Abstract [001]

Top-Down approach to formal and informal astronomy education in Thailand

Matipon TANGMATITHAM,
Academician, National Astronomical Research Institute of Thailand (NARIT)

Traditionally, informal astronomy education is done separately from formal education and is often organized by independent group of volunteers, amateur astronomers, science centers, etc. This "organic" and "bottoms-up" approach has been proven to work in many developed countries. However, its natural progression could take a long time to develop to such stage, particularly in developing countries lacking these infrastructures. Instead, the National Astronomical Research Institute of Thailand (NARIT) took a different approach in an organized top-down approach where equip our formal educators with means to also become effective informal astronomy educators. With our extensive teacher training workshop and multitudes of other programs we have transformed the scene of astronomy education in Thailand from where it was just a few decades ago before NARIT was founded, into a thriving landscape it is today.

Abstract [002]

Astronomy Education for All under Taiwan Top Science Student project

Hao-Yuan DUAN,
Graduate Institute of Astronomy, National Central University;
Wing-Huen IP,
Graduate Institute of Astronomy, National Central University;
Pei-Hsin CHEN,
Graduate Institute of Astronomy, National Central University

We are running an educational project called Taiwan Top Science Student project (TTSS) at National Central University (NCU) in Taiwan, which is supported by the Ministry of Education. In this talk, I will introduce a series of sub-projects aimed at Astronomy Education for All (AE4ALL) under TTSS and discuss future plans. The AE4ALL includes: Astronomy for Kids (storytelling and picture drawing), astronomy carnival festivals in Taoyuan City, (online) courses for senior high school students, training camps for high school teachers, public online lectures like exploring the starry sky in 500 seconds (instructor: Prof. Wen-Ping Chen), and night-time open houses and day-time school visits to the NCU Observatory. We are very interested in promoting these astronomical education and public outreach activities in other places in cooperation with local governments and organizations. For example, a Mars City will be constructed in Chiayi City, which aims to collaborate with the High-Resolution Stereo Camera (HRSC) team onboard the Mars Express spacecraft to introduce the various features of Mars and its moon, Phobos, to the public and provide basic scientific education. In addition, we successfully organized a K-12 astronomy education forum last year in Chiayi City and will hold the second forum this year in Kaohsiung. In the future, we would like to coordinate all the astronomical observation facilities of schools at different levels in Taiwan to form a working group and cultivate students' scientific interests with joint projects proposed or implemented by the schools themselves.

Abstract [003]

A trial to offer programming-oriented courses for graduate and undergraduate programs and possible application to secondary school teaching

Kinoshita DAISUKE,
Graduate Institute of Astronomy, National Central University

A course named "Astroinformatics" was offered at Institute of Astronomy, National Central University, for three times, in academic years 2019, 2020, and 2022. This course is targeted to graduate students, mainly master course students, and focuses on computer programming for astronomical research. Nowadays, a lot of observational data and astronomical catalogues are available for us. Students experience downloading of data and catalogues, reading of data and catalogues, trying simple analysis and plotting. Python is chosen as the official computer language for this course. Students are highly encouraged to write their own Python codes, but just in case some students find difficulties, a set of sample Python scripts is offered for students. Students can take a look at my sample Python scripts, go through them, ask question if any, execute those scripts, and modify some parameters to see what happens. All of those sample scripts are placed at a repository on GitHub (https://github.com/), so that students can download them conveniently. Furthermore, Jupyter Notebooks are also prepared and placed at GitHub repository, and Binder (https://mybinder.org/) can be used to execute those sample scripts. Binder provides a virtual machine for users, and we are able to access to the virtual machine using a web browser. Students do not need to install necessary Python modules, such as Numpy, Scipy, Astropy, and Matplotlib, on their own computers, but a web browser, such as Firefox or Chrome, is the only thing needed for them. Topics for this course include, but not limited to, blackbody radiation, periodicity analysis, visualisation of planetary motion and orbital integration, construction of HR diagrams using Gaia catalogue, construction of Hubble diagram. I report the design of the course and some feedbacks from students.

Abstract [004]

How graduate students can get involved in K-12 education and science communication

Sena A. MATSUI,
Graduate School of Science, Nagoya University

I am a Ph.D. student specializing in Astrophysics at Nagoya University in Japan, researching the formation and evolution of the Milky Way and dwarf galaxies within the Local Group. Alongside my research, I am deeply interested in education and aspire to become a researcher working in a Japanese planetarium (planetarium director). I have actively participated in outreach programs conducted at elementary, junior high, and high schools, as well as planetariums and shopping malls throughout Japan. These experiences have allowed me to interact with a diverse range of audiences, particularly Japanese students. Many Japanese high school students and younger have never heard of graduate school. Their questions in my presentation ranged from space to career paths. I believe that graduate students can influence career choices by sharing their experiences in astrophysics with high school students and younger. This presentation aims to share my experiences and insights on how graduate students can effectively engage with K-12 education, positively influencing career choices and inspiring younger generations in the field of astrophysics.

Abstract [005]

Home Science, Home Astronomy for early half of the K-12

Akihiko TOMITA,
Wakayama University;
Takuya KOTANI,
Osaka Ohtani University;
Yoshiko NAGASE,
Osaka Ohtani University;
Yukiko TAKEGAWA,
Science Planning Office for Kids;
Hiromi TSUJI,
Osaka Shoin Women's University

Children like to play with science, but they are less interested in science classes at school, especially from the upper grades of elementary school and afterwards. Teachers like to enjoy science with young students, but have less confidence when it comes to teaching science at school, especially after the upper grades of elementary school. This is well known in Japan, but it may be a global problem beyond the country. One way to overcome this is to introduce playing with science in everyday life. The report will focus on the practical examples and evaluation methods discussed in the KSRUG, a research group for children's scientific play that focuses on children's involvement in objects, phenomena, and natural phenomena, with particular emphasis on the pre-school to early elementary school years (early half of the K-12), and on the contents of astronomy education.

Abstract [006]

Astronomy Curriculum of Primary School (Grades 3-6) in Taiwan

Wen-Kuang CHENG,
Ganghe Elementary School, Kaohsiung;
Tsuiwen CHEN,
Ganghe Elementary School, Kaohsiung;
Ming-Jun SU,
President of Kaohsiung Astronomical Society;
Ming-Liang LIN,
Adjunct Assistant professor, National University of Kaohsiung

This research examines the astronomy teaching contents in the three curricula, Taiwan's 2019 Science Curriculum Guidelines, China's Compulsory Education Science Curriculum Standards of 2022, and the US's Next Generation Science Standards (NGSS) of 2013. The China's Curriculum Standards use spiral approach to arrange the learning content of astronomy, resulting in learning topics that gradually deepen at each stage. However, it requires more instruction time. On the other way, the NGSS based on the students' cognitive development indicate that, K-4 students learn to observe astronomical phenomena with view from the earth, such as planets and lunar eclipses. In comparison, Taiwan's 2019 curriculum guidelines focus on core competences, but the descriptions of the learning contents just knowledge fragments, so teachers need to design their teaching strategies to help students to reach the goals. This study reorganized the astronomical teaching contents in Taiwan's 2019 Curriculum Guidelines through literature review and the authors' teaching experiences. As a result, teachers should adopt the following model-based teaching strategies: 1. Moon unit: Establish the concepts of "Earth-Moon Scale" and "Moon Phases." 2. Sun unit: Use "sundial" to integrate the concept of solar movement. 3. Constellation unit: Use the "Star Map App" instead of the traditional constellation disk.

Abstract [007]

Astronomy Education at LanTan Elementary School, Taiwan

Jung-Hui CHIU,
LanTan Elementary School, Taiwan

LanTan Elementary School in Chiayi City has an observatory established in 1986. It has a refracting telescope with a main mirror diameter of 15 centimeters. During class time, as long as it is sunny, children operate the telescope every day to observe sunspots. Currently, teachers, students, and astronomy volunteers observe the sun during the day and the moon, Saturn, and other celestial bodies at night. There is also a digital planetarium that uses digital projection on the dome to simulate the universe, bringing a closer view of celestial bodies with dynamic simulations. The sound and light effects are also excellent, allowing the children of LanTan Elementary School to comfortably learn about astronomy while lying on chairs. LanTan Elementary School is an important base for promoting astronomy education in the Yunlin-Chiayi-Tainan region of Taiwan. It allows astronomy enthusiasts in the region to explore the secrets of the night sky through telescope observations. Night observations mainly use a 15-centimeter refracting telescope as the main mirror, combined with astronomical CCD cameras, multi-band filter wheels, and professional astronomical software for telescope control. This allows for basic observations and research of variable stars, comets, asteroids, and more. We also organize special celestial events such as Star Party, including the astronomical spectacle of "Mars Opposition" in October 2020, when Earth and Mars were closest, the "Conjunction of Jupiter and Saturn" in December 2020, and the "Total Lunar Eclipse Occulting Uranus" in November 2022, allowing the public to observe the celestial bodies through the telescope. Through curriculum development and morning astronomy activities, LanTan Elementary School allows children to be exposed to more astronomical knowledge from a young age, fostering their interest and allowing them to see celestial bodies in the universe through astronomical telescopes. This sparks more imagination

and may lead to the germination of future space travel and life, generating more possibilities. In order to make Chiayi a region with the most popular astronomy, LanTan Elementary School established the Chiayi City Science Volunteer Team in 2011, and cooperates with multiple schools in morning astronomy activities, allowing astronomical seeds to take root and flourish in the region. The school has facilities such as an observatory, a planetarium, a mobile planetarium dome, and a cosmic base photography studio. Astronomy classes are provided from kindergarten to sixth grade, using starlight to illuminate children's scientific enthusiasm and life attitudes. The astronomy education curriculum at LanTan Elementary School covers both formal and extracurricular learning and is implemented throughout the school. From morning astronomy, Sun Day, Moon Day to nighttime stars, students learn through hands-on experience with telescopes. There are also a series of astronomy courses and bilingual natural science courses developed in flexible curriculum, integrating astronomy into daily life, making it lively and interesting. With the opportunity to learn astronomy at all times and places, everyone can learn about astronomy. LanTan Elementary School is the starting point and development base for the Chia-Yi Amateur Astronomers Association. The school and the association complement each other, and teachers, students, and volunteers have devoted themselves enthusiastically to promoting natural science and astronomy education for over 30 years. In 2021, National Central University specifically named the 300150 asteroid discovered by the Lulin Observatory as "LanTan." This is the first time that an elementary school in Taiwan has named an asteroid, affirming the contribution of LanTan Elementary School to astronomy education, which is meaningful.

Abstract [008]

Online Observation -

An equal chance for all Students and Teachers

Hossein KHEZRI,
Mehr Observatory, Bushehr, Iran;
Maryam PAPARI,
Mehr Observatory, Bushehr, Iran;
Parham EISVANDI,
Mehr Observatory, Bushehr, Iran

We were a small team that traveled to different regions with a telescope and taught astronomy. We also hosted many students in our observatory where we gave them various trainings After the start of the covid pandemic, we decided to organize online observations, which made us hold a new window to teach astronomy to different people in different areas, from big cities to small villages, and those who are interested can Observe the sky live through a telescope with their mobile phones or computers. At the beginning of the start of covid and the shutdown of face-to-face programs, many students messaged us that they missed observation nights and the observatory. We decided to hold online observation nights, which at first we only had online observation of the moon for a limited number of students. We received good feedback from the event. so we decided to develop online observation. At first we speak about the moon and we were able to show the surface of the moon with its craters and seas. And it continues with NASE. We had some online observation in NASE courses. After some time, it was decided to do online observation for the sun and planets and the result was much better than what we thought.

Abstract [009]

Students' International Network for Astronomy - SINA: Never-give-up activities

Mahdi ROKNI,
Manager of Students' International Network for Astronomy (SINA);
Akihiko TOMITA,
Wakayama University;
Saba IZADI,
Member of Students' International Network for Astronomy (SINA);
Hosein SHEIKHIANI,
Member of Students' International Network for Astronomy (SINA)

Students' International Network for Astronomy (SINA) regularly started its activities around the world with students from different regions to build up a huge communicational network of students based on culture, education, social skills and all the aspects which can be related to astronomy. These activities officially initialized from students of Bushehr, a city in south of Iran and so far thousands of students around the world have directly participated in SINA's activities. SINA has already been a part of IAU and other international astronomy associations. Our main aim have been to stablish a community based on friendship and international peaceful relations within astronomy in different opportunities for students. However, SINA have majorly been active in Iran, but during last three years students of different countries such as Japan, Romania, Bulgaria, Spain and many others from the region have been involved in SINA. One of the most important activities of SINA is Astronomy Day in School (ADIS) international Persian ceremonies which have been started from Iran since 2019. Our future goal is to make an official society in cooperation with IAU and try to include more activities in order to encourage students joining this network.

Abstract [010]

Astronomy Education and Taiwan's 2019 Science Curriculum Guidelines for Junior and Senior High Schools

Ming-Jun SU,
President of Kaohsiung Astronomical Society;
Ming-Liang LIN,
Adjunct Assistant professor, National University of Kaohsiung

Taiwan's new 2019 curriculum guidelines for science intend to cultivate scientifically literate citizens who should possess the core science concepts, inquiry skills, and scientific attitudes and have a basic understanding of the nature of science. According to articles related to the US Next Generation Science Standards (NGSS), astronomy education is indeed an effective means to cultivate students' scientific literacy and increase their interest in science. However, the astronomy content in the Taiwan 2019 Science Curriculum Guidelines is relatively weak, and the descriptions of the teaching content are just knowledge fragments. Therefore, astronomy teaching strategies should be strengthened. To improve the quality and effectiveness of teaching, this study suggests: 1. In elementary school, using the view from the Earth. 2. In junior high school, using the heliocentric coordinate system and visualization models, such as a simple DIY Sun-Moon-Earth model, to study the phenomena caused by the movements of the Earth, the Sun, and the Moon. 3. In senior high school, introducing real astronomical data and integrating astronomy with mathematics and physics, such as rediscovering the Hubble-Lemaître law by analyzing the real data.

Abstract [011]

Experience in Astronomy Outreach for Children

Chi-sheng LIN,
Graduate Institute of Astronomy, National Central University

When conducting astronomy activities, we need to follow certain principles. However, imparting astronomical knowledge is not our sole objective. In addition to cultivating critical thinking, knowledge, and skills, we also aim to establish a connection between people and the stars. When people see the stars, we want them to naturally develop a sense of familiarity, as if they were seeing loved ones or friends. For example, when we guide the children to observe Saturn using a telescope, we do not inform them in advance about the appearance of Saturn, but instead allow them to discover it themselves and experience the joy of discovery. We can employ various teaching methods to achieve the aforementioned goals. Lastly, as an astronomy educator, his responsibility is to bring people closer to the stars.

Abstract [012]

The contributions of KenTing Observatory in informal astronomy education and its prospects

Pin-Wei WANG,
National Museum of Natural Science

Informal astronomy education has achieved remarkable accomplishments in the past two decades. Through various informal learning environments, people have gained a deeper understanding of the universe, fostering curiosity and passion for astronomy. As a significant base for astronomical observation in Taiwan, Kenting Observatory is poised to play a crucial role in the future. In response to future changes, Kenting Observatory has implemented a series of measures to meet the public's needs and fulfill its public function. With enhanced facilities and partnerships, Kenting Observatory will continue to advance astronomy education and scientific research, inspiring scientific curiosity and exploration.

Abstract [013]

KenTing Observatory: Hands-on observing and Image analysis for students in 23 Years

Joshua LIAO,
KenTing Observatory;
Xue-Hui MA,
KenTing Observatory; National Museum of Natural Science;
Jie-Lin YANG,
KenTing Observatory

The Kenting Astronomical Observatory (KTO) is affiliated with the National Museum of Natural Science and was established by Dr. Sun Wei-Hsin in 2000. The KTO is located within the National Museum of Marine Biology and Aquarium in Checheng Township, Pingtung County. The observatory has three main objectives, which encompass scientific research, education, and promotion. In terms of education, the KTO has developed astronomy observation and teaching programs during winter and summer vacations. These programs provide astronomy observation courses for high school and university students, including practical data processing and image analysis. The high school program lasts for four days and three nights, while the university program lasts for eight days and seven nights. Additionally, the KTO collaborates with high schools to offer weekend learning courses.

Abstract [014]

"H-R Diagram" Education Program for Enhancing Teacher's Data Literacy Teaching Capacity

Jungjoo SOHN,
Dept. of Earth Science Education, Korea National University of Education

In the current national curriculum of the Republic of Korea, there is an emphasis on developing data literacy skills in science education. To achieve this goal, teacher training programs have been actively implemented. In this presentation, we introduce a case of developing a teacher education program that applies big data and data science in astronomy, focusing on the "H-R diagram". We strategically utilised basic statistical analysis and data visualisation with input data from the shared archives of the HIPPARCOS satellite and AAVSO. The developed education program was implemented on Google Colab for Online learning and included explanations for the entire process. The results of the development were reviewed by content and field experts and applied to teacher training, resulting in improvements in knowledge expertise on the characteristics and life cycle of stars, understanding of big data properties, knowledge information processing, and improvement of educational abilities.

Abstract [015]

A geometry lesson of ancient astronomy in high school

Shan-Chien YANG,
Taipei First Girls' High School

This report will share a geometry lesson in the elective earth science course of ancient astronomy in high school. Due to the need to train critical thinking skills among Asian female high school students in the science classroom, there is a certain level of emotional difficulty. The course theme is how ancient people measured the size of the Earth and the distance to the sun, inviting students to make comparisons between ancient and modern times and between Eastern and Western cultures. As the times are always progressing, there must be room for improvement in the methods used by ancient people. The classroom scenario attempted to create is to propose feasible improvement suggestions and separate them from opposing opinions, allowing students to successfully complete the learning task. This report explains how to explore the cultural differences in viewpoints on the Earth and distant stars, and the speculations on celestial bodies, which led to limitations in the methods used to measure the distance from the Earth to the Sun, by using the from the Tang Dynasty in AD 600, which was a national examination book, and the knowledge of geometry in the Greek era in the high school earth science textbook. Additionally, students are asked to discuss the key points and evidence regarding the question, "After the author of the Zhou Bi Suan Jing calculated the answer, could they discover any serious errors through self-checking?" This teaching design includes reading and comprehension of Eastern and Western historical and cultural texts, as well as the discipline of astronomy and spatial geometry, allowing students to demonstrate critical thinking and argumentation skills through classroom training.

Abstract [016]

Advancing Data Literacy Skills with NSF's NOIRLab

Justine SCHAEN,
Education Specialist, NSF's NOIRLab;
Ardis HERROLD,
Education Specialist, Vera C. Rubin Observatory

NSF's NOIRLab is the preeminent United States center for ground-based optical-infrared astronomy and operates five scientific Programs: Cerro Tololo Inter-American Observatory (CTIO); the Community Science and Data Center (CSDC); Gemini Observatory; Kitt Peak National Observatory (KPNO); and the Vera C. Rubin Observatory. This session will provide an overview of NOIRLab's Programs and Projects including US-ELTP, a joint endeavor between NOIRLab, the Thirty Meter Telescope, and the Giant Magellan Telescope. The session will introduce a variety of data-based education programs NOIRLab has developed for elementary through high school classrooms. Strategies will be discussed for bringing authentic data and experiences into classrooms around the world that support national standards. Specifically, we will explore the Globe at Night program, a light pollution citizen-science campaign that is applicable to all grade levels and serves as a strong Problem-Based Learning opportunity. We will also take a closer look at the new Teen Astronomy Café – To Go! program that brings Python Notebooks, developed by astronomers, into high school classrooms (no coding background required). All education programs offered by NOIRLab are free.

Abstract [017]

Explore the Solar System with Vera C. Rubin Observatory

Ardis HERROLD,
Education and Public Outreach, Vera C. Rubin Observatory;
Justine SCHAEN,
Communications, Education and Engagement, NSF's NOIRLab

Vera C. Rubin Observatory is a United States ground-based telescope under construction in the Andes Mountains of Chile. When it begins operations in 2025, it will begin a ten year program to image the entire sky every three to four nights. Using the most advanced camera ever developed for astrophysics, the Observatory will detect thousands of objects that have changed position or brightness, and produce very deep views of the Universe, delivering an unprecedented amount of optical data every night. The Rubin Education and Public Outreach team has designed interactive classroom online investigations that require only a connection to the internet. Each contains intuitive tools and visualizations to make it easy to explore authentic data. These investigations work best with students who are in advanced middle school through introductory college classes, and who are new to learning about astronomy. They cover topics commonly taught in an introductory astronomy unit or course. This session will show how to access and use these free investigations, as well as the support materials that come with each, such as an introductory activity, assessments, and the teacher guide. We will explain our design to enhance data literacy and science practices and to increase self-confidence in all learners. We will work through “Surveying the Solar System” as an example lesson and model some teaching strategies for inclusive and active learning.

Abstract [018]

Amateur Radio Astronomy Telescope with RTL-SDR and Mobile phone, and the result of detecting HI 21cm line

Yeah-Chun YANG,
Research Assistant, Taipei Astronomical Museum

RTL-SDR is originally designed for DVB-T TV tuners. We employ a portable RTL-SDR device with an RTL2832U chip and QFH antennae to build a cheap radio device that can probe radio signals from 27MHz to 1700MHz. Within the range of detected radio frequency, the 21cm Hydrogen spectrum line lies at 1420MHz. Combining mobile phones and antennae with LNA and BPF we can construct one Portable Astronomy Telescope with a limited budget while still effective enough for educational purposes. The Apps and antenna design details are described in the content.

Abstract [019]

Star-Stamp: A stamp rally application for astronomy education in Japan

Ernie YUZUKI,
GK Tech / the TENPLA project;
Naohiro TAKANASHI,
the TENPLA project / the University of Tokyo

We have developed a web application "Star-Stamp" which for learning and enjoying astronomy (https://star-stamp.net). This application is designed for children who are member of local astronomy club, "Mitaka Astro Club". All of the children have a simple telescope (D = 4cm) and use it to watch stars. When children find the stars, they can get a digital stamp by showing QR code to teachers. We will introduce the features of "Star-Stamp" and demonstrate how to use it.

Abstract [020]

Taiwan astronomical Observation collaboration Platform (TOP)

Shih-Ping LAI,
Institute of Astronomy, National Tsing Hua University, Taiwan;
Wen-Hsin CHEN,
Institute of Astronomy, National Tsing Hua University, Taiwan

The Taiwan Astronomical Observation Collaboration Platform (TOP) is an inclusive community that brings together students, teachers, and amateur astronomers from Taiwan. The primary objective of TOP is to consolidate the available astronomical observation resources across schools of all levels and among amateur astronomers. Through collaborative efforts, TOP aims to cultivate a passion for scientific exploration by engaging in diverse observing projects. Notably, TOP serves as a bridge between professional astronomers and K-12 schools, facilitating the exchange of ideas, techniques, and data among participants. This enables K-12 teachers to receive comprehensive support and enhance their capabilities in astronomical education. This collaborative endeavor not only expands the participants' horizons but also nurtures a lifelong pursuit of learning and curiosity-driven exploration.

Abstract [021]

The Development of Interactive Multimedia Website on Transitting Exoplanets

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Recently, approximately 4,000 exoplanets have been discovered using a variety of techniques. More than half of confirmed exoplanets are detected using the transit technique, which should be credited to the launch of many

space telescopes (the Kepler mission and the TESS: Transiting Exoplanet Survey Satellite). This research aims to develop and implement an interactive multimedia tool to facilitate learning about transiting exoplanets. The application offers a realistic experience by presenting observational data from the 0.7-m class Thai Robotic Telescope networks (TRTs). Photometric information is sourced from the SExtractor python pipeline, and a transit model has been created using the 'batman' algorithm. Moreover, the application features a comparison of the size between stars and planets and displays the habitable zone of a star system. Learners can manipulate various planet parameters to calculate their fitting, enhancing their understanding of exoplanets. All elements of the design have been expertly validated to ensure accuracy and effectiveness. The effectiveness of the interactive tool was assessed using formative testing. The result of the assessment can be obtained.

Abstract [022]

Activities of Internet Telescopes in Astronomical Education

Kouichi TODA,
Department of Mathematical Physics, Toyama Prefectural University, Japan;
Internet Telescope Project, https://www.kitp.org/

We are working on a project named Internet Telescope Project (ITP, https://www.kitp.org/). The purposes of our project are the development of Internet Telescopes (ITs) and the spread of astronomical education using them. ITs are small telescopes with cameras that are operated by a browser user interface via the Internet and are available for free. We installed them at various locations in Japan and other countries. It means that anyone can observe the night sky by using them anywhere and anytime. In some situations such as the coronavirus pandemic, it is an advantage to be able to do that without going outdoors. We report the development of a new system for our ITs using the INDI Library, which is open-source software to control astronomical equipment. The new system allows us to install various telescopes and cameras more easily than the previous one and makes it easier to set up ITs. We introduce the ITP schoolwork bank. This is a system on the web for preparing and releasing instructional plans for the use of ITs in school science classes and is also available for free. By sharing this bank with school teachers, we aim to evolve this into more user-friendly instructional plans for various educational scenes. We also report recent outreach activities using ITs. Although many science events were canceled due to the coronavirus pandemic, we exhibited ITs at some events face-to-face or remotely.

Abstract [023]

Application of Science Fairy Tale Writing in Science Course for Primary School Teacher Preservice Education

Hsien-Chuan FAN,
Education and Art Colledge, Ningde Normal University

"Earth and Space Science" is an optional course in the professional core of the primary teacher preservice education. In order to stimulate students' interest in learning, the researcher used the story "Secret in Starlight" as a scaffold to help students think about what kind of star they were and how they would participate in the dialogue to others in the original tale, then found that students were very interested in the topics and could take the initiative to read more information to enrich the dialogue between stars. At the end of the semester, the researcher then used another story "Dialogue between Books" as a model, guiding students to imagine how they would talk to other books or readers if it were a kid's book about earth or space science. The students' imagination is thus unleashed, and there are many wonderful works. It shows that students love science fairy tale writing and focus on their specific science points to explore with their taste.

Abstract [024]

Implementation of "Big Idea in Astronomy" in Japanese schools -Curriculum research as a prerequisite for interdisciplinary and foundational courses in high school science-

Hidehiko AGATA,
Public Relations Center, National Astronomical Observatory of Japan

Aiming to installation into government curriculum guideline, we attempt to design new curriculum of science education in Japanese high school that smoothly connect from junior high school. Social problems that we face today require interdisciplinary scientific comprehension to be addressed while students learn each science subject, which is physics, chemistry, biology, and geology in Japanese science curriculum, independently. Considering the purpose of science education and its role in society, we reconsider compulsory subject for science education that should be comprehensive and foundational in order to nurture problem solving skills. Our goal is to implement "Big Idea in Astronomy" into the Japanese high school science curriculum. In this presentation, we will discuss the progress of our research.

Abstract [025]

On A Small Wide-Field Space Telescope Project For K-12 Astronomy Education

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Hao-Yuan DUAN,
Institute of Astronomy, National Central University, Taiwan;
Zhongyi LIN,
Institute of Astronomy, National Central University, Taiwan;
Jen-Kai HSU,
Institute of Astronomy, National Central University, Taiwan;
Po-Chieh YU,
College of General Studies, Yuan-Ze University, Taiwan;
Shinsuke ABE,
Dept. of Aerospace engineering, Nippon University, Japan

To combine astronomy education and education in space science and technology, it is proposed to mass-produce a miniaturized wide-field op-tical telescope with an aperture of about 5 cm to be deployed on either microsatellites or cube satellites with close involvement of middle school students. The idea is to develop a constellation of such space tele-scopes to collect optical or UV photometry of bright massive stars. Very successful and important experiences have been achieved by the BRITE constellation which is composed of cube satellites of a mass of 10 kg and 20x20x20 cm in size (Pablo et al, 2016, PASP, 128, 125001). As the Taiwan Space Agency (TASA) is planning to launch a dozen of low-Earth orbit Earth observation satellites with scientific payload capability, it is possible to consider the inclusion of such an experimental instrument on some of them for the purpose of science education. In this project, an international science team will be established by inviting K-12 astronomy educators to join to provide their inputs and share the scientific data.

Abstract [026]

Extension from K-12 teaching experience at Yuan-Ze University

Po-Chieh YU,
College of General Studies, Yuan-Ze University, Taiwan

Yuan-Ze University (YZU) is a medium-size university with student number of ~8500. However, we don't have college of science since our former is college of engineering. Teaching natural science is a challenge, especially in English. I will share my experience of teaching astronomy and programming. I will also present some feedback from students of learning science in high school as references for high school teachers. I will also discuss potential concerns of 108 class guide lines and the policy of teaching in English.