

Space Mission: Ice Moon

The Space Mission: Ice Moon project puts pupils in the roles of scientific experts in an Emergency Response Team after a disaster in space. Working in teams in the classroom, up to 30 pupils use video-conferencing facilities and interactive materials to help resolve the disaster. They must use and develop all their skills as scientists, mathematicians, planetary geographers and communicators.



Partners

National Space Centre
Futurelab



Technology

Broadband video-conferencing
Flash user interface
Flash Media Server

Outline

Orbiting around Jupiter, Europa is a small moon with a large reputation. Completely encrusted by ice that experts believe is up to 100km thick, this dark, frozen moon may be one of the only places in the solar system, other than Earth, where life is possible. An immense liquid ocean is predicted to exist beneath the ice, where microscopic life-forms may be thriving. But Europa is also exposed to Jupiter's huge gravitational field and radiation, making it an incredibly hostile environment.

An international team of astronauts has landed on Europa to establish a base inside its thick ice crust. But during a routine expedition the astronauts lose their bearings. As oxygen runs low, radiation levels soar, and ice caves collapse around them, they contact base camp for assistance...

The project makes full use of broadband capacity, including video-conferencing, continuous data streams, video footage of the astronauts, and communications from the base station's computer avatar, to create an experience in which pupils act as scientific experts during a space emergency.

The 90-minute experience is led by a Mission Commander who communicates with pupils in the classroom via video-conferencing and web chat. Playing the one astronaut left in the base, the Commander guides the pupils to implement their rescue plan. The Commander also controls the progress

and challenge level of the mission, initiating additional extension events, showing video of the astronauts and avatar and providing feedback and prompts where necessary.

The mission calls for pupils to undertake a set of cross-curricular activities, using scientific, geographic, mathematical and communication skills. Pupils have to analyse data from mapping equipment, calculate oxygen consumption and carbon dioxide poisoning, monitor and update health profiles, analyse ice vibration data, and communicate their findings with each other, the Mission Commander and the astronauts.

Pupils must learn to work together in order to rescue the imperilled astronauts before they die from oxygen starvation, radiation sickness, or from being crushed in the cold, dark caves in Europa's ice crust. For 90 minutes pupils become experts with the responsibility for saving lives in their hands.

Learning and Research Objectives

The project is intended for 11-16 year old pupils. Each mission involves between 18 and 30 pupils at a time, and promotes working with scientific, geographical and mathematical data, as well as speaking, listening, presentation, reasoning and team-working skills.

The overarching aim of the project is to enable pupils to 'work as scientists', engaging with scientific ideas and

practices as they take on the role of the Europa astronauts' Emergency Response Team.

The following key learning intentions were investigated during this research project.

- 1 To engage in scientific problem-solving, understanding science as a process of inquiry.
- 2 To evaluate, interpret and analyse evidence and understand its limitations.
- 3 To work collaboratively to achieve larger aims, understanding science as a collaborative activity.
- 4 To develop skills of scientific literacy.



Astronaut route map



Navigation team in action

Research and Development Process

This project was developed from an existing e-mission, Operation Montserrat. Futurelab worked closely with partners at the National Space Centre to develop the scenario, activities, user experience and user interface for Space Mission: Ice Moon. An expert glaciologist was consulted to ensure accuracy of information on ice phenomena and a professional television writer was recruited to elaborate the story into scripts for pre-recorded video scenes of the astronauts.

The National Space Centre and Futurelab held workshops with pupils and teachers to test and improve the concept. Year 8 pupils were involved in evaluating and developing the story, while a team of practising science teachers collaborated on planning and detailing the activities. In 2005 and 2006 final trials with almost 100 pupils aged 12-14 took place in secondary schools and City Learning Centres.

Contacts

Futurelab: Hans Daanen,
hans.daanen@futurelab.org.uk
National Space Centre: Education
team, education@spacecentre.co.uk

Preliminary Findings

The video-conferencing and broadband technology supported the pupils in taking on their roles as members of the Emergency Response Team. The immediacy of communicating directly with the Mission Commander via video-conferencing and watching video of the astronauts as if in real-time provided an authentic and relevant context in which pupils could imagine they really were scientists responsible for the lives of astronauts. Their imaginative engagement with the scenario gave the mission a sense of urgency and purpose; pupils were engaged throughout the mission. Space Mission: Ice Moon therefore also strongly supported pupils in their scientific endeavours of analysing and interpreting evidence and working to save the astronauts' from their dangerous situation.

Pupils took their responsibility for saving the astronauts very seriously and they adopted a problem-solving approach to the mission. They broke the mission down into smaller problems and questions, planning strategies, identifying relevant resources and information, taking decisions and identifying subsequent problems and questions. Through this process they engaged with science 'from the ground up', as a process of obtaining and interpreting evidence to create explanations. Pupils were enthused and engaged throughout the mission and felt a great sense of achievement when they had successfully saved the astronauts.

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Supported by:



Futurelab
1 Canons Road
Harbourside
Bristol BS1 5UH
United Kingdom

tel +44 (0)117 915 8200
fax +44 (0)117 915 8201
info@futurelab.org.uk
www.futurelab.org.uk