The Travelling Telescope

O. M. Susan, The Travelling Telescope, Kenya
O. T. Daniel, The Travelling Telescope, Kenya

Presenters: Susan Murabana (Kenya)

The telescope has been around for more than 400 years and yet most people have not had a chance to look through one. The Travelling Telescope, a social enterprise based in Kenya, is trying to change that by taking our 12 inch computerised portable telescope and digital mobile planetarium to underserved schools and communities.

We also recently built a As the youth partners of Airbus Foundation we run a space robotics program in these schools. We have also developed space songs with music videos that are available on youtube and our social media platforms. We also run a biweekly virtual Cosmic Quiz hosted on Zoom and streamed live on Facebook. We have reached hundreds of thousands of students and hundreds of schools individually.

We also invite tourists for a guided tour of Kenya's amazing equatorial unpolluted dark skies to learn and appreciate the views of the stars, planets, the Moon and other deep sky objects through our telescope in an effort to promote astro tourism.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

Introducción a la Investigación Formativa: Una Perspectiva Inicial Desde la Astrofotografía

J. Cera Hernández, SED Bogotá VGP, Colombia
J. Yopasá Cabiativa, Universidad Distrital Francisco José de Caldas, Colombia

Presenters: Julián Cera Hernández (Bogotá)

A continuación, se expone una reflexión sobre la importancia de la investigación formativa en estudiantes de grado décimo y once del Colegio Virginia Gutiérrez de Pineda, toda vez que, dentro del marco del enfoque pedagógico propuesto para los estudiantes según el PEI, la iniciación a la investigación se hace necesaria, como elemento complementario para transformar no solamente la acción del aula de clase, sino para aplicar conocimientos adquiridos en otros espacios, tal como se estructura el objetivo mismo de los semilleros de investigación. Para aplicar dichos conocimientos, se ha usado el desarrollo de actividades a través de salidas de campo, que han permitido concebir al estudiante en su sentido propio de ubicación celeste, usando elementos de Tecnologías de la Información y la Comunicación - TIC - de forma pertinente, para dar cuenta, que los fenómenos astronómicos son previstos de forma detallada, y éstos concuerdan con la teoría previamente estudiada en el aula.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

Considerations for Maintaining and Updating Academic Terminology - The Internet Encyclopedia of Astronomy as a Case Study-

H. Agata,National Astronomical Observatory of Japan, JAPAN
A. Kuwata, Tokyo University, JAPAN
S. Okamura, Tokyo University, JAPAN
T. Handa, Kagoshima University, JAPAN

Presenters: Hidehiko Agata (Japan)

In today's globalized world, most of the scientific terms are shared and updated in English by various scientific organizations. However, at the primary and secondary school level, there is often a need for each country's own basic academic terminology translated into their own language.
In Japan, until the 1990s, the Ministry of Education, Science and Culture (MEXT) compiled and published glossaries of terms in various scientific fields, but this project has not been carried on at present.
We examine how the astronomy community in different countries, especially in developing countries, can address this problem.
As a reference case study, we report on the maintenance, management and use of "Internet Encyclopedia of Astronomy", published by the Japanese Astronomical Society in 2018.
http://astro-dic.jp/ (Sorry, Japanese only)
Unlike books, online terminology databases are free of charge and open to all users, and have many advantages, such as the addition of images and videos, advanced search functions, and the ability to update the content at any time. The access analysis and questionnaire surveys show that this dictionary is increasingly used not only in higher education, but also by those involved in primary and secondary education.

Session 1 - *August 26 23:00 UTC - 04:00 UTC*

Hands-on Solar Eclipse Outreach Program

Kinjal Patel, Gujarat University,India
Nidhi Kushwah, Gujarat University,India
Zarna Khatri, Gujarat University,India
Gopi Premesh, Gujarat University,India

Presenters: Kinjal Patel (INDIA)

Hands on Solar Eclipse Outreach Program
KHOJ- science art innovation
An initiative by: Manthan Educational Programme society, India and ZOOM Kinder Museum, Vienna.
Supported by: Gujarat State Financial Services Ltd. Promoted by: Gujarat CSR Authority
Event promoted by: GUJCOST
About KHOJ:
Khoj is a dynamic museum focusing on the idea of bringing innovation and inquisitiveness in the minds of children. One of the interesting activities conducted in year 19-20 was a hands-on solar eclipse outreach program for students and community members.
About Solar Eclipse Outreach event:
There was an annular solar eclipse viewing event on 26th December 2019. The main aim of this event was to outreach the science behind solar eclipse and create public interest in observing solar eclipse and also removing the myths related to eclipses from the minds of people.
The key features of the event included
Exhibition area which explained the science related to eclipse and astronomy.
Hand- on activities like pinhole camera, pinhole sheets, drawing activity etc.
Different methods to see the eclipse. You can see the eclipse using mirror projection, through a sieve through a safe solar viewer.
And the telescope area where people could observe the solar eclipse.

Approximately 1500 visitors(school students and community members) were benefited directly. The entire solar eclipse was broadcasted live on several television news channels .The event was only successful with a huge support of volunteers and astronomy clubs.
Through this paper presentation we would like to share several such activities and innovative methods so that different organizations could use these and start such movements globally.
By: Khoj Museum

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

School Without Walls

F. Costa, Escola Secundária de Barcelos, Portugal

Presenters: Filomena Costa (Portugal)

'School without Walls' takes place in a natural space - the Arboretum, in order to resume the connection between human beings and nature, in a holistic perspective, contemplating regular and multidisciplinary sessions, in a context of meaningful discovery, sharing and learning process.
The activity will articulate the knowledge, the 'know how to do' and the 'know how to be', directing attention to the space outside the school - the ARBORETUM- causing questioning, astonishment and awakening the awareness of belonging to Earth, using digital applications and students' appetite for technologies, as tools to reconnect them to nature.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

Motivation to Science through Astronomy

Sutapa Chattopadhyay, Sabitri Debi Memorial Trust (School of Astronomy), India

Presenters: Sutapa Chattopadhyay (India)

A very little child feels attraction to the picture postcard which tells some story. It may be a picture postcard or poster of Jupiter or Saturn or Comets. In the primary level syllabus, basics of observational astronomy and identification of astronomical objects are included. If teachers are trained properly for teaching the basics of astronomy then it will be fruitful. They induced students a nice dream along with planets, constellations and associated stories. In my school, when students look the nice postcards, posters they ask me many questions like how these objects gain so many colours? How can we see these objects in the sky? They try to identify the objects from these pictures. It is proved that astronomy will act to motivate to make good questions and science is nothing but a good questioning process. The object of this paper is to reach primary level students with stories of astronomy which inspire them for questioning.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

Dater l'Univers Avec des Supernovae (en confinement)

P. Kobel, Gymnase du Bugnon, Switzerland
F. Lewis, Open University, UK

Presenters: P. Kobel (Switzerland)

Ce projet de science participative permet aux élèves de reconstruire leur propre diagramme de Hubble à partir d'observations réelles de Supernovae Ia (Faulkes telescopes), analysées en ligne avec le logiciel JS9. L'ensemble de l'activité est publiée sous format d'activité en ligne interactive sur golabz.eu. Il a été réalisé avec deux classes d'élèves durant le confinement.
Les élèves sont d'abord introduits au diagramme de Hubble, à l'expansion de l'Univers, aux supernovae, puis aux bases de photométrie. Compte tenu de la difficulté (pour des élèves du secondaire) face aux logarithmes, j'ai utilisé les définitions de luminosité [W]et luminosité apparente [W/m2] au lieu des magnitudes. Ceci leur permet de retrouver eux-mêmes la relation luminosité-distance tout en travaillant avec des unités et des concepts préalablement acquis. Les valeurs des vitesses de récession des galaxies hôtes des supernovae ont toutes été cherchées en ligne.
Les élèves ont d'abord analysé la supernova Gaia16agf afin d'obtenir une courbe de luminosité apparente au cours du temps. A partir du pic de cette courbe et sachant la valeur du maximum de luminosité d'une supernova Ia, la distance a pu être calculée. Un diagramme de Hubble à 2 points et une première estimation de l'âge de l'Univers est obtenue.
Finalement, les élèves ont pu appliquer ce qu'ils ont appris à un jeu de donnée d'une autre supernova de leur choix (aussi observée avec les telescopes Faulkes). Ces jeux de données n'ayant pas encore été analysés précédemment, il s'agissait de la partie « science participative » de ce projet pilote.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

Physics Class of Senior High School Using YouTube and e-Book

Ichiro Chikami, Kagoshima Chuo senior high school

Presenters: Ichiro Chikami (Japan)

Teaching materials using Youtube and e-book is useful in closing school under covid -19. I made a Youtube video and e-book of physics for senior high school students. I report activity from distance class in our school and possibilities.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

The Pandemic and its Impacts on the Planetário da Unipampa: A brief Reflection on Virtual Planetarium Sessions for School Groups

R. K. Kimura, Unipampa, Brazil
C. P. Irala, Unipampa, Brazil
G. F. Marranghello, Brazil

Presenters: Rafael Kimura (Brasil)

The pandemic that occurred in 2020 challenged planetariums around the world to rethink and restructure their actions. The Planetário da Unipampa, a young planetarium located in the south of Brazil, was suddenly forced to abandon all its initial planning, to close the doors of the fixed dome and to discontinue work with the mobile planetarium. Faced with the need to think of new alternatives to continue offering its services to the community, the Planetário da Unipampa started a set of actions in the virtual environment, including virtual sessions for school groups. In order to understand the nature of the motivations of the teachers who scheduled the virtual session, understand how the COVID-19 pandemic impacted on the actions of these teachers, and measure the scope and demand for virtual planetarium sessions in scientific communication during and after the pandemic, we conducted a semi-structured interview with four teachers. In the conversation, the teachers highlighted the importance of the virtual visit in the context of the pandemic that helped them in their virtual teaching actions, the interaction with students who were curious and encouraged to ask questions and the desire that the virtual sessions continue to be offered even after the planetarium reopened.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

Outreach through Historical Astronomy : Instruments of the Jantar Mantar Observatories

Nandivada Rathnasree, Nehru Planetarium, Nehru Memorial Museum and Library, and Public Outreach and Education Committee, Astronomical Society of India
Niruj Mohan Ramanujan, SARAO and Public Outreach and Education Committee, Astronomical Society of India
Aniket Sule, Homi Bhabha Center for Science Education and Public Outreach and Education Committee, Astronomical Society of India
Priya Hasan, Maulana Azad National Urdu University, Hyderabad and Public Outreach and Education Committee, Astronomical Society of India

Presenters: Nandivada Rathnasree (India)

Historical Astronomy instruments give a very special vantage point towards basic astronomy outreach, though very rarely available in the public domain. The Jantar Mantar observatories in India are unique in terms of providing historical astronomy instruments for contemporary public utility, with an added significance that public utility for understanding Astronomy was also one of the intended usages by their creator, the astronomer king Sawai Jai Singh.

Built in rubble masonry, the structures of the instruments incorporate spherical trigonometric principles underlying the positions of celestial objects and the changes therein. Effective utilisation of the four extant Jantar Mantar observatories, their instruments, and models of the instruments, has been the thrust of outreach efforts aiming to shift its perceived presence from a passive tourist attraction to an added utilisation as active teaching laboratories of Astronomy.

Specific activities in this direction have involved 1. Devising positional astronomy activities for local students 2. Developing activities/worksheets for public visitors, 3. Creating small scale models for nationwide teacher training workshops and 4. Involvement of students towards preparation of templates for possible restoration of the observatory instruments.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

LAB You [Learn Astronomy by Yourself] : Building Indonesian High School Astronomy Learning Education Without Barriers

I. T. Majid, State University of Jakarta, Indonesia
S. S. Sukmawati, Ahmad Dahlan University, Indonesia
A. D. Ramadhanti, Islamic State University of Jakarta, Indonesia

Presenters: Atika Destri Ramadhanti (Indonesia)

The development of public knowledge about astronomy in Indonesia has grown rapidly. However, these had not followed formal astronomy education that was relatively stagnant due to the unavailability of the curriculum in high school. Besides that, authors develop website-based astronomy learning media using a hosting system. The LAB You (Learn Astronomy by Yourself) uses a curriculum designed to follow the IOAA path. Also, LAB You classified into various modules of courses that can be taken sequentially according to the curriculum. All tutors have expertise in each field of their course. LAB You were like an online course that has several features as supporting media like presentation video, book learning, assignments, online video consultation, group discussions, et cetera. LAB You were expected to help students learning astronomy in Indonesia.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

Astrostays: Creating Sustainable Livelihoods

Sonal Asgotraa, GHE - Astrostays, India
Paras Loomba, GHE, India

Presenters: Sonal Asgotraa (India)

With the aim of leveraging astronomy as a key developmental intervention, Global Himalayan Expedition (GHE), a social enterprise working in the Ladakh territory, partnered with International Astronomical Union Office of Astronomy for Development (IAU OAD), to create Astronomy for Himalayan Livelihood Creation (AHLC). This programme promotes astronomy to further develop the economy of the remote villages in Ladakh. The first project of AHLC is AstroStays. The main objective behind AstroStays is to leverage astronomy to create
sustainable livelihood opportunities for these remote communities. Astrostays engages tourists in local culture,
stories and heritage while travellers live in a homestay, which in turn generates benefits for the rural and remote region that has access to clear night skies. Communities are kept at the core of the programme– community members are equal stakeholders in the development of AstroStays. The inflow of money into the village economy alleviates everyone equally, and many women, in particular, are now more confident and handle family finances. Since starting in June 2019, 30 women from 15 different villages have been trained on the basics of astronomy and how to operate a telescopes by scientists from the Indian Institute of Astrophysics (IIA). The first astrostay in Ladakh was set up in the village of Maan (4250 metres elevation), near the lake Pangong Tso. A team of five trained community members from Maan now use their new skills to conduct night sky viewing sessions for the incoming tourists using a 10-inch telescope on a tracking mount. A second telescope has been installed in nearby Leh, in a partnership with PAGIR, an organisation working with specially-abled people of Ladakh. The five-member team has been similarly trained as the women to promote inclusive astrotourism. There are now five astronomical homestays operational in Ladakh. In the last four months of operations, over 510 travellers have visited the astrostays, generating an additional income of around 1410 USD for the community and local entrepreneurs. Conducting night sky watching sessions and homestays for the incoming tourists has enabled communities to create new channels for generating revenue, while along the way fostering sustainable progress in the economy, gender equality, as well as scientific temperament in the region.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

Astronomy for Extracurricular Activities

Adina Oancea, Colegiul Național "Octavian Goga" Sibiu, Romania
Florentina Ileșan, Colegiul Național "Octavian Goga" Sibiu, Romania

Presenters: Adina Oancea (Romania)

We describe some activities we do to introduce Astronomy to our students. We provide some examples of "hands on activities" during our extracurricular activities.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

Role of Schools in Protecting Dark Sites for Astrotourism in Tanzania

N. T. Jiwaji, Marian University College, Tanzania

Presenters: Noorali Jiwaji (Tanzania)

We discuss the role of schools to increase public awareness of protection of Tanzania's large dark skies areas for its Astrotourism potential threatened by light pollution from economic development through rural electrification.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

New Technology of Teaching Astronomy

Mourad Faraj PhD in Nano satellite

Presenters: Mourad Faraj (Morocco)

Astronomy is one of the most exciting and rapidly evolving branches of science. Historically, not only scientists and students, but the general public has been very much interested in the achievements and advances of this science. Students are fascinated to understand different astronomy topics, such as the sunrise and sunset, the phases of the moon, the changing seasons, the appearance of comets, eclipses of the Sun and Moon, the motion of planets in the starry sky.

New technology are giving us opportunities to share astronomy with a lot of people around the world , VR and AR using live experience in teaching more complicated subjects by using experience. Astronomy has influenced our history and culture through its practical applications as well as through its philosophical and religious implications. Our calendars have an astronomical basis. Many cultures (including ours) have written their mythology in the sky. Astronomy still has practical applications for timekeeping; calendars; daily, seasonal, and long-term changes in climate; and navigation

Just as an example, “Calendars, mirrors the sky and cultures” is a project in the Scientix repository that studies, through the topic of calendars, the measurement of time and its history and impact on past and present societies, while discovering different astronomy methodologies. Pupils study the Sun’s path in the sky, the cycles of day and night, the seasons and phases of the Moon…all the phenomena that punctuates and shapes our daily lives. The study of Gregorian, Muslim, Hebrew and Chinese calendars… as well as those of the ancient Mayans, Gauls, Romans and the French Revolution, are used to firmly link astronomy to the heart of history and cultures.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

Expanding Exoplanet Research: Student Inquiry-Based Citizen Science Pedagogy & Networked Telescopes

Daniel O. Peluso, University of Southern Queensland, AU, USA
Carl Pennypacker, Lawrence Berkeley National Laboratory, USA
Colleen Megowan-Romanowicz, American Modeling Teachers Association, USA
Franck Marchis, SETI Institute, USA

Presenters: Dan Peluso (United States of America)

We propose the development of an allied novel citizen science exoplanet follow-up observing research program in collaboration with the SETI Institute using small networked Unistellar eVscope remote telescopes, and an inquiry-based astronomy curriculum patterned after the successful Modeling Instruction pedagogy. Efforts will be targeted at United States and Australian K-12 schools, junior colleges, and other education centers. This citizen science project will likely improve exoplanet research through strategic follow-up campaigns for NASA's Transiting Exoplanet Survey Satellite (TESS) and allow us to explore the benefits and disadvantages of engaging teachers and students in exoplanet research. Although education institutions will be the primary focus, the general public will also be engaged. A collaboration with the American Modeling Teachers Association will assist with curriculum outreach and development, as well as community raising for this project with education centers. We hope that a combination of remote-access, robotic and citizen science observations will enhance exoplanet follow-up; improve teacher recruitment, morale, and retainment; increase student STEM skills and motivation; and inspire further astronomy/science education and community engagement.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

Zero Shadow Day

Samir Dhurde, Inter-University Centre for Astronomy and Astrophysics, India
Arvind Paranjpye, Nehru Planetarium, Mumbai, India
Niruj Mohan Ramanujam, SARAO, South Africa
T. V. Venkateswaran, Vigyan Prasar, India

Presenters: Samir Dhurde (India)

In about a hundred countries in the world, at least on one day every year, the sun's rays are perfectly perpendicular to the ground at noon. On such a day, at local noon, the shadows "disappear" (are minimum). This makes for a great outreach opportunity for astronomy communicators at all places in between the Tropics where this occurrence is seen.

Since the Zero Shadow Day (ZSD) happens during the daytime, the moments around zero shadow can be easily enjoyed by everyone and there is no need for any specialised equipment to show it. All that is needed is for the Sun to be shining on the particular date which can be calculated for the given latitude.

This activity has the capacity for networking astronomy communicators representing 40% of the world's population under one event. The countries in the tropical region are mostly developing ones. The ZSD event, being inexpensive to share and appealing to all age groups, provides a good chance to talk about astronomy and do some daytime activities even in remote places. It was started in the Inter-University Centre for Astronomy and Astrophysics, Pune, India around 2005, as an offshoot of the activity of repeating Eratosthenes' method and has continued to gain popularity among Indian formal and informal educators. Since then the event has been actively celebrated every summer. We wish to take it to a larger base so more people can enjoy and learn from it.

The talk will explain this occurrence, enlist ideas and tools to plan a ZSD event and also include example activities to be done by the participants. We will also share experiences from India where this has been run as a national campaign by the Public Outreach and Education Committee of the Astronomical Society of India. We will appeal to our peers to help initiate proper plans of organising this hitherto untapped event, all over the world.

Session 1 - *August 24 08:00 UTC - 14:30 UTC*

Astronomy at School, One Experience.

Cano Mejia, Alvaro Jose, professor, COL

Presenters: Alvaro Jose Cano Mejia (Colombia)

In this presentation, show a didactic sequence to start astronomy in the classroom. Or with amateur astronomy groups. And others didactic experiences.

Session 3 - *August 24 23:00 UTC - August 25 04:00 UTC*

O Papel dos Astrônomos na Educação em Astronomia (The role of Astronomers in Astronomy Education)

R. Langhi, São Paulo State University (Unesp), School of Sciences, Bauru, Brasil

Presenters: Rodolfo Langhi (Brasil)

Apresentamos uma breve explicação sobre o trabalho de astrônomos amadores e profissionais em prol da Educação em Astronomia, trazendo um problema importante para o nosso país, o Brasil: existem poucas ações para disseminar e ensinar essa ciência atraente e motivadora, a Astronomia. Daremos exemplos internacionais e nacionais sobre como é possível motivar um grande número de pessoas envolvidas no ensino e na popularização da Astronomia em todo o país.

In this oral presentation, we give a brief explanation about the work of amateur and professional astronomers in favor of Astronomy Education, bringing an important problem to our country, Brazil: there are few actions to disseminate and teach this attractive and motivating science, Astronomy. We will give international and national examples about how it is possible to motivate a great number of people engaged to teach and popularize Astronomy all over the country.

Session 3 - *August 24 23:00 UTC - August 25 04:00 UTC*

Best Practices in Virtual Programs

Ken Brandt, Robeson Planetarium, Lumberton, NC, USA

Presenters: Ken Brandt (USA)

How do you get your audiences to interact with you in a virtual environment? How do you extend your virtual footprint so that your institution remains in the public eye? I will address these topics as we discuss the different ways I've promoted the planetarium while under quarantine.

Session 3 - *August 24 23:00 UTC - August 25 04:00 UTC*

Interactivity for Learning: Using Strategic Questioning in the Interactive Planetarium

S. K. Schultz, Minnesota State University Moorhead, USA
T. F. Slater, University of Wyoming, USA

Presenters: S. K. Schultz (United States)

Planetariums were created to teach astronomy; however, the planetarium in and of itself is insufficient to automatically ensure student learning occurs. Modern teaching strategies, like active learning, have consistently shown to move students toward a better and longer-lasting understanding in classrooms (viz., Bonwell & Eison, 1991), yet seem to be only rarely observed among planetarium educators' instructional practices. Formative assessment, in particular assessment conversations or targeted questioning, is a part of active learning strategies that can inform the instructor and give feedback to the student. Ruiz-Primo and Furtak (2006, 2007) developed a coding scheme to systematically identify and analyze the depth of formative assessment conversations between K-12 classroom teachers and their students, known as the ESRU cycle. The overarching goal of this study is to evaluate the nature of active learning-based formative assessment conversation cycles in the planetarium learning environment and identify any rationale or barriers to their use. A synthesis of collected data found scant evidence of complete formative assessment conversation cycles, but varying degrees of interactivity between the planetarium lecturer and the audience were observed. Nevertheless, planetarium educators clearly state a desire for professional development opportunities to become more effective educators. Taken together, these results lend weight to the notion that professional development for planetarium educators in using active learning and formative assessment conversation cycles could improve the quality of instruction given in planetariums.

Session 3 - *August 24 23:00 UTC - August 25 04:00 UTC*

The Dance of the Elements - An Interdisciplinary Approach to Teach the Origin of Elements

Chitra Uthaya. M, Excelsoft Technologies, India
Ilavenil Thirumavalavan, Excelsoft Technologies, India

Presenters: Ilavenil Thirumavalavan, Excelsoft Technologies, India (India)

2019 was declared the International Year of the Periodic Table by UNESCO. The K-12 Learning Events team of Excelsoft Technologies, India used this as an opportunity to showcase the uses of the periodic table and the elements in every facet of our lives. One of these was the often-omitted topic– that every element on Earth came into being through stellar processes.
This is a topic that is not usually learnt in school, and even people who find black holes interesting in science fiction are intimidated by quarks and nucleosynthesis. This necessitated a multi-pronged approach. The final exhibition had:

- An online project where students traced out the origins of an everyday object.
- An interactive periodic table which displayed the process by which each element came into being.
- A seven-scene dance drama with more than 100 students which was presented to an audience of students and the general public.

The dance drama narrated the events from the Big Bang to the formation of the Solar System. The lyrics of the dance drama stressed the fact that human beings are made of the same materials, and come from the same origins as the Universe. Students with varied skills were involved in composing the music, singing and applying make-up.
The dance drama was understood by the lay audience, helped students see the connections between Chemistry and Astronomy, and appreciate how elements came into being. Students who were not interested in astronomy prior to the dance drama started showing interest.

Session 3 - *August 24 23:00 UTC - August 25 04:00 UTC*

Observatório Solar e a Astronomia Indígena

I. Bittencourt, Universidade de São Paulo, Brasil
T. P. Idiart, Universidade de São Paulo, Brasil

Presenters: Izabela Bittencourt (Brasil)

O observatório solar é um instrumento que algumas culturas antigas utilizavam como ferramenta de observação e previsão de alguns fenômenos celestes. Os indígenas Guarani, atualmente distribuídos em territórios de regiões do Brasil, Bolívia, Argentina e Paraguai, faziam uso desse instrumento, denominado como Cuaracy Ra'Angaba, para orientação espacial e temporal, determinando o calendário econômico, social e religioso. O uso do observatório solar para abordar astronomia cultural pode ser empregado em atividades de educação básica em espaços de ensino formal e não formal. No Ensino Fundamental, o desenvolvimento dessa atividade pode abranger grande parte dos conceitos da unidade temática Terra e Universo exigida pela Base Nacional Curricular (BNCC), aplicando, ao mesmo tempo, a Lei Federal 11.645/08 (BRASIL) que torna obrigatório o ensino da história e cultura afro-brasileira e indígena no currículo escolar da rede de ensino. A proposta de atividade segue a ordem de: (1) contextualização da atividade; (2) instruções para execução da atividade; (3) relações culturais com marcadores espaciais/temporais; e (4) abordagem conceitual. O método expositivo - dialogado proposto como atividade, tende a revelar concepções alternativas de conhecimentos científicos e culturais relacionados ao experimento. Com essa atividade, é possível ressaltar que a compreensão dos significados atrelados às observações celestes não está desvinculada das práticas sociais e culturais de um dado grupo.

Session 3 - *August 24 23:00 UTC - August 25 04:00 UTC*

Attracting People Potentially Engaged in Astronomy on YouTube: Ricot's Astronomy Studio

A. Kuwata, The University of Tokyo, Japan

Presenters: Atsuki Kuwata (Japan)

Although I have been a staff member of stargazing parties at the National Astronomical Observatory of Japan, events for elementary school students, and so on, these days the events were canceled due to the ongoing coronavirus concerns. Then I became a YouTuber to upload videos of astronomy on my YouTube channel, "Ricot's Astronomy Studio." The reason I chose YouTube is that I thought YouTube videos can attract people who are potentially engaged in astronomy. In my talk, I will introduce the achievability of YouTube attracting the people and the reactions of the viewer.

Session 3 - *August 24 23:00 UTC - August 25 04:00 UTC*

Mindful and Yoga Astronomy

Breezy Ocana Flaquer, Dominican Republic.
Samir Dhurde, IUCAA, India

Presenters: Breezy Ocaña Flaquer (Dominican Republic)

Astronomy is a fascinating subject, but it can be a very abstract science, and therefore sometimes the concepts are very difficult to grasp, especially for young minds.

I have started to "play" astronomy, I have started to implement hands-on activities in which kids are able to experience the concepts that are being taught. At some point of the activity, we will incorporate a mindful moment, with the purpose of creating space for the here and for the now. I have found so far that this inclusion will bring attention to what they are doing, therefore, will create the space for real learning.

I have also been working on teaching Astronomy through movements. This means, we move through the universe with our imagination, using our bodies, with yoga poses for kids, incorporated into the lessons. For example, we could tell multicultural Constellation stories, with a carefully thought out sequence of Yoga poses, included in the storytelling process. The children will be learning about the constellations, but they will also benefit from the physical activity. This is now taking the shape of a project, in collaboration with Samir Dhurde, IUCAA, India. Currently, the goal is to try to bring this material to any children or school that might be interested.

The trials for the mindful astronomy lessons have started in an online format. The trials for the astronomy through movement will be done (when conditions normalize) in the Dominican Republic and India, the two countries which have a deep connection to me. Currently I am in discussion with some friends who are also interested in outreach and who would be willing to help with the trials, especially for kids of rural areas. This is a work in progress and I have just started to test some of the material with kids, other than my own son. Also, I am adapting the material into an online format, with pre-recorded sessions. A lot of the communities where I would like to go, will not have the possibility of internet connection. So hopefully, by the time preparation of these resources is finished, I can go to them in person.

Session 3 - *August 24 23:00 UTC - August 25 04:00 UTC*

Demonstrative and Hands-on Astronomy for all spectrum of society

Soumen Ghosh, Regional Science Centre, India
Vikas, Regional Science City, India

Presenters: Vikas (India)

Night sky has always fascinated us from early civilization to the modern era. Primitive men watch the movement of celestial bodies with great curiosity. At the beginning of agriculture based hydraulic civilization, early Egyptians noted that the heliacal rise of the star Sirius (Lubdhak) is associated with the flood in the Nile. Astronomy was one of such early sciences which is inseparably associated with human history. We are still inquisitive to know more about celestial neighbours to distant stars and galaxies. Astronomy is a major branch of science disseminating world wide by science museums through various demonstrative and Hands-on activities. As part of fulfilling basic mandates Regional Science Centre is organising Hands on activities to attract all segments of society right from students to teachers,hobbyist to professional, community to underprivileged. Through designed Hands-on activity Regional Science Centre established itself as centre of excellence to propage astronomical knowledge and inculcate scientific temper in society. As a part of a demonstrative model it has an inflatable mobile planetarium where the night sky with all minute details can be created using a star filled cylindrical projection system. People of all groups are engaged to watch the sky and identify stars and constellations directly through live demonstration. Even open-ended curiosity driven questions are also taken and answered at the end of the session. Some exhibit based hands on Minds-on models helps them to understand astronomical phenomena like why we see one face of the moon, Black hole or Gravity Weii, Relative position of distant Stars, Gravitational Pull, Gravitational Lensing, How telescope works.
Primary school teachers are responsible to impart comprehensive knowledge to kids for some of the basic astronomical phenomena as per curriculum . Most of the cases even teachers have a lack of understanding of the subject. Hands-on activity was specially designed for elementary level teachers to give ideas about events like Solar/Lunar Eclipse, Phrases of Moon,Summer / Winter Solstice. Same time fabricated teaching aids can be utilised in daily classroom teaching. Same time, secondary level students are exposed in making astronomical gadgets like Astrolabe to identify the latitude, Planisphere to locate the stars, Sundial to find out the direction and time, and low cost gadgets to observe solar/lunar eclipses. Night sky observation through a telescope is a popular community science program conducted round the year except monsoon days. Covering special astronomical events like solar eclipse and transit of venus in rural areas attracts substantial footfall and at the same time facilitated us as powerful tools to bust myths and inculcate scientific temper among the common mass.

Session 3 - *August 24 23:00 UTC - August 25 04:00 UTC*

Challenges for Creating an Inclusive Observatory

Y. Pramudya, Universitas Ahmad Dahlan, Indonesia

Presenters: Y. Pramudya (Indonesia)

The public observatory needs to be visited by the general public including the disable person. However, usually the main concern is limited only on providing the accessible infrastructure. At Observatorium Universitas Ahmad Dahlan (UAD), we are currently designing the learning material for visual impaired and hearing impaired. The tactile planetarium can be used by visually impaired people to touch the tactile constellation inside the dome. The dome is also easy to be installed and folded to be stored. We also utilize the 3 dimension printer to produce the model of moon surface and its crater. The visual impaired person can touch to study the moon surface. Some of the images need to be revised to avoid the misconception. The development of sign language on astronomy words is giving us the opportunity to interact better with hearing impaired students. Basically, the hearing impaired students had no major difficulties studying basic astronomy while visiting the observatory. However, as we further discuss the technical details of astronomy such as the geometrical optics and the seasonal changes on Earth, the sign language on specific astronomy terms is highly needed.

Session 3 - *August 24 23:00 UTC - August 25 04:00 UTC*

The Case for Coordinating Earth & Space Science Education

W. H. Waller, Endicott College and The Galactic Inquirer, USA

Presenters: William H. Waller (United States of America)

The Earth sciences address processes within and among the rocky Earth, its ice caps, oceans and atmosphere. The space sciences consider Earth as a planet among other planets in the Solar System and the greater cosmos – what is commonly called astronomy. Together, the Earth and space sciences span what we know – and what we would like to know – about our place in space and moment in time. The Earth & space sciences, in concert with the life sciences, comprise what is commonly known as the natural sciences. In this presentation, I argue in support of teaching the Earth & space sciences together, so that students can attain a more holistic understanding of their physical environment, how it came to be, and where it is headed. Such teaching (and teachers) should receive the same priority as in the teaching of physics, chemistry, and biology. My reasoning for bundling and advancing Earth & space science education has institutional, scientific, and cultural underpinnings. These will be discussed along with ideas for enhancing the interaction, cooperation, and coordination of Earth & space science educators worldwide (see https://drive.google.com/file/d/1iktmzxZYdwH2HsilFYp0FRzkcqt4fAMO/view?usp=sharing).

Session 3 - *August 24 23:00 UTC - August 25 04:00 UTC*

Creation of a Working Group for the Determination of the Variability of Solar Type Stars

L.J. Restrepo-Quirós, University of San Buenaventura Medellín, GTTP, Colombia
Carolina Escobar, University of San Buenaventura Medellín, GTTP, Colombia
Nubia Mena, GTTP, Colombia
Jonathan Ospina, GTTP, Colombia
Luisa Ramírez, GTTP, Colombia
Carlos Ríos, GTTP, Colombia
Julián Tobón, GTTP, Colombia

Presenters: León J. Restrepo-Quirós (Colombia)

A working group was established in Colombia made up of people from different groups (HOU / GTTP-Universidad de San Buenaventura Medellín / Sociedad Antioqueña de Astronomía / Sociedad Julio Garavito / Parque Explora-Planetario / AstroMAE). The proposal given by the group advances processes of Project Based Learning, doing field work (observations and expeditions), LCO.net teams such as the Faulkes telescopes, the one meter Cerro Tololo and the 40 cm telescopes located all over the world, within the LCO Global Sky program Partner This proposal originated in the one presented by AEGORA of the Complutense University of Madrid, but it is particularized in solar type stars.

Session 3 - *August 24 23:00 UTC - August 25 04:00 UTC*

1 House 1 Telescope Movement to Spark STEM Hobby in Malaysia

K. Amirul Hazim, Apadilangit, Malaysia
A. Hafez Murtza, Apadilangit, Malaysia

Presenters: Amirul Hazim Kamarulzaman (Malaysia)

A hobby is a regular activity done for enjoyment, typically during one's leisure time, not professionally and not for pay. Participation in hobbies encourages acquiring substantial skills and knowledge in that area. Hobbies are a great stress reliever; they offer new challenges and experiences which enrich your perspective. Astronomy can be an exciting hobby. Forget sitting in the observatories, dealing with sophisticated telescopes and calculations. Initially astronomy is an outdoor nature hobby. Starry nights with a milky way in the middle of the sky are the biggest arena that can be explored by humans. Telescope invention allows us to look at further details on the moon, planet and stars. Understanding human nature and the necessity to lead a movement, Apadilangit; Universe Awareness Malaysia has come out with a strategy to promote intellectual hobby as a new trend in Malaysia. Therefore, “1 house 1 telescope” project was launched. This project promotes astronomy as a family and intellectual hobby that can detach kids from gadget addiction, foster family bonding, building talent and boost interest in STEM. We suggested affordable and the easiest set up telescope for parents to have. In order to make this project sustain we grow our community with stargazing events, continuous support and motivation. Community members are encouraged to share their photos of stargazing. We planned to have 100 families with telescopes spread around Malaysia by the end of this year.

Session 3 - *August 24 23:00 UTC - August 25 04:00 UTC*

IMPACT Dome Approach for Blind and Visual Impaired (BVI) Towards Understanding Stars and Sky

A. Hafez Murtza, Apadilangit ; Universe Awareness Malaysia, Malaysia
K. Amirul Hazim, Apadilangit ; Universe Awareness Malaysia, Malaysia

Presenters: Hafez Murtza (Malaysia)

Teaching astronomy to visual and hearing impaired students is a new topic in Malaysia. Less effort has been allocated to teach astronomy for inclusive and impaired students. This is due to lack of needs to emphasize astronomy and it leads to insufficient learning tools and teaching aids produced to teach them. This issue has triggered us to promote astronomy and its benefits for inclusive and impaired students. Apadilangit has developed a miniature Malaysia sky in the form of a geodesic dome with tactile images. This helps blind and visually impaired people to experience the sky via touching sense. The modular dome has made it easy for logistic and storage purposes. Each single piece of the triangle with tactile constellations can be used as separate teaching tools. This project called IMPACT Dome is a collaboration between Malaysia and Indonesia. We build two separate domes each for the northern and southern hemisphere based on the country's longitude location. Students are expected to understand the basic concept of astronomy. Feedback from participants and teachers showed a good understanding of the spherical sky and 2D constellations. Students are also able to understand the star guide to the cardinal direction. We discover that this dome is able to help normal people to learn astronomy in the location where sky is usually obscured by cloud and heavy light pollution.

Session 3 - *August 24 23:00 UTC - August 25 04:00 UTC*

Astronomy and Philiosophy

FERNANDES, R.R., USP - Universidade de São Paulo, Brazil

Presenters: Rodrigo Rosas Fernandes (Brazil)

There are currently more philosophical issues in astronomy than in the schools of philosophy. It is about time for philosophy teachers to learn from astronomers just as it is time for astronomers to start questioning astronomical data in a philosophical way. Both areas should join hands, in full union.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Cosmic Adventures

D. Millar, Orange County Astronomers, USA
R. AmirArjomand, Orange County Astronomers, USA
C. Caballero, Orange County Astronomers, USA

Presenters: Doug Millar
Reza AmirArjomand
Ceci Caballero (USA)

Cosmic Adventures is an inreach program of the Orange County Astronomers, providing members with opportunities to do real astronomical research and activities of scientific value. By being an inreach this program ensures the seriousness of its participants.
With around 800 members, OCA is among the largest amateur astronomy clubs in the world. OCA has an extensive outreach program that brings telescopes and education to numerous schools and venues throughout the region all year round.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Astronomy for Development in Ethiopia and Africa

Mirjana Povic, Ethiopian Space Science and Technology Institute (ESSTI), Ethiopia

Presenters: Mirjana Povic (Ethiopia)

Due to nature (such as its dark skies) and human resources, Africa has great potential for scientific research in astronomy and space science. At the same time, the continent still faces many difficulties and its countries now recognise the importance of astronomy, space science, and satellite technologies for improving some of its main socioeconomic and ecological challenges. The development of astronomy and space science in Africa has grown significantly over the past few years, and it has never been more possible to use astronomy for development than it is now. However, much remains to be done. This talk will summarise recent developments in astronomy in Africa and will focus on how working together in the development of science and education (using Ethiopia as an example) we can fight poverty on a long-scale and increase in the future our chances of achieving the United Nations Sustainable Development Goals for the benefit of the entire population.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Activitis of Astronomy in Kutch (Kachchh), Gujarat, India

N. N. Gor
N. H. Gor

Presenters: Nishant N Gor (India)

We are working in the field of Science popularizing activities with schools and different communities

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Mobile Planetarium of Unipampa: Teacher Training and Dissemination Space

C.P. Irala, G.F. Marranghello, R.K. Kimura

Presenters: Cecília Petinga Irala (Brazil)

We all know the importance of Astronomy in the knowledge of the world in which we live. Look at the sky, find out about our past, present and future in the Universe. On some level, everyone is curious about Astronomy, but the opportunities to contemplate these curiosities are not for everybody. In Brazil, although the contents of Astronomy are present in the national curricular parameters for basic education, we know that in practice the teaching of these contents are taught in a disconnected way by teachers who most often come up against the limitation of not having received basic knowledge of Astronomy.

We know that scientific dissemination environments, such as planetariums, diminish this reality, bringing people closer to their most intrinsic curiosities about the Universe and motivating the work of astronomical contents within the classroom. In this sense, in 2019 the mobile planetarium of Unipampa carried out a work in 18 cities in the interior of the state of Rio Grande do Sul, covering more than 10000 km, which served 300 school classes in sessions at the summit, 200 undergraduate students in Geography in an initial training course which made use of resources such as the planetarium itself, applications, sky simulation programs and telescope, with the main purpose of promoting initial training and disseminating astronomy in places with little access to science centers and disclosure.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Telescope in Rural India

S. Chattopadhyay, Sabitri Debi Memorial Trust, School of Astronomy, India

Presenters: Soham Chattopadhyay (INDIA)

A survey says that 'telescope' is a new subject to school children in rural India. A few amateur astronomers are trying to reach schools and clubs but more effort is very much required. In this paper, I want to categorize observational astronomy in three; one, astronomy in naked eyes; two, use of binoculars and three, use of telescopes. It has been proved telescope making workshops are very interesting to school students. Students as well as their guardians are available in the evening. After work the guardians return home and try to spend quality time with their children. It is a good time to assemble them in a small ground or in a long courtyard and show them the wonders of the sky. Children are always interested in watching the night sky and they're naturally curious. I think my project can stimulate their inner curiosity and the desire to know the unknown. This can also inspire young minds to practice Astronomy as a hobby, and who knows some bright minds may even be inspired to take Astronomy as their career. Basic knowledge of Astronomy will also make the students more attentive.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Stories of Tomorrow: School Children Imagine a Trip to Mars

J. Saraiva, NUCLIO, Portugal
S. Tyszka, NUCLIO, Portugal
R. Doran, NUCLIO, Portugal

Presenters: Jose Saraiva (Portugal)

Stories of Tomorrow was an European project that ran between 2017 and 2019 in which 5th grade students were asked to work in groups to come up with stories about getting to Mars and living there. They used a purpose-built computer tool that allowed them to create e-books that could include text, images, animations, videos, sounds... taking advantage of an interdisciplinary inquiry approach that involved the teachers of all disciplines. The main goal of the project was the evaluation of the way the use of storytelling and technology contributed to deeper learning in curricular science matters. This numerical evaluation met with some drawbacks, but some conclusions were reached. We focus here on the implementation in Portugal, where it reached close to 1000 students in four schools through the two years of implementation. From the point of view of people working directly with the students, there were some very gratifying results: the enthusiasm and creativity of young people, their pleasure in creating and presenting their stories to the other participants, the fact that they learned that computers can be used as tools for research, and their new found capability to work in groups, collaborate and distribute tasks. For the teachers involved, the experience of collaborating and integrating their teachings was also a new one, and for the most part met with enthusiasm and willingness to go the extra bit. Though the project focused on Mars, the basic idea of storytelling can be applied to virtually any curricular subject and any grade.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Projetos de Articulação Horizontal e de Articulação Vertical

M. R. Alvelos, Colégio da Imaculada Conceição, Portugal
P. Teixeira, Colégio da Imaculada Conceição, Portugal
S. Figueiredo, Colégio da Imaculada Conceição, Portugal

Presenters: Rosário Alvelos (Portugal)

A Instituição a que pertenço lançou-me o desafio de construir projetos baseados na flexibilidade curricular com inovação pedagógica. Como professora de Físico-Química, tentei elaborar projetos e sequências de aprendizagem em que alguns conteúdos que fazem parte das Aprendizagens Essenciais de Físico-Química tocam os que são tratados noutras disciplinas, ou em outros ciclos de ensino. Venho falar de dois projetos, um com articulação horizontal no 7º ano e outro com articulação vertical envolvendo uma turma de 7º ano e outra de 4º ano. No primeiro, após a análise das Aprendizagens Essenciais de outras disciplinas do 7º ano de Escolaridade, percebi que História tem a temática do Big Bang e a Matemática trabHistóriaalha as potências de base 10. Assim, elaborei um projeto, com a colaboração dos colegas de e Matemática, com o objetivo de formar um conhecimento integral e quebrar os preconceitos de que as Ciências Físico-Naturais e as Ciências Sociais não se relacionam. Como produto final, os alunos construíram uma linha de tempo em que o início é o Big Bang e percorre vários marcos históricos nas três disciplinas, mantendo a noção da diferença temporal que separa os eventos. No segundo projeto, foi preparada uma ação de formação inter-pares, pelos alunos do 7º ano para os seus colegas de 4º ano sob a temática: “O Sistema Solar, a Terra e a Lua”, onde foram exploradas algumas características dos vários planetas do Sistema Solar assim como as estações do ano e as fases da Lua. Este projeto foi possível, pois encontro-me a lecionar uma Oficina de Ciências Experimentais aos alunos do 1º ciclo onde desenvolvo uma pequena parte do Currículo de Estudo do Meio.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Astronomy Workshop of MUDIC-VBS-CV

F. Reyes. IES Gabriel Miró, Director área tecnología del MUDIC, SPAIN
R. Martínez. Directora actividades STEM del MUDIC, Asesora Cefire de Orihuela, SPAIN
C. Perea. Directora-Gerente MUDIC, Miguel Hernández University, SPAIN
J. Roldán. Director de Personal MUDIC, Asesor Cefire de Orihuela, Miguel Hernández University, SPAIN

Presenters: Francisco Reyes Andrés (Spain)

At the Science Didactic and Interactive Museum of Orihuela (Spain) we have prepared an astronomy workshop for primary and secondary students. The duration of the workshop is one and a half hours. It is divided into two parts: the first takes place in the planetarium. Visitors are introduced to the main constellations and movements of the sun, moon, and planets in the sky using the Stellarium program. Visitors leave this activity with many questions: why are Mercury and Venus only seen at sunrise or sunset? Why are planets seen at a certain time of year? etc. In the second part, to answer these questions, visitors with the help of tablets and a model of the carousel-planetary that we have created to carry out activities such as: placing the planets on the model of the solar system on a certain date, pointing out the positions in which planets seen from Earth would be observed. At the end of the workshop most of the students have reached the objectives that we propose in this workshop for the different levels of primary and secondary for which it is designed.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Using Game-Based Learning for the Teaching and Learning of Astronomy

A. Cardinot, National University of Ireland Galway, Ireland
J. A. Fairfield, National University of Ireland Galway, Ireland

Presenters: Adriana Cardinot (Ireland)

Several studies have highlighted the use of game-based learning (GBL) as a successful methodology for achieving learning outcomes and promoting social development (Barton et al. 2018, Hamalainen et al. 2018, Sung & Hwang 2013). Educational games have the potential to provide intrinsically motivating learning experiences that immerse and engage the player with a variety of topics (Durlak et al. 2011). Moreover, GBL has attracted increasing attention as an effective approach to teaching (Cardinot & Fairfield, 2019). However, taking advantage of these qualities to facilitate the teaching and learning of astronomy may not be an easy task.

In our research study, we developed and examined the effectiveness of teaching astronomy through games. Our aim in this presentation is to discuss how non-digital games can be used to support the learning of astronomy topics. A total of 498 post-primary students (12-16 years) took part in the study in Ireland. Results indicate that non-digital games can be exploited not only as a useful learning tool to promote conceptual knowledge but also as an activity to enhance students' motivation and engagement with science.

Barton et al. (2018). Journal of Positive Behavior Interventions, 20(3), 138-148.
Cardinot & Fairfield (2019). International Journal of Game-Based Learning, 9(1), 42-57.
Durlak et al. (2011). Child development 82(1), 405–432.
Hamalainen et al. (2018). Simulation & Gaming, 49(1), 50-71.
Sung & Hwang (2013). Computers & Education 63, 43–51.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

School Planetariums Network in Colombia

E. Torres, Planetarium of Medellín, Colombia

Presenters: Enrique Torres (Colombia)

From the Planetarium of Medellín, Colombia in 2019, the collective construction program of school planetariums was developed in 6 educational institutions in the department of Antioquia, with the purpose of providing these remote communities with an important instrument for dissemination and training in astronomy at school level. This construction was carried out by teachers and students from these institutions with the support of personnel from the Medellín planetarium and Parque Explora. This talk seeks to show the development of this experience, the social impact it has had and future plans.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Temples and Astronomy in India

Raka V. Dabhade, Fergusson College, Pune, India
Manish Hiray, Ferugsson College, Pune, India

Presenters: Raka V. Dabhade (India)

Since ancient times, temples in India have not only been the places of worship and religious activities, but are perfect examples of astronomy and architecture. The temple's architecture has played a role in calendar making and keeping time too.
All ancient temples in India are attractions of very inspiring sculptures and the geometry involved. In this communication we present some temples to give some examples.
The Vidyashankara temple at Sringeri, in Karnataka state has twelve zodiacal pillars, Rashi stambhas in the outer hall. The design of the pillars of this temple involved certain astronomical concepts, for example, the first rays of the rising sun fall on specific pillars with the zodiacal symbol on the pillar corresponding to the position of the sun.
Another example sited is the Gavi Gangadharesvara temple in south India. This is a cave temple and is particularly known for an event locally known as the “Surya Majjana”. This is an event where the sun’s rays make their way through an arc to shine ultimately on the idol situated deep inside the cave.
Similar event occurs at the Mahalakshmi temple of Kolhapur. The event here is called Kirnostav, meaning the festival of the sun rays. In this case the sun rays fall directly on the deity on certain days. It is interesting to note that the rays first fall on the deity’s feet, then chest and finally on the entire body.
The Konark temple in Odisha is specially dedicated to the Sun as it is the destroyer of darkness and empowers knowledge and all the life on earth is ultimately due to the sun.
India has a rich heritage and thousands of temples and monuments where there is ample scope for research in Astronomy heritage.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Informal Science And Art Education In The Constructivist Environment

I. Jokin, Municipal center for extracurricular activities, Bulgaria

Presenters: Ivo Jokin (Bulgaria)

One of the major educational problems at present is the alienation from the school and the lack of willingness to study, especially in the field of science subjects, The motivation of the students for education and attracting their interest towards science could be successfully accomplished in constructivist environment by means of the relatively new approach (method) in education the method of research or study/ Inquiry Based Learning/ applied to the learning of science - Inquiry Based Science Learning.

According to that approach the learning is based on " studying, research" of issue or phenomenon with the participation of all students in a class in all stages/phases of the lesson – in the discussion in the beginning of the lesson, setting of the major scientific issue and the formulation of a hypothesis, performing of experiments and their analysis, discussion. Thus the students come to the facts by themselves and give their suggestion concerning the relationships among them. They take the role of young scientists/ researchers.
Linn, Davis and Bell give the following definition: "The research work could be defined as a conscious process for problem diagnosing, doing experiments and defining of alternatives, planning of research work, giving scientific research suggestions, looking for information, designing of models, discussing with classmates, forming of clear argumentation" The research approach in science and in particular in Physics and Astronomy enables the development of skills and opinions which will be useful lifelong for the young people.

The description of the work I have presented as my experience in the organization of extracurricular activities with students in science and art, the forms and methods, results and some good practices in teaching astronomy in the constructivist environment. Participation in joint projects with research organizations, use of online labs and remote ones.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Project LEGO-LAB 2019

C. Homem, Escola Básica Integrada de Angra do Heroísmo, Portugal
T. Leite, Regional Directorate for Education of the Azores, Portugal

Presenters: Cátia Homem
Tiago Leite (Portugal)

In this presentation, we intend to introduce the LEGO-LAB 2019 project that was developed in the Chemistry classes in collaboration with the Programming and Robotics Club.
The project involved two 8th grade classes, divided in two groups of 10 students. Each group built and programmed a different robot to be used in the laboratory in acid-base experimental procedures. In each group, students formed work teams, distributing tasks and responsibilities, in order to complete each of the phases that were foreseen in the project: Research and Design, Construction and Programming, Use and Presentation and Dissemination of results.
The Research and Design phase consisted of collaborative research between students and teachers, involving LEGO robots, created in similar contexts, so that students could design their own original solutions, according to the equipment available.
The Construction and Programming phase consisted in building and programming the LEGO robot, using pH and temperature sensors or a syringe to drop colorimetric indicators of acidity or basicity.
The Utilization phase consisted of carrying out the experimental activity, using the robots, developed by each class.
The Results Presentation and Disclosure phase ended up not being carried out as expected due to the pandemic COVID-19, however each group prepared a poster. This was entirely carried out online on the Google Drawings platform.
To carry out this project, students had to use digital cooperative tools, such as Google apps and Canva.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Bringing Eclipses Closer to Home - the Indian Experience

Niruj Mohan Ramanujam (Astronomical Society of India, South Africa)
Rathnasree Nandivada (Nehru Memorial Museum and Library, Astronomical Society of India, India)
Aniket Sule (Homi Bhabha Centre for Science Education, Astronomical Society of India, India)
Samir Dhurde (Inter University Centre for Astronomy and Astrophysics, Astronomical Society of India, India)
TV Venkateswaran (Vigyan Prasar, Astronomical Society of India, India)
Sarita Vig (Indian Institute of Space Science and Technology, Astronomical Society of India, India)
Harvinder Kaur Jassal (IISER Mohali, Astronomical Society of India, India)

Presenters: Niruj Mohan Ramanujam (South Africa)

Eclipses continue to capture the public imagination like no other celestial event does, and outreach communities worldwide have been successful in utilising them for large scale engagement. In the Indian context, widespread myths about the harmful effects of eclipses makes education campaigns particularly challenging. In addition, the range of languages and cultures makes such effort all the more complex.

The Public Outreach and Education Committee of the Astronomical Society of India has been conducting campaigns for the public and for students, during the many recent eclipses. Here we describe our efforts in collaborating with the students and amateur astronomy communities in India, as well as engaging with the public with an emphasis on superstitions and scientific reasoning. We also discuss the campaign to construct simple eclipse viewing equipment across many parts of India, which facilitated both mass viewing of the eclipse as well as hands-on measurements by the students themselves.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Dark Skies Rangers - Portugal

N. Correia, NUCLIO, Portugal

Presenters: Nelson Correia (Portugal)

Our planet, seen from the International Space Station, looks like a Christmas tree. This light, visible from space, is light pollution caused by outdoor lighting that projects the light to all directions, diminishing greatly the darkness of the night sky.
Light pollution is a global problem that we must fight for the following reasons:
It is a great waste of energy and money;
Contributes to climate change;
Affects living beings and in particular human life;
Prevents people from seeing the stars and disturbs astronomical observations.

The international project Dark Skies Rangers is promoted in Portugal by NUCLIO with the following objectives:
Communicate the causes and consequences of light pollution;
Raise awareness of the importance of using outdoor lighting that are energy efficient and that direct the light downward;
Contribute to the reduction of light pollution and the preservation of the night sky;
Promote interest in Astronomy.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Astronomy With an Online Telescope

Alan Cayless; Jo Jarvis

Presenters: A. Cayless (United Kingdom)

Open University astronomers Jo Jarvis and Alan Cayless have recently produced an online course "Astronomy with an online telescope". This eight-week course gives participants the unique opportunity to use COAST, one of the Open University's two robotic telescopes located at the Observatorio del Teide in Tenerife and forming part of the university's OpenScience Observatories.

The course provides hands-on experience of observational astronomy. Operating COAST remotely, participants can control the telescope and request images through an online interface. Practical observing projects during the eight weeks include imaging Messier objects and making observations of variable stars. The variable star measurements are combined with the results of others to form a light curve, introducing a collaborative citizen science element to the course.

While accessible to school pupils and interested adults, this free online course has also been developed with teacher professional development in mind. We are currently developing supporting materials for teachers, linking the course to the relevant national astronomy curriculum within the UK.

In order to make the materials and activities as relevant as possible in a classroom setting, we have undertaken considerable developmental testing in partnership with a local school in Scotland.

The session will show the telescopes in action and present some of the results and outcomes from our school partnership. We will also discuss the teacher training resources being developed and outline how to take part and obtain your own stunning images of celestial objects with COAST.

Session 5 - *August 25 15:30 UTC - 22:00 UTC*

Travel to a Black Hole: Effects of a Lesson Series Aimed at Inclusive Education on Children's Perception of Space Science

T.E. Vossen, Leiden University, The Netherlands
A. Schut, Leiden University, The Netherlands
P.M. Russo, Leiden University, The Netherlands
A.M. Land, Leiden University, The Netherlands

Presenters: Tessa Vossen (The Netherlands)

Science, Technology, Engineering, and Mathematics (STEM) skills are becoming more and more important for participation in civic life as well as for employment. It is very important that youth be given opportunities for learning STEM subjects and develop a sense of themselves as someone who does science. However, studies show that STEM activities are in many cases not inclusive. Women and people from underrepresented minorities are underrepresented in the workforce of STEM-related fields. To make STEM education and the STEM workforce more inclusive, people from all genders, backgrounds and ethnicities must feel welcome and at home. In this project, we invited 65 children from two schools from underprivileged neighbourhoods in The Netherlands to participate in the lesson series 'Travel to a Black Hole'. This lesson series was developed during three co-creation sessions with experts on education, science communication, diversity and inclusion of women and URM's in STEM. The lesson series uses different role models to highlight diversity, actively debunks stereotypical ideas, emphasizes the talents of children themselves, and includes elements of inquiry-based and design-based learning to foster active learning. Through questionnaires, classroom observations and interviews we assessed the impact of the lesson series on the development of children's perceptions, attitudes and sense of belonging in space science. The results indicate that childrens' interest in space science was sparked and that after the lesson series, they viewed the space science workforce as more diverse. In this contribution, we will share the results from our study as well as the pitfalls and successes of the project in order to help and inform fellow educators and institutions.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Defining and Identifying Inclusive Education

S. Varano, Istituto Nazionale di Astrofisica, Italy
C. Boccato, Istituto Nazionale di Astrofisica, Italy
S. Casu, Istituto Nazionale di Astrofisica, Italy
F. Di Giacomo, Istituto Nazionale di Astrofisica, Italy
D. Guidetti, Istituto Nazionale di Astrofisica, Italy
E. C. Molinari, Istituto Nazionale di Astrofisica, Italy
S. Ricciardi, Istituto Nazionale di Astrofisica, Italy
S. Sandrelli, Istituto Nazionale di Astrofisica, Italy
A. Zanazzi, Istituto Nazionale di Astrofisica, Italy
A. Zanella, Istituto Nazionale di Astrofisica, Italy

Presenters: Stefania Varano (Italy)

Universal Design is the design of products and environments in order to be aesthetically pleasant and usable, without being adapted, to the greatest extent possible by everyone, regardless of their age, ability or status in life. In particular, Universal Design for Learning aims to provide different ways for students to interact with the materials and look for their meaning and motivation.
We present here a study on a list of tags and keywords for the definition of specific inclusive features of educational activities, in order to label existing resources and have support parameters, in terms of inclusion, when designing new ones. These tags have been identified on the one hand on the basis of the self-evaluation of our experience; on the other hand this list results from the advice of experts working with (or representing) disadvantaged groups and/or Special Educational Needs (SEN).
The main aim of these tags is to identify the inclusive potential of activities available on several platforms for astronomy education, in order to exploit them at best or to be aware of any difficulties that could be encountered in their use.
In addition to that, we intend to help increase awareness about inclusive design methodologies and extend the Universal Design for Learning approach as much as possible.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Through Hands On Teaching, Let Students Really Understand the Astronomy in Life

Hongfeng Guo, National Astronomical Observatories of Chinese Academy of Sciences, China

Minchen Zhou, China Hands _On Universe, China

Presenters: Hongfeng Guo (P.R.China)

This presentation is about to show the recent progress of the HOU program in China. We would like to use a few examples to illustrate how to let students really understand the laws of celestial bodies in Hou teaching. We also want to share with you the experience of introducing observation, measurement, calculation, analysis, modeling, human performance and other activities into astronomy teaching.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Supernova Hunting With Robotic Telescopes

K A Mosedale, Radley College

Presenters: Kevin Mosedale (UK)

Over the last twelve months, a small group of UK year 12 students (16/17 years old) have been using robotic telescopes (LCOGT) to study recent supernovae identified using the Gaia Alerts Service and Transient Name Server database. This presentation by the teacher who ran the group will outline the way the group ran, reflect on the research and the lessons learned as a result of the project.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Space Mission From a Secondary School: Candasat I

J. Redondas, IES de Candás, Asturias, Spain

Presenters: Javier Redondas (Spain)

The first space mission carried out at the IES de Candás consisted basically in designing, testing, launching, recovering and analysing collected data of a payload flying to the stratosphere driven by a helium-filled high altitude balloon.
Our motivation and main goal was to highlight that it is feasible and worthwhile to develop and fly a scientific payload on a balloon-borne platform; and this can be conducted in an educational environment, which means the use of low-cost devices and no deep scientific and technical knowledge.
Several months have been needed for developing the different stages of the project. Finally, after some cancellations and delays due to meteorological and legal issues, the balloon reached the stratosphere, obtaining data of position, temperature, pressure, humidity and wind as well as some pictures and videos.
From the pedagogical perspective, students developed 21st century learning skills like creativity, innovation, communication and collaboration, critical thinking and problem solving, as well as life and career skills like productivity, perseverance, leadership and responsibility.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Our Space Our Future: Evaluating the Impact of Space Science on Young Peoples' Attitudes and Aspirations

S. Bartlett, Cardiff University, UK

Presenters: Sophie Bartlett (United Kingdom)

Our Space Our Future is a European educational programme with a vision to enable and empower all young people to consider a career related to space science as a relevant, attainable and exciting aspiration for their future. We will be delivering multiple interventions to school children, their families and local communities across five European countries: Denmark, England, Italy, Portugal and Wales built around space science and space industry themes.

In order to assess whether or not we achieve this vision, what we can learn from our experiences and what this means for the future of informal STEM education, we have embedded a rigorous and longitudinal evaluation framework into our methodology. Our approach will not only help us to identify if our approaches work, but how and why they work. This will allow us to generate recommendations for both practitioners and teachers and to provide real examples of good practice to the wider education community. In this talk I will discuss our approach to evaluation and our data collection tools that could be adopted by practitioners to evaluate the impact of other similar initiatives seeking to induce attitudinal change among young people.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Solar Eclipse For Astronomy Education and Public Outreach in Indonesia

A. Yamani, langitselatan; Planetary Science Institute, Indonesia
H. L. Malasan, ITERA Astronomical Observatory, Sumatra Institute of Technology; Astronomy Division, Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung, Indonesia
R. Muztaba, Sumatra Institute of Technology, Indonesia
A.A Yusuf, Sumatra Institute of Technology, Indonesia
D. Andrian, Sumatra Institute of Technology, Indonesia
D. Triyono, Sumatra Institute of Technology, Indonesia

Presenters: A. Yamani (Indonesia)

Indonesia has a long story with a total solar eclipse as in the past the government prevented people from observing the events. It was during the previous solar eclipse in 1983 and 1988, the government advised the public not to observe the eclipse because it will damage the eyes.

During the 2000s, the annular eclipse 2009 received high interest from the public, but it was not until Total Solar Eclipse 2016 that we received massive interest to observe the eclipse directly and indirectly, especially to those who live outside the totality path. This is also the case during Annular Solar Eclipse 2019. During both events, astronomy institutions, communities and religious communities held solar eclipse observations as well as live streaming for the public. Many groups also traveled to the totality and annular site to do public outreach and education in schools.

On June 21st, 2020 annular solar eclipse, Indonesia only experienced a partial eclipse but we still receive high interest from the public to watch the event. Unfortunately this eclipse happened during the pandemic and we could not hold any public observation. To fulfill public curiosity, several astronomy institutions observed the eclipse and live streamed the event. We also join MY-EAUNIVASE (MY– East Asia UNIVerse Awareness Solar Eclipse), the East Asia collaboration to observe and live stream the eclipse, initiated by UNAWE Malaysia.

In this paper, we will review and discuss the lessons learned in astronomy outreach and education during the solar eclipse in Indonesia since 2016. We will also discuss strategies for Education and Public Outreach using solar eclipse to engage the public and for education in schools in relation to the upcoming 2023 hybrid solar eclipse and how to engage the public during this time of pandemic.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

1520-2020 Magellan, Astronomy 500th Anniversary of the 1st Round the World Trip

Michel Faye, Louis-Le-Grand High School Paris FRANCE
Suzanne Bourdet, F-HOU, FRANCE

Presenters: Michel Faye (FRANCE)

What Magellan met during his journey: a solar eclipse, the Coalsack nebula (dark magellanic cloud), the two bright Magellanic Clouds, time lags, and rotations of the Earth.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Astronomy Workshop of MUDIC-VBS-CV

F. Reyes, IES Gabriel Miró, Director área Tecnologia del MUDIC, SPAIN
R. Martínez, Directora actividades STEM del MUDIC, Asesora CEFIRE de Orihuela, SPAIN
C. Perea, Directora-Gerente, MUDIC, Miguel Hernández University, SPAIN
J. Roldán, Director de Personal MUDIC, Asesor CEFIRE de Orihuela, Miguel Hernández University, SPAIN

Presenters: F. Reyes, IES Gabriel Miró, Director área Tecnologia del MUDIC, SPAIN (Spain)

At the Science Didactic and Interactive Museum of Orihuela (Spain) we have prepared an astronomy workshop for primary and secondary students. The duration of the workshop is one and a half hours. It is divided into two parts: the first takes place in the planetarium. Visitors are introduced to the main constellations and movements of the sun, moon, and planets in the sky using the Stellarium program. Visitors leave this activity with many questions: why are Mercury and Venus only seen at sunrise or sunset? Why are planets seen at a certain time of year? etc. In the second part, to answer these questions, visitors with the help of tablets and a model of the carousel-planetary that we have created to carry out activities such as: placing the planets on the model of the solar system on a certain date, pointing out the positions in which planets seen from Earth would be observed. At the end of the workshop most of the students have reached the objectives that we propose in this workshop for the different levels of primary and secondary for which it is designed.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Experience of Annular Solar Eclipse in Ethiopia amidst COVID -19.

Alemiye Mamo, Ethiopian Space Science and Technology Institute(ESSTI), Ethiopia
Esteginet Getachew, Ethiopian Space Science and Technology Institute(ESSTI), Ethiopia
Getinet Feleke, Kotebe Metropolitian University(KMU), Ethiopia

Presenters: Alemiye Mamo Yacob (Ethiopia)

Eclipse is all about celestial shadow that occurs as celestial bodies move along their orbits. An annular solar eclipse happens when the Moon comes between the Sun and Earth and the Moon obscures all but an outer ring of the Sun. The annular solar eclipse of 21 June 2020 started from central Africa, crossed over eastern Africa to southern Arabian peninsula then to northern India, south- east Asia , China and ended in the Pacific Ocean. The path of annularity was about 60 km wide and covers a distance of14000 km in just 3 hours and 45 minutes. The 21th June 2020 annular solar eclipse was marked as the greatest moment of an Astronomical event in Ethiopia awaited for three decades since 1983. In most part of Ethiopia both annular and partial solar eclipses were observed that cover the sun's surface from 60-97% during maximum eclipse. In this talk we will share the experience and lessons learned during the annular solar eclipse of June 21, 2020 that happened at Lalibela in particular and in Ethiopia in general amidst COVID-19.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Observing Light pollution in the Times of Pandemic

Mila Mitra, STEM & Space, India

Presenters: Mila Mitra, STEM & Space, India (India)

The program 'Globe at Night' enables students to understand how light pollution in their location can be measured by observing recognizable constellations such as Orion and Leo and counting the number of stars. The faintest stars you can see gives the limiting magnitude. Due to the pandemic, there was a lockdown in India. This resulted in many places that would normally contribute ambient light, to be closed. Such as malls, industry, offices, etc. The ambient light was distinctly less and it was clear that fainter stars could be seen than in other times. Additionally, the smoke and atmospheric pollution was also significantly less. The 'Globe at night' program was conducted online with about 100 students during this time. Their results were compiled and compared to light pollution data on Globe at Night from previous years for the same location. This showed that indeed the light pollution was less due to lockdown and fainter stars could be seen. This data and study and the program conduction will be presented.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Action Sun

Deirdre Kelleghan Ireland

Presenters: Deirdre Kelleghan (Ireland)

Action Sun is a workshop developed by Deirdre in which groups of children literally bring the Sun to Earth in real time. This activity can take place indoors or outdoors . During the workshop we replicate the action on the solar disc by using either data directly from NASA's Solar Dynamics Observatory or directly from a solar telescope . The materials are paper , paint and glue , during the workshop here is a continuing dialogue between the participants and Deirdre about what the sun is , what it does for us and what its features are doing on the day. The Action Sun workshops to bring the Sun to Earth in real time was considered an exemplary initiative in innovation and creativity in science teaching by STENCIL (2012) Science Teaching European Network for Creativity and Innovation in Learning. Action Sun played a part in the opening of the UNESCO led event 'Building the Scientific Mind 2013' in Java Indonesia.

One of the basic principles of the curriculum is that children's current understanding and knowledge should form the foundations for new learning.

Action Sun supports the curriculum strand Art as it uses mixed media to create the sun. The use of paint and paper to convey action and explosive movement on the solar disc. Action Sun also supports primary school art as it enables children to use the characteristics of the materials to make structures and features on the solar disc. Making the sun in this way is both creative and exploratory. This is learning, kinesthetic learning i.e. learning by doing. Learning science through the arts facilitates the use of many kinds of intelligence. The learning process in the making is as valuable as the finished suns. Textures and spatial organisation also comes into the creation of this work.

Action Sun supports the Science primary school curriculum on many levels. My information talks in between making the sun's features will touch on the fact that we need our sun for us to exist. We need our sun to be the source of energy for plants via photosynthesis. The mini talks will make sure that the children understand that the sun is our main source of heat and light. By building these suns the children will be learning by hands on investigation of the features of the sun. The children will literally be exploring the physical features of the sun with their hands in mini scale.

During the activity I will emphasise to the children the dangers of looking at the sun. Action Sun is a very safe way of exploring our star in a way that enhances a child's knowledge and encourages further learning.

Making is the technological component of the Science Curriculum. Action Sun provides the child with an opportunity to make the sun, and thereby investigate its properties in their school yard.

Action Sun is a cooperative activity encouraging social skills and group learning. The goal is to bring the sun to Earth to examine it and observe it safely. We will not just be aiming for mastery of the subject matter but will be making connections between head, hand and heart while cultivating the capacity to discover systems. Observation and wonder equals sustained learning.

Action Sun supports the Geography strand in primary education as the Solar System is part of the lesson plan. The Sun is the central hub of our solar system and is therefore one of the most, important objects in our daily lives

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Robotic Telescope for Developing Countries

M. S. Hiray, Fergusson College, Pune-4, India
R. V. Dabhade, Fergusson College, Pune-4, India

Presenters: Manish S Hiray (India)

The robotic Telescope system is a boom for remote observation. It's changing the traditional way of Astronomy. Though it is quite an expensive technology and very few have the liberty to access it. By keeping basic things intact, one can achieve the same goal using locally available sources and open-source software. Such systems are cost-effective and can be used by developing countries. Collaborations among different schools across the world will bring exciting science to the classroom. I will explain the details of developing such a system and the tools required for it.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Under the Common Sky- for Development and Interchange of Ideas

E. Gradzka, Association "Under the common sky", Poland

Presenters: E. Gradzka, Association "Under the common sky", Poland (Poland)

Development which is a common goal of various types of projects can be reached by different means and can target various skills. In our idea of projects we focus on development of human capital and we try to respond to the needs of human nature which desires to wonder about the beauty of the Universe. Our methodology which is inspired by Polish transition period into democracy tries to unite astronomy as a scientific endeavour with promotion of social engagement of the participants for the local community. Our experience shows that there can be no real progress without work for the others, and science as a tool has to be used wisely and cannot be separated from other fields of human interest (like democracy). Also, too often we observe a growing problem of 'projectism' or 'volounterism' which I understand as high expectations of help, especially from abroad, which leads to disempowerment of local people. In our projects we aim to stimulate the participants to investigate, wonder and discover (engage in self-search of knowledge and materials), learn new skills (usage of the computer program Stellarium or a sky map or a telescope) and languages (Russian or English), cooperate (during work of astro clubs), share obtained abilities and engage in work for local community (astro events). We want to empower and inspire. That is what we tried to implement in Kyrgyzstan between 2015-2020, Armenia in 2018/2019. Tajikistan 2019/2020 and hoped for Uzbekistan in 2020/2021.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Astronomy Olympiad for Schools

H.M. Dalee, Arab Union for Astronomy & Space Sciences.
Dr. Abdullah Al-Kamali, QNRF, Qatar.

Presenters: Hani Dalee (Qatar)

"Astronomy Olympiad for Schools" is an activity held for the fifth consecutive year (2016-2020) in Doha- Qatar by the Arab Union for Astronomy & Space Sciences in cooperation with Katara Planetarium and Ministry of Education- Qatar, and dedicated for students in both middle & high school levels, in order to increase the awareness of Astronomy.

Simple and purposeful astronomy projects are assigned to students to study and fulfill between October and April of each academic year. Hands- on are exhibited during national occasions called "National Week for Science Research" usually takes place in April. Winners are honored at the closing ceremony of this week.

A workshop to train teachers firstly takes place in October. Teachers are then asked to convey their knowledge to their students (3-6 students) to fulfill those projects. The supervisor teachers are in contact with the Olympiad coordinators throughout the time of the competition, to make sure that all steps are correctly done.

More than one meeting and activity, dedicated for training students during that period, take place in different locations, depending on the nature of the project of that year. The number of the projects to be fulfilled is 2-3 projects.
The yearly number of participants is between 400-500 students, plus 60-80 teachers. So far, more than 2000 students from about 120 schools participated in this Olympiad. In 2020, 66 schools with a total of 380 Students plus 70 teachers have participated, Winners were, virtually, announced despite Covid19 Pandemic.

In our talk, we are going to present a summary of these projects and how students carried them out. We will show the positive impact of our competition on the students. and will explain how the events of the Olympiad created a community of amateur astronomers descending from different nationalities living in the State of Qatar.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Meteorites: Poor Man's Space Probe From Our Solar System

Bharat Adur, Akash Ganga Centre for Astronomy (AGCA), India
Amritanshu Vajpayee, Akash Ganga Centre for Astronomy (AGCA), India

Presenters: Amritanshu Vajpayee (India)

A flaming streak flashes across the night sky and disappears. On rare occasions the flash of light plunges toward Earth, producing a boom like the thundering of guns and causing a great explosion when it lands. When ancient peoples witnessed such displays, they believed they were seeing a star fall from the sky, and so they called the object a shooting star or a falling star.
A meteoroid is a small sand to boulder-sized particle of debris in the Solar system. The visible path of a meteoroid that enters Earth's (or another body's) atmosphere is a meteor, commonly called a "shooting star" or "falling star". Many meteors are part of a meteor shower. The root word meteor comes from the Greek meteōros, meaning high in the air.
A meteorite is a portion of a meteoroid or asteroid that survives its passage through the atmosphere and impact with the ground without being destroyed. Meteorites are sometimes, but not always, found in association with hypervelocity impact craters; during energetic collisions, the entire impactor may be vaporized, leaving no meteorites.
A fireball is a brighter than usual meteor. It defines a fireball as a meteor that would have a magnitude of -3 or brighter if seen at zenith.
Meteoric dust: Most meteoroids are destroyed when they enter the atmosphere. The left-over debris is called meteoric dust or just meteor dust. Meteor dust particles can persist in the atmosphere for up to several months.
At AGCA, the following work has taken up along with amateur astronomers', Citizen Scientists, and interested college/school students.
Earlier studies of fresh meteorite recovery, analyses of Jaganath Meteorite in Orissa (2003) using INAA (Current Science, 2004). Took up field work at Lonar Crater, Buldana, Maharashtra with a team of (11+13) participants, and looked for impactites in this region; there we collected over 800 rock samples and over 200 soil samples within and around the crater.
Conducted petrography for some of impactities samples for looking for impact features mentioned earlier. SEM studies for shatter cone and other impactities.
XRD studies for shatter cone, certain breccias were also taking up for looking at shocked minerals.
INAA has been an effective tool for understanding trace elements in these samples, specially the PGE elements and heavier elements.
Present context as the nature of the work is complex; we propose to analyze the soil samples look for the meteoric inclusions if any. As mentioned earlier the dating of this crater is still under question as there have been no detailed studies for this crater.
Some theoretical simulations were done to understand Meteor physics; preliminary results were deceptive.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Skills'lab - A case study in Lagoa, Algarve

B. Sousa, Alpoente, Portugal

Presenters: Bruno Sousa (Portugal)

Education paradigms shift along the years, especially with the change of societal needs and technology. Critical thinking, creativity, collaboration, and communication, also called the 4 C's, are considered essential key competences for modern students to succeed in school and the workplace. These 21st century skills are relevant when applying for jobs, starting careers, in educational attainment, health and well-being.
Public awareness of science (PAwS), public understanding of science (PUS), or more recently, Public Engagement with Science and Technology (PEST) are terms relating to the attitudes, behaviors, opinions, and activities that comprise the relations between the general public or lay society as a whole to scientific knowledge and organization.
Skills'lab was a project applied in three Lagoa primary schools, using scientific methodology. A science teacher helped the elementary teacher and served as a co-creator in the classroom. 222 students from six 4th grade classes and six 3rd grade classes, with ages ranging between 8 and 10 participated in it. A questionnaire was applied in the midst and end of the year to the elementary school teachers and at all the students, asking them to grade certain claims from 1 (don't agree) to 5 (totally agree).
The project was evaluated by the teachers with an average of 4,58 to its conformity to age and 4,75 regarding conformity to curricula, benefit to the students and evolution in student' skills in the classroom.
The students thought the activities interesting, attractive, furthered their understanding of how science is made, and their interest in science themes.
The apparent success, even if local, showed a great benefit in the interaction of elementary school teachers and science teachers.

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Dive in the Sky

N. Correia, NUCLIO, Portugal

Presenters: Nelson Correia (Portugal)

Dive in the Sky was a Comenius project developed by students and teachers from 5 countries (Austria, Bulgaria, Lithuania, Portugal and Turkey) to increase students' interest in science and mathematics, to increase their knowledge about the night sky and the universe, and to encourage students to be scientists in the future. The project also included meetings in each country with cultural and linguistic activities to raise awareness to European countries and different cultures. The students used new technologies and produced works about light pollution (having received 8 awards in the Dark Skies Rangers contests), the Sun, planetary systems and deep sky, enhancing their ICT skills and their understanding of Astronomy. We also carried out astronomical observations, one astronomy dictionary, cartoons about an astronomer, lesson plans to teach astronomy and English. The students presented the works in English, which has improved their communication skills and the astronomical vocabulary. All works and activities were posted on the blog http://diveintheskynet.blogspot.com

Session 7 - *August 26 08:00 UTC - 14:30 UTC*

Astronomy for All at the University

V. M. Alves, Universidade Federal de Pelotas, Brazil

Presenters: Virgínia Mello Alves (Brazil)

Since 2013, we offer, as an open discipline, the "Basic Astronomy". It is an introductory contact with the main astronomical topics. As an open discipline, all the university students, from all undergraduate courses, can request registration. The goal is to show how Astronomy can connect itself with any knowledge area. This interdisciplinarity is important to politically show the importance of having a planetarium as institutional space, beyond the traditional public role. Our planetarium project intends it to be a place were all undergraduate courses, as well as the post-graduation ones, can use its facilities and/or collaborate with its functioning. To achieve this goal, after the normal classes about the main topics of Astronomy, the last classes are earmarked to students present a brief seminar about some topic which connects Astronomy with their knowledge area. Some examples of these seminars will be presented and we hope to get suggestions from our peers.

Session 9 - *August 26 23:00 UTC - 04:00 UTC*

Models Mentales, Concepciones Espontáneas y Alternativas Para Niños Acerca de la Forma de la Tierra: SE Necesita Cuidado al Producir Dibujos y Animaciones

P. H. A. Sobreira, Federal University of Goiás, Brazil

Presenters: P. H. A. Sobreira (Brazil)

La forma de la Tierra esférica es el modelo aceptado culturalmente y por la Ciencia y opuesto a lo que los sentidos nos revelan. Animaciones muestran la Tierra esférica suelta en el espacio y el cielo estrellado adjunto puede reforzar los diversos modelos mentales, concepciones espontáneas y alternativas de los niños acerca de la forma de la Tierra, en oposición a la enseñanza de la forma esférica de la Tierra. Se realizó revisión bibliográfica sobre el pensamiento científico y el aprendizaje en niños (Piaget e Inhelder, 1956; Ausubel, 1968), sobre el cambio conceptual (Posner et al, 1982; Strike y Posner, 1992) y las concepciones y modelos mentales sobre forma de la Tierra (Nussbaum y Novak, 1976; Nussbaum, 1979; Baxter, 1989; Vosniadou y Brewer, 1992). Los autores que hicieron investigaciones de los modelos mentales de niños y de profesores sobre la forma de la Tierra, muestran que hay entre 4 y 7 nociones, y acá son presentadas 6, las que difieren más entre ellas: Tierra Plana, Tierra Doble, Tierra Hueca, Tierra-País, Tierra Esférica Achatada y Tierra Esférica. Hay que considerar que los niños poseen ideas preexistentes precisas o equivocadas y parcialmente correctas al respecto de la forma de la Tierra, para la preparación de las animaciones. Las animaciones y los dibujos más adecuados deberían exhibir la superficie de la Tierra alejándose del observador. Luego, las animaciones conducirían a un viaje alrededor de la Tierra para revelar la curvatura del horizonte, posteriormente alejarse para demostrar la Tierra esférica y finalmente posar en la superfície plana nuevamente.

Session 9 - *August 26 23:00 UTC - 04:00 UTC*

GALAXY CRUISE – Your Galactic Journey as a Citizen Scientist

K. Usuda-Sato, National Astronomical Observatory of Japan, Japan
M. Tanaka, National Astronomical Observatory of Japan, Japan
M. Koike, National Astronomical Observatory of Japan, Japan
J. Shibata, National Astronomical Observatory of Japan, Japan
S. Naito, National Astronomical Observatory of Japan, Japan
H. Yamaoka, National Astronomical Observatory of Japan, Japan

Presenters: Kumiko Usuda-Sato (Japan)

The Universe is full of galaxies of various shapes. We invite the general public to unlock one of the mysteries together: Why do galaxies show such diversity? How were the galaxies formed and evolved? Galaxy interactions and mergers may be the key to unlock the mystery.

GALAXY CRUISE is the first citizen science project conducted by the National Astronomical Observatory of Japan (NAOJ). Citizen Astronomers classify features of the interacting galaxies displayed on their screens one after another. We use the vast comic images taken with Hyper Suprime-Cam (HSC). HSC is a giant digital camera with an extremely wide field of view mounted on the Subaru Telescope.

GALAXY CRUISE is likened to a cruise ship where many crew members sail together. To keep interest of Citizen Astronomers, our site has the following unique features.
(1) Through training and practice menus. All citizen astronomers need to complete the three training sessions to obtain a basic knowledge of galaxies so that they can confidently classify galaxies.
(2) Gamification Events. Souvenir icons and passport stamps are given to citizen astronomers who complete specific observational areas.
(3) Exploration of the Vast Universe. Citizen astronomers enjoy exploring the vast cosmic images captured by the Subaru Telescope during the classification.

Our website was launched on November 1, 2019, in Japanese and February 19, 2020, in English. As of July 13, 2020, 4442 people from 68 countries and regions signed up, and the total classification results have exceeded 540,000. In our presentation, we will show the demonstration of our website and the latest results.

GALAXY CRUISE: https://galaxycruise.mtk.nao.ac.jp/en/

Session 9 - *August 26 23:00 UTC - 04:00 UTC*

Student Inquiry Activities in the Online Environment

N. Matsumoto, Keio Senior High school、JAPAN

Presenters: Naoki Matsumoto (Japan)

The author's elective course for 3rd year high school students on the topic of observational astronomy was conducted in an online environment for 4 months. I will report on the practice.

Session 9 - *August 26 23:00 UTC - 04:00 UTC*

Astronomical Activities by Astronomical Amateur Circles

T. Maeda, Kagoshima astronomical circle, Japan

Presenters: Toshihisa Maeda (Japan)

There is a rocket launch site in Kagoshima. Therefore, we feel the universe is familiar. We will introduce astronomical activities in collaboration with local universities and public observatories.

Session 9 - *August 26 23:00 UTC - 04:00 UTC*

Apadilangit@Home as Catalyst of Interest in STEAM During of Covid-19 Pandemic

K. Amirul Hazim, Apadilangit, Malaysia
A. Hafez Murtza, Apadilangit, Malaysia

Presenters: Amirul Hazim Kamarulzaman (Malaysia)

Currently the world suffers from the pandemic of Covid-19. Education institutions were closed to curb the spread of the virus. Face to face teaching and learning are not allowed which affects students' interest in learning. Physical activities for science education such as experiments in the laboratory no longer can be done. Therefore educators need to be creative and innovative to attract student learning and interest in STEAM. We found that Astronomy is a great tool to gain interest in STEAM. In Astronomy, our laboratory is free. Sky is accessible even when people stay at home. With proper guidance, students are able to explore the sky with their own curiosity. Malaysia Restriction Movement Order requires education institutions to close and teachers are required to teach online. Apadilangit; Universe Awareness Malaysia took a step further to develop 1st astronomy activity modules online in Bahasa Malaysia. Modules are crafted to suit kindergarten and primary school students. Developed by Apadilangit's team, a project named Apadilangit@Home provides various astronomy project based learning activities that can be done at home with family. Apadilangit@Home encourages 3R concepts (Reduce, Reuse and Recycles) to complete the projects . These open source modules allow students to download the materials for free. Students can pick themes which are solar system, constellation, space arts, technology and history. We hope via this initiative students will be interested in STEAM.

Session 9 - *August 26 23:00 UTC - 04:00 UTC*

My- East Asia Universe Awareness Solar Eclipse (MY-EAUNIVASE) Unite Universe Awareness Community in the region

A. Hafez Murtza, Apadilangit; Universe Awareness Malaysia, Malaysia
K. Amirul Hazim , Apadilangit; Universe Awareness Malaysia, Malaysia

Presenters: Muhammad Hafez bin Ahmat Murtza (Malaysia)

The Universe Awareness program is known as an educational program for kids. 63 countries have been part of this program. Due to Covid-19, teaching astronomy and outreach events were halted. On 21st June 2020, an annular solar eclipse is going to happen and people in East Asia where the eclipse occurs will probably miss the phenomena. Apadilangit; Universe Awareness Malaysia has taken an initiative to start the 1st collaboration among East Asian National Coordinator of Universe Awareness and 1st to observe the solar eclipse virtually together. Under One Sky spirit, this event was participated by 10 Universe Awareness countries which are Malaysia, Singapore, Indonesia, Thailand, Vietnam, Philippines, Taiwan, South Korea, Japan, and Brunei. The main objectives are to educate students and the public about solar eclipse and how it happens in different countries and sharing cultures related to it. We also aim to develop community and partnerships of Universe Awareness National Coordinator in the region. Marathon of the solar eclipse from most western countries to the most east country has been broadcasted. To celebrate and promote diversity of races and cultures, people behind the event are also highlighted. This event gained good feedback from teachers and participants has sparked interest for next collaboration among the community in terms of astronomy in education, inclusiveness, culture, scientific observation and dark sky project.

Session 9 - *August 26 23:00 UTC - 04:00 UTC*

The Long Term Measurement of the Sky Quality in Nagano, Japan

Toru Suyama, Nagano City Museum, Japan

Presenters: Toru Suyama, Nagano City Museum, Japan (Japan)

The Nagano olympic games were held in 1998. We assumed the sky quality would become bad, because many developments were needed to prepare for the olympics. Thus, Nagano city museum and the amateur astronomy club "Kirakira" started to measure sky quality in Nagano city, in 1993. We keep on measurements of sky quality up to the present.
In this presentation, we talk about the time variation and the spatial distribution of the sky quality in Nagano city.

Session 9 - *August 26 23:00 UTC - 04:00 UTC*

Impact of Language, Culture and Heritage on the Way We Learn and Communicate Astronomy

B. Solís-Castillo, Universidad Central de Chile, Chile

Presenters: Basilio Solís-Castillo (Chile)

The language we speak, the culture in which we grew up and where we come from have a tremendous impact on the way we learn astronomy. In a world predominantly dominated by social media and information around the globe, it is not easy to find a way to learn in-depth astronomy in a language other than English. Additionally, the historical predominance of western culture has influenced the way our modern society sees the world, and of course, the sky.

In the present talk, I will share my experience working at the Planetarium of Santiago de Chile as Outreach coordinator and Science advisor, where we explored different strategies to reach diverse communities throughout the country, like the creation of the School network of Radio Astronomy, itinerant astronomy exhibitions, online resources and activity kits, to bring the astronomy closer to broader audiences.

Even though the construction of world-renowned astronomical observatories in Chile has boosted the interest in astronomy in the community, many challenges have not yet been addressed. In that line, we created an exhibition called: ” The Universe south of the world: a celestial heritage”, where we worked with the Chilean indigenous population to raise awareness about their culture, traditions, and to include their ancestral heritage into the global picture of today’s astronomy. Finally, as part of the IAU Astronomy Translation Network, I will present the projects I have been involved in, the importance of learning astronomy in our own language, how members of different nationalities can collaborate in a diverse environment and how feasible is to implement similar initiatives in science education that can assure inclusion, diversity, and equity in our countries.

Session 9 - *August 26 23:00 UTC - 04:00 UTC*

100 Hours for 100 Schools

P. J. Miller, Hardin Simmons University. USA
C. R. Pennypacker, University of California at Berkeley, USA
B. B. Thurber, Lawrence Berkeley Lab, USA

Presenters: C. R. Pennypacker
B. Thurber (USA)

100 hours for 100 schools (100/100) is a collaboration among several organizations involved in providing high quality and well supported astronomy education programs. The 100 schools come from schools that already actively participate in Global Hands on Universe (GHOU), the International Astronomical Search Collaboration (IASC), Galileo Teacher Training Program (GTTP) and several other international astronomy initiatives. The teachers are invited to select and develop a project with their students, take images using LCO's 0.4 meter telescopes and share and discuss their images and projects on a Padlet (padlet.com).

A number of projects are suggested, from the basic to the advanced, with online training offered through GHOU as well as video and handouts offered on the IASC website. Several projects will be discussed in the presentation.

Current members of the 100 Hours for 100 Schools Global Sky Partnership are awarded 1.5 hours of telescope time to use with students from LCO.Global. Participants may be awarded more time as needed to complete their projects and activities.

The first three groups in 2020 have filled up the Padlet at https://padlet.com/icollaboratory/LCO2020 . Because the first Padlet has so many great images, the new Padlet for the second half of 2020 is located at https://padlet.com/icollaboratory/LCO2020_3 .

A discussion about how to join 100 hours for 100 schools will complete the oral presentation. Question and Answer time will follow.

Session 9 - *August 26 23:00 UTC - 04:00 UTC*

Open, Accessible, and Inclusive Lecture Tutorials for Introductory Astronomy

I. Ramirez, Tacoma Community College, USA

Presenters: I. Ramirez (United States)

I have created a set of ~40 Lecture Tutorials for Introductory Astronomy which align well with most of the chapters in the OpenStax Astronomy textbook. This work is offered as an Open Educational Resource, the worksheets are accessible, and elements of inclusivity have been implemented on them as well as their associated materials, namely PowerPoint lectures and YouTube videos. I will describe my approach to this work, the importance of it being open and accessible, and how it can be obtained and implemented by other instructors.

Session 9 - *August 26 23:00 UTC - 04:00 UTC*

The Kinematics Geometry of the Theory of Relativity Special in Understanding the Physical and Visual Effects. Theory of Special Relativity?

M. Chacon Rodrigues, Universidade Federal de São Paulo, BR.
N. S. Magalhães, Universidade Federal de São Paulo, BR.

Presenters: Marina Chacon Rodrigues
Nadja Magalhães (Brazil)

The present review on the kinematics of the Theory of Special Relativity is based on the importance of understanding one of the pillars of contemporary physics in high-speed studies without gravity, such as particle accelerators and black hole jets. In this sense, we seek to apply the theme in the model of high school and / or graduation, using mainly the mathematical tool of the diagram of Minkowski. Thus, one can: explore Minkowski's space-time geometry; and extracts deductions from algebraic formulas, graphs and illustrations. In particular, in the investigation of physical and visual effects, applications such as: physical effects in time of neutrinos, superluminal effect in jets of black holes and relativistic doppler effect in approximations / distances of galaxies. For this, an exploratory bibliographic quantitative methodology was used. Conclude that the use of Minkowski's approach geometry can facilitate the understanding of the theory and relativistic phenomena. Thus, it is expected that this geometric approach favors the understanding of the subject by future interested parties, students and teachers, and may add to formal education.

Session 9 - *August 26 23:00 UTC - 04:00 UTC*

La Danza del Universo: a Fusion of Art and Science

Myrta Villanueva; Carl Pennypackerç

Presenters: Myrta Villanueva (Chile)

The Dance of the Universe is a work in progress that endeavors to bring elements of current astrophysics to the general public, communicated via the medium of dance in a good theatre. For about six years, we have held annual La Danza's in Antofagasta. The science intends to be appropriate and clear, and the dance, costumes, backdrops, and accessories are the result of months of planning. The performances are held in the Municipal Theater in Antofagasta, and also taped. Segments of the Danza are contributed to the Global Science Opera each year.

An underlying theme is that the Universe is very beautiful, and we want to create beautiful representations of the Universe in dance – such representations that can appeal to an audience of all ages.

In this talk we will describe the process, some of the outcomes, some of the weaknesses, and also show a short clip from one of the earlier performances. Chile probably has more astronomers per capita and a larger segment of its economy in astronomy and culture than any other nation on earth, so we have a special duty to share the Universe's beauty with its people.

Session 9 - *August 26 23:00 UTC - 04:00 UTC*

The Tactile Universe: Accessible Astrophysics for Vision Impaired School Children

N. Bonne, University of Portsmouth, UK
J. Gupta, University of Portsmouth, UK
C. Krawczyk, University of Portsmouth, UK
L. Nuttall, University of Portsmouth, UK
K. Masters, Haverford College, USA

Presenters: Nicolas Bonne (United Kingdom)

Astronomy is a science that can inspire a wide range of audiences worldwide, but due to its visual nature, the vision impaired (VI) community can find it difficult to access this topic. The Tactile Universe, led by blind astronomer and science communicator Dr. Nic Bonne, is an on-going public engagement project based at the University of Portsmouth's Institute of Cosmology and Gravitation. The project's focus is on creating accessible activities and free resources that will enable members of the VI community, particularly younger school students, to build confidence and engage with current research topics within astrophysics and cosmology. By sharing best practice and providing consultancy and training, we are also working to change attitudes towards, and inclusion of VI people in academia and science communication. In this talk, we will discuss how Dr Bonne's experiences as a VI student and researcher influenced the project's beginnings and how the involvement of the wider VI community has helped to direct and improve the project as it has grown. We will showcase our tactile solar system and galaxy resources, and outline how we are working to deliver these to students around the UK. Lastly, as well as sharing the lessons we have learnt through both missteps and successes, we will discuss our plans to develop additional resources focusing on light, waves and gravitational wave research to engage with older VI pupils.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

Llevando Astronomía a las Escuelas

J. Vannini Ramirez, ANASA, Nicaragua

Presenters: Julio Vannini Ramirez (Nicaragua)

Estudiantes en países en desarrollo carecen usualmente de la posibilidad de experimentar de cerca la astronomía. Al compartir nuestras experiencias, equipos, y materiales por medio de una visita, se puede crear impacto y encender la llama de la curiosidad y pasión por el estudio de la Ciencia.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

Interdisciplinarity in an Astronomical Observation by Remote Access in Real Time

A. Folhas, NUCLIO - Núcleo Interactivo de Astronomia, Portugal

Presenters: Alvaro Folhas (Portugal)

Astronomy is considered by many scholars to be the precursor of all sciences. It arises from the need for Man to interpret the consequences of the Earth's movements, and to consider his own place in the Universe. Thus it covers a large part of the spectrum of knowledge, and is, therefore, an area of interdisciplinarity par excellence.
Interdisciplinarity develops an integrative process of several disciplines, or fields of knowledge, gathered around a specific activity, or on the resolution of a certain issue. The whole is greater than the sum of the parts involved, and results in knowledge with meanings that help to better interpret reality, and will persist in memory strongly.
This short lecture is intended to be a quick trip through different areas of knowledge, based on an astronomical observation carried out remotely, in real-time, from the Faulkes Telescope North, a telescope located at the Haleakala Observatory (Hawaii).
Preparing an activity like this implies, first of all, understanding the reason why different geographic locations may have different time zones, which allows us to link geography with astronomy, with physics, with mathematics, and even curiosities as discovering that the shortest distance between two points on the globe can be a sharp curve. We will have the opportunity to get knowledge about some of the optical principles that allow us to reach distant galaxies through telescopes, and how our vision structures work to understand the information we receive from them. We will also observe how these devices are handled remotely, and how the electronic photon record can be used to obtain graceful and stunning images that combine aesthetics with information and allow us to reach further into the knowledge of the Universe.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

Examples of Student-led Research Using Robotic Telescopes

F. Lewis (Faulkes Telescope Project and National Schools' Observatory) Wales
P. Roche (Faulkes Telescope Project) Wales
S. Roberts (Faulkes Telescope Project) Wales
A. Newsam (National Schools' Observatory) England

Presenters: Fraser Lewis (Wales)

I will present several examples of projects for students and teachers using data and resources from the Faulkes Telescope Project and the National Schools' Observatory. Both projects have recently celebrated their 15th anniversary and both provide free access via the internet to 2-metre robotic telescopes.

Each project contains supporting material on several aspects of astronomy, in particular extended projects to create colour-magnitude diagrams of open clusters and light-curves of variable stars, supernovae and transiting exoplanets.

Other simpler activities are suitable for younger pupils and all are intended to further students' knowledge of science and mathematics, while also improving computer literacy and communications skills, strengthening critical thinking and allowing them to experience real-world applications in science and technology.

Based in South Wales, the Faulkes Telescope Project provides free access, via both queue scheduled and real-time observations, to a global network of 2-metre, 1-metre and 0.4-metre telescopes. The National Schools' Observatory (NSO) is located at Liverpool John Moores University. It has a mission to enable "Access to the Universe for All" and provides access to the 2-metre Liverpool Telescope on La Palma.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

Student Activities Using Stellarium to Reproduce Measurements Made by Ancient and Medieval Astronomers

V. M. Spathopoulos, Glasgow International College, UK

Presenters: Vassilios Spathopoulos (UK)

It has long been suggested that aspects of the history of science should be included in the teaching of physical sciences as this can increase student motivation and interest. Furthermore, by introducing to students the scientific contributions of both Western and non – Western civilisations, they can obtain a much more objective and balanced view of how science has developed.
Observational astronomy is one of the oldest sciences and continues to this day to inspire many youngsters. With planetarium software such as the popular freeware Stellarium package, it is possible to accurately simulate the motion of celestial bodies on a laptop or home computer. The software makes it possible for the user to choose the observation location and date, thus obtaining a realistic view of the sky from anywhere in the world, in the past, present or future.
By utilising those capabilities, a set of student activities is presented that is inspired from historical astronomical measurements performed in antiquity and the middle ages. These activities are based on observations made by the ancient Greeks and Babylonians and also the medieval Islamic and Chinese astronomers, whose contribution to the development of astronomy was immense. Although lacking important observational technology such as the telescope, those pioneers performed naked eye measurements and implemented simple but ingenious astronomical calculations. These include for example, methods for estimating the longitude difference between geographical locations using lunar eclipses, the distance to the Moon using a solar eclipse, and the size of the Earth by observing the altitude of a star.
With the aid of the Stellarium software, activity instructions have been designed that enable the user to simulate some of these ground-breaking scientific achievements. The use of planetarium software has the advantage of adding a visual aspect to the procedure thus offering greater realism. Students can therefore closely follow the ingenious methods devised by those sky observers of the past and obtain an understanding of the contribution of the various ancient and medieval cultures to the development of astronomy.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

Comic Books on the Space Education: Case Studies of Angola an Zimbabwe

Eldrige de Melo, Angolan Office for Space Affairs, Angola
Marco Romero, Angolan Office for Space Affairs, Angola
Ruvimbo Samanga, Space in Africa, Zimbabwe

Presenters: Ruvimbo Samanga, Marco Romero, Eldrige de Melo (Angola)

Space Science has seen marvelous achievements in the past few years from reaching an asteroid, approaching the Sun, landing on Mars, Moon and exploring deep space. Such achievements of humanity were celebrated throughout the world, although many people do not fully understand the science behind it.
Explaining those achievements can be a challenge to the children because their curiosity and interest for space science and technology is sometimes bigger than the basic knowledge needed to understand it well.
This paper aims to present the processes of creation of Space Comics, Animations and video-games as examples of essential tools for space education. Furthermore, discuss the possibility to evolve from there to be able to apply in Space Science Technology Engineering and Math (SSTEM) programs in schools around the world.
After a thorough study of all didactic materials of animations and comics created to date related to space, a series of Space Comics and Animations, named “Kids and Satellites” were created with the aim of increasing the engagement among students, through the active involvement of the children with the written language and sequentially juxtaposed images. Efficient, since the comic format transmits large amounts of information in a short time and Effectiveness, by processing texts and images in different areas of the brain according to the Double Code Theory of Cognition.
From the research done it was noticed most of the literature introducing Space Science and Technology is by answering the fundamental questions of why and what is space and explaining the solar system. After that, several topics are approached taking into account a logical chain of content, gradual and pedagogical progression, simple language, practical connection of spatial matters with our daily life and finally the connection between science and space technology with activities and learning at school in the mastery of STEM. The two main proof of concepts will target primary schools in Angola, France and India to apply this methods in 3 different education realities and space programs.
With Comics, students not only learn faster, they learn better. Consolidated bases in this project, allow near future integration of Space science and technology in the curriculum of schools. The methods learnt at this research and its effect in education of the student will be further studied in the future editions and can be converted into a whole book.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

LIGO-India: Education and Public Outreach Efforts

Vaibhav Savant, Inter-University Centre for Astronomy & Astrophysics, India
Samir Dhurde, Inter-University Centre for Astronomy & Astrophysics, India

Presenters: Vaibhav Savant (India)

LIGO-India is an upcoming advanced gravitational-wave observatory to be located in India as a part of the worldwide network for observing gravitational waves. A site near Aundha in the Hingoli district of Maharashtra state has been selected for this. The requirements of the project put it in a relatively isolated region that is in a nascent stage of economic and industrial development with a majority of the population engaged in agriculture as a source of livelihood.

A LIGO-India EPO (LIEPO) team was constituted to assess and address the unique requirements of EPO of the project at three levels - local, national and international. The team has been working actively in the surrounding regions of Hingoli for the past year while also engaging interested people across the country and the world. Presented here are the various initiatives undertaken, the unique challenges faced and the impact of the activities. We also welcome ideas and collaborations based on these.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

Educational Resources for EPN24 Planetary Field Analogue Sites

T. Thompson, Thompson STEM Engagement, UK
R. Cane, Thompson STEM Engagement, UK, The University of Edinburgh, UK
P. Roche, Faulkes Telescope Project, UK

Presenters: Tony Thompson (United Kingdom)

The Europlanet 2024 Research Infrastructure (RI) provides free access to the world's largest collection of planetary simulation and analysis facilities. The project is funded through the European Commission's Horizon 2020 programme and runs for four years from February 2020 until January 2024. The Transnational Access (TA) programme supports all travel and local accommodation costs for European and international researchers to visit 24 laboratory facilities and 5 Planetary Field Analogues (PFA) [1].

As part of the education and inspiration tasks associated with Europlanet 2024 RI, we have produced classroom resources aimed at age 10-14 year olds relating the conditions found within the PFA sites to astrobiology and the habitability of Mars.

These resources have been produced around all PFA sites:

Rio Tinto River (Spain)
Iceland Field Sites (Iceland)
Danakil Depression (Ethiopia)
Kangerlussuaq Field Site (Greenland)
Makgadikgadi Salt Pans (Botswana)

These resources link in with common areas found in worldwide STEM curriculums, such as volcanism, pressure, pH and evaporation. To achieve this, we have filmed lab-based demonstrations and included them in a classroom lesson plan alongside teachers' notes. In addition, each lesson plan focuses on how the conditions of the PFA's could affect the habitability of Mars.

Following studies such as Salimpour et al 2020 [2], highlighting the extent to which astronomy has been incorporated into school curriculums, we have chosen to highlight three subject areas with lower representation in high schools into our resources; physics, space exploration and astrobiology.

As these analogue sites can be linked to more planetary bodies than just Mars, our next steps are to create similar resources based around the habitability of the icy moons of the Solar System.

References: [1] The Europlanet Society, TA1 Planetary Field Analogues (PFA). Available at: https://www.europlanet-society.org/europlanet-2024-ri/ta1-pfa. [2] Salimpour, S., Bartlett, S., Fitzgerald, M.T. et al. The Gateway Science: a Review of Astronomy in the OECD School Curricula,

Including China and South Africa. Res Sci Educ (2020). https://doi.org/10.1007/s11165-020-09922-0

Acknowledgement: Europlanet 2024 RI has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 871149.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

Robotic Telescopes and Hands-on Research in Classroom

S. Kesari, Astrophile Education, India

Presenters: Sneh Kesari (India)

The robotic telescopes have been a significant source of astronomy discoveries by amateur astronomers. They have been operating at remote locations like Hawaii, Tenerife, Atacama desert etc. where frequent visits are difficult and the remoteness has ensured skies clear of light pollution weather phenomena. As a result, the telescopes have been operational for long durations of the year, ensuring collection of data and its analysis.
With rapid growth in numbers of robotic telescope observatories, as compared to professional astronomers, data collection is faster than data analysis. At this point, students and citizen scientists prove to be a valuable asset. IASC has been a pioneer in bridging the gap by providing the realtime scientific data to students and educators for analysis. They have discovered thousands of Minor Planets be it MBA, NEO, KBO etc.
With the increase in participation of private players like SLOOH, iTelescope etc, it is only going to grow bigger ensuring astronomy research starts at a very early age for the students. Thus, THEME for the presentation will be:
How robotic telescopes change the world of research in astronomy?
How organizations like us are helping in achieving this change?
How the idea of robotic telescopes can help students and classroom settings?
How can we take robotic telescopes to the next level?
So, real time data analysis is the need of the hour. My presentation will focus on the above aspects and give it a futuristic approach.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

Making Space Programme: Combining Arts and Astronomy

A. Cardinot, National University of Ireland Galway, Ireland
A. Shearer, National University of Ireland Galway, Ireland

Presenters: Adriana Cardinot (Ireland)

The Making Space Programme has acted as a catalyst to accelerate the promotion of the astronomical and geological sciences in Galway, Ireland. Funded by the Royal Astronomical Society (RAS200 grant), the project aims to broaden and deepen the city culture by celebrating the breadth of astronomy through arts – weaving it into art centres, music and public events. Our project is addressed to individuals who are under-represented groups in science (socially, economically and educationally disadvantaged), under-engaged regions in Ireland (e.g. those with no access to third-level institutions, science festivals and outreach programmes), and women's groups who traditionally have been under-represented in STEM. Since 2017, the project has been working with different groups in Galway to communicate astronomy through arts. The focus of our presentation will be on the astronomy and arts intergenerational programme, in which a group of secondary students and older people from the local community completed several shared activities to learn more about astronomy through art activities such as modelling and painting. Our preliminary findings have shown that all participants highly accepted our innovative approaches and stated that the project has been contributing to increase their science knowledge. Thus, we will discuss the different activities conducted in our programme and how the arts were used to talk about astronomy to various groups.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

Hands-On Astronomy in Elementary School: How to Teach and Inspire Student's Trough Experiments

C. V. Manaia, Maria, Agrupamento de Escolas de Condeixa-a-Nova, M.E., Portugal

Presenters: Maria Manaia (Portugal)

This presentation puts astronomy education into context nowadays. Lack of teacher training and few practical activities are amongst the issues found on this subject. It introduces some changes in the way we educate our pupils which are supported by literature review and practical experiments with young astronomy students. "There is a need to disseminate this knowledge to overcome some difficulties (...) and the ways to do practical activities in primary school."(Sá, 2014).

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

Soapbox Science - When Science Communication Meets Feminism

Simone Lackner, Soapbox Science Lisbon, Portugal

Presenters: Simone Lackner, Ph.D. (Portugal)

Soapbox Science is a non-profit public outreach initiative, to promote women in science and their research, through public engagement. Founded in the UK in 2011 by the two research biologists Dr Nathalie Pettorelli and Dr Seirian Sumner, Soapbox Science events transform public areas into an arena for public learning and scientific debate reaching from Europe to Africa, from North to South America as well as far as Australia. The event format is inspired by ‘Speaker’s Corner’ in London’s Hyde Park, an historical arena for freedom of speech and public debate that helped create the open democracy that the UK enjoys today. In order to reach its intended audience, Soapbox Science events take place in busy public areas such as riverside walks, public parks, town squares and beaches. There is no technical support or sound amplification, just simple and engaging props. Soapbox Science has two core aims: 1) to bring cutting-edge science to members of the public who may not have set out to interact with science or scientists in an accessible, fun, and unintimidating way and 2) to promote and support women in Science, Technology, Engineering, Mathematics and Medicine. We want to increase their visibility, provide inspiration and role models for budding young female scientists, and improve awareness of the wealth of research that is conducted by women in STEMM around the world. Our events therefore feature an all-women speaker list, using an inclusive definition of "woman" and "female", welcoming applications from trans women and non-binary people.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

Youth, Science, and Media: Perceptions of Astronomy and Space Sciences in Formal and Informal Contexts

S. Anjos, Communication and Society Research Centre, Institute of Social Sciences, University of Minho, Portugal and Department of Science Communication & Society and Leiden Observatory, Leiden University, Netherlands

A. Carvalho, Communication and Society Research Centre, Institute of Social Sciences, University of Minho, Portugal

Presenters: Sara Anjos (Portugal)

The importance of the media, both in the acquisition of knowledge, and in the formation of opinions and representations of science subjects, has been widely acknowledged in research. However, there is still an insufficient number of studies which focus on how young audiences specifically access, understand and create science-related content via different platforms, thereby mobilising different literacies. The present empirical study seeks to explore some bridges in this regard. By looking at a young public interested in science, namely Astronomy and Space Sciences, we intend to ascertain what they value and how they appropriate scientific information in their social relations in order to build critical scientific literacy for decision-making and the formation of opinions about science. The main results of this study confirm that informal learning plays an important role not only in the development of identification with science by young people, but also in the search for related academic and professional pathways. Although it confirms that younger people do not seek science news, the current study suggests that they do engage in seeking science-specific information according to their interests. The absence of a reflection on how science discourses and news are produced and filtered by the media and other science communication
agents underlines the relevance of promoting critical science literacy, which seems to imply a link to other literacies, media literacy included.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

Arts, Science, Games and More - Activities at the Ghana Planetarium

Sarah Abotsi-Masters, Ghana Planetarium, Ghana
Dr Jacob Ashong, Ghana Planetarium, Ghana
Mrs Jane Ashong, Ghana Planetarium, Ghana
Godfred Amartey Noble, Ghana Planetarium, Ghana
Solomon Appekey, Ghana Planetarium, Ghana

Presenters: Sarah Abotsi-Masters (Ghana)

In this presentation we will showcase the wide variety of activities carried out at the Ghana Planetarium during the 10+ years since it opened. Watching a planetarium show is a wonderfully immersive experience, but we wanted to add value and provide an encounter that would be even richer for visitors. We felt this was particularly important because of the low levels of exposure to astronomy for the majority in Ghana. So we designed weekend events that would include additional activities to complement the learning of the planetarium show. The Planetarium has a small staff, a few volunteers and limited funding, hence it was important to find or develop activities that were relatively easy to undertake (not too much preparation time) and used materials that were cheap and easy to find locally.
Looking back we can see that our events have covered a wide range of astronomy topics (Sun, moon, stars, solar system, distances in the universe, spaceflight, rockets, asteroids, comets and light pollution to name a few) and included a variety of different types of activities, from talks by guest speakers, art and craft activities, building models, learning through games, telescope and solarscope viewing, and many different hands-on experiments and activities. We also have a robotics/electronics club, have conducted teachers workshops to encourage hands-on science and have started astronomy clubs in several schools around Accra.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

The Impacts of Astronomy Club Centauri of Itapetininga's Social Media on Its Community

R. F. Raffa, Federal University of São Carlos, Brazil.
M.A.C. Medeiros, Federal University of São Carlos, Brazil.
A.D. Moreau, Federal Institute of Education, Science and Tecnology of São Paulo, Brazil.

Presenters: Rodrigo Felipe Raffa (Brazil)

Astronomy is a delightful science that teases the human mind with the Universe's magnitude. Being also a democratic field of science, once its laboratory, the sky, can be accessed by everyone. Aiming to explain the wonders of the cosmos, guide the naked eye observations and take telescopes to communities that don't come into contact with astronomical machinery, the Astronomy Club Centauri of Itapetininga has been performing over the last 5 years, several meetings to spread astronomy. The team is formed by amateur astronomers, elementary School Teachers and University Professors who started off in 2015 along with Federal Institute of Education, Science and Technology of São Paulo (Itapetininga Campus) and the Federal University of São Carlos (Sorocaba Campus). Acknowledging that most of the events promoted by the Club are physical meetings, the pandemic of the new CoronaVirus has imposed upon us new challenges once almost all of the scheduled activities for 2020 were suspended. The way out was increasing the Centauri's participation on its social media with tutorials about naked eyes observations in which the audience may watch the sky from their own backyard. Thus, the team's activities could remain virtually through the use of the Information and Communication Technology (ICT) in order to keep people's interaction, enabling the Club to still guide the community to perform simple and good observations. With the goal of leading the public to perform observations without equipments, some tasks were proposed: behold planetary conjunctions, moon's phases, observing satellites such as the Starlink trails, ISS (International Space Station) and the HST (Hubble Space Telescope) in addition to recognize famous constellations visible from south hemisphere like Crux, Scorpio and Orion. By Facebook, it was possible to analyze the impressive numbers of people's engagement out of the publications. The average persisted in 200.000 users per month, along the first 3 months of the pandemic in Brazil (from March to May), which represents that contents about Astronomy and Science call people's attention when these topics are in their reach. Based on the amount of followers and their engagement, it is noticed the good acceptance brought by the audience, due to the easy-going communication carried out with scientific rigor, we were allowed to demystify topics related to astronomy. Recently, Centauri's team creates daily posts with topics related to phenomena that can be followed without any specific apparatus and intend to go beyond covering topics like astrophysics, astronautics and cosmology.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

Rethinking and Re-Imagining Science – STEM for Girls

M. Shamshad, Beaconhouse School System, Pakistan

Presenters: Mirwat Shamshad (Pakistan)

A growing body of research on science learning makes it clear that a basic understanding of science requires far more than the acquisition of a body of knowledge. It requires understanding science at a basic level i.e the nature and processes of science. I believe that now more than ever, informal and interactive learning environment should play an important role in science education.
In my own school days and even today, I find that science is taught in my country in the most un-fascinating way, reducing the curriculum to just reproducing some science laws and laborious exam preparations.
I had a small stint of teaching Physics in 2008-9. As I took up the task of teaching Physics to High School Girls, again, in 2015 after a break of almost six years, I found a strong urge to rekindle the spirit of exploration and inquisitiveness in my girl students. This desire set me on a pathway that involved a lot of hands-on activities, guest talks, visits, astronomy sessions and International collaborations.
Pakistan is a resource starved country with not enough opportunities afforded to students for learning science. I took up the challenge of doing hands on science to create enough interest for the students to get them hooked to the idea of science. I set off with a small exhibition in November, 2016. I later invited one of my university professors, Dr. Pervaiz Hud Bhouy, who is renowned for his work in popularizing science. He delivered a talk on “why should girls follow a STEM career?” that was well received by the students.
I have since then arranged multiple talks by eminent scholars of the country on cutting edge topics. Multiple hands-on activities including exhibitions were arranged to encourage my students to do and learn science. In order to give my students an exposure to the environment of science at work, I arranged visits to Power Generation projects, the aviation industry of the country, national center for physics etc.
Astronomy has remained central to my efforts . Telescopes are not in easy access to most of my students. In order to address this, I collaborated with some of the most active Astronomical Societies and arranged multiple observation sessions including Solar and talks by Astronomers . I also conducted two courses for my students as well as some of the underprivileged children who were affected by "war on terror". I utilized Harvard Smithsonian Micro-observatory remotely operated telescopes to provide hands on experience to students for processing astro-images as well as search of Exoplanets. The work of the students was later published on their website.
In order to create awareness among my students, we celebrated World Space Week i.e a UN Chartered program.
Recently despite the COVID-19 crisis, we also celebrated International Day of Light 2020 in collaboration with International partners.
The revision of the national curriculum in Pakistan is a slow process. Our national physics curriculum was last revised in 2007. A lot of latest developments in physics, hence remain unaddressed and

unavailable to students and teachers. In order to keep myself updated on the cutting-edge research both in the domains of physics and education, I have continued to take part in national and international programs. I was selected and represented Pakistan in “International Teachers Week, 2019” at CERN. I also got selected to participate in “Active Learning of Optics and Photonics Workshop" at Indonesia and Winter School of Quantum Optics and Photonics at ICTP, Italy. This not only provided me to learn first hand the cutting research but was also instrumental in becoming part of an international network collaborating to promote science. As a result we are on path collaborative science where students exchange postcards with fellow students across the globe discussing ideas and understanding different cultures.
My pursuit is ongoing as recently I have participated in FRONTIERS project by EISA.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

The State of Astronomy Education in Iran: Challenges and Solutions

Saeed Jafari

Presenters: Saeed Jafari (Iran)

Astronomy has a long history in Iran. Our ancestors were pioneered in astronomy and from ancient years was an excelled country in the construction and use of astronomical buildings. Today, there are more than 200 local astronomical societies and centers in the country that the amateur astronomy community has played a significant and influential role in the education and promotion of astronomy to the general public since 2000. A greater part of astronomy education was provided by amateur astronomers through outreaching events, observing nights, and education and outreach projects. Another part of it has been disseminated by science journalists who are amateur astronomers and astronomer teachers in the media and newspapers. Considering the enormous potential that has existed in the growth and development of Iranians in the field of astronomy, in the meantime, challenges such as the specific cultural and social constraints for women's activities, lack of sufficient knowledge of the teachers as well as the training required for them, the lack of a standard curriculum for teaching astronomy and network of astronomy teachers, and also economic barriers, have caused socio-economic development and education through Astronomy to grow less in Iran. This survey suggests challenges for teaching astronomy in general.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

FRONTIERS Astrophysics in the Classroom

L. Almeida, R. Doran, J. Gonçalves, P. Doran

Presenters: L- Almeida (Portugal)

The Erasmus project “FRONTIERS – Bringing Nobel Prize Physics in the Classroom” aims to provide resources and training to teachers to successfully introduce Modern Physics in the classroom. After selecting topics of scientific research - Gravitational Waves, Astroparticles, Astrophysics & Cosmology, High Energy Physics - the consortium has designed inquiry based learning activities that can be exploited and widely used by the educational communities. Initially thought to target high school students, these activities have been explored to produce new learning materials adapted to different levels, including primary school. The project has allowed the creation of virtual learning communities of educators and researchers that can share their experiences and collaborate towards new resources. In this talk, we will guide you through the project’s material that concerns Astrophysics and Cosmology and provide an overview of the project’s hallmarks.

Session 11 - *August 27 15:30 UTC - 22:00 UTC*

Fostering Scientific Creativity Through STE(A)M

H. Fonseca, Universidade de Santiago de Compostela, Spain
C. Pomar, Universidade de Santiago de Compostela, Spain

Presenters: Helena Fonseca (Portugal)

Nowadays, more and more attention is being paid to STEAM (Science, Technology, Engineering, Arts and Mathematics) in education, as well as to 21st century skills such as creativity and problem solving. Problem solving in science and STEM approaches requires a student to explore his or her knowledge, imagine a variety of pathways to a solution, and often create new combinations of knowledge or new skills and techniques for a solution; these procedures require creativity. Many researchers claim that scientific creativity covers the same mental processes that lead to any kind of creativity, but additionally it requires scientific knowledge (theoretical, technical and experimental) necessary to produce an original idea or product. Thus, STEAM approaches and intentional promotion of scientific creativity should be addressed in schools, preparing students to become future STEM professionals, to foster science literacy and to understanding of how scientists work, as part of their overall understanding of society.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Clear Skies: A Learning Experience

Priya Hasan, Maulana Azad National Urdu University, Hyderabad, India
S N Hasan, Maulana Azad National Urdu University, Hyderabad, India

Presenters: Priya Hasan (India)

Clear Skies was conceived as an exercise to inculcate rational thinking in students, using Astronomy as an
effective tool. We worked for more than a year with the same set of students (~100). These underprivileged students belong to Shaikhpet, Hyderabad. We had various sessions with them ranging from eclipse observations, kite flying, Apollo Moon Landing, Chandrayaan 2, periodic table, etc. (Details can be found on our website https://clearskies2019.wordpress.com/). We would share our experiences and the lessons we learned.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Teaching Astronomy With e-Learning Platforms

A. L. Boldea, National Institute for R&D in Physics and Nuclear Engineering, Bucharest; University of Craiova, Romania
M. Stavinschi, Astronomical Institute of the Romanian Academy, Bucharest, Romania

Presenters: Afrodita Liliana Boldea (Roumania)

In the didactic activity, in order to accomplish the teaching-learning process, the teacher uses different methods for lessons, depending on the specifics and the topics taught.

The introduction in the educational environment of online communication information technologies of e-learning type had a strong impact on the didactic strategies and the forms of organizing the training in the educational process. The computer together with the information and documentation sources (Internet, encyclopedias, etc.) are the elements that lead the learning process, towards the interaction with pupils and students.

This paper aims to present and implement a modern training method, as efficiently as possible, through the e-learning platform MOODLE, for teaching an Astronomy course to students and pupils.

The content of the paper highlights the composition of an online course, with interactive assessment tests, scientific documentaries, dictionaries and homework, coming to support students at a distance, respectively to diversify the methods of teaching astronomy. By accessing such online courses, students deepen the knowledge gained in the teaching-learning-assessment process.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Innovative Ways to Approach Our Universe Through Games and Art. The Cases of Cosmic Radiation (Cloud Chamber) and Gravitational Waves Model.

C. Papandreou, Epitalion Ilias Primary School, Greece

Presenters: C. Papandreou (Greece)

The initiative for this presentation derives from the great teaching ideas and experience acquired after participating at the GTTP workshop in Leiden (ESA, October 2016) and the Playing with Protons summer school for Greek primary school teachers (CERN, August 2017, 2nd edition). The next step was the development of brand new activities and the creative evolvement of the students (according to their age and abilities) with new big ideas in Science, Astronomy and Cosmology.
These activities enhance their understanding of how science works, allowing them to experience STEM in a fun and less daunting way, unfolding their creative power by been encouraged to use their imagination, their language skills and sensory abilities such as storytelling, gaming, model making and theatrical acting.
In the case of the Cloud Chamber, the idea of a cloud traveling in a chamber, like clouds do in the sky, is symbolic. It symbolizes the journey of knowledge and the experience that our pupils will acquire from their involvement with an experiment that in 1927 and 1936 gave Nobel Physics and shed more light on the cosmic rays that "showers" our planet.
The same sense is expressed through our other approach for Gravitational Waves. Mr. Rainer Weiss, the 2017 Nobel Prize laureate in Physics, sent us his best feed-back and comments on how to improve this idea.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Interdisciplinary Approaches in STEAM Education : Learning Science Through Theater

M. Sotiriou, Science View, Greece

Presenters: Menelaos Sotiriou (Greece)

How can we leverage students' understanding on STEM concepts and at the same time guarantee their cheerful engagement? How can we transform school to an innovation hub that connects the scientific world and the local community? Learning Science Through Theater (LSTT) initiative strongly promotes the above principles by creatively merging STEM with Art in a dialogic/inquiry process. Theater is used as a means of deliberation, a vehicle around which the whole team of stakeholders builds relationships that favor education and transfer of scientific knowledge.
Students build their understanding on scientific concepts applying and developing knowledge from their curriculum and become acquainted with the concept of learning science creatively. Develop skills in communicating science in their local communities. They manage to develop creative skills in a spirit of cooperation and teamwork (create script, scenography, costumes, music or even a video composition). This process, engages students in a highly motivating environment where they learn to recognize, analyze and imagine alternative explanations and models and communicate a scientific argument or issue in a creative and alternative way.
Science Education as well as Science Communication in terms of informal science education refers to activities, events, or interactions characterized by mutual learning, not one-way transmission from “experts” to publics, among people of varied backgrounds, scientific expertise, and life experiences who articulate and discuss their perspectives, ideas, knowledge, and values.
6 years of implementation background and a framework strongly aligned to the most recent EU demands for shaping the scientific literate citizens of the future, LSTT achieved a remarkable engagement of the target groups set and important results in the field of Science Education by involving 4500 students and 350 teachers.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

STEM STEAM STREAM In Kindergarten

Dr. Paraskevi Foti, Educational Coordinator in Third Region of Attica, GREECE

Presenters: Dr Paraskevi Foti, Educational Coordinator in Third Region of Attica, GREECE (GREECE)

What is STEM ?
What is STEAM?
What is STREAM?
A project based on STREAM Methodology in kindergarten class about the circle of water

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Scientix, the Community for Science Education in Europe

J. Redondas, IES de Candás, Asturias, Spain

Presenters: Javier Redondas (Spain)

Scientix is an initiative dedicated to promote science education and vocation in Europe; it is open to the participation of teachers, researchers, policy makers, local actors, parents and anyone interested in science education.
The Scientix community was born as an EC initiative and, coordinated by European Schoolnet, which is a key factor in innovating in teaching and learning and strengthening European collaboration. The project aims to promote Inquiry-Based Science Education (IBSE) and other initiatives at national level, as well as facilitate the constant dissemination and exchange of technical knowledge and practical examples in the teaching of all branches of science at European level. It is currently in the fourth phase of the project (2020-22), funded by the Horizon 2020 R&D program.
The project is supported by a group of 377 ambassadors from 39 countries that, under the Scientix umbrella, have voluntarily committed to supporting science education in their countries.
The portal/internet platform collects and presents European STEM education projects and their results are maintained to ensure permanent searchable access to projects and further dissemination. The resources repository and projects sections are complemented with a moodle platform. Moreover, organized face-to-face activities are essential for professional development and better interaction between teachers, researchers, policy makers and other actors.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Blue and the Sky - An Astronomy Education Project for Kindergarten

S. Casu, INAF-Osservatorio Astronomico di Cagliari, IT
A. Luca, INAF-Osservatorio Astronomico di Cagliari, IT
G.L. Deiana, INAF-Osservatorio Astronomico di Cagliari, IT

Presenters: Silvia Casu (Italy)

Blue and the sky is an educational astronomical project aimed at very young children and designed around the leading character of a blue sphere called Blue. The creation of the character of Blue stems from the need to find an effective interlocutor in astronomical education for the kindergarten (and primary school) sector: Blue is not a dispenser of knowledge, Blu knows nothing about our Planet, Blue doesn't even know what/who Blue is. Anything is new for Blue and it is up to children to tell Blue about our world and the Universe, with their simple words. In this way, each child discovers himself/herself as the bearer of knowledge and experiences and becomes aware of being part of a Universe full of lot of things to be explored.
The project has been designed in collaboration with kindergarten teachers, it is based on a learner centered, collaborative and meta cognitive approach, and respectful of different children learning styles.
Since the project has been designed as very modular in its nature, it could be adapted to a wide range of arguments to be discussed.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Introduction to Meteor Observation Using Radio Waves (radio meteor observation)

M. Sato, National Institute of Technology, ICHINOSEKI College, Japan

Presenters: M. Sato (Japan)

The method of observing meteors using radio waves from a distance is called radio meteor observation. For observation, the presenter uses radio waves (VOR: VHF Omnidirectional Range) that provide position information to the aircraft, inexpensive USB type receiver (SDR: Software Defined Radio) that runs on a PC, and using an obsolete VHF TV antenna. In this presentation, we will introduce the observation system and future prospects.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Down2Earth: Using Asteroids, Comets, Impacts and Meteorites in the Classroom

P. Roche, Faulkes Telescope Project, Cardiff University, UK
J. Horak, National Museum of Wales, Cardiff, UK
C. Roche, National Museum of Wales, Cardiff, UK
M. Allen, Faulkes Telescope Project, Cardiff University, UK
H. Usher, Faulkes Telescope Project, Open University and Cardiff University, UK
L. Kurtze, Faulkes Telescope Project, Germany
S. Roberts, Faulkes Telescope Project, Swansea University, UK
R. Miles, British Astronomical Association, UK

Presenters: Paul Roche (UK)

Down2Earth is a programme that has been running as part of the Faulkes Telescope Project since 2005, and now encompasses a variety of topics linked to “minor solar system bodies”, and includes:

- observations of asteroids and comets using the FT access to the LCO network;
- archive data on a number of asteroids (including rotation studies and parallax measurements) and comets (including outburst activity);
- an online simulator to model the craters produced by the impact of asteroids and comets on Earth, Moon and Mars;
- classroom resources relating to asteroids, comets, impacts, mass extinctions, meteorites and meteors, and
- a loan box scheme where schools can access real meteorite samples to study in the classroom.

The project is now expanding to include a “virtual meteorite gallery” (with 3D scans of the D2E meteorite collection to supplement the school loan box scheme), the “Comet Chasers” project for younger students, a network of meteor cameras, and micrometeorite collection. It will soon cover the full range of topics from “deep space” to “deep impact”, linking closely with the EuroPlanet 2024 research infrastructure project.

This talk will review the D2E programme and showcase some of the newer materials being added to the project.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Science as a Way of Life through Astrophysics: Reaching Children through Reaching the Adults

Prajval Shastri, AIPSN, India

Presenters: Prajval Shastri (India)

While science is an integral part of the curriculum in all of Indian school education, it is taught as a separate subject, with written exams as the goal. Furthermore, for multiple reasons, the weightage given to activities and experiments such as they are in the standard textbooks has been reducing over time, as a result of which learning-by-doing has taken a back seat. The preponderance of the written word in teaching thus becomes a barrier to science becoming a way of life for the growing mind, especially for first-generation learners who do not have comparable exposure and access that their peers have in the home environment. Furthermore, with cell-phones and internet connectivity penetrating wide and deep, the level of the discourse for the adults is set by private TV channels and worse, fake information, However, astrophysics is a highly enabling vehicle to attract and reach parents and adult care-givers of young first-generation learners. This thread will be explored in the talk.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Learning Astronomy With Coding and Making Activities

Maura Sandri, INAF OAS Bologna, Italy
Rino Bandiera, INAF OA Firenze, Italy
Pietro Càssaro, INAF IRA Noto, Italy
Silvia Casu, INAF OAC Cagliari, Italy
Francesco D'Alessio, INAF OA Roma, Italy
Fabio D'Anna, INAF IASF Palermo, Italy
Federico Di Giacomo, INAF OAP Padova, Italy
Maria Teresa Fulco, INAF OA Capodimonte, Italy
Giuliana Giobbi, INAF OA Roma, Italy
Marco Malaspina, INAF OAS Bologna, Italy
Barbara Olmi, INAF OAPA Palermo, Italy
Serena Pastore, INAF OAP Padova, Italy
Agatino Rifatto, INAF OA Capodimonte, Italy
Stefano Sandrelli, INAF OAB Milano, Italy
Rosanna Sordo INAF OAP Padova, Italy
Rachele Toniolo, INAF OAP Padova, Italy
Stefania Varano, INAF IRA Bologna, Italy
Alessandra Zanazzi, INAF OA Firenze, Italy

Presenters: M. Sandri, INAF OAS Bologna, Italy (Italy)

We present some educational activities developed by researchers and technologists of the Italian National Institute for Astrophysics (Inaf), in order to promote astronomy and astrophysics using STEM educational approach. In particular, we present coding and making activities for children between the age of 8 and 12, which – over and above addressing astronomical issues – help students develop computational thought and a problem-solving attitude, as well as skills related to science and technology. The activities are available on a dedicated website, developed by INAF: Play. For each activity, a descriptive sheet is available, with the theory and practice necessary to create the program or perform the laboratory. The activities can be carried out by learners in complete autonomy, or else, they could be used by teachers as a support for a classroom activity. They allow students to learn some of the essential features of the Solar System planets, stars, galaxies, nebulae, and other beautiful objects in the Universe. The activities also make pupils study in depth difficult concepts, such as strength and weight; deal with the theme of the search for life in the Universe. Pupils will even be able to create their own astronomical documentary, using Scratch. Furthermore, with the proposed making activities, they can build scientific instruments, as well as improve their knowledge of the sky and constellations.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Destinazione Luna - To the Moon and Back: Experimenting Digital Fabrication to Democratize Astrophysics and STEM in Italian Public Schools

Sara Ricciardi INAF Istituto Nazionale di Astrofisica OAS Osservatorio di Astrofisica e Scienza dello Spazio di Bologna - Italy
Fabrizio Villa INAF Istituto Nazionale di Astrofisica OAS Osservatorio di Astrofisica e Scienza dello Spazio di Bologna - Italy
Stefano Rini Istituto Comprensivo 12 Bologna - Équipe formativa territoriale Emilia-Romagna- Italy

Presenters: Sara Ricciardi (Italy)

We highlight the education activities designed and carried on in Bologna celebrating the 50th anniversary of the man on the moon and the 20th year of INAF (National Institute for Astrophysics). Outreach and Educational activities were designed and implemented from July 2018 to September 2019 through a full year of MOON by INAF and its partners. This occasion was the chance to build a broad and diverse team of experts in
many fields (astrophysics, pedagogy, picture books, cinema) with the aim of bringing the Moon and Space Exploration very close to the citizens of Bologna. We wanted to talk, play and engage young people and adults reflecting and enjoying different points of view and demystifying the idea of science and scientists.
In this framework we redesigned a physical artifact called ‘Lunatario’ together with multidisciplinary educational activities. At the end of this one year experiment we also redesigned again the Lunatario through digital fabrication tools with the aim of bringing the Lunatario and the related activities to the schools.
In this contribution we will focus only on the educational activities, giving more detail to the original design and implementation of the Lunatario artifact and the development of the associated educational activities in terms of free resources and implementation in public schools.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Innovations in Astronomy Communication

Kathan Kothari, Abhay Kothari, Manthan Educational Programme Society, India

Presenters: Kathan Kothari (India)

Manthan Educational Programme Society, India has been working in the field of Science Communication and Entrepreneurship Development on a national level since a period of two decades. In this period of the activities, Manthan has gained an opportunity to explore different innovative approaches of science communication. Astronomy has always been a subject which has interested several members and brought people to gather.

In the period of 2 decades some of the interesting milestones have been as under:
Astronomy Street Shows
Astronomy on Camel Cart
Hands-on Astronomy Exhibitions
Low Cost Hands-on Kits
Workshops
Solar Eclipse Outreach
Paper based model Activities
Teacher training programmes
Observation sessions
Anti-superstition programmes
Astronomy for development

Several such ideas have been explored to share different concepts of Astronomy to masses in our country. Through this presentation we would like to share several such activities with the participants and also share with them the simplicity of the activities. The presentation would also focus on innovative approaches adapted in each outreach programme. Under our programmes we have involved several levels of people from Scientists to Grass-root members to even students who are involved in the projects as researchers and communicators. We believe that many of the activities carried out by our organisation are replicable and if such similar initiatives are carried out globally, it would bring a great change amongst the students and the community members, focusing on sustainable development.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Open Astronomy Schools

G. Rojas - NUCLIO, Portugal

Presenters: G. Rojas (Portugal)

Open Astronomy Schools is a project that intends to invite the already existing community of teachers and trainers involved in teacher training events since 2009 in the framework of projects like the Galileo Teacher Training Program, Universe Awareness and others.

As part of the OAS initiative, two Teacher Training calls were in January and December 2019 to foster the promotion of training events, with financial and material aid available. Organisers and participants receive certificates endorsed by the International Astronomical Union in the framework of IAU100.
A summary of the events and achievements will be presented.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Inquiry Activity in Kagoshima Chuo Snior High School Senior?

Ichiro Chikami, Kagoshima Chuo senior high school, Japan

Presenters: Ichiro Chikami (Japan)

Kagoshima Chuo senior high school has been designated Super Science High school(SSH). We work class improvement and inquiry activity. I introduce our activity, collaboration with Kagoshima University and a workbook for inquiry activity.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Outreach Through Quantitative Astronomy in the Planetarium Dome

Nandivada Rathnasree, Nehru Planetarium, Nehru Memorial Museum and Library, India

Presenters: Nandivada Rathnasree (India)

Planetarium projection systems incorporating comprehensive astronomy solutions provide powerful tools for outreach, with possibilities of quantitative activities to be undertaken by the participants, “Under the Stars”.

At the Nehru Planetarium, Nehru Memorial Museum and Library, New Delhi, India, efforts in this direction have involved a number of workshops and activities conducted in the planetarium dome which created opportunities for 1. Appreciation of exciting celestial events in local contexts, 2. Incorporation of data in the planetarium dome from student asteroid discoveries, 3. Involvement of students in visualisation of astronomical data in the dome, 4. Positional Astronomy workshops with measurement in the planetarium dome and the Jantar Mantar observatory, 5. Interdisciplinary workshops and activities using the planetarium dome.

Particularly rewarding is the involvement of students towards creating content based on astronomical data for the planetarium dome. This process could work as an initial learning step for the students wishing to be involved in analysis oriented projects in Astronomy.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Pan-African Public Campaigns - a Tale of Two Shadows

Niruj Mohan Ramanujam (African Astronomical Society & South African Radio Astronomical Observatory, South Africa)

Presenters: Niruj Mohan Ramanujam (South Africa)

The African continent is host to an incredible diversity of culture, language, and a range of scientific engagement. Therefore, developing a pan-African astronomy campaign presents its own set of opportunities and challenges.

Here we describe some aspects of two such campaigns, the Transit of Mercury on 11 Nov 2019, and the Annular Solar Eclipse on 21 July 2020, that the African Astronomical Society was involved in. The Society coordinated the campaign in collaboration with a number of organisations across Africa. Both campaigns focussed on creating quality resource material aimed at students and the general public, that was made available online. The Transit campaign required the availability of telescopes and our efforts went into coordinating public events with local collaborators.

The Eclipse campaign was unique in that it occurred during a global pandemic where large gatherings were prohibited in most countries. Here we describe some aspects of our eclipse campaign that emphasised hands-on activities for the public that could be carried out in isolation, by which they could see the eclipse safely from their homes. We will also briefly discuss what we learnt from this campaign in regards to student experiments in astronomy in a Covid-world.

Session 13 - *August 28 08:00 UTC - 14:30 UTC*

Rationale for a New Journal: the Astronomy Theory, Observations and Methods (ATOM) Journal

M. Fitzgerald, School of Education, Edith Cowan University, Australia

Presenters: Michael Fitzgerald (Australia)

The rationale behind the creation of a new journal, Astronomy Theory, Observations and Methods (ATOM) journal, currently hosted at rtsre.otg is provided. It aims to fill a niche in the community for papers on any general topic in astronomy that may not find their place in top tier astronomical journals. The talk outlines the thinking behind why there is a gap to be filled with regards to current scholarly metrics and the nature of other journals of similar scope and impact. The journal aims to be accessible to new and novice scientific authors, as well as those more established, through accessible developmental peer review and an explicit aim to avoid using publication metrics as a barrier to publication selection. The scope, which accepts more broader articles than most, of the journal and considerations on behalf of a potential author are also outlined.

Session 15 - *August 28 23:00 UTC - 04:00 UTC*

Online Performance of the Science Live Show "Universe"

K. Kamegai, National Astronomical Observatory of Japan, Japan

Presenters: Kazuhisa Kamegai (Japan)

The science live show "Universe" is performed every Saturday at the Science Museum in Tokyo. However, as the venue "Synra Dome" is temporarily closed due to the outbreak of the new coronavirus, the show has been performed online since May 2020. We will report the actual method of the online performance.

Session 15 - *August 28 23:00 UTC - 04:00 UTC*

Overcoming Borders Among Us: NASE, the Teacher-training Program

A. Tomita (Wakayama Univ)
S. Uenoyama (Wakayama Univ)
Rosa M. Ros (NASE)
Beatriz García (NASE)

Presenters: Akihiko Tomita
S. Uenoyama (Japan)

The teacher training program, NASE, Network for Astronomy School Education, developed by the working group of the International Astronomical Union, was implemented as the remote course for pre-service teachers of Wakayama University. It was found that a combination of reading material, on-demand video, and real-time discussion sessions for less than ten students was effective to overcome the "physical" distance issue. We will also present the NASE materials for visually-impaired children to enjoy astronomy. Though astronomy is considered to be a highly "visual" subject, the material developed is found to be effective regardless of eyesight, overcoming the eyesight issue.

Session 15 - *August 28 23:00 UTC - 04:00 UTC*

Development of Software to Draw HR Diagrams for Specified Direction and Range of Distance and its Application to Education and Research

Kouji Ohnishi, National Institute of Technology, Nagano College, Japan
Ryota Tadachi, The University of Electro-Communications, Japan

Presenters: Kouji Ohnishi (Japan)

We are investigating a system to assist data science, such as discovering new relationships by visualizing multivariate data using a device that displays (all-sky) like a planetarium.
As a first step, we have developed a planetarium software that has a function to create a stellar HR diagram for a specified direction and range of distance from the planetarium images as an educational tool for high school and university students.

The data used here are mainly from the Hipparcos star table, which contains about 120,000 stars. The software can display data such as the position of the star (longitude and latitude), distance (parallax), proper motion (longitude and latitude), B-V color index, and spectral type of the star. GAIA data is also used for star regions such as Orion.
This HR diagram generator can display color magnitude (absolute magnitude - B-V color index), apparent magnitude - B-V color index, proper motions, etc. at the same time in a pop-up window in any direction and any field of view. Using these charts, you can draw an ordinary HR diagram for understanding the evolution of stars in any direction, and at the same time, you can visually search for groups of stars such as Open Clusters, OB associations and Moving Group.

Session 15 - *August 28 23:00 UTC - 04:00 UTC*

beginning of Japan Astronomical Heritage

Toshihiro Handa, Kagoshima University, Japan
Toshihiro Horaguti, National Museum of Nature and Science
The committee of Japan Astronomical Heritage, the Astronomical Society of Japan

Presenters: Toshihiro Handa (Japan)

In 2016 the Astronomical Society of Japan (ASJ) started Japan Astronomy Heritage (JAH). ASJ chooses a few historical items in astronomy every year and gives the title of JAH. We hope this activity will help understanding the history in astronomy, protection of legendary items, and public interests to scientific progress in astronomy. We will talk about how to build the system, current status and future.

Session 15 - *August 28 23:00 UTC - 04:00 UTC*

Photographing ISS Solar And Lunar Transits

R. T. Sparks, NSF's NOIRLab, USA

Presenters: Robert T. Sparks (USA)

The International Space Station (ISS) is the largest satellite orbiting the Earth and is frequently one of the brightest objects in the night sky as it passes overhead. The ISS has a maximum angular size of over an arc minute as seen from the ground. Given its large angular size, it is relatively easy to obtain images that reveal the structure of the ISS with a small telescope or even a DSLR with a zoom lens.

An easy time to photograph the ISS is when it transits the Sun or the Moon. This presentation will cover how to find out when an ISS solar or lunar transit occurs in your area, the equipment and camera settings to successfully capture an ISS transit and tips and tricks in the field.

Another interesting project is observing parallax during an ISS solar or lunar transit. Given these are only visible from a relatively narrow path on the Earth's surface, parallax can easily be observed by two observers separated by relatively small distance allowing a calculation of the distance to the ISS.

Session 15 - *August 28 23:00 UTC - 04:00 UTC*

Astronomy at School to Promote a Better Welcoming for Refugee Students

E. M. Penteado, National Outreach Coordinator, Brazil
A. M. Assumpção, Universidade Estácio de Sá, Brazil
D. Falcão, Museu de Astronomia e Ciências Afins, Brazil
G. de Aguiar, Universidade Federal do Rio de Janeiro , Brazil

Presenters: Douglas Falcão (Brazil)

The potential of astronomy education and outreach to foster social inclusion and sustainable development is increasingly being discussed worldwide. This is because of the intrinsic characteristics pertinent to astronomy, such as the historical relationship between humans and the sky, and the knowledge about the origin and fate of the universe, that make us realize that Earth, our only home in the universe, is just a small fragile planet that must be preserved. By recognizing the potential of astronomy for the awakening of a global citizenship, enhanced by the image of Earth observed from the space showing the absence of political borders, we bring here some thoughts on the dissemination of this science to scholar groups where immigrant and refugee students are found, enhancing a better welcoming in the new place of residence when these topics are discussed together with those composing their social environment, such as colleagues, and teachers. The “distance factor”, the view of our place from the distance, provided by images such as the well-known “pale blue dot” is used for a change in perspective, and serves as a sparkle for discussing multiple themes in the classroom ranging from human rights to climate change. Such an approach can be extended to other social environments, like museums and science centers, strengthening the feeling of global citizenship so necessary to provide all human beings the right to live in plenitude.

Session 15 - *August 28 23:00 UTC - 04:00 UTC*

Science Education for Scientific Literacy: Involving Students in Citizen Science Initiatives

Paige Yeung, Stanford Online High School, USA

Presenters: Paige Yeung (USA)

This study uses the concept of scientific literacy as first described by Paul DeHart Hurd in 1958 to examine the place of citizen science and student research in science education. This paper draws on qualitative observations of middle and high school students participating in the NASA Exoplanet Watch program through an astronomy research workshop. The roles of students and teachers in the workshop setting are discussed and contrasted with their roles in a traditional science classroom setting. The abilities of traditional laboratory courses and research courses to fulfill the goal of promoting scientific literacy are examined and compared. Previous research on astronomy research seminars and work done by citizen scientists through various platforms are detailed and investigated. From the perspective of both an astronomy workshop instructor and a previous astronomy research seminar student, I explore how increasing access to research and awareness of citizen science through secondary education may be effective for increasing scientific literacy and promoting education on science-related issues. This research contributes to modern literature on involving students in research initiatives and equipping students with the scientific literacy needed to understand and make informed decisions about science

Session 15 - *August 28 23:00 UTC - 04:00 UTC*

Cecilia Project - Diffusion and Popularization of Astronomy

Elysandra Figueredo Cypriano, University of São Paulo, Brazil
Vitória Bellecerie da Fonseca, University of São Paulo, Brazil

Presenters: Vitória Bellecerie da Fonseca (Brazil)

Cecilia Project, in honor to the britain astrophysicist Cecilia Payne-Gaposchkin, the first to discover the chemical composition of the Sun, is a fraction of the program “USP - Ciência na Comunidade” (Science in the Community) which aims to promote student protagonism through actions of scientific divulgation in a school environment. The main idea is to transform the Earth and the Universe sciences accessible and attractive, exploring the interdisciplinarity potential of Astronomy with areas such as Meteorology, Geophysics, Chemistry, Biology and Physics. Our goal is to bring up to light a frontier science to young people in regions of high vulnerability.
These practices favor the partnership between university-school through educator support in teaching those science areas that are in the curriculum but may not be largely explored in reality. Furthermore, these activities operated by undergraduate students bring a sense of appreciation of their formation and belonging in a more ample context and with social relevance.
Using a low cost experiment in a dialogic approach, we show High School students how spectroscopy is used for astronomers. Besides that, we talk about the biggest and more modern telescopes on Earth and their benefits for the study of the Universe. We also have an evolution panel, showing Big Bang, galaxies, stellar and planetary evolution, giving an opening to talk about planetary sustainability.

Session 15 - *August 28 23:00 UTC - 04:00 UTC*

The Right to the Night sky in Punitive Enclosure Context

M. A. Senn, Universidad Nacional de La Plata, Argentina
N. Guevara, Universidad Nacional de La Plata, Argentina
R. F. Haack, Universidad Nacional de La Plata, Argentina
V. B. Acosta, Universidad Nacional de La Plata, Argentina
C. Silva, Universidad Nacional de La Plata, Argentina
R. Adamson, Universidad Nacional de La Plata, Argentina
J. Ruta, Universidad Nacional de La Plata, Argentina
N. Gomez, Universidad Nacional de La Plata, Argentina
K. Brelis, Universidad Nacional de La Plata, Argentina
M. S. Puga, Universidad Nacional de La Plata, Argentina
B. J. De Bortoli, Universidad Nacional de La Plata, Argentina
F. Pallazzo, Universidad Nacional de La Plata, Argentina
A. Lizzi, Universidad Nacional de La Plata, Argentina

Presenters: Maria Azul Senn,
Rodrigo Haack,
Victoria Acosta (Argentina)

The outreach project “Right to the night sky” has been accredited and recognized since 2014 by the Faculty of Astronomical and Geophysical Sciences and the National University of La Plata. It’s comprised of an interdisciplinary group of students, graduates, and teachers of Astronomy, Geophysics, Educational Science, Law, Psychology, Social Work, and Social Communication.
The main objective of the project is to strengthen access to education, recreation, and the connection with the night sky for youths deprived of their liberty in institutions for minors. This is addressed through thematic workshops, in which all voices are sought to participate equally, and astronomical nocturnal observations.
Education and recreation are human rights, their exercise is protected and promoted by various national and international regulations, even for persons held in punitive confinement, and with special emphasis for children and teenagers.
Yet, the access to these rights by the young people living in the deprivation of liberty is highly conditioned and undermined by the living arrangements of such punitive confinement institutions. The observation of the nocturnal sky is not granted since not all cells possess windows that allow the view of the exterior, and, as the night is associated with “danger” and “insecurity”, there aren’t outdoor activities in the evening.
The presentation focuses on the activities developed, the methodologies used, and an analysis of how the project evolved.

Session 15 - *August 28 23:00 UTC - 04:00 UTC*

ASTROMINAS - Seizing of the Scientific Universe by High School Female Students

Ivanice A. Morgado, University of São Paulo, Brazil
Elysandra Figueredo Cypriano, University of São Paulo, Brazil

Presenters: Ivanice A Morgado
Elysandra Figueredo Cypriano (Brasil)

The main goal of this extension project is to raise awareness about natural sciences, technology and math career opportunities among high and senior middle school girls through contact with female scientists. Astronomy is used as an instrument to stimulate interest in these areas, because of its interdisciplinary nature and multiple connection with the other fields. Teaching by investigation was used whenever possible. Another goal of the project is to value the contribution of female researchers in science and in society. Also to bring about critical thinking regarding gender, race and sexuality influences in scientific careers.
The initial plan for this event consisted in bringing the 100 selected girls to the main University of São Paulo campus where they would have classes, do experiments and visit research institutes. Due to the Covid-19 pandemic; however, we had to change this project to a fully on-line one. On the plus side, the use of technology allowed us to reach girls all over the country.
As it was paramount for the organizers to use critical education and dialogical action in the context of the Freirean Pedagogy, the students were divided in groups of 5 girls which would interact through Whatsapp. Each of those groups were followed closely by one of the 80 female undergraduate or graduate volunteer students of the several areas in Astrominas. Those advisors were dubbed as “fairy godmothers”, and they incentivized the collaboration between the girls. The groups would communicate with each other through weekly posters produced by them and shared in a digital canvas called Padlet. In those posters they highlight their views on the most interesting contents of the week. All the students were stimulated to read and comment on all the other groups' panels.
Astrominas online had about 10 000 applications out of which 600 girls were selected. Out of those only 10% dropped out before the end of the 5 week period of the project. This is a small number in the context of distance learning and the pandemic. We tend to attribute this success to the very motivated, expert and warm kinded presence of the advisors in the day by day activity of the groups.
We collected feedback from both the students and advisors alike. The students answered questionnaires both in the beginning and the end of the event. Our main intention was to gauge the level of interest in science and the immediate impact of Astrominas upon it. The advisors had to fill weekly logs reporting mainly on the general engagement level of the students and the impact of this mentoring activity on themselves. This data will be thoroughly analysed in the near future. Preliminary results points for a high level of satisfaction from both students and advisors.

Session 15 - *August 28 23:00 UTC - 04:00 UTC*

"Un Eclipse en tus Manos" - Astronomy Kit Development for Schools

S. Cabezon, USACH, Chile
M. Montenegro, PUC, Chile
E. Villanueva, Colegio Alberto Pérez, Chile

Presenters: Elizabeth Villanueva (Chile)

This project develops a resources kit (didactic and concrete and digital material) to be used individually (self-contained) and in classroom activities, explaining why solar eclipses occur and also how to apply this phenomenon to study celestial bodies.
The kit is complemented by a teacher's guide and a teacher development professional development model for classroom use. The kit is for 7th to 10th grade students (Chilean school curricula); aligned to the curricular contents in Sciences and Mathematics of the corresponding cycle.
The kit arises from the need for low-cost, high-quality educational material that promotes astronomy in the population, based on interest in the last two total solar eclipses in Chilean territory.
The kit will be marketed among astronomical outreach institutions, astronomical research centers and schools. For the latter, it will be promoted as tool that enrich the curricula, which delves into a rare phenomenon (probably never seen by the executors of these experiments), with entertaining dynamics and which can be replicated in the homes of the students for further study.

Designing educational material, based on low-cost, concrete and digital material, that permits to understand the reason for the occurrence of a total solar eclipse and related topics, suitable for school children from fifth to twelfth grades to promote astronomy at the school level.

Specific Objectives:
1. Preparing one kit of didactic material to support the learning of the solar eclipse phenomenon and related subjects aimed at students from 7th to 10th grades.
2. Preparing a teacher's guide for the use of the kit in the classroom.
3. Designing a teacher professional development model to implement innovative teaching in Astronomy using the didactic material kit.

The project aims to impact its stakeholders in the following ways:
• At the level of institutions focused on the dissemination of Astronomy:
o Increasing the offer of didactic resources for teaching Astronomy in the classroom

o Disseminating the educational value of the project and its academic results in the media (either by the research group of this project, or by each institution that owns the kit)
• At the teacher level:
o Having kit of activities associated with the topic of interest and that are related to the learning objectives of the Chilean School Curricula
o Promoting positive attitudes towards the areas of Science, Physics and Mathematics
o Promoting participation of their students in scientific fairs using variations of these activities
o Motivating professionally students and develop scientific skills in them (e.g. critical thinking, logic, teamwork, etc.)
• At the general public level:
o Having kit that make them understand an astronomical phenomenon autonomously
o Integrating the family group of students as learning subjects (eventually students will be able to replicate the experiments in their homes)

Session 15 - *August 28 23:00 UTC - 04:00 UTC*

On the Possibilities of Astro Tourism in Japan -Astro tourism Japan "Sora Tourism" as an Attempt to Share "Under One Sky"-

H. Agata, National Astronomical Observatory of Japan, JAPAN
M. Arai, Dentsu, JAPAN

Presenters: Hidehiko Agata (Japan)

Number of participants in astro tourism in Japan (estimated)
It is estimated that about 8.5 million people participate in astro tourism activities in Japan. The male-female ratio is slightly higher than that of females, but there is no big difference. By age group, the prevalence of female young people (15 to 29 years old) and male seniors (60 to 69 years old) is relatively high.
And number of prospects of astro tourism in Japan(estimated)
It is estimated that about 40 million people are expected to participate in astro tourism in Japan in the future. The male-female ratio is higher than that of the female group, with 53.6% for women.By age group, the emergence rate of women aged 30 to 39 is relatively large.

Session 15 - *August 28 23:00 UTC - 04:00 UTC*

Developing and Disseminating Tactile Telescope Models Created with a 3D Printer

K. Usuda-Sato, National Astronomical Observatory of Japan, Japan

Presenters: Kumiko Usuda-Sato (Japan)

Using a 3D printer, we developed the tactile models of the Subaru Telescope, the large optical-infrared telescope built and operated by the National Astronomical Observatory of Japan on Maunakea, Hawai'i. Based on comments from the blind and visually impaired (BVI) people and a science teacher of special needs, we created two types of model: A detailed model for sighted people and people who are BVI who have excellent haptic observing (touch interaction) skills and a simplified model for students at special needs schools for the visually impaired who are learning how to touch samples and need tactile models in science classes. With these models and other tactile models of celestial bodies, the special exhibit "Touch the Universe" was held at the tactile museum of the Japan Braille Library in 2018 and Akashi Municipal Planetarium in 2019. In our presentation, we will present tips for developing a tactile model and report the special exhibit.

Making Tactile Models with a 3D Printer: http://prc.nao.ac.jp/3d/index_e.html

Session 15 - *August 28 23:00 UTC - 04:00 UTC*