UNAWE Indonesia project: raising total solar eclipse 2016 awareness through educational packages

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Abstract: On March 9\textsuperscript{th} 2016, some regions in Indonesia witnessed the Total Solar Eclipse (TSE). At that time, Indonesia was the only mainland in the world that could observe TSE. This moment is extraordinary because its probability of being observed at the same point happens every 350 years. On a purpose of raising public awareness and engaging more participations, UNAWE Indonesia developed a handy material and sent the so called educational packages which provided essential information about eclipse, especially TSE. Each package contains of modul of TSE study and materials for simple TSE activity so people who received the package could observe TSE safely. In the delivery of this program, we established a collaboration partner, whom are teachers, as an 'eclipse ambassador'. The local partners were responsible for socializing the information for school or their community. We encouraged them to conduct an observation activity and ask them to fill an evaluation report. As a result, 48 out of 59 partners or equal to 81.3\% of all partners has sent the evaluation of the package and documentation of the activity during TSE. They responded positively as it was easy to understand, functional, and convenient.

1. Introduction

The trajectory of Total Solar Eclipse (TSE) in Indonesia was a narrow and long path. It extended from west to east Indonesia. It passed through not only at big cities such as Palembang, Palu, Ternate and Balikpapan, but also other remote districts across the archipelago. These areas are known for having difficulty with communication and transportation access such as Muko-Muko in Bengkulu, Kapuas in West Borneo, also North Halmahera in North Mollucas.

![Figure 1. The trajectory of TSE 2016 in Indonesia](image)

As a member of UNAWE international, UNAWE Indonesia has a mission to introduce beautiful cosmos for children, especially children who are in unfortunate condition in socio-economically as well as geographically. We realized how it is became very important for the public to get the need of correct
information of TSE and how to observe it. We were conducting the project by developing simple teaching material that provide resource to educate student the fundamental principle of science behind the eclipse that is easy to understand and deliver. These material will helped teacher (especially science teacher) for conducting a selected topic science in a guided. The material also give information when TSE occurs and how they can safely observe in a right method.

Moreover, with the limited number of big expedition by both professional and amateur astronomers to observe TSE across the islands, we wanted to share knowledge by ensuring a wider audience of Solar Eclipse observation in rural area with this first hands experience. The distribution points of our package not only targeted areas in the totality path, but also it wider than that.

2. Method

2.1 Gathering eclipse ambassadors
Local school teachers and educator were our main target to be given the educational package. These teacher would be asked to conduct socialisation program, workshop activities and arrange observation on 9th of March. One of main network we got to get the teacher was Pengajar Muda from Indonesia Mengajar.

We were choosing the person in local area who have the same spirit in educating the children. Pengajar Muda has one year teaching placement at elementary school in remote area with difficult access of transportation and communication. Their presence in those areas not only for teaching, but also they have to convince parents and local teachers how important education is for their children or student. For the local teacher and educator, we have to find their contact with our networking. After we know their contact, we personally asked them by phone call or text whether they are willing to be our ambassadors. When they were agreed to conduct the program, they received our package.

2.2 Developing material study and arranging educational package
We set up a simple package with all our materials inside it. Teachers would be able to not only deliver the information but also conducting the observation with ready to use eclipse glasses. We also selected material study, topic and activities highly on TSE topic. Material that we provide educational packages included some of material things and simple learning module to execute in school and communities.

Here are materials in our educational package:

a. Booklet
Booklet provided contains essential and brief information of TSE on the March 9th, 2016. The booklet gives information about the solar eclipse: what eclipse is, how eclipse happens, as well as when and where the eclipse occurs, how to observe eclipse safely.

b. Activity material
The activity material consist of aluminium foil and compact disc (CD). We sent aluminium foil to make the pinhole box because of, how it is considered as a hard to get material in those remote areas. And CD contains of activities modules and videos about various astronomy topics especially eclipse. We put also all material study in our website as an open resources to ensuring a larger audiences.

c. Teacher paper work
The papers work consist of Term of Reference(ToR) and evaluation paper. ToR as a guide on how to conducting the programs that are socializing the TSE and plan observing activity in the day of eclipse with children, teacher and communities. And for evaluation paper, our ambassadors need to fill the question and sent it back to us along with the activity documentations (if it possible)

d. Other materials
We sent the eclipse data location for spesific area that received our educational packages. We also sent 5 eclipse glasses for each educational packages. These eclipse glasses can help them to observe TSE safely.
3. Result

In collaboration with Indonesian Postal Office (PT Pos Indonesia), our educational packages have reached 59 locations (schools) across 14 provinces in Indonesia within 2 months of delivering period (Jan-Feb 2016). We have successfully delivered all way through from the Western tip point of Indonesia in Muko-Muko district to East Indonesia in East Halmahera district, both ends of the North in Natuna Islands district and south of Indonesia, Kota Kupang. The number in the circle of figure 3 represents the number of packages that received in the locations. And we also have successfully sent 42 packages to 42 locations in totality path from all of the packages.

We have received 48 evaluations of 59 packages that we distributed or 81.3% from all packages. The evaluation papers sent back to us for our evaluation after the project. 45 evaluation papers have been received along with the activity documentations, 3 evaluations were carried out by phone and 11 evaluations can not sent back to us due to difficulties of transportation and communication access.

From the evaluation papers, the participants reached more than 3000 that involved socialization and eclipse observation arranged by our ambassadors. From the figure 3, the number on socialization is more than the number on the day of eclipse. The decrease number happens because of several factors which are bad weather in the day of eclipse particularly in West Indonesia, while the national holiday when eclipse day so many people choose to observe at their house, and because they come to several different schools, but when the observation day they just organize eclipse observation in one location. It was a well performed project that shown how engaging teacher to
Figure 5 derived from the evaluation paper that 96.5% of our ambassadors can implement the project. It is equal with 44 ambassadors had successfully implemented the eclipse project from 48 ambassadors who sent back the evaluation papers. This shows that our project was deliverable. There were 4 ambassadors that had not successfully conducted the eclipse observation. It is due to: bad weather in Borneo and Sumatra, parents prohibition in Musi Banyuasin district, and Muslim prayer in Muko-muko district.

**Figure 5. The deliverability of eclipse project for ambassadors**

4. **Summary and conclusions**

The conclusions reached in this project can be summarized as follows:

a. For some locations, educational packages program is the main program, even the only program, related TSE. Beyond TSE, the program could be an inspiration for teachers to teach or deliver about science in class.

b. From evaluation reports of Eclipse Ambassadors, we saw that the packages were very useful, easy to understand and implemented in their schools. Indeed, our program is an educational program that is new to be implemented along with a phenomenon that will happen. We also face the challenges of both technical and non-technical when prepare this program, such as making the module easy to read and understand, setting up the packages within a very short time, and find contact of Eclipse Ambassadors also ask them if they want to organize the program in their location or school.

**Figure 6. The activities in locations that received our packages.**

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