar to return to the video and view FAQ's or ask your own question.
- Click on the Science button for background information about galaxies, the quest design and discoveries made by citizen scientists in astronomy.

Use the contact us form on the website if you would like some AstroQuest rewards for your students. We have seven different lenticular printed magnets featuring AstroQuest galaxies available.

Happy Questing!

Assessment

Student Assessment 1 (Science Understanding)

Select an interesting galaxy that you have examined from the 'My Gallery' section. Present a report on your galaxy as either a poster, PowerPoint or written report. In your report include distinguishing facts about your galaxy such as its composition, redshift, star forming rate, type, stellar mass and the information available from the different wavelengths of light gathered by the different telescopes.

Some questions to consider include:

- What is redshift?
- Does your galaxy show any signs of a merger or disruption from another galaxy?
- Is your galaxy still undergoing rapid star formation?
- Does your galaxy support the idea that galaxies and stars are still undergoing evolution?

Students assessment 2 (Science as a Human Endeavour)

Select one of the astronomers involved in the project and produce a report on their research and achievements. The findings could be presented as either a poster, PowerPoint or written report. In your report include a discussion of the importance of scientists, engineers and information technologists working together in large teams and how the use of computer modelling assists in large-scale data processing.

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Links to the Australian Curriculum: Science (Year 10)

Science understanding concepts include:

Earth and space sciences: The universe contains features including galaxies, stars and solar systems, and the Big Bang theory can be used to explain the origin of the universe (**ACSSU188**)

- describing how the evolution of the Universe, including the formation of galaxies and stars has continued since the Big Bang.

Science as a human endeavour concepts include:

Nature and development of science:

Scientific understanding, including models and theories, is contestable and is refined over time through a process of review by the scientific community (**ACSHE191**).

- recognising that Australian scientists such as Brian Schmidt and Penny Sackett are involved in the exploration and study of the Universe.

Advances in scientific understanding often rely on technological advances and are often linked to scientific discoveries (**AC SHE192**).

- recognising that the development of fast computers has made possible the analysis of radio signals and other data.
- considering how computer modelling has improved knowledge and predictability of phenomena
- researching examples of major international projects
- considering how information technology can be applied to different areas of science such as the Square Kilometre Array.

Use and influence of science:

People use scientific knowledge to evaluate whether they accept claims, explanations or predictions, and advances in science can affect people's lives, including generating new career opportunities (**ACSHE194**)

- recognising that the study of the Universe and the exploration of space involves teams of specialists from different branches of science, engineering and technology.
- considering how the computing requirements in many areas of modern science depend on people working in the area of information technology.

Values and needs of contemporary society can influence the focus of scientific research (**ACSHE230**).

- recognising that financial backing from governments or commercial organisations is required for scientific developments and this can determine what research is carried out.