



Winning Hearts and Minds:

Highlights from pupil and teacher competitions run
within the Space Awareness programme

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In compiling this report we wish to acknowledge the very important contributions of the various teachers, educators and pupils who willingly shared their inspiration and enthusiasm by entering the competitions. Congratulations to all the finalist and winning entries showcased here; your efforts represent the very best in space science education throughout Europe and beyond.



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Introduction

To showcase outstanding practice and celebrate both teacher and pupil achievements, two international competitions were run within the [Space Awareness](#) programme, the [Celebrating Excellent Space Science Teaching](#) competition for educators, and the [Space Scoop Comic Contest](#) for pupils. The case studies within this document are designed to (1) highlight examples of outstanding contributions; (2) celebrate the efforts and impacts of the competitors; and (3) inspire the future practice of other educators based throughout Europe and beyond. The case study selection in each case was based on a complementary selection of winning and international finalist entries, showcasing diversity in terms of audiences, approaches and geographical regions.

Celebrating Excellent Space Science Teaching Competition

Educators from 13 participating countries (plus a global contest for any entries not covered by an existing national version) were invited to describe what (and how) they used Space Awareness resources in their teaching. The entrants were asked and present evidence of how their efforts had worked in practice, in particular any noticeable impacts on their students, as well as key learning points they wished to share with other educators. Submissions were invited for two categories, corresponding to key priority intended impacts within the Space Awareness programme:

- A: Inspiring young people from diverse backgrounds with space science
- B: Supporting young people to become aware of space-related careers

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The *Space Scoop* Comic competition

Young people between the ages of 8 and 18 years were invited to create an original comic based on one of the [Space Scoop](#) news stories. The four international winners, as well as three complementary national winners, are showcased here to highlight evidence of pupils' engagement with space science through the Space Awareness project.

The case studies explore some intriguing perspectives, for example:

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Training learners to inspire other learners

Organisation: Macaé College – Rio de Janeiro State, Brazil (Colégio de Aplicação de Macaé – RJ)

Teacher: Nicolle Cabral Coutinho

Learners teaching credits: Arthur Santiago, Karine Oliveira, Douglas Klen, Christopher Luiz, Marlayne Mendes, Sérgio Carlos

Resources used: [Our Wonderful Universe: Know Your Planets](#)



The main changes that were achieved for the learners

(see the [Space Awareness Intended Outcomes](#) for further information)

Feel	Value	Understand
Were inspired by the space sciences	Appreciate that space science contributes to everyday life, such as the use of satellites and also technologies that were first used in space but are now in common use	Understand that space science career opportunities are diverse, rewarding and highly accessible (especially for girls and ethnic minorities)

Who were the learners?

In Brazil, young people have little knowledge of scientific careers or careers in teaching science. The objective of this work was to encourage high school students to follow these careers by experiencing being a teacher and inspiring other learners to love space science. The work was carried out by high school students of the Macae Application High School in a primary school in the same municipality, for a group of 23 children in the 5th grade (aged 10-14 years). The activity was carried out at "Jacyrta Tavares Duval Municipalized State School" during the regular school day.

The challenge

Students have to pass exams to move up the school system. Children may miss school because they are from poor families and are needed at home, or some may have learning difficulties. Therefore, there is a wide age range of between 10 and 14 years in 5th grade.

The activity had two main objectives. First, to stimulate high school students to pursue a scientific career or a career in teaching science which is undervalued in Brazil. Second, to engage elementary school 5th grade learners in learning more about the Universe.

What we did – Training learners to inspire other learners

The high school students researched the topic of the Solar System to prepare a class for the 5th graders. They conducted research on content, reviewed the Space Science [teaching career video](#) and discuss how to ask questions and enable learning.

Adapting resources. The students searched for "new planets" in the Space Scoop news site. They also read academic Brazilian works on astronomy teaching. They adapted questions from the "Game of Letters of the Planets - UNAWÉ" to be used to play a game with the 5th graders.

Pacing the teaching. A terrestrial globe, provided by the International Organization Universe Awareness (UNAWÉ), was presented 5th graders with questions about the [Earth and the Solar System](#). Then the lesson was given, emphasizing some curiosities about the Solar System, the Trappist-1 system, probes, satellites and telescopes. *"During the slide show, the children saw some curiosities about the planets, such as "Venus is the hottest planet" and "there are rocky and gaseous planets and all gaseous planets have ring systems." They were introduced to Trappist-1, at that time it was possible to hear a loud "Wow!" in chorus!"*

Questioning. At the end, a question-and-answer game was played. The class was divided into two teams, in a fun activity with half of the questions being identical to those of the initial questioning.

Evidence of achievement

Teaching to Learn. High school students learnt to teach basic space science knowledge by learning what it takes to be a teacher.

Access to quality resources. High school students learnt that they have direct access to space science knowledge and understanding by accessing international high-quality teaching resources.

Making learning accessible. After the teaching session the 5th graders were able demonstrate accurate knowledge of what they had been taught and were curious to learn more.

Lessons learnt

1. **Leaners can inspire other learners.** *"Children are always interested in any kind of contact with science, demonstrating a special preference for Astronomy. This class-experiment was very enjoyable for both the high school students and children and teachers of the school that received us."*
2. **The process can be repeated.** *"I teach Physics at the Macaé Application High School, which is a full-time high school. For 2018, I intend to offer an elective discipline: Astronomy. I will encourage students to use the resources from the Space Awareness website and to create new materials for teaching and disseminating Astronomy to children in Macaé-RJ."*

What the judges said:

"Very positive to work between classes of different ages and communicate."

International Judge

"She works in a public school with students from poor families. For these students these classes bring new horizons for their futures showing new perspectives."

National Judge

Enabling new horizons

Organisation: General Lyceum of Tzermiadon, Lasithi, Crete

Teacher: Maria Eleftheriou

Resources used: A rich combination of [Educational activity](#), and resources including [Citizen science app](#), [Space Scoop](#), [Careers Hub](#), [Careers profiles](#), [Webinars](#), and [Teaching materials](#)

Astrophysicist

MY SKILLS & INTERESTS

- Enjoy math and science.
- Have a good imagination.
- Work well on your own.
- Enjoy working with computers.
- Enjoy solving mysteries or problems.
- Enjoy learning about new things.
- Do well in math and science, physics, chemistry, astronomy and electronics.

WHAT I DO

I study celestial objects like galaxies, stars and planets in order to understand what they are made of, what their surface features are and how they were formed. Astrophysicists spend most of their time in observatories, laboratories using instruments like telescopes, satellites, sensors and probes. They also spend time in their offices analysing the information gathered by these instruments. Theoretical astrophysicists also spend time forming theories about how objects in space are formed or structured. Astrophysicists involved in observational astrophysics mostly spend time making observations with instruments. This may require travel to faraway locations. Astrophysicists work a lot with computer simulations and computer programming.

STORIES THAT INSPIRE

INFORMATION

Information source: NASA

Russian astronaut with Greek origin

Astronaut talks with students!

Μαθητές συνομίλησαν με τον κοσμοναύ...
Μία βόλταστο διάστημα έκαναν οι μα...
youtube

Space awareness jobs

Who is an astrochemist?
Inspiring a new generation of space expl...
space-awareness

Greek biologist works in NASA

Ελενη Αντωνιαδου – Ελληνίδα Επιστημ...
Μιλιά - 12.03.2014. Ελενη Αντωνιαδου. Ε...
youtube

Greek woman astronaut

Το ξέρω, κάποια μέρα θα δω τη Γη από...
Η πρώτη εμπειρία της Ολυμπίας Κυριαο...
kathimerini

Card game in Greek

SPACE awareness

The main changes that were achieved for the learners

(see the [Space Awareness Intended Outcomes](#) for further information)

Value	Understand	Do
Value the contributions made by both women and men to space science	Understand that space science career opportunities are diverse, rewarding and highly accessible (particularly to girls and ethnic minorities)	Consider choosing to study and pursue careers in space science and engineering or science and engineering more widely, (especially girls and ethnic minorities)

Who were the learners?

The learners were 15-year-old students studying at the General Lyceum Tzermiadon at the Oropedio Lasithiou, in Crete. They were from a rural setting, often from low-income families employed in seasonal agricultural activities. Most of the female students had no specific career goals. The community is rather isolated. What we do in school is their main source of stimuli.

The challenge

The challenge was to widen the students' horizons so that they could imagine what is possible and open to them. Physics is part of the school curriculum but there is no discussion of career choices in science, and information about space-related careers is not included in the Greek curriculum. Thus, the use of the Space Awareness material formed a unique window through which our students (and their families) could see the wonderful Space that surrounds us, and enabled them to dream about glorious space related careers.

What we did — Enabling new horizons

The teacher assembled all the resources including careers [interviews](#), [webinar](#) materials, and other [careers information](#) e.g. who is a [space educator](#) and who is a [space psychologist](#). These were used carefully with each stage being discussed so the students felt empowered to do their own internet explorations.

Discussion. The class first discussed career options and how they could go about making informed choices.

Questioning. The teacher posed some open questions, for example: “*Can you imagine yourself working on something related to space?*” Most of the young people felt this would be impossible.

Careers interview videos. The students watched the careers videos from the Space Awareness project. They were impressed by the fact that the people presented in the video were very young. They had never heard of some of the space professions, “*it was inconceivable for them that a lawyer can work on space issues! [...] They were also impressed by watching several women following a space-related career.*”

Empowering. The students asked the teacher if they could follow these careers and what qualifications they would need and where they could study. The discussion was focused on Greece and Europe.

Follow up. They realised that they can participate in space-related competitions. The teacher “challenged” them to find other space-related professions and to discuss them in the next lesson. They watched the video on who is a space educator and space psychologist. They played the game on [introducing space careers](#).

“Students were thrilled by the (unexpected) vast variety of space-related professions as well as by the (also unexpected) equal opportunities that men and women have in this field.”

Evidence of achievement

Changing minds. Before this work, some of the students were suspicious about whether the new information reflects reality. They believed that the space-related professions had nothing to do with the Greek reality and especially with the reality of their small, isolated village. They also believed that women do not have any access to these professions. Through the interviews and the material from the Space Awareness project they have completely reviewed their initial opinions.

Motivating exploration. To motivate them even further the teacher asked them to find corresponding material for Greek (both male and female) astronauts as well as for Greek scientists working in space-related organizations and agencies. They found information on a [Greek astronaut](#), a [Russian cosmonaut of Greek origin](#), a female [Greek biologist who works in NASA](#), information about careers in [mechanical aerospace](#), and information about the [European astronaut selection](#) process.

Invention and fun. The students decided to reinvent the card game into a more collaborative team effort and they [shared their results on Padlet](#).

Changing hearts. The students changed their opinions about space-related careers. Some girls started to change their attitudes towards science-related disciplines. The boys said that their horizons had been widened. They never imagined professions (e.g. artists) could be relevant to space science. One of the girls said she had previously been interested in the psychology profession, and by playing the Space Awareness card game she learnt that psychologists worked for Space Agencies - she could not believe it. After discussing it, everyone realised that it is very normal that psychologists are necessary in such stressful situations as space missions. The boys were also impressed by the fact that many women choose scientific professions.

Lessons learnt

1. **Change is possible.** *"In the classroom there was a beautiful and constructive upheaval, as in few hours several strong stereotypes had been collapsed. Most students shouted to see more things about space. Some of them wanted to see more details about aircraft engineers. Generally, there was a turnaround of the students' opinions about space careers and they showed great interest not only in the space-related professions but also for the actual subject matter: planets, rockets and in general most of the topics that are covered by space science. Finally, many of them mentioned that it would be very helpful if we could present professions and career prospects for which students are unfamiliar. The material provided by Space Awareness offered an excellent chance to present to the students of my school unknown but inspiring space-related careers from which they gained a lot of creative ideas."*
2. **Challenging stereotypes.** *"I was very interested to see that using the Space Awareness material changed the established and perhaps anachronistic positions of the students, e.g. that space is only for men, or only for geniuses who live in the U.S.A."*
3. **Resources as innovative stimuli.** The Space Awareness resources provided the impetus to explore new horizons. Special "minorities" like schoolchildren in the countryside and/or students from low-income families did not previously think about accessing information about careers and opportunities in European Union.
4. **Momentum.** In the future we aim to combine these successful activities with natural science courses and some after-school activities, including specialist speakers, to help students become familiar with space and realize the opportunities for careers in space science specifically, and science, technology and engineering more generally.

What the judges said:

"Clear use of space awareness careers resources, with an impact on the students."
International Judge

"Clear explanation of the goal, context and most of all the relevance of the activity for the target group. An excellent example of using space career resources!"
International Judge

Enabling diversity in project work

Organisation: 2nd Minority Primary School of Komotini, Greece

Teacher: Marina Molla

Resources used: A Journey to the Universe: [A puppet show](#) and [Space Scoop](#)



The main changes that were achieved for the learners

(see the [Space Awareness Intended Outcomes](#) for further information)

Feel	Understand	Do
Enjoyed learning about space science	Understand that space science can be interdisciplinary	Share their understanding of space science and technology with learners, peers, family and their community

Who were the learners?

The learners came from the 2nd Class (2016-17) of the 2nd Minority Primary School of Komotini. The children were all Muslim and the teaching at the school is bilingual. This group was made up of 11 year olds and included 12 girls and 4 boys.

The challenge

The project was implemented within the framework of the Greek language program. Language skills come from wanting to communicate, having a purpose and wanting to share. The challenge was to find a subject area that excited and inspired communication.

What we did — Enabling diversity in project work

The teacher prepared by drawing together the resources (Space Scoop stories), the materials and ideas for a project. It was the children's decision to produce a puppet show for the TV outlet *Happy Channel* and to design their project as a performance on the theme of Astronomy.

Discussion. The teacher facilitated discussion on how the students would achieve their goal and all the things they had to do, for example planning the project, research, writing the script, making the props and rehearsing.

Discovery and Explanation. The students were given a chance to browse the Space Scoop resources. They were then divided into groups based on the topic that interested them. They choose the following Space Scoop stories:

[Sleeping Beauty Wakes Up From a Deep Space Slumber](#)

[Rosetta Makes Friends with a Comet](#)

J' Marks the Spot for Rosetta's Landing

[Cassini's Grand Finale](#)

[Goodbye From Cassini](#)

[The Day the Earth Smiled](#)

[Photobomber Stars](#)

[Black Holes Make Waves Across The Universe](#)

[Cosmic Butterflies Fly in the Same Direction](#)

Why You Couldn't Hide Your Spaceship in a Nebula

Time Flies on an Alien World

These stories were printed so that the group could share and discuss them. Some stories that were not in Greek were translated by the teacher who acted as a guide in the process.

Collaborative writing. Once students were familiar with their topic they had complete freedom to decide what they were going to do next. They decided to create a collaborative scenario of dialogue-interviews, and a shadow theatre play introduced by a dance sequence. Students used resources on [storytelling](#) to get ideas, [Space Words](#) to look up technical words, and browsed ESA and NASA websites for visual material.

Collaborative art and design. The groups worked very hard to make all the props and the artwork that was needed for their performance.

Performance. Their work was presented to the whole school and beyond the school.

Evidence of achievement

Making and planning. The students tackled their performance project by making all the props and artwork. They wrote the scripts and scenarios for the shadow puppet. Every child had some work on display.

Sharing knowledge. Accompanied by an interview with the teacher, the children's work was presented on the TV show "*Space News*" on a children's TV channel and then as a [YouTube video](#) in the Space Awareness "[Our Wonderful Universe](#)" MOOC.

"We delighted ourselves ...the beauty of our wonderful universe is based on the diversity of its objects and phenomena.....this offers a perfect tool for students to realize that the beauty also of human beings is based on their diversity."

Lessons learnt

1. **Activity.** When children are active they learn. *"Space triggers their curiosity and imagination and involves them in the learning process"*.
2. **Design.** There are such rich and high-quality educational materials relevant to space. There is scope for art and craft, design and performance and all of it involves communication and language.
3. **Access.** The students were given a choice about the direction of their project and had access to information, materials and activities so that they could really succeed in their goal.
4. **Involvement.** Every child could be involved to their comfort level.
5. **Safe and Fun.** *"This year we continue to be inspired by the Universe, we have already participated for the third time in the Eratosthenes Experiment and as the children said, we will continue with Mission X Train Like an Astronaut, now the whole school."*
6. **Keep up the momentum.** *"At the same time, we started applying activities from Space Awareness, for example 'Planet Earth and Meet our neighbour: Sun', we will continue with the 'Moon' and the 'Black Holes' and we intend to use the resources on space-related careers."*
7. **New learning conversations.** *"We are expecting to interview a nutritionist."* The children have many questions about the nutrition conditions in space and the nutritional needs of the astronauts living in the International Space Station.

What the judges said:

"A puppet show created by the kids and aired on a tv channel & used in a MOOC -- creative, encourages the students to take ownership, tv show widens reach. And good plans for future activities."
International Judge

"The use of Space Scoop for arts is a great example of using space for different subjects. The teacher was involved in making the MOOC, and the Space Scoop competition with the same students. Great valorization by presentation in a TV show and to parents."
International Judge

Feeding curiosity, sharing knowledge

Organisation: India Tamil Nadu Panchayat Village School

Teacher: Janet Felicia

Resources used: [Our Wonderful Universe - Know Your Planets](#)



The main changes that were achieved for the learners

(see the [Space Awareness Intended Outcomes](#) for further information)

Feel	Do
Were inspired by space science	<p>Want to learn more about space science</p> <p>Shared their understanding of space science and technology with learners, peers, family and/or their community</p>

Who were the learners?

Panchayat school is a village school in a rural area in south India. The villagers work in agriculture, coconut farming, and in the ancient oil extraction industry which uses wooden machines. Most of the children have parents who did not go to school. Some parents went to school and left at age 14. The students were 9 to 10 years old. There were 30 children in the class and they worked in groups of 10. The groups were mixed gender and included special needs (late bloomers), and gifted and talented (fast learners).

The challenge

Usually we teach from books but the children have many questions. For the children and their families, the sky and stars are part of their lives and fascinating. They ask interesting questions, such as “How is our planet hanging in the sky?” “Are there other planets like ours?” “Are we living on the surface of the Earth or inside the Earth?” “How are our houses constructed on the surface of our Earth?” They can look at the sky and wonder but there are no resources for them to search, or things they can feel or look at or do.

What we did — Feeding curiosity, sharing knowledge

As the teacher I prepared a set of resources for each group that included: printed photos of the planets, the Know Your Planets card game, the Planets and Sun model for Universe in a Box, and coloured pencils. With these resources more things were possible, for example:

Explaining with photographs so they knew about the features, colours, size, and distance of the planets in the Solar System. *“There was a lot of discussion about the colours of planets. They were very eager to know why the planet Mars appears red? Why our planet Earth appears blue?”*

Discussion. Children that were usually shy joined in. *“The difference in size of the planet was also interesting to them. They asked more questions about how Jupiter can be bigger than our Earth? (until then they thought Earth should be the largest planet with so many large continents and oceans on it). [...] Then we came to the planets in order of distance from the sun. In this session, the children were happy that at least the Earth is third in distance from the Sun. (Since they are very small children, they expect that the Earth should be first in everything). I personally enjoy teaching these little children and their curious innocent questions.”*

Demonstrating. Moving to the Universe in a Box component, the children were very pleased with the exercise. They touched each ball as a representation of each planet in the box. They liked the Earth and Saturn with rings which I made with a disposed computer CD on a cut ball. They named each planet.

Small Group-work. In groups of 10 the children arranged the planets in order from the sun. *“One thing I noticed in this session was that the late-bloomers found this activity very interesting and they gave it their full participation which is not what happens when we follow only the book-and-lecture method.”*

Active learning. Using the game pack, each student picked one card and coloured it. They remembered the reason for the colour and so they coloured it correctly. With the cards exercise where one student had the picture and another the features every one could be involved. *“I noticed there was no hierarchy among the students as fast or slow learners. Because all the students had their card to read and had to answer the question on the card. So all the students in each group had their role to play. [...] I noticed it in their voices and in their bright smiles. There was a healthy attitude among the children throughout the game and each group finished the game successfully.”*

Evidence of achievement

Making and displaying. The students tackled a display project which involved making tiny colourful rockets, a chart to remember the order of the planets, a night sky on the blackboard, planets arranged on a foam board, a pocket book, and a circle book. There was a notice board featuring the contributions made by both women and men to space science. *"It was like an exhibition in my class."*

Sharing knowledge. The children invited teachers and younger children and explained the display and what they had learnt *"This boosted their confidence and their sharing of knowledge of space science with others."*

Lessons learnt

1. **Activity.** When children are active they learn. *"I would like to make similar activities for more concepts".*
2. **Design.** Design the activities carefully so that all the students have equal chance to take part.
3. **Access.** All students must have an opportunity for hands-on experience. Preparing resources is time consuming for teachers but it is good for overall learning.
4. **Involvement.** Self-confidence was boosted for students especially the late bloomers.
5. **Safe and Fun.** The climate of the class was happy and joyful with no harshness. *"When the children are in a happy mood, any difficult concept can be registered in their mind and so it will be easier for the teachers."*

What the judges said:

"She has involved herself as a Student when she is teaching the resource with her innovative idea"
National Judge

"Quite classic but nicely described and rich for sharing with peers, with a lot of details about what the children learnt and felt, how the activity helped being inclusive, communication with other students and teachers, and clear advice for others + a great consideration of gender balance."
International Judge

Catalyst for change

Location: Slum Streets, Trichy Region, India

Educator: Bharath Kumar

Resources used: Career interview and games



The main changes that were achieved for the learners

(see the [Space Awareness Intended Outcomes](#) for further information)

Value	Understand	Do
Value the contributions made by both women and men to space science	Understand that space science career opportunities are diverse, rewarding and highly accessible (particularly to girls and ethnic minorities)	Consider choosing to study and pursue careers in space science and engineering or science and engineering more widely (especially girls and ethnic minorities)

Who were the learners?

I have been working with a group of children from slums in the Trichy Region. They are aged between 10 and 16 years old. Most of their parents are on daily wages and working in construction and gardens. They have seen the sky at night but have no knowledge of space science. They may have watched a few Hollywood science fiction films about space travel.

The challenge

There is no classroom and no timetable. But the children are curious and inquisitive.

What we did – Catalyst for change

Video inspiration. I chose the interview part of the resource and showed the children the video on my mobile phone. I translated it into Tamil so that students could discuss it. They were inspired!

Game and Discussion. Then I introduced various career opportunities in space science through a paper game where I wrote careers on a piece of paper and asked them to choose one. We then discussed why they were interested in that one and I explained about each career that they selected.

Evidence of achievement

Sparking the imagination. After our discussion one student wanted to know more. She is now studying in middle school and asking questions about a career in science.

Extending reach. She invited me to visit her parents to explain to them the opportunities that are possible.

“That was an amazing outcome of my session in the slum. This has inspired and motivated me to teach space science to more groups of children.”

Lessons learnt

Catalyst. Everyone has opportunities but how can these children know what is possible – the paths that are open to them – without some help and direction? I feel that someone like me can be a catalyst to open up the pathways.

What the judges said:

“Given the social context this was a good step forward introducing space career opportunities to students and valuable experience”
International Judge

“He has taken his session to underprivileged kids and inspired them”
International Judge

Learning across borders

Locations: Belvedere school, Napoli, Italia & PetraPreradovića School, Zadar, Croatia

Teachers: Gabriella Ricci and Anita Šimac

Resources used: A rich combination of careers profile resources including [Students' dreams of space](#); [Who is an astronomer?](#); [Space careers in the classroom](#) webinar; and the [Astronaut's job = cool](#) careers teaching materials.



The main changes that were achieved for the learners

(see the [Space Awareness Intended Outcomes](#) for further information)

Value	Understand	Do
Value the contributions made by both women and men to space science	Understand that space science career opportunities are diverse, rewarding and highly accessible (particularly to girls and ethnic minorities)	Consider choosing to study and pursue careers in space science and engineering or science and engineering more widely (especially girls and ethnic minorities)

Who were the learners?

This project involved extensive collaboration between two different schools, one based in Italy and the other in Croatia. The learners were 26 students at the Belvedere school, Napoli, Italia, and 20 students from PetraPreradovića School, Zadar, Croatia. They were 14-15 years old.

The challenge

Bridging the gender gap and encouraging gender equality was a topic that both teachers were passionate about. They decided to engage two of their classes to investigate the role of women in STEM subjects. Both teachers had previously observed that within the subjects they taught (physics and mathematics), most role models were male. During one such lesson, each teacher asked their students to name female scientists and mathematicians. The fact that they could name but a few was not surprising to the teachers. They decided to develop a project to show children that STEM related careers and specifically careers in space are open to both men and women.

The teachers' role was to guide and moderate the discussions and activates in their respective schools. The challenge was turn this into a collaboration across borders in schools that were in different nations.

Key questions for consideration included: Does a gender gap exist? If so why do girls decide not to pursue careers in STEM related subjects? Who are the role models for girls in science? How can we make a change?

What we did — Learning across borders

The teachers assembled all the resources:

Discussion. We used several resources on the Space Awareness website (see "Resources used" above). The webinars in particular were inspirational and thought provoking. This led to discussions in our schools.

Planning via Skype. During a Skype conversation between our schools (in Italy and Croatia) we came up with a timetable and plan of how to proceed with the project.

Brainstorming. In smaller groups, the students wrote down their thoughts, ideas and impressions on STEM and the gender gap.

Stimuli: Teachers provided the pupils with a list of women, past and present, who have contributed to science. They asked the pupils to investigate the careers and lives of these women and try to find more individuals who made a change in the world.

Investigation and presentation. Each group presented their work to their peers and then all the material was combined. This resulted in posters, PPT presentations, a kahoot quiz and a padlet share space. The padlet was extremely useful to all of us as we used it to document our research, thoughts and even inspirational quotes. It was a living document!

Skype discussion. We set up a Skype lesson between our schools in which we presented our final work to each other. The conclusion was: "*If models of women in STEM were promoted to children at a young age, the stereotypes of women in STEM would be overcome*".

Taking time. This project was spread over a month. It enabled the students to dig deep into their research and produce work that made them and us, their teachers, very proud. The children could hardly wait to present their results to each other on Skype.

Evidence of achievement

Independent discovery. The Space Awareness website proved to be a valuable resource. Many topics and webinars were available to the children to read and listen to, in class and then in their homes. In smaller groups the children soon discovered that women had to overcome stereotypes in the past to prove themselves. These women were inspirational to all children, boys and girls. So many women worked behind the scenes in NASA for example. We watched the film 'Hidden figures' and also NASA live streams.

Wider sharing. In addition to the various presentation formats mentioned previously, we also reported our experience on our [school web page](#) and presented the project to the staff of our schools.

Changing hearts and minds. The results of this project were not only the materials produced but the change that we all experienced in our mind-set.

The boys in our classes concluded that: *"Women inspire all of us not just girls. Why should we emphasise their contributions as 'The contributions of women'? It is their contribution as people of the human race that inspires us."*

This quote was printed and displayed in our classroom: *"I like to think of mathematicians as forming a nation of our own without distinctions of geographical origin, race, creed, sex, age or even time. . . all dedicated to the most beautiful of the arts and sciences."* Julia Robinson.

The girls in our classes concluded that: *"STEM careers are the future and they are all part of the future. Whether they are girls, boys or from different ethnic backgrounds, the importance is the passion they have for science. This should be nurtured from an early age."*

Lessons learnt

1. **Teachers can enable learning across borders.** As teachers we truly believe it is our responsibility not only to teach the syllabus we are provided at a high standard but to inspire young minds. The passion we have for our profession should be transferred to children.
2. **Teachers can inspire young minds.** We must show them that there are immense opportunities for them no matter what gender or race they are. We are all member of the human race, citizens of the World.
3. **Quality resources empower teachers.** The resources available to us, as we have experienced with Space Awareness, are tremendous.
4. **Teachers can make a difference.** It is up to us to use them as much as possible in order to help our students fulfil their dreams and potential.

"The message we wish to share with other people is this: STEM is the future, our children are our future, help them be the future!"

What the judges said:

"A great project addressing gender in STEM, aimed at both girls and boys. Space Awareness resources are used as a starting point that is built on by students with further research. The enthusiasm of both the students in the photos and the teachers in the application comes through clearly. The link between classes in Italy and Croatia add to the different perspectives."
Global Contest Judge

"Well thought out practice using Space Awareness resources. Should be praised for the cross-cultural exchange as well."
International Judge

Making links with local knowledge

Organisation: Holiday classes for Nigerian school pupils

Teacher: Ogbonna Chinasa Edith

Resources used: [Sun, Earth and Moon Model](#)

The main changes that were achieved for the learners

(see the [Space Awareness Intended Outcomes](#) for further information)

Feel	Understand
Found the activities interesting Enjoyed learning about space science	Understand the impact of space science on society and everyday life

Who were the learners?

The activity was part of an educational outreach programme and was used with 40 junior secondary school students attending holiday classes. The ratio of boys and girls was approximately even. There was little information available about their parents' backgrounds, but they were mainly children raised in the countryside (nearby village area). Prior to this activity these pupils had little or no exposure to space (though they have been taught about some of the principles in class). They were not previously familiar with inquiry-based learning approaches.

The challenge

Prior to this activity these pupils had little or no exposure to space (though they have been taught about some of the principles in class). They were not previously familiar with inquiry-based learning approaches.

What we did – Making links with local knowledge

Igbo Calendar

The Igbo calendar (Igbo:) is the traditional calendar system of the Igbo people which has 13 months in a year (afo), 7 weeks in a month (onwa), and 4 days of Igbo market days (afor, nkwo, eke and orie) in a week (izu) plus an extra day at the end of the year, in the last month. The name of these months was reported by Onwuejeogwu (1981).

Although worship and spirit honoring was a very big part in the creation and development of the Igbo calendar system, commerce also played a major role in creating the Igbo calendar. This was emphasized in Igbo mythology itself. An example of this is the Igbo market days of which each community has a day assigned to open its markets, this way the Igbo calendar is still in use.

The original Space Awareness Sun, Earth and Moon model was adapted to include the Igbo calendar to demonstrate the cultural astronomical heritage we shared as a community. The Igbo calendar activity engaged them with the traditional calendar of the Igbo people of Nigeria.

The Igbo Lunar Clock. *“The Igbo reside in the Eastern part of Nigeria. The Igbo calendar has 13 months in a year and 7 weeks in a month. Each week comprises of 4 market days namely Afor, Nkwo, Eke and Orie. At the end of the year an extra day is added to make 365 days. Students can use this 28-day month (i.e. a Lunar month) to appreciate the motion of the moon around the Earth.”*

Follow-on activities. Various activities reinforced the relevance of the Sun, Earth and Moon model. For example, the students drew the phase of the moon that night; played a physical memory game to learn how the moon revolves around the Sun; and marked three equidistant points between the separations of the squares. The students also moved around a large circle naming the days of the week. Then noting the lunar phase already established, we discussed with the students what pattern is expected after every week, month.

Evidence of achievement

This activity really helped in setting the mood for the rest of the activities which included the workings of the Sun-Earth-Moon system. Linking this exercise with the Igbor lunar clock generated a lot of discussion. The students were very interested in the information they could deduce from the activity themselves, rather than just receiving it from the teaching staff.

Lessons learnt

"Inquiry based learning is a powerful method for introducing science topics. The pupils/students generally exhibited "discover" instincts and sentiments which transformed to greater confidence in science. The activity really engages the students and makes the work less tedious for the teacher. It is a mutually rewarding method for teaching science."

What the judges said:

"Classic activity enriched by another."
International Judge

"Good use of the local calendar to make cultural/historical connection to Astronomy & space sciences."
International Judge

Creative Excellence - Case Studies

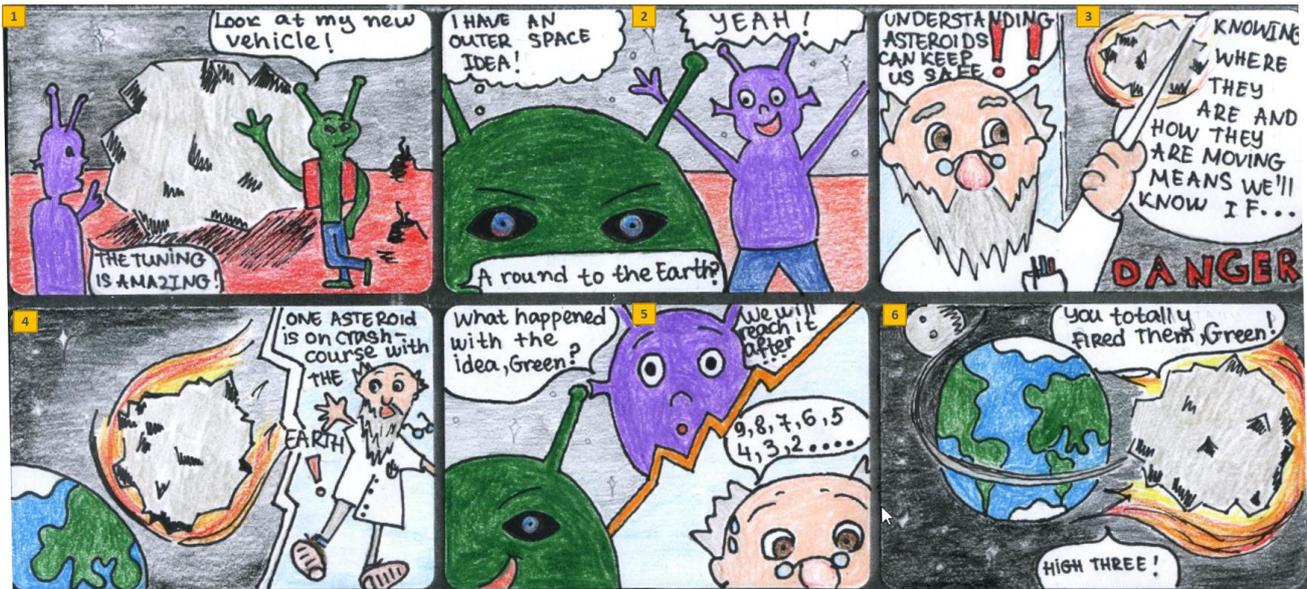
Inspiring young people with space science news

Making space science cool and subverting stereotypes with humour

Country: **Bulgaria**

Name and Age: **Stefania age 15 years**

Associated Space Scoop story: [The Asteroid with a Heart of Stone](#)



The story opens with two teenage alien 'lads' hanging around on a red planet. The leader is Green and his pal is called Purple. Green poses casually leaning against a grey rock, legs crossed at the knees, three fingers raised and sporting a wry cunning smile. We learn that the grey rock is an asteroid and Green's new vehicle. In the central section (frames 2 and 5) we see Green looking directly at us, inviting us to share the joke of "A round to the Earth". There is an underlying message that understanding asteroids can keep us safe. At the same time the witty artist is playing with stereotypes and preconceptions. The scientist is a stereotype character, with glasses on the tip of his nose, white coat, beard, practical shoes, nearly bald. The word DANGER in red and an asteroid hurtling towards earth could be frightening but instead it is funny. We the audience are in the know and so the scientist's reaction is comic – his glasses fly off his nose and he jumps in panic. The young artist interprets the potential destructive power of the asteroid as a fast car with amazing tuning (frame 1). Momentum is built up with a countdown (frame 5), and the ending is energetic, by spinning round the earth to avoid a collision. The final salute of 'high three' embodies the spirit of the piece which makes Space Science cool, and subverts stereotypes with humour.

Judges' comments.

Stefania is a 15 year old student from Bulgaria. She has chosen to depict the Space Scoop, "An Asteroid with a Heart of Stone". Her comic is fast-paced, highly entertaining and humorous, with an educational element that describes the importance of asteroid tracking. The comic is ideal length, with fabulous hand-drawn style that is bold and filled with personality.

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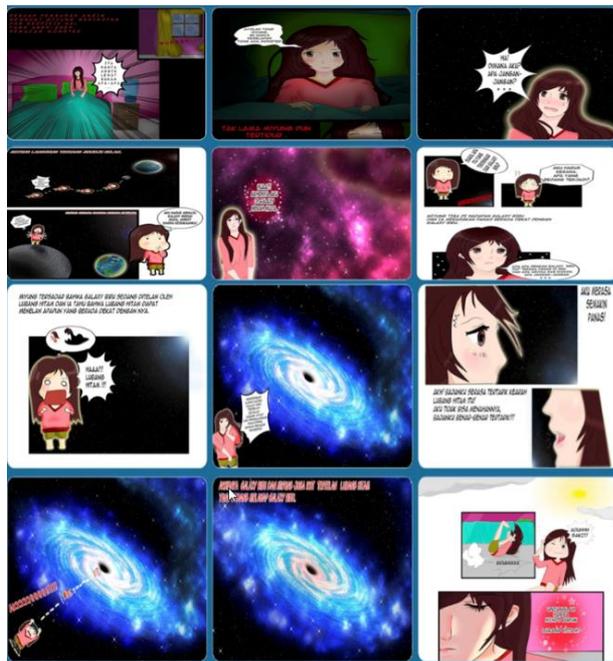
Inspiring young people with space science news

A journey of emotions: the lure of space and the unknown

Country: **Indonesia**

Name and Age: **Andini aged 16**

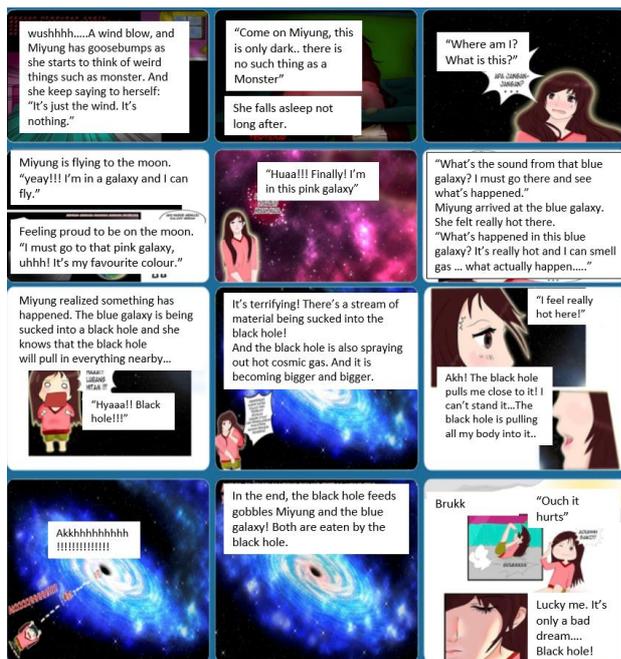
Associated Space Scoop story: [Are you Afraid of the Dark?](#) Featuring an artist's rendition ([image credit Kavli IPMU](#)) published in associated Press Release from [Sloan Digital Sky Survey](#).



This anime style comic adapts the colour palette of the Space Scoop article. The protagonist is a young girl called Miyung and the story is conceived so that the viewer knows she is dreaming but is never-the-less drawn into her emotional journey. Miyung is *whimsical* when she decides to go to the pink galaxy because it is her favourite colour, she is *excited* to fly, and *curious* and *full of wonder* in travelling to the moon and beyond. There is also *fear*. At the beginning of the story it is fear of the unknown, she tells herself not to be frightened and to sleep. In the end it is fear of the dangers of annihilation – of being gobbled up by a black hole.

Miyung is often reacting to what is happening: fear, sleep, dream, journey to the moon, adventure, sucked into a black hole, wake up with a bump. Interestingly, in the central frame (5), Miyung looks directly at the audience. She is the 'presenter' against the majestic and wondrous backdrop of the pink galaxy.

This comic is a vivid example of a young artist processing her mixed feelings about space science, where there are known facts as well as many unknowns. It is a fluent depiction of mixed emotions where even the last frame ambivalently combines humour and relief.



Judges' comments

Andini is a 16 year old student from Indonesia. She has chosen to depict the Space Scoop, "Are You Afraid of the Dark?". Her comic creatively interprets a dream during which the character visits and explores the objects within the Space Scoop, introducing them to the reader in a dynamic and interesting way. The artist is highly skilled, and her colourful and hilarious comic has really brought the character and story to life.

Creative Excellence - Case Studies

Inspiring young people with space science news

The wonder of space exploration, world citizenship, and international collaboration

Country: **Iran**

Name and Age: **Mani is 9 years old**

Associated Space Scoop story: [British Astronaut Blasts Off to International Space Station](#)



Participants in this story are benign celestial objects with smiling faces. They gaze at the astronaut hero like approving elders. The vectors follow the gaze of these celestial bodies to frames 4 and 5 where extended hands are shaken and waved in affirming friendship. The green alien looks directly

at the audience while the human astronaut's face is hidden by a helmet. The relationship is consolidated with a gift and the language throughout invokes very positive associations ("dear alien", "I'm so happy", "It's really enjoyable", "so magnificent"). The last frame is modestly proud as the hero is applauded by a cheering crowd representing a wide diversity of backgrounds. In this celebratory story of discovery, inspiration and hero worship the astronaut figure is evident throughout. The young artist has embraced and celebrated the possibility that an astronaut from Iran could be chosen by NASA to go into space.

Judges' comments

Mani is a 9 year old student from Iran. He has chosen to depict the Space Scoop, "Astronaut Blasts Off to International Space Station". His comic tells a charming story, which carries a poignant message about bringing peace to the world. The comic is neat and concise, and the hand-drawn style of the artwork is unique and vibrant.

Creative Excellence - Case Studies

Inspiring young people with space science news

Melding art and science: insights into how engagement is experienced

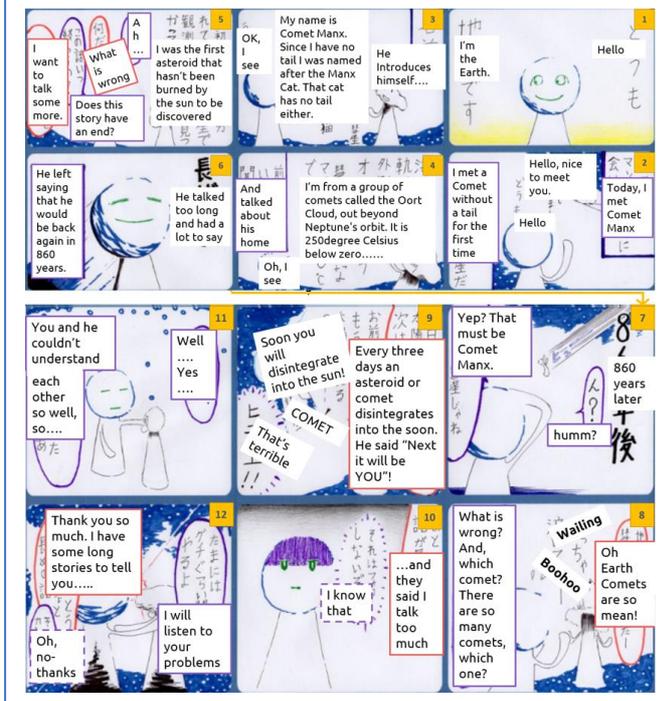
Country: **Japan**

Name and Age: **Takaaki (16-18 category)**

Associated Space Scoop story: **What Do You Call a Comet Without a Tail**



Translations



In this beautifully wry tale, the young artist interprets factual information from the Space Scoop article to show us a complex adult/child relationship that is funny at times, but also a little sad. The story unfolds as a dialogue between the 'Earth character' that is a knowing and tolerant adult figure, and the 'comet Manx' a child that talks a lot so that Earth begins to wonder 'does this story have an end?' (frame 5). Earth listens to Manx but is quite glad to say goodbye (frame 6).

In space 860 years soon passes, and the tone of the story changes when Manx returns. In the second part of the comic, the facts from the Space Scoop article are translated into the distress of a child who is being bullied and teased for being different: "The Manx Comet isn't made of the same material as other comets, so it doesn't have a tail." In frames 8 and 9 Manx is quite distraught.

In frame 11 we see the child is comforted by a larger benign adult figure. The Earth knows the fate of Manx, and privately the Earth is tired of the endless chatter (frame 10) but will listen and console anyway.

This is an interesting example of Space Scoop articles and the comic genre transcending cultural and language convention. The young artist illustrates the adult/child relationship that is experienced by many young people. For example, the distressed child, the comforting and kindly adult figure, the knowing adult, and the child that fears the future and seeks comfort in talking. These are universal interactions and readable in the relations between the participants.

In this work art and science are melded into insights about how engagement works.

Creative Excellence - Case Studies

Inspiring young people with space science news

From the known to the unknown making sense of strange facts

Country: **Poland**

Name and Age: **Justyna aged 17**

Associated Space Scoop story: [A Star with a Secret](#)



This Space Scoop is based on a Press Release from ESO.

Translations



In this comic the young artist has achieved an intriguing feat of visual storytelling. It is mystery story and more. The protagonists in this comic are an 'alien' surgeon and a sister (nurse). The surgeon is the information provider and the sister supplies the emotional response as the drama unfolds. The young artist has composed the elements in each frame to mimic a variety of complex camera angles. The wider angle of 'somewhere in space', contrasts with the intimate interior of the hospital scene (frame 3), while in the row of frame 4, 5 and 6 the protagonist looks out at viewers drawing them into the mystery. The instrumentation beautifully transitions the story from the hospital interior to landscape in which the disaster takes place and the hospital is demolished. The talented artist has paid a lot of attention to detail. The second frame shows a bed and red cross in space which in the context of the other frames tells the viewer that this is a space hospital. The protagonists are aliens with antennae that shift with their emotions. The clues to the mystery are carefully positioned in the comic. The last line of the Space Scoop article reads "But astronomers have found one strange star in this cluster that contains lots of a chemical element called lithium. Astronomers have no idea how it got there!" There is a star on a hospital bed in frame 3 – a sick star. The mystery is solved when the element is named and the story transitions into three facts. The artist achieves these transitions between emotional drama, mystery and fact by skilled use of contrasting colours in the frame with connecting motifs like the star and the eyes.

Creative Excellence - Case Studies

Inspiring young people with space science news

The bigger picture from space, one earth and the audacity of hope

Country: **Romania**

Name and Age: **Sandu aged 16 years**

Associated Space Scoop story: [A Whole New World](#)



This comic takes the title from the Space Scoop article and then draws on other research to describe an earth destroyed by overpopulation, environmental pollution and an asteroid. The story is told through a dialogue between Mira, the protagonist, and her mother.

It is a packed story with scenes of a colony on Mars, and a grimy and polluted Earth. But it is what is visible from space that is central to the narrative.

In frame 2 Mira is looking at the earth and the audience with tears in her eyes. In the midsections (frames 5 & 8) there is a sense of what has humanity done!

In frame 10 Mira again looks out of the frame but now sees signs of blue/water and rejuvenation on Earth. This artist understands the significance of what is visible from space.

The young artist is using her imagination and the comfort of a trusted relationship (with her mother) to make sense of the challenges facing the planet. The hope is that nature ALWAYS finds a way.

Judges' Comments.

Sandu's beautifully illustrated comic tells a moving story about a future in which humanity has destroyed our fragile planet and colonised Mars — a future that is perhaps not beyond imagining. The poignant tale is complemented by the delicate painting and subtle colours.

Creative Excellence - Case Studies

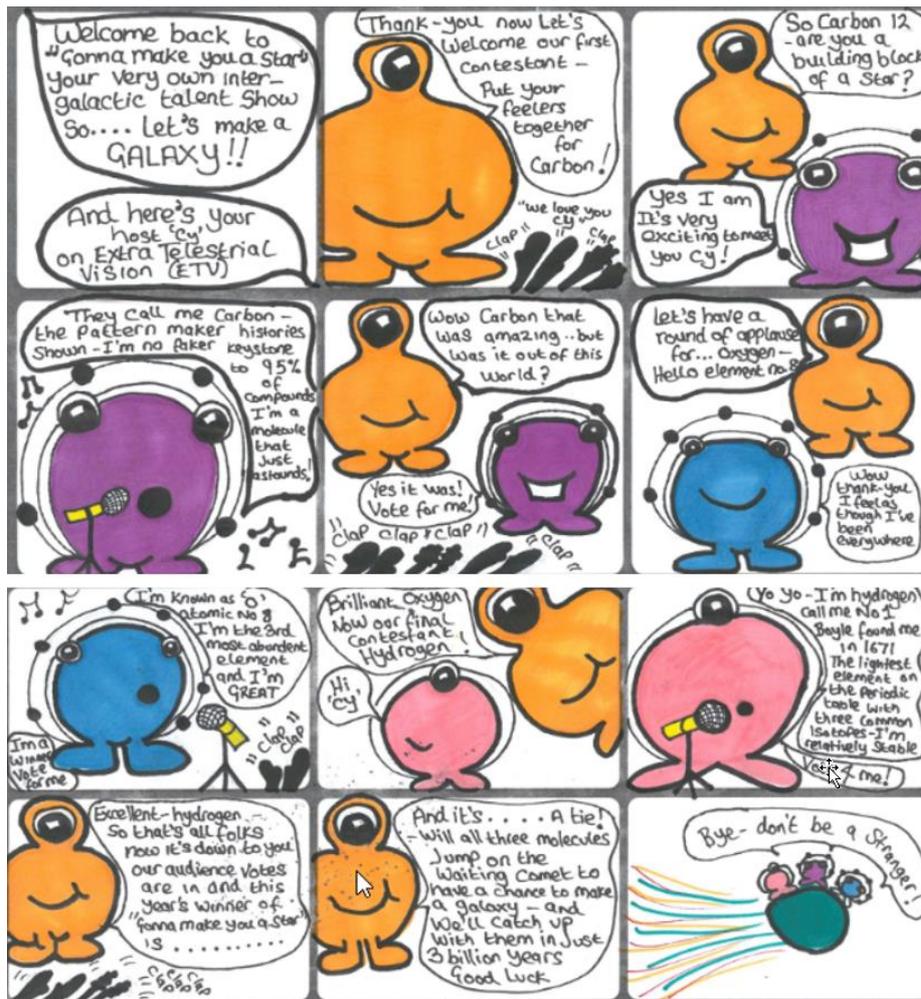
Inspiring young people with space science news

It is a wrap: science facts and fun graphics on Extra Telestial Vision TV

Country: **UK**

Name and Age: **Morgan (category 8-11 years)**

Associated Space Scoop story: [The Building Blocks of Life](#)



In this comic the young artist is having fun and at the same time interpreting some interesting and complex facts. The story is packaged as a TV contest.

There are lots of visuals and content jokes. The show is called 'Gonna make you a Star', it is on "Extra Telestial Vision (ETV)", the host is called Cy and he/she asks the audience to put their "feelers together" for three contestants: Hydrogen, Carbon, and Oxygen. The bubble eyed, smiling characters are larger than life filling the frame with strong colours, music notes and clapping hands.

The microphone prop is used to cue the contests. The story unfolds with the three elements called up to justify how each is the building block of the life. Facts from the Space Scoop are incorporated by each character and the tie ending comes naturally: there is no single winner, they are all necessary. The composition is skilfully executed, leading up to the concluding message that all three elements are important. In the last frame Carbon, Oxygen and Nitrogen depart together propelled by a colourful vector transporting the elements into space.

This young artist makes this engaging account look deceptively simple and shows understanding in selecting the right combination of facts within a limited canvass.