The best gift you can give yourself is a good education

“Everyone likes presents, the best gift you can give yourself is a good education” so says Astronaut Space Shuttle Commander Mark Kelly on his crew’s September tour of the UK. Mark Kelly is a veteran of three missions into space and Commander of last June’s STS 124 Mission to the International Space Station

STS 124 mission to the International Space Station

Mark together with Karen Nyberg, Mike Fossum, Ron Garan, Ken Ham and Akihiko Hoshide of the Japanese Space Agency form the crew of space shuttle mission STS 124 (Fig 1). The astronauts’ mission was one of NASA’s most complex operations. NASA described their space flight as ‘the nearest to a perfect mission’. The crew delivered to the International Space Station, ‘Kibo’ the Japanese Experimental module (Fig 2) and robotic arm and the mission involved three space walks. The mission also took a ‘Buzz Lightyear’ toy into space for the first time as part of a programme to help get students excited about maths, science and technology.

Fig 1 – The astronaut crew of space shuttle mission STS 124 celebrating their visit to the UK where they gave presentations to over 15,000 school, college and university students. They are from the left pilot Ken Ham, Akihiko Hoshide of the Japanese Space Agency, Commander Mark Kelly, space walker Ron Garan, a Bradford student, robot arm specialist Karen Nyberg and lead space walker Mike Fossum. The crew spent 13 days in space and travelled almost 6 million miles.
The docking between the space shuttle and the space station requires intricate calculation and precision. The operation takes place at 17,500 miles per hour, 250 miles above the earth. The space shuttle chases the space station for over one million miles and has less than 3 inches (7.6 centimetres) tolerance of error during the docking procedure.

**The International Space School Educational Trust**

The astronauts (Fig 3-5) were in Britain as the guests of the International Space School Educational Trust, (ISSET [http://www.isset.org/](http://www.isset.org/)). ISSET, working together with Kennedy and Johnson Space Centres, has developed a range of inspirational programmes that make a real difference to engaging young people in educational achievement, especially in mathematics, science and engineering. ISSET is a charity formed in 1998 to utilise the power of the human space program to encourage young people to have personal ambitions and goals, particularly relating to STEM, and to inculcate the NASA ‘you can do it’ spirit.

Currently, ISSET enables each year around 200 students and 150 teachers from the UK to benefit from life changing experiences at Kennedy and Johnson Space Centres. The students and teachers gain first hand experience of meeting and working with people at the heart of the human space programme, the world’s biggest and most prestigious practical mathematical challenge. To the students the
astronauts, space scientists and rocket engineers rank alongside rock and sports stars, except that they have ‘got there’ through education, particularly in mathematics, science and engineering. The Trust has also developed a range of multi-media, hands-on, learning meets fun programmes that use the context of space to motivate and excite young people.

The importance of mathematics

ISSET was founded to employ space exploration to stimulate achievement and the taking up of higher education and careers in STEM. However the Trust believes that ability and attainment in higher level mathematics is essential both in its own right and to underpin all STEM development. In respect of this, the human space programme is ideal to both stimulate interest in and utilise complex mathematics. Space Shuttle Commander and veteran of four space missions Charlie Precourt clearly states the importance of mathematics in the space programme, he says, “We use maths for just about everything. From the complex maths that goes into the design of the space shuttle, to the count down, to the compass headings that we use for landing the space shuttle. Maths is everywhere in space flight, without it we could never get off the ground or come back to earth.” In fact, without young people developing understanding and taking up higher level mathematical study there would be no future space exploration.

Astronaut crew visit to Britain

ISSET also arranges astronaut, space scientist and rocket engineer visits to Britain such as the September 2008 visit by the STS 124 space shuttle crew. During their visit, the astronauts visited London, Aldershot, Norwich, Cardiff, Port Talbot, Belfast and Bradford. They gave presentations to and met over 15,000 students and community representatives. One of the highlights of the crew visit was a presentation to over 5,000 school students at rugby world champions, Bradford Bulls’ Gratton Stadium making it Britain’s biggest ever space education event. This was an impressive event; the young people of Bradford cheered as the astronauts arrived, they saw a big screen presentation of the crew’s mission into space and then a huge interactive session took place with the astronauts answering questions from youngsters in the stands. At the end of the presentations, the astronauts split up and mingled in the crowd answering questions and posing for photos with school groups. The feedback from one mum was, “my daughter came home and said that an astronaut told me that I can become anything that I want”. The crew provided the young people with a lasting and inspirational memory.

The astronauts gave some great messages of hope and encouragement. Mike Fossum told the students, “I had to work hard to be successful at my maths as I found it really difficult, but without maths I could never have gone on to fly like a super hero in space”. Whilst Commander Mark Kelly said, “When I was young I was not doing well in school. I have told the students that if they are maybe not doing so well now, they can turn that around any time and that working hard and investing in your education really pays off”.

Astronaut crew member Karen Nyberg was the 50th woman in space. Her advice is, “Being in space is awesome. I hope that I can help young women to follow whatever dream they have and to study maths and science. It can be hard to get girls to study maths but maybe I can inspire girls to take up the opportunities that mathematics can give them. Although I am the 50th women in space I am looking forward to the day when we stop counting”

Partnerships and working together

The visit by the astronauts was a large scale partnership between ISSET and many organisations. The Trust planned, funded and facilitated the crew visit by working with the innovative Yorkshire Forward Regional Development Agency, The Exchange, Norfolk’s award winning industry, Space Connections, link organisation, Bradford College and University, a range of schools throughout the country, Cardiff LEA, the Northern Ireland Department for Education and the Northern Ireland Science Park. Through such partnerships, the astronauts were able to visit schools, colleges and universities, attend civic events and even be the guests of honour at the inaugural event at the restored Pump House at the historic Titanic Dock in Belfast.

ISSET has a history of working with universities to enable astronauts and ‘rocket scientists’ to meet and work with students, examples of this including Commander Scott Kelly at Imperial, Canadian astronaut and neurosurgeon Dafydd Rhys Williams at Swansea and the University of Wales, female pioneer astronaut Bonnie Dunbar at Cardiff University, British born astronaut Piers Sellers at Queen Mary’s, NASA’s record breaking British born astronaut Michael Foale at Cardiff University and Mark Kelly at the University of Glamorgan.

Director of ISSET, Chris Barber said “It is remarkably uncanny the effect that the astronauts have on people of all ages. They make everyone feel better about themselves and their fellow human beings. They represent the pinnacle of human achievement and that is founded on mathematical understanding and complex application. The astronauts tell us of their work in the harsh and unforgiving environment of space and their visits release the pioneering spirit that exists in all of us”

Space Centres

Since 1998, ISSET has arranged student experiences of a lifetime at Kennedy Space Centre in Florida and Johnson Space Centres in Houston. The visits can be tailored to have a particular focus but all visits enable young people to access awe inspiring mathematical and engineering creations. The ISSET web site shows the experiences British young people at the space centres, including being inside
the amazing Vehicle Assembly Building where the space shuttle is assembled, being shown around the space shuttle in the maintenance bay, being in historic mission control and meeting current astronauts and legends from the Apollo programme to the Moon.

The Trust also provides teacher professional development programmes: ‘Utilising Space in the Classroom’ that is coordinated with the Kennedy Space Centre Education Team and ‘Comparative Education in Houston’ that is coordinated by Rice University and involves the Houston School District and Johnson Space Centre. ISSET has commenced working with UKSEDS student organisation to organise university student programmes at the Space Centres in the USA during 2009.

**Are the programmes effective?**

Over 85% of the young people who have participated in ISSET Kennedy and/or Johnson Space Centre experiences have gone on to study mathematics, science, technology or engineering in higher education.

Basim Jafar, aged 15 years, of Stoke Newington Community School, London said, “Being involved with the ISSET programme has made me aware of what humans can achieve and made me determined to make something of myself”.

Whilst Samuel Hosseini, formerly of Cathays High School, Cardiff stated, “I just wanted to let you know, that before winning the ISSET competition and going to NASA, I did not think I could get into university, and that there was no point in even thinking about it. It was the extraordinary selection of people that I met at the space centres (mostly consisting of astronauts) who encouraged me to follow my dream of becoming a doctor. The visit consisted of meeting people who genuinely reinforced the idea that they wanted people like us to come back and to work for them when we are older, which truly inspired me to fulfill my potential. I am now studying biology at Imperial College London and have a place to study medicine next year.”

**Contact**

If you are interested in how the possibility of first hand experience with the human space programme may help you or your students with mathematical development please contact: Chris Barber, Director of ISSET on either 02920710295 or cbarber@isset.org or visit the web site at http://www.isset.org/.

The best gift you can give yourself is a good education – Chris Barber