University of Central Lancashire with the International Astronomical Union OAD

Touching Space – Accessible Astronomy

Project Report 2017

Introduction

The Touching Space project was awarded funding by the OAD, with the aim of bringing astronomy to both children and adults with visual impairments and other forms of disability. Through the use of sensory activities designed to provide a different approach to learning that does not rely on the traditional visual side of astronomy, the Touching Space project introduced those who previously would not have been able to interact with such a science and brought it to life.

Touching Space was proposed and run by undergraduate students from the University of Central Lancashire (UCLan) who worked with local charities Galloway's Society for the blind and Action for Blind People (which is now merged with the RNIB). The project ran with guidance and support from external organisations such as the UCLan Physics Society, Aerolite Europe and The Space Collective.

Activities Implemented

Over the course of the project, Touching Space collaborated with Galloway's and Action for Blind People to bring activities to those who these charities support, in the most accessible way possible. A key part of our proposal to the OAD was providing the experience to multiple age groups, and this was achieved by our work with these charities.

Galloway's allowed for us to meet adults with a range of visual impairments and undertake an astronomy club which met on an evening for a talk which had an emphasis on descriptive language, the use of sound such as those recorded during meteor showers and asteroseismology (the sound of stars), and the use of tactile materials. The Space Collective donated to the project a wide range of resources such as Buran shuttle tiles, parachute fragments from Soyuz spacecraft, thermal insulation from the space shuttle program and numerous patches from the Apollo program. These, along with meteorites from Aerolite Europe allowed for the explanation of atmospheric re-entry of spacecraft, the interaction of meteors with the atmosphere and why meteor showers occur, the composition of planets such as Earth and Mars and how they differ from the gas giant planets and also allowed us to give away some of the smaller Buran tiles for people in the group to keep.

Sitting as a group and having a discussion about these things allowed for people to ask questions in a safe environment of things they are unable to observe but are able to wonder about. Answering their questions was one of the most fulfilling parts of the project, as the wonder of space was well and truly present.

A donation from Scopes4SEN (http://patrickpoitevin.weebly.com/scopes4sen.html) (Scopes for Special Educational Needs) meant that both Galloway's and Action for Blind People had access to a telescope during the project. To ensure this was made accessible to those with visual impairments, a CCD camera was inserted where the eyepiece of the telescope should sit and linked up to a projector which showed the image on a screen. Then the contrast could be changed and the colour inverted to allow those with such visual impairments to look at either a laptop or projector screen and see more clearly the object the telescope was focused on.

At the Lancashire Science Festival in 2016, Action for Blind People after meetings with the Touching Space Project Team were able to attend and bring along a group of children with visual impairments. They visited the stand at which Touching Space, along with the UCLan Physics Society, had set up various activities to do with space science and astronomy. These included the use of robotic arms to complete a simple task like those the Canadarm performed on the space shuttle, using a thick pair of gloves to experience how an astronaut feels trying to perform repairs on EVA (Extra Vehicular Activity), firing air rockets and using a microscope projected on a laptop to examine moon rocks.

The feedback we received from this event was very positive, particularly as some of the school children who also visited the science festival brought with them some children with visual impairments. The range of activities provided was diverse enough to provide a fun and engaging introduction to space and astronomy. The Touching Space team will again be at this event in 2017 to provide more hands on and sensory activities.

The John Muir Award is something that Action For Blind People offer their young people, as an extra qualification they can work towards through the charity. It is an environmental award scheme and as astronomy deals with topics such as light pollution and makes us aware of our surroundings, the Touching Space team attended one of their residential trips at Castlehead Field Centre in the Lake District to host a star party.

This event was made up of 16 students aged 14-17 all with varying levels of visual and motor impairment and learning difficulties. After a short talk on the basics of astronomy, the floor was open to questions from the young people, before the room was split into smaller groups and the sensory resources were used to explain things such as meteor showers, how spacecraft work, how the moon feels and how Mars would feel.

Over a 3 hour session, materials from The Space Collective and Aerolite Europe were passed around the room while a braille star chart donated by NASA Goddard was used to explain to those who were able to read braille about the scale of the solar system, facts about the planets and stars and encouraged more questions.

The feedback from Peter Inman, the lead for the Action for Blind People residential was as follows:
"*We also had a group of undergraduates from Preston University (UCLan) who ran a "Touching Space" programme which ran a space club which they could adapt for our visually impaired group. Jasmin Evans and her colleagues arranged to run a short workshop on the Friday evening of our October residential. Bringing along a sample of telescopes, star charts and space rocks and meteorites, which the young people and staff found very interesting. It was well adapted and engaged everyone in the group it involved discussions and exhibits indoors and a selection of telescopes both inside and outside. This was additional to our set evening programme and left the group discussing the evening and the possibilities of space for the rest of the weekend. For many of them it was the first chance to look at the stars and discuss space."*

Jake, 16 attended this event and gave the following feedback:
"Hi I'm Jake. I am registered as Blind or Severely Sight Impaired and have been since birth. My eye conditions are Glaucoma, Aniridia, Nystagmus and Retinitis Pigmentosa.
I applied to go on the Vision England project as there were others going who I already knew, and I thought it would be fun.
My favourite activity was the Astronomy workshop. Students from a local Uni came and we got to hold rocks which had come out of meteors and we had a go at using the telescope. I enjoyed helping others who couldn't see at all by describing the stars. We had a questions and answers session about Space and they told us how we can get involved and what courses are available at Uni."

Andrew, 14 also attended the event and gave this feedback:
"My Name is Andrew I am 14 years old and I was lucky enough to be a participant on the scheme of Vision England and have been involved in all three residential of year one of the five year project. Activities were not just physical which is a great change, they're are activities which involve being creative, which also requires you to put yourself out there within the group which is sometimes hard in a new environment with new people but everyone encouraged, supported and helped each other to have a great time. Another great activity within Vision England was the workshop on your "Touching Space" which helped us to discover space and look at the stars. Jasmin talked about space

and meteorites and even brought some braille star charts which I was able to read. We all asked a lot of questions and Jasmin and her colleagues took time to explain to us and to touch space rocks and meteors. We went outside using telescopes the rest of the group described to me what we were looking at. This really opened my mind to the vastness of space.
My experience of Vision England as a participant in summary was a great experience, where in that time we experienced lots of different activities and experiences, like above the "Touching Space" were you were able to enjoy activities in a supportive environment which I could not have done otherwise and feel safe, and connect with my peers in an instance where you don't feel you have to put a guard up to be completely yourself."

Again through collaboration with Action for Blind People, a one day workshop style event was held at UCLan. We welcomed 43, 4-17 year olds again all with varying levels of visual and motor impairment and learning difficulties.

As this was a large group, to ensure that we could talk to the students one to one we asked for the names of each student and volunteer to be printed both in large print and in braille so that the name cards could be attached to a lanyard and students who were blind could still read our and their peers names.

The group was split into two, with the first group going to visit the UCLan Alston observatory for a tour and planetarium show, and the other taking part in a rotation of four different stations with hands on activities.

Each of the stations was staffed by two volunteers, and had different themes of astronomy, comets and meteorites, spacecraft and robotics. Crib sheets were provided to volunteers for each of the areas, with guidance on the activities and how to approach the students to best gain their trust and engage them in the activity.

For the astronomy station, there was a solar system tape measure where the students would walk along guided by a volunteer and stop at the points of each of the planets of the solar system along with an explanation of what it was like. This allowed the students to be hands on and experience the scale of the solar system. There was also an inflatable universe ball to explain the origin of the universe and difficult concepts such as cosmology along with videos.

At the comets and meteorites station, there were loupes (which students with visual impairments already have experience of as they use them in their everyday lives) to examine meteorites and point out features, a USB microscope linked to a laptop for the magnification and change in contrast of images of meteorites under the microscope. The students were encouraged to hold, feel and smell the meteorites in comparison to terrestrial rocks, and then use magnets to decide which was which. There was also a bowl filled with sand and topped with flour, in this activity the students could drop the rocks into the bowl and feel for the craters created by the impact and hypothesise on what would change the size of the crater before testing their theory. With some meteorites hidden slightly under the surface they were also able to use magnets to 'hunt' for meteorites.

In the spacecraft section we used headsets to play audio loops from mission control during different missions, and asked students to tell us what they could pick out from the recordings. Using spacecraft materials from the Space Collective, different missions and spacecraft were explained to students and they had the opportunity to examine all of these and ask any questions. We also explained how rockets work with videos, used the mentos and coke experiment to show the chemical reactions in a rocket and 3D printed models of spacecraft, and both Moon and Mars

surface craters. The Principia mission was also discussed, as students were very aware of this having taken part in school activities surrounding the mission.

For the robotics section, two robotic arms were used to show students how robotics is used in spaceflight for components such as the Canadarm. The students had the chance to control the arm for themselves and figure out how the controls worked to complete a small task. Using the Mars Science Laboratory '7 minutes of terror' video which explains the landing procedures that Curiosity undertook on its descent to Mars, the students asked any questions they had about Mars exploration and the possibility of life on the planet.

Challenges of project implementation and recommendations for future OAD funded projects

When working with children with visual impairments, a key point to remember is that they are very inquisitive and very capable – the activities that are undertaken must be challenging and pitched to the right level. Also a lot of the children that we worked with had disorders such as ADHD and as such they require a constant stream of activities as they find it difficult to concentrate on one thing for a long period of time.

To improve the events that Touching Space held, we would encourage a collaboration with some form of art and craft activity which would give students the chance to experience two different subjects and keep them busy and engaged when they have spent as much time as they would like to on one of the activities.

The setting is very important, there was a detailed risk assessment carried out by both parties for our events as we wanted to ensure the environment was as safe as possible. When planning activities bear this in mind, along with factors such as access for parents etc.