

## THE CREATIVE APPROACH FOR DISSEMINATING ASTRONOMY TO THE GENERAL PUBLIC

Y. PRAMUDYA<sup>1,2</sup> & W. SAWITAR<sup>3</sup>

<sup>1</sup>Pusat Studi Astronomi Universitas Ahmad Dahlan, Jalan Gondosuli no. 1, Yogyakarta, DIY, Indonesia

<sup>2</sup>Prodi Magister Pendidikan Fisika Universitas Ahmad Dahlan, Kampus 2, Jalan Pramuka no. 42, Yogyakarta, DIY, Indonesia

<sup>3</sup>Planetarium dan Observatorium Jakarta, Taman Ismail Marzuki no. 3, Jalan Cikini Raya, Jakarta Pusat, DKI Jakarta, Indonesia

*E-mail: yudhiakto.pramudya@pfis.uad.ac.id*

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### ABSTRACT

Astronomical outreach activities for the general public who are unfamiliar to astronomy is a challenging task. It requires creative thinking to solve the problem. The amateur astronomical clubs in a number of cities in Indonesia routinely schedule observations at public parks. The interaction between these clubs and formal education institutions is established by face to face interaction and assisted by social media. The physics teachers who took astronomy courses in university are potential resources to enlarge the outreach scope by creating astronomical clubs as an extracurricular activity. Recent progressive trends in astronomy dissemination for the disabled are also a great opportunity to assist the disabled in experiencing hands-on activities based on formal and informal education.

*Key words:* outreach: extracurricular: culture: disable

### 1. INTRODUCTION

Science dissemination and popularization has become a focus for research institutions. Scientists need to be able to communicate with the public. The science literacy of the public can be enhanced through the improvement of astronomy education quality and astronomy outreach (Prather et al. (2009)). However, the public feels that astronomy is an difficult subject to be studied. The math and physics content in astronomy contribute to these poor perceptions. Even in schools and universities, there is limited time for astronomy courses (Sawitar (2001, 2013)) Hence, the number of people who are unfamiliar with astronomy is large.

Astronomy outreach can be assisted by amateur astronomy clubs (Berendsen (2005)). Currently, more than 20 clubs in Indonesia have a routine schedule of meetings and observations. However, the participation in the activities is dominated by the club members regardless of their level of astronomy knowledge. Therefore there is a need for knowledge on how to increase public participation in the club activities. Research will tackle the problem of difficulties in increasing public engagement, especially for people who have less interest in astronomy.

The significant growth of social media users is a promising way to disseminate astronomy information to the general public. It also can be used for communicating ideas between amateur astronomy clubs and research

institutions. This information propagation can also be established through formal education. Physics teachers who attended astronomy workshops or classes should be treated as a potential resource for teaching students. As a result, students will be exposed to astronomy from an early stage.

### 2. THE ACTIVITIES

There are number of activities that have been developed by the astronomy clubs in Indonesia. Some of them are focused on astronomy popularization and dissemination to the general public. The activities are held not only at school and university areas but also in public ares. These activities have to offer solutions for the problem of the public perception that astronomy is a difficult, expensive subject and there are limited resources for students to learn astronomy, especially students with disabilities (Grice (2011-2012)).

#### 2.1. Extracurricular Program at the School

Astronomy is not a priority subject to be taught at school. The condition is getting worse due to curriculum changes which moved astronomy into geography instead of the physics course. Therefore, there is a need to have additional sessions for astronomy. In Indonesia, such a session is usually formed as an extracurricular program. The students who are interested join the program. However, they have very tight schedules for after school programs, as the requirements for graduation be-

come higher and higher. Another problem is the lack of equipment, such as telescopes, at the schools. The major problem is obtaining permission from the parents to let the their child stay until night.

This is where the role of astronomy amateur clubs can tackle the problems. The club can foster extracurricular programs, such as by guiding the students in building their own instruments. The club also can perform observations during the day to observe the Sun. Night observation could be be limited to before 8 pm.

The club can also can get benefits from the program since the program alumnae may join the club as members. However, at some schools, the continuity of the program needs to be considered as the main priority. Amateur astronomy is a hobby based activity, and therefore the participation of students could vary.

Himpunan Astronomy Amatir Jakarta (HAAJ) has fostered a number of extracurricular programs. Now, it has established extracurricular program networks in the Jakarta, Bogor, Depok, and Tangerang areas. The members of the program showed a high level of interest in doing more advanced astronomy activities such as presenting their observations in seminars or conferences. The Surabaya Astronomy Club (SAC) has started a similar activity in recent years. Based on the SAC experience, the students improve their understanding about the astronomy and the club by joining the program. Pusat Studi Astronomi Universitas Ahmad Dahlan (PASTRON UAD) is also planning to foster a school extracurricular program in Yogyakarta, especially for Muhammadiyah based schools.

### 2.2. *The Boy Scouts and Astronomy*

As an outdoor activity, astronomy is related to the knowledge of navigation. Navigation is a major part of Boy Scout skills. The members of Boy Scouts learn more details about the constellations and how to observe them. At the same time, members of amateur astronomy clubs learn how to make approximations about their direction by knowing the constellations and the altitude of particular objects using the size of their fist. HAAJ was asked to assist the US Boy Scouts in earning their astronomy badge. The UAD Boy Scouts learn basic astronomy with PASTRON and are planning to have a stargazing activity at their training ground. One of the members of UAD Boy Scouts used their knowledge to teach students while doing his teaching practice in Thailand.

### 2.3. *Observation at the park/mall*

The park and mall are the best place to meet people. Their background, as well as their purpose in visiting the park or mall is diverse. Hence, several amateur astronomy clubs decided to have stargazing activities at the park or mall as shown in figure 1. They asked people to try to observe the Moon or stars through telescopes and binoculars. Some of park and mall visitors had never used a telescope before. In addition, they are not aware about the club and astronomy events. HAAJ and SAC usually hold the activity in conjunction with the



Figure 1. Stargazing at the park by the Surabaya Astronomy Club (SAC document).

Earth Hour awareness night. Astronomi Amatir Makassar (AAM) has similar activities at a park on the seaside.

### 2.4. *The Culture and Astronomy*

The Star of Asia project was launched on 2009 to celebrate the International Year of Astronomy. The project goal is compile stories in the Asia Pacific that are related to astronomy. The professional and amateur astronomers in Indonesia have started some projects to investigate the ancient buildings in Indonesia and their correlation to astronomy knowledge at that time, such as the alignment of the temple to particular direction or the function of the building to be a gnomon. These activities are promising for bridging the gap between the astronomy community and the archeology and history communities.

People who begin to study astronomy usually learn the names of constellation based on Greek mythology. In many places in Indonesia, people recognize similar constellation by other names. This name is related to the social living and culture development at that place and time. For example, the name of Lintang Waluku (star of plough) may be related to the way people in Java obtained their food. Lintang Waluku is the name for Orion.

Taneyan Ilmu Ga'i Bintang in Sumenep has started a project to compile the traditional poetry and songs that tell the stories about the sky. People can enjoy the beauty of poetry and songs and learn the details of the Sun and stars at the same time. One of the poems is a poem about the group of seven stars. People in Sumenep have imagination that group is a Nanggala; a cow-pulled plough.

### 2.5. *Read the Universe*

This program is organized by SAC at a library located in a suburb of Surabaya. The children in the library learned astronomy by watching a presentation about the night sky. They also experienced observing the Moon through the telescope after the presentation session has finished.



Figure 2. Visually impaired high school students trying to use the educational kit and module about the eclipse (PASTRON document).

### 2.6. Astronomy for the Disabled

Disabled people usually have limited resources to learn science, especially astronomy. PASTRON developed an astronomy module and the educational kit for visual impaired students as shown in figure 2. The module and educational kit cover the topic of solar system. The visual impaired students who are already in the high school are usually put into the social science class. This does not mean they are not interested in natural science. The school does not have suitable educational kits and module for natural science courses for visually impaired students.

After PASTRON introduced the module and education kit, the students showed high appreciation and curiosity for learning other astronomy subjects. PASTRON also collaborated with Lina Canas, who runs a project called Meet Our Neighbours! She developed inexpensive educational kits about the Sun and planets. PASTRON implemented the projects to elementary schools students, both visually impaired and sighted students. The results show that there was an increment of the test score by comparing the pre-test and post-test result during the projects. The visually impaired and sighted students had to finish their project to build a tactile model of the planet and sun. Initially, both the visual and impaired students were reluctant to work together, it was the first time for them to do so. In the end, they mingled and blended as a good team. In addition, the visually impaired students showed their confidence in presenting their work to the group of students. The mentally retarded students also got the experience of observing the Moon and planets. That was the activity of Taneyan Ilmu Ga'i Bintang.

### 3. DISCUSSION

The amateur astronomy club and research institutions have started to disseminate astronomy information to the general public. The strategies cover not only the form of talk shows or conferences but also more creative activities. The activity can be a collaboration with

other fields such as art. This brings an opportunity to reach more people. Since the collaboration creates a fun environment it makes astronomy a popular science. However, the continuity of the activities may become a problem. Therefore, the clubs and institutions have to have a good plan to make the activities sustainable. Research institutions have beneficial resources for analyzing the accuracy of the astronomy content and the effectiveness of the pedagogical methods.

### 4. CONCLUSIONS

The need to be creative to create outreach programs for general public is high. There are still a lot of people who are not aware of astronomy activities, phenomena or events. Amateur astronomy clubs and research institutes have to work together to set up a plan to bring astronomy to the general public. Such activities can be formed by collaboration between astronomy and culture. The activities also not only focus on the school or universities but also in public areas and must be introduced to people who have disadvantages, such as visually impaired people.

Future programs will be focused on astronomy dissemination through multimedia, such as, but not limited to, routine radio programs, short movies, and dances about stars. Programs can also be set up to respond to a debate over the new month decision among the Islamic community, as the new month can be determined either by calculation or observation, or both, of the crescent Moon. The astronomy community can give enlightenment to the public about the science behind the Moon and Sun motion. This collaboration between amateur astronomy clubs and research institutions is the backbone to make the creative outreach programs sustainable.

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