OFFICE OF ASTRONOMY FOR DEVELOPMENT

ASTRONOMY FOR DEVELOPMENT

Case Studies

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CASE STUDIES

In 2015, the United Nations General Assembly set 17 Sustainable Development Goals (SDGs) for our planet, intended to create a sustainable future by 2030. The IAU Office of Astronomy for Development (OAD) has funded and coordinated over 200 projects that use astronomy as a tool to address challenges in communities and fulfil some of these SDGs.

OAD Fellows, Dana Ficut-Vicas and Maria Alejandra Diaz, interviewed a few OAD projects to understand how they are changing their communities. This document is a case study of the impact of these projects.

Kevin Govender
Director
July 2023

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Rediscovering Identity through Astronomy, Chile

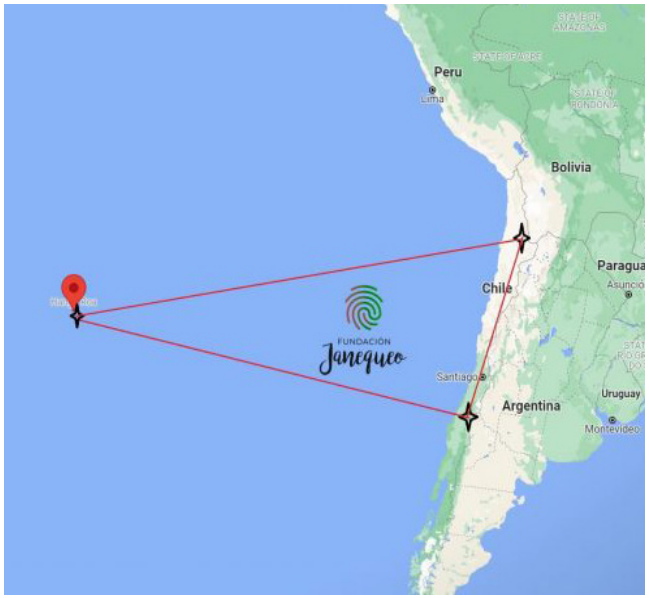
By María Alejandra Díaz

INTRODUCTION

Chile hosts some of the best skies in the world, and this project harnessed the full potential of astronomy as a source of development for the country. Educational conditions are tough in the poorer regions of the country and cannot effectively use astronomy as a gateway into STEM (Science Technology Engineering Mathematics) studies and careers. But there is an opportunity to use astronomy to connect with the country's roots, as the Indigenous groups have studied the cosmos for thousands of years, and their cultures are deeply interwoven into their cosmovision. This project explored whether astronomy can be a tool to reclaim and preserve this ancestral knowledge and make STEM subjects relatable to Indigenous students.

ACTIVITIES

Rediscovering Identity Through Astronomy (RITA) aims to use astronomy as a means to help Indigenous students rediscover their ancestral roots and also get them acquainted with new STEM career paths. The project worked with Indigenous educators and school students in the Likan Antai, Pascuense, and Mapuche communities in Chile. Throughout the duration of the project, monthly astronomy questions were posed to the students (e.g. 'Has your community ever looked at stars?'). Students then reached out to engage their communities on these topics, and also shared their results with other students during monthly virtual meetings. RITA is a project of the Fundación Janequeo, a foundation that uses STEM to educate, promote equality, preserve Indigenous knowledge, and foster development in communities.



RESULTS

Thirty-five Indigenous students, with approximately equal gender distribution, from three different under-resourced schools participated in this project. Their teachers and families were indirectly affected by the project as well.

The project team has stayed in touch with the teachers and is currently processing results from questionnaires and comments from the teachers. While the analysis is ongoing, some results are already apparent: 1) students became progressively more participative throughout the project. At first, very few students spoke or even showed their faces during the zoom calls, but at each meeting, more of them started turning on their cameras, raising their hands, and talking more. Despite problems with the internet connection, the students made a visible effort to attend the meetings on time. 2) The engagement with their culture also proved successful. Students were able to answer the research questions, providing many interesting stories from their communities. For example, one student explained how he talked to his grandfather, who told him that his grandfather had once told him that when you look at the night sky you can contact your ancestors.

Through the project, students from different communities connected with each other. During the meetings, recurring themes of the relationship with the night sky came up for all three groups. For example, the three cultures had a strong connection to the Pleiades. Discussing these common points connected the participants from the different schools.
The project changed students' perceptions that STEM and astronomy were not relevant to them. By the end of the project, one student declared he wanted to be an astronomer when he grew up.

"RITA has planted a tiny seed in the children's minds to get them interested in science. Now we need to continue watering those seeds."

– Yasmin Catricheo, project coordinator

SDG ANALYSIS

A preliminary analysis (pending full analysis of collected data) provides evidence of the RITA project fulfilling at least two SDG targets.

Target 4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples, and children in vulnerable situations.

By working with Indigenous students from disadvantaged socioeconomic backgrounds, RITA is reducing inequalities in STEM education. There is evidence that the students were highly engaged and developed an interest in STEM and astronomy.

Target 11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage.

By reconnecting the youngest generations with their community's knowledge, Indigenous cultural heritage is preserved. Students have learned more about their culture, engaged with older people in their families and communities, and also shared this knowledge with other communities, establishing new connections.

FUTURE PLANS

The next step for the RITA project is to create a project report including the questions and the answers of each student, and drawings from the students. The report will be published as a book and sent to the participating students. There are plans to organize a second version of RITA with different groups, which would culminate in a meeting of all participants. An international version of the project is also being planned.

CONCLUSIONS

The RITA project is an example of the multi-faceted contribution of astronomy to society. It has provided a way to preserve the cultures of First Nations, given students from underserved communities an exciting first contact with STEM, and promoted new connections between communities. The project coordinator Yasmin commented 'I really saw myself in those kids. I only had one teacher at my school, I never had many opportunities (...)'.

Chile is particularly fertile ground to use astronomy to its full potential, as it has world-class observatories and many Indigenous communities with strong connections to the night sky. One of the crucial outcomes of the project is that it sets an example for newer, creative ways of using astronomy to drive development.

PROJECT COORDINATOR

Yasmin Catricheo is a physics educator from Chile and a member of the Mapuche First Nation who works on developing projects for underdeveloped communities at the Associated Universities Inc (AUI). As a child, she attended a school with few resources. Nonetheless, she eventually got into the field of astronomy, and since then she has worked to give back to her community those STEM opportunities she did not have, eventually leading to the creation of the Rediscovering Identity through Astronomy RITA project.

PROJECT URL: https://www.astro4dev.org/rediscovering-identity-though-astronomy/

Astronomy for Students Through Interactive App and Game, Bangladesh

By María Alejandra Díaz

INTRODUCTION

Most school and university students in Bangladesh don't have access to astronomy education. This project developed an interactive astronomy app to popularize astronomy and science among these students as well as introduce them to sustainability concepts.

ACTIVITIES

The project develop an interactive astronomy app to popularize astronomy and science among students in Bangladesh. The interactive application has twelve anthropomorphized characters: eight planets, three moons, and the Sun. Users can chat with these characters, asking them questions about their characteristics such as their mass, temperature, etc. For example, when chatting with the Earth character, students learn about climate change, light pollution, and resource scarcity.

The app was tested at two schools and the team is currently implementing some of the feedback in order to refine the app.

RESULTS

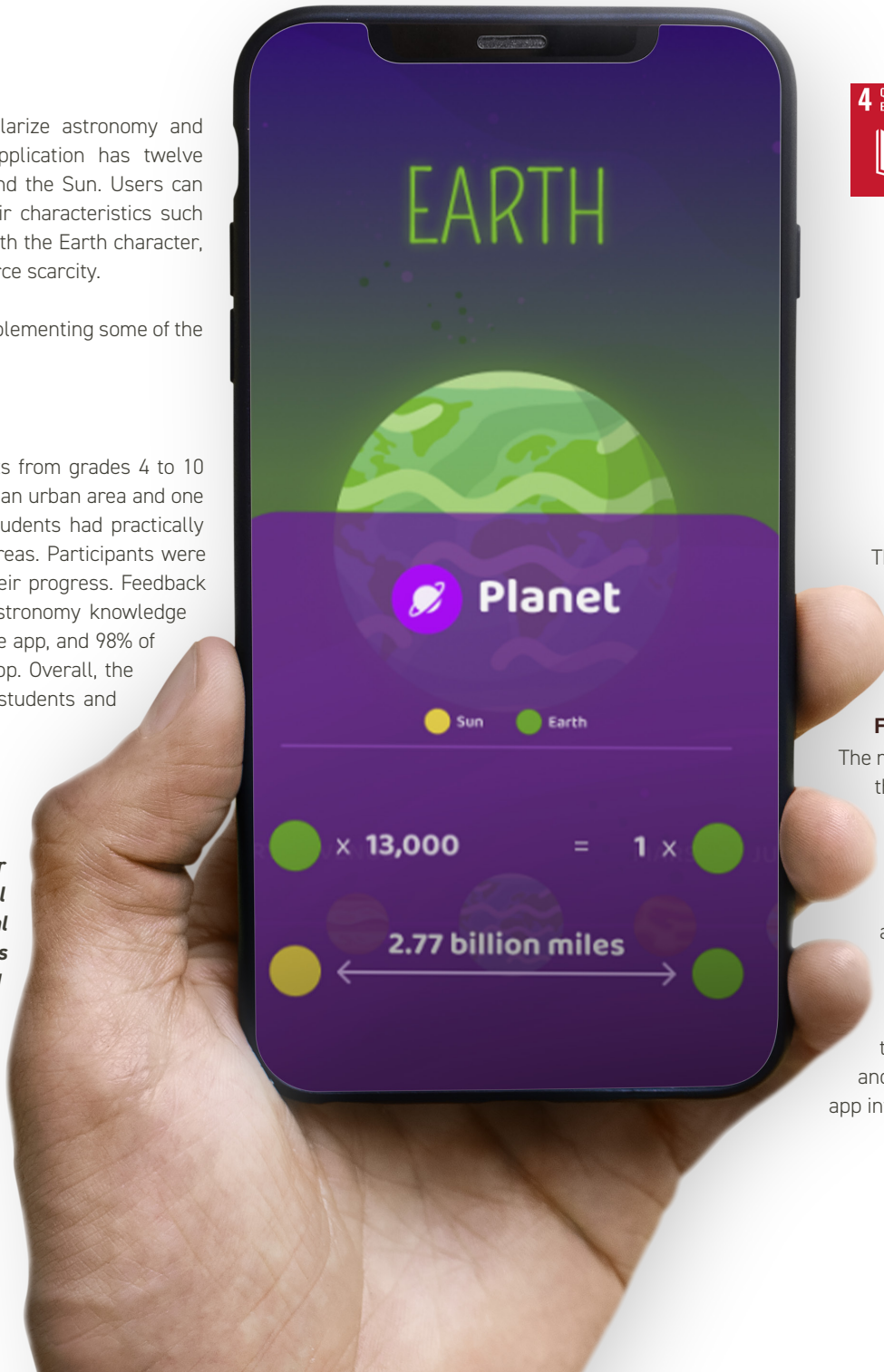
The direct audience impacted by this project were 79 students from grades 4 to 10 (ages 10 to 15). The participants were from two schools, one in an urban area and one in a rural area with scarce socioeconomic resources. The students had practically no astronomical knowledge, especially those from the rural areas. Participants were involved in a training session followed by a quiz to assess their progress. Feedback shows that 33% of students displayed an increase in their astronomy knowledge after the activity. 91% of students gave positive feedback on the app, and 98% of students felt they had learned something new by using the app. Overall, the results showed that the project was successful in educating students and generating interest in astronomy and science.

SDG ANALYSIS

At least two SDG targets were met by this project

Target 4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations.

Results show the app increase the astronomy knowledge of the students. By working with students from rural areas with less resources, the project can lessen the educational gap with rural areas.



Target 4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.

The app not only teaches astronomical concepts but also touches upon climate change and sustainability, providing the students with a well-rounded educational experience.

FUTURE PLANS

The next step for the project is to officially release the app in the Play Store, with a PC version of the app also under consideration. If there is interest, the team will add features and make the design more interactive. One possibility is adding more characters in the app, for example, some scientists.

Currently, the languages of the app are Bangla and English, but in the long term, the aim would be to collaborate with the OAD and the astronomy community to translate the app into as many languages as possible.

CONCLUSIONS

This is the first OAD-funded project centered on app development, and it has shown how mobile applications can be used as a tool to evoke interest in science and teach about development challenges. This locally developed app has created a positive impact among students, and its potential to be adapted to other languages means its impact could be multiplied. Overall, it sets a precedent for apps as science communication tools with great reach.

PROJECT COORDINATOR

Ahmed Estiak is a young researcher from Bangladesh. He earned his Physics degree at the Shahjalal University of Science & Technology and is currently looking to pursue postgraduate studies in Astrophysics. He was the president of the Copernicus Astronomical Memorial, the only astronomy organization in his university. Through this organization, he got involved in astronomy outreach and education. His experiences conducting outreach at schools were the seeds of inspiration for this project.

PROJECT URL: https://www.astro4dev.org/astronomy-for-students-through-interactive-app-and-game/

Astronomy for Mental Health

By María Alejandra Díaz

INTRODUCTION

Mental health disorders are currently one of the biggest challenges to global well-being, and this has only been exacerbated by the COVID-19 pandemic. In Armenia, where one of the project coordinators is based, the pandemic was accompanied by a war that has resulted in large numbers of displaced citizens. The result was a profound impact on mental well-being.

Because of its connection to nature and its inspirational qualities, astronomy harbours the potential to improve mental health. Thus, it could be a powerful tool to assist people, including vulnerable communities.

This intervention was one of the pilot activities for the OAD Flagship on Astronomy for Humanity. Several people have contributed to the Flagship, namely, Dominic Vertue, Armine Patatanyan, Sandra Benitez Herrera, Thummim Mekuria, and Amelia Henkel.

ACTIVITIES

The Astronomy for Mental Health project explores how astronomy can help improve the mental well-being of vulnerable groups. The project implemented several astronomy activities designed to foster mental health. Activities included star-gazing, astronomy talks, hands-on workshops, all of which were designed to integrate cognitive aspects (such as astronomical knowledge), emotional aspects (such as the beauty of the cosmos), and sociological aspects (such as the power of astronomy to bring people together). The activities were designed in consultation with both health professionals and astronomers. The direct audience in Armenia were 13 children with mental health needs. Their siblings, parents, and staff of the support centre were indirectly influenced by the project as well.

RESULTS

The activities provided some promising results. Participants were excited about the topics and asked many questions, and the results show remarkable signs of change in their behaviour and mood. There were, among others, clear signs of motivation, openness, and absence of negativity. Moreover, a sense of community seemed to develop among participants, who were listening to and supporting each other. This was supported by the assessment questionnaires, which show that the children placed more value on interpersonal relationships after the activity. Specialists have also commented that these activities have the potential to improve the attention spans of the children, and a future implementation may seek to measure this.

A similar project was implemented in Nigeria in 2019. In that case, results showed a decrease in cases of depression and anxiety, and the audience asked for these activities to continue.

Another similar activity in Spain targeted around 90 elderly people from different care centers. The results show participants were highly satisfied with the activity and feel it contributed to enhancing their self-esteem and rise in positive emotions.

In South Africa, 20 care-workers took part in a workshop to identify needs and challenges where astronomy can play a role. Participants noted that the workshop allowed them to experience how astronomy can be used as a tool in a mental health setting.

SDG ANALYSIS

Astronomy for Mental Health meets at least two SDG targets.

Target 3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being.

Through its activities, the project is promoting the mental well-being of its participants. Results show an increase in positive emotions and a decrease in negative ones.

Target 4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples, and children in vulnerable situations.

By conducting educational and inspirational activities with vulnerable groups, the project is reducing inequalities in STEM education. The activities also have the potential of improving the attention span of the participants.

CONCLUSIONS

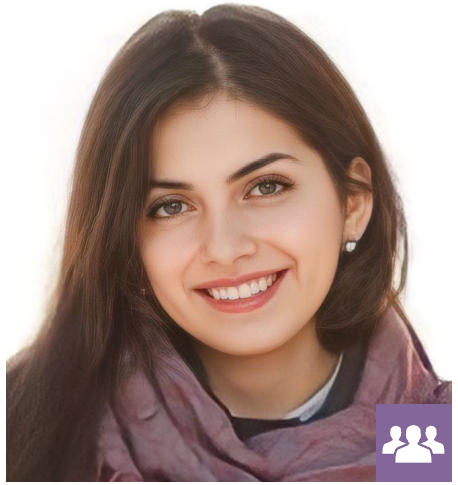
Astronomy's potential contribution to mental health has not been widely explored. The field of astronomy is generally viewed as awe-inspiring, deeply connected to nature, and intellectually stimulating. Astronomy for Mental Health is one of the projects that may tap into this potential, showing that astronomy activities focused on well-being can successfully benefit mental health while also improving cognitive performance and social bonds. It has set an example of how astronomy can collaborate with other disciplines, with the outcomes of this project potentially impacting other fields like psychology and humanitarian work.

FUTURE PLANS

There are plans to expand the Astronomy for Mental Health project by incorporating new locations and new target groups, like mental health facilities, prisons, or people in disaster zones.

Moreover, this project is defined by interdisciplinary collaboration: astronomy outreach and educational activities are enriched by psychology, and likewise, astronomy provides tools for psychological interventions. This means the project could eventually expand to help other disciplines as well

> **"Our goal is not only relief of symptoms, but also empowerment. When we see the empowerment of people, we see their full engagement in life, their enjoyment of life and their participation in the community, in the lives of other people."**
>
> – Armine Patatanyan, Project Coordinator



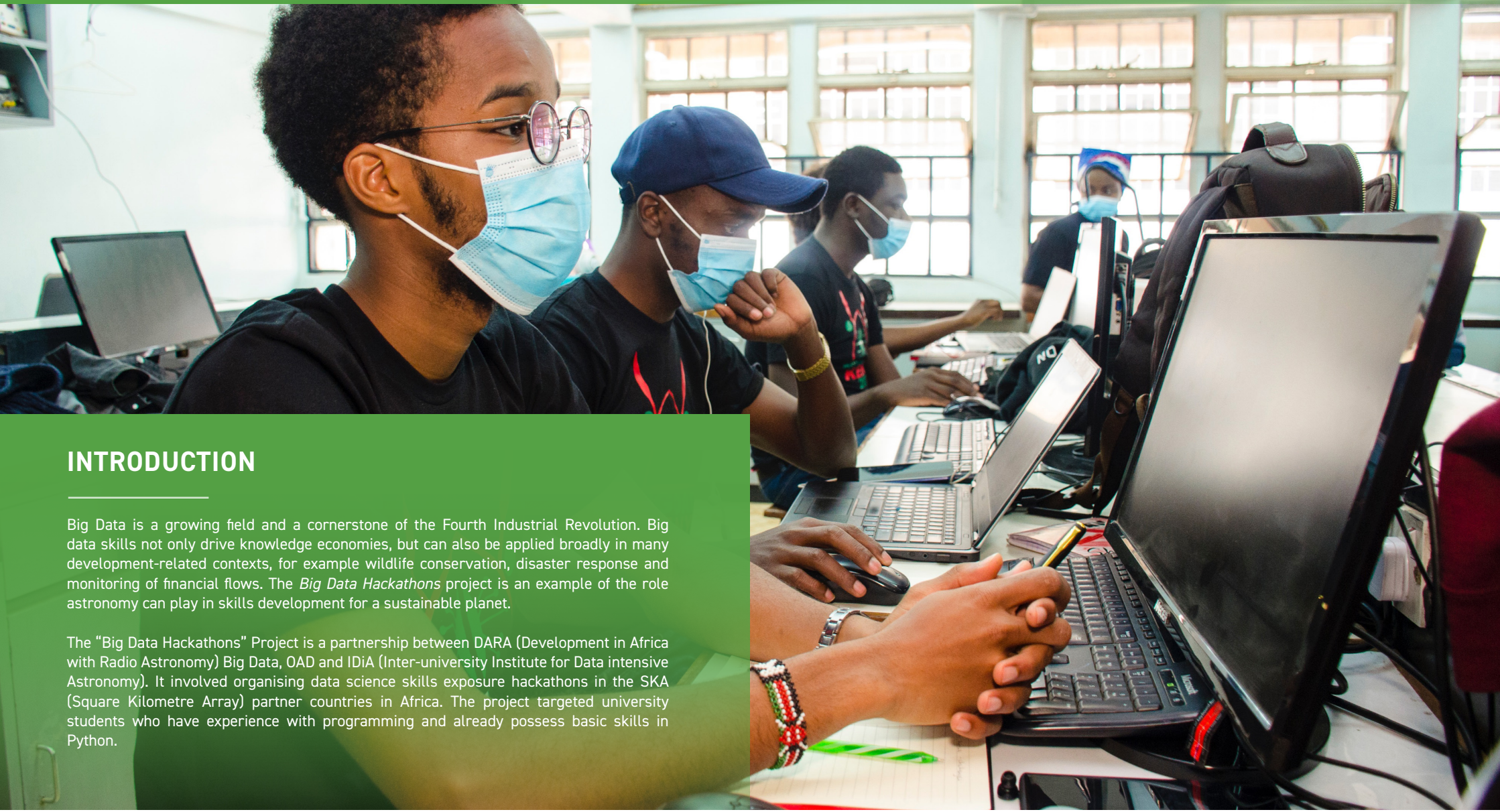
PROJECT COORDINATOR

Armine Patatanyan is based in Armenia and has a background in International Relations, Human Rights, and Conflict Management. She has experience in humanitarian settings, having worked, among other projects, in women empowerment and refugee integration programs. She became interested in astronomy after a powerful, emotional experience during an astronomy exhibition: she felt she had found a tool to appreciate the beauty of life and deal with life's challenges, a feeling she has defined as 'cosmic empowerment'. Since then, she has been working on astronomy outreach projects to share this cosmic perspective with as many people as possible. This culminated in her fellowship with the OAD, in which she worked on the Astronomy for Mental Health project. Currently, this project is led by OAD Fellow Dominic Vertue who has a background in social work and international humanitarian assistance.

PROJECT URL: https://www.astro4dev.org/astronomy-mental-health/

Big Data Hackathons

By Dana Ficut-Vicas



INTRODUCTION

Big Data is a growing field and a cornerstone of the Fourth Industrial Revolution. Big data skills not only drive knowledge economies, but can also be applied broadly in many development-related contexts, for example wildlife conservation, disaster response and monitoring of financial flows. The *Big Data Hackathons* project is an example of the role astronomy can play in skills development for a sustainable planet.

The "Big Data Hackathons" Project is a partnership between DARA (Development in Africa with Radio Astronomy) Big Data, OAD and IDiA (Inter-university Institute for Data intensive Astronomy). It involved organising data science skills exposure hackathons in the SKA (Square Kilometre Array) partner countries in Africa. The project targeted university students who have experience with programming and already possess basic skills in Python.

ACTIVITIES

The Big Data Hackathon was part of the DARA Big Data project running since 2017. DARA revolved around two main activities: a) Big Data Africa School, a two-week event where participants attended lectures and workshops and had the opportunity to interact with invited speakers from academia and industry to fully explore the benefits of data science, b) Big Data Hackathon, a three-day events where participants worked through tutorials with real data, solving real-world problems and then completed a hackathon team project. The "Big Data Hackathons" project comprised activities that immersed the participants into the reality of solving problems and inspired them to employ their knowledge and skills for a better world.

RESULTS

Over the past five years, around 400 students participated in the events implemented by the DARA Big Data project, and many inspired by this project continued specializing in this field of study. Some students returned as tutors for the "Big Data Hackathons". (In fact, 80-90% of the tutors are former participants). Although the participation is restricted to university level students, with a preference towards postgraduates, the participants came from different faculties or specialisations. This interdisciplinary approach exposed the participants to an even broader range of data science applications and inspired them to use the knowledge in their own fields of interest.

The main results of the projects were:

- increased confidence of the participants and their ability to understand and implement data science and machine learning techniques
- increased awareness about the broad application of data science in academia or industry
- resources to study, even if courses are not available at their universities
- universities inspired to broaden their curricula by including data science courses
- exposure to the career opportunities related to data science as a development skill

SDG ANALYSIS

Target 4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples, and children in vulnerable situations.

Target 4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.

It contributed to high quality education by increasing awareness of data science to address developmental challenges in Africa and for better job opportunities. "We cannot do skills development in three days but we can give exposure", according to Dr. Nikhita Madhanpall. This project was sometimes the first contact that participants had with the field of data science. It also provided inspiration to adapt the curriculum at university in order to prepare students for the jobs of the future.

Target 8.5 Achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value.

It contributed to SDG 8, by offering skills that helped participants qualify for better paid jobs. Empowering students with data science skills is essential not only for the career development of the participants but also has potential to be applied to the socio-economic development in the region.

Target 10.2 By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status.

This project carefully selected its participants and constantly searched for ways of becoming more accessible to all student categories including female students. Between 2017 and 2020, only 20% of the participants were female, but starting from 2020 the percentages increased to 50% female participation at each event. This project made a contribution to Reducing inequalities, by increasing female participation and bringing Data science to communities that would not have otherwise had access to this opportunity.

Target 17.6 By 2030, Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism.

Finally this project has been possible because of the partnership between OAD, IDiA and DARA Big Data. This partnership contributed to knowledge sharing and cooperation for access to science, technology and innovation in the developing world. (SDG 17, target 17.6).

CONCLUSIONS

This project set out to grow local talent and skills in data science in Africa. The feedback collected from the participants shows that 90% of the audience understood the importance of data science in their fields of study and for their own personal and professional development and the job opportunities that open up with mastering such skills. The "Big Data Hackathon" project lives on through the open resources that allow others to run their own hackathons, or tutorials that can be used for future hackathons. Former participants returned as tutors, making a substantial contribution to the number of direct and indirect beneficiaries impacted by the project.

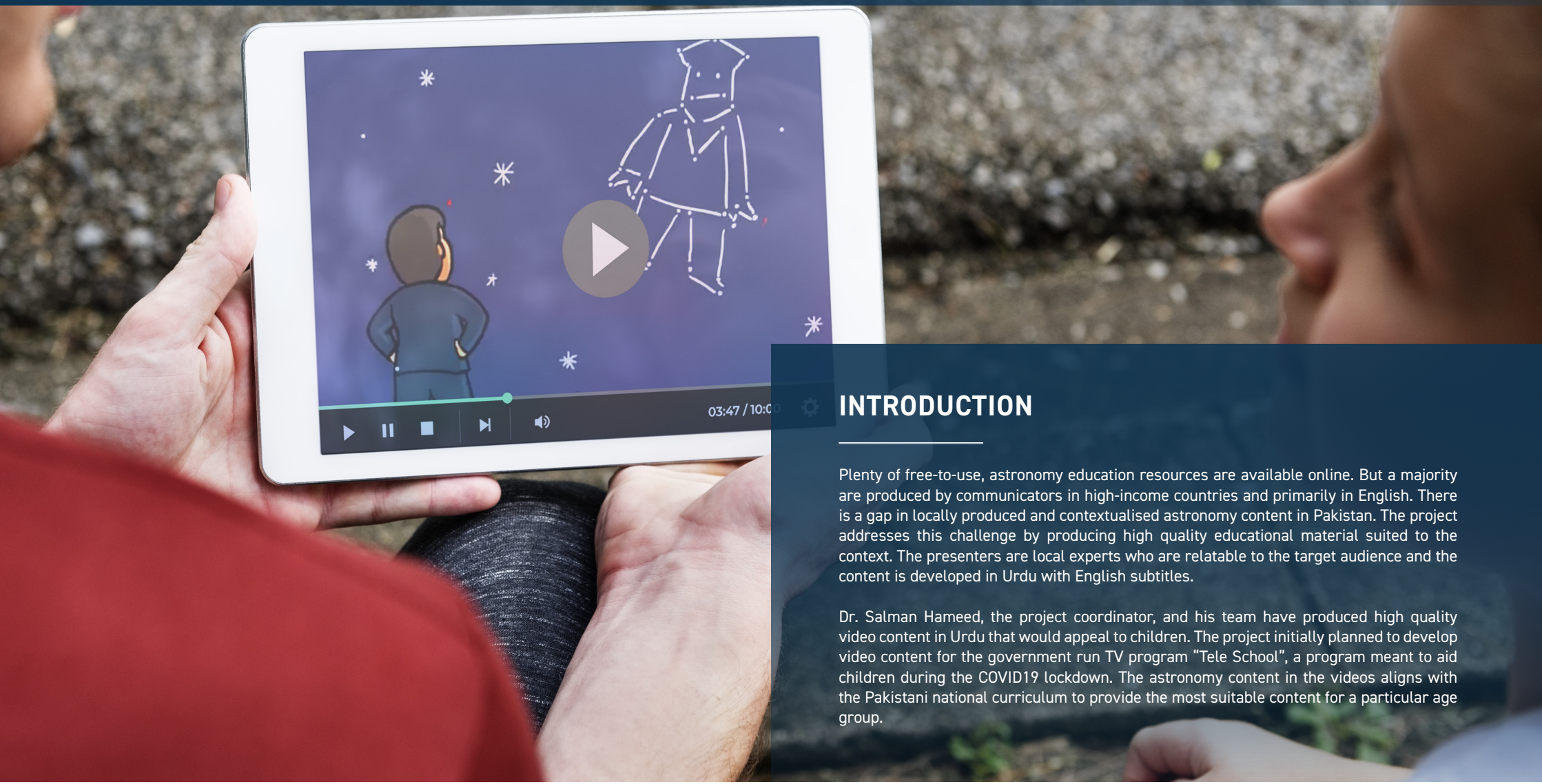
PROJECT COORDINATOR

Inspired by the dark skies of South Africa, Dr. Nikhita Madhanpall, born in Pietermaritzburg in KwaZulu-Natal, South Africa, followed her interest in physics and astronomy from early childhood up to a PhD level. Then she combined her scientific career with her passion for helping people and found fulfilment in Astronomy for Development. She coordinated the "Big Data Hackathons" project from 2020 to 2023. The project is now run by Eslam Hussein, Duduzile Kubheka, and Lisa Hendricks.

PROJECT URL: https://www.astro4dev.org/big-data-hackathons/

Video Astronomy Lessons for School Children, Pakistan

By Dana Ficut-Vicas



INTRODUCTION

Plenty of free-to-use, astronomy education resources are available online. But a majority are produced by communicators in high-income countries and primarily in English. There is a gap in locally produced and contextualised astronomy content in Pakistan. The project addresses this challenge by producing high quality educational material suited to the context. The presenters are local experts who are relatable to the target audience and the content is developed in Urdu with English subtitles.

Dr. Salman Hameed, the project coordinator, and his team have produced high quality video content in Urdu that would appeal to children. The project initially planned to develop video content for the government run TV program “Tele School”, a program meant to aid children during the COVID19 lockdown. The astronomy content in the videos aligns with the Pakistani national curriculum to provide the most suitable content for a particular age group.

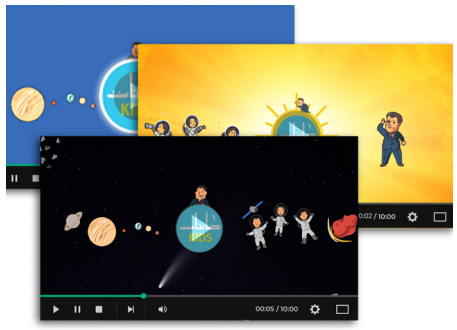
ACTIVITIES

The main activity is the production of high-quality video astronomy lessons for school children. The final product is a package of 10 videos, which touch upon different astronomy themes that are part of the national curriculum in Pakistan for different age levels. A promotional campaign was run to introduce the videos as supplementary material in both private and public schools across Pakistan. Another promotional campaign was targeted at the general public. The team also organised a launch event for each video and interacted with the audience online via Q & A sessions or live observations.

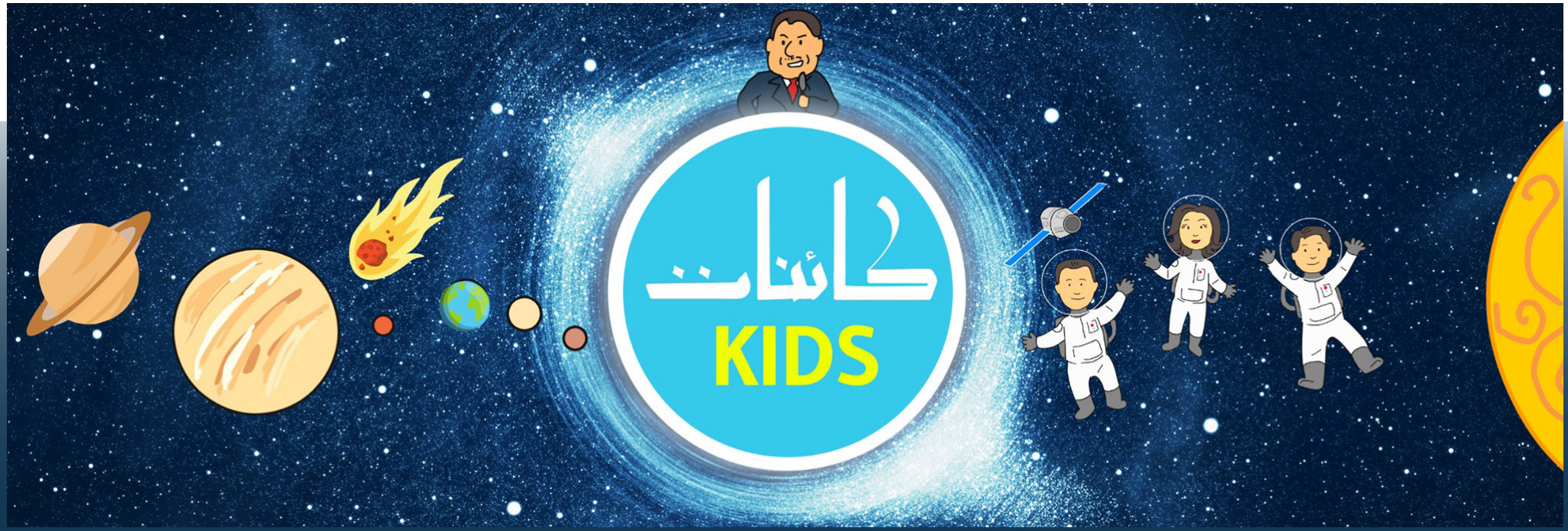
Dr. Hameed hopes the project will be an inspiration for other countries. He considers both the content and communication of this content, turning these videos into an educational experience that can reach children.

RESULT

"The big gap in the developing world is high quality content" says Dr. Salman Hameed. The videos cover topics such as planets, seasons, galaxies, stars, asteroids and comets. They contain local representations to help children relate with the content, subtitles in Urdu and English, and carefully chosen characters, addressing misconceptions, being inspirational and stimulating curiosity.



The videos are available on YouTube (KainaatKids) and on the project's Facebook page. So far, the videos have been viewed more than 125000 times on YouTube.



SDG ANALYSIS

Target 4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples, and children in vulnerable situations.

Target 4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.

This project contributes to quality education for all (SDG 4) and grants children access to knowledge about astronomy (Target 4.5 and Target 4.7).

Target 10.2 By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status.

It addresses inequalities in the access to quality educational content in different areas in the world, by bringing such content to Pakistan.

FUTURE PLANS

The Astro4Pak project will be followed by new projects such as an astronomy news show for kids giving them the ability to stay connected with astronomy as a science beyond the school curriculum. Another project to follow is creation of astronomy/science clubs all over Pakistan and then a network of clubs that share an online portal where activities, infrastructure and expertise can be shared to ensure the sustainability of the clubs in the long run.

CONCLUSIONS

The project produced high quality video educational content for children in Pakistan. In the process, it built expertise and experience in creating quality content and experience. One of the key lessons shared by Dr. Salman Hameed is that "it is not what you know that is crucial but rather how you condense the important information in a cohesive way".

PROJECT COORDINATOR

Dr. Salman Hameed grew up in Pakistan and fell in love with astronomy when the "Cosmos" TV series was broadcast in Pakistan. He followed his passion and got a bachelors in Physics and Astronomy at Stony Brook University, New York and a PhD in Astronomy at New Mexico University. During his postdoc at Massachusetts University, he started engaging in science in a more interdisciplinary way, accepting an interdisciplinary faculty position in science and society. Always involved in astronomy and science communication, astronomy for development came as a natural blend between his previous astronomy studies and his current direction of research on science and society.

PROJECT URL: https://www.astro4dev.org/video-astronomy-lessons-for-pakistani-school-children/

OruMbya: Astronomy as Fuel of Life, the Resilience of Stars in Yoruba, Afro-Brazilian and Indigenous Cosmogony, Brazil

By Dana Ficut-Vicas

INTRODUCTION

OruMbya is a combination of Orum, meaning the sky and Mbya, the name of an Indigenous population in Brazil. The OruMbya project blends astronomy and culture for the benefit of young people searching for purpose and socio economic development whilst struggling with poverty and marginalization.

Brazil is a country of great contrasts, where poverty causes marginalization and impedes socio-economic development. Young people in poor neighbourhoods are often too over-whelmed by the socio-economic challenges they are facing to be able to pursue a better life through education and culture. The OruMbya project aims to help these young people find purpose and strength in their culture and, through astronomy, learn that there are pathways to growth and fulfilment. The project targeted audiences in Brazil, Cape Verde, Mozambique, Sao Tome and Principe, Angola, and Portugal.

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ACTIVITIES

This project organised a number of public events at the Observatory of Valongo. Every event was a combination of three experiences, dedicated to astronomy, African and Indigenous knowledge, and art or music. There were roundtable discussions where people from different countries shared their experiences of cultural astronomy, workshops on traditional food/herbs used in Afro-Indigenous cultures, as well as seminars on specific astronomy subjects (calendars, cycle of seasons, stars, planets, chemical evolution of the Universe). The project also developed an allotment (a small garden) with symbolic elements connecting Astronomy and African Indigenous culture.

RESULTS

The exchange of knowledge helped to bridge cultural differences. "When we use culture to speak about any theme, the subject is common, but the way of speaking is different" says Dr. Gracy Mary Moreira. The beneficiaries of this project are 1400 people, mostly students and teachers, divided in three groups: 280 persons who joined the webinars, 85 people who participated in the online course "Cosmology connected to race", lectured by Dr. Alan Alves Brito, and other viewers on YouTube. The participants were both international and Brazilians from within and outside Rio de Janeiro. Many participants are in regular contact with the project coordinator asking about new events and further developments on the allotment.

SDG ANALYSIS

Target 4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples, and children in vulnerable situations.

Target 4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.

Target 10.2 By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status.

The webinars and exchange of knowledge on contemporary science and Indigenous knowledge contributed to education (SDG 4, Target 4.5, 4.7), and reducing social inequalities (SDG 10, target 10.2).

Target 11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage.

The project activities helped participants understand the connection to nature from both astronomical and cultural points of view and shared the cultural and natural heritage that should be protected (SDG11, target 11.4).

Target 17.6 By 2030, Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism.

All this is achieved through a collaboration, a mutual understanding between groups of people with diverse cultural backgrounds, united by the sky, and the purpose of achieving harmony with nature (SDG 17, target 17.6).

FUTURE PLANS

It has inspired a new project "OruMbya women in a social technological world", which will use astronomy and the idea of allotments in a new context, focusing on the dissemination of STEM among young girls. With the support of the British Council, this new project will organise a series of five courses focused on women in different aspects of science and culture, with a particular focus on black and Indigenous women.

CONCLUSIONS

The combination of astronomy and culture made the project interesting and engaged people who would not have otherwise participated in a science or astronomy activity. It strengthened connections between astronomers and Indigenous groups in Brazil and African countries and brought these groups closer together for future collaborations.

PROJECT COORDINATOR

The project is coordinated by Dr. Gracy Mary Moreira, Dr. Arianna Cortesi, Dr. Alan Alves Brito and Nilson Moreira, who all come from very different cultures and united under the love for astronomy and for a better world. Dr. Gracy Mary Moreira has a background in human resources and administration and a Honoris Causa title for her work in different cultural projects. She is inspired by the sky and her love for astronomy, her religion and culture of African origin, deep connection with Nature and the Universe. Dr. Arianna Cortesi is an astronomer, originally from Italy and is currently a postdoc in Rio de Janeiro, Brazil. She is motivated by the idea of changing the world in a peaceful way through meaningful actions of great impact. Dr. Alan Alves Brito is a Professor at the University of Rio Grande do Sul, Brazil. He is also a writer, for whom dissemination of science is one of the most passionate expressions of the work of scientists and science communicators, fundamental in the fight against inequalities and racism in Brazil. Nilson Moreira is an independent system analyst, who works as a consultant at the Federal University of Rio de Janeiro, Brazil. His passion is to spread knowledge and love for technology and culture.

PROJECT URL: https://www.astro4dev.org/orumbya-astronomy-as-fuel-of-life-the-resilience-of-stars-in-yoruba-afro-brazilian-and-indigenous-cosmogony/

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