

# MATHARE AMBASSADORS OF ASTRONOMY

Narrative Report



Partners Poland Foundation & Education Effect Africa

## 1. PROJECT SUMMARY

## 2. DESCRIPTION OF IMPLEMENTED ACTIVITIES

### 2.1. Mathare Ambassadors of Astronomy Training of Trainers

Preparations for the Mathare Ambassadors Training of Trainers (recruitment of science teachers working in non-formal primary schools in Mathare and finalizing on the training agenda) started in March 2013.

Education Effect Africa and Partners Poland Foundation targeted the teachers that had been cooperating with the partnering organizations in other projects popularizing hands on science and astronomy. Project Coordinator Edward Ngumo and Project Leader Kasia Tekien used the following selection criteria:

- Demonstrating basic knowledge in astronomy and ICT skills;
- Declaration of full attendance during in the Mathare Ambassadors of Astronomy Training of Trainers and coaching sessions;
- Declaration of incorporating astronomy topics and practical activities into science lessons;
- Declaration of participation in Mathare Astronomy Festival.

In total 17 teachers were selected to participate in 5 day intense training on astronomy and facilitation which took place between 15<sup>th</sup> and 19<sup>th</sup> April 2013.

The training agenda was prepared by Susan Murabana and Kasia Tekień.

DAY I			
TIME	ACTIVITY	MATERIALS NEEDED	TRAINER
11.30 – 12.30	1. Introduction to the project 2. Integration of the participants	Power Point Presentation about the project Flipchart and markers	Kasia, Edward, Susana
12.30 – 13.30	Lunch		
13.30 – 14.45	Introduction to astronomy  1. What is astronomy, history of astronomy 2. Astronomy vs. Astrology 3. What is a star? Sun	Stellarium	Susana
14.45 – 15.15	Tea Break		
15.15 – 17.00	Our Solar System	Clay Paint Brushes	Susana

		Wires Water containers Wire cutter (yes)	
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**DAY II**

TIME	ACTIVITY	MATERIALS NEEDED	TRAINER
09.00 – 10.30	<ul style="list-style-type: none"> <li>Eclipse</li> <li>Planetarium Software</li> </ul>	Torch (sun) Globe (earth) Small white ball (moon) Stellarium and Celestia	Susana
10.30 – 11.00	Tea Break		
11.00 – 13.00	Art of oral presentation Research and preparation of 2 minute presentation in pairs Recording of the presentations Watching of the presentations and discussion	<ul style="list-style-type: none"> <li>Flipchart and markers</li> <li>Video Camera</li> <li>Laptop and projector</li> </ul>	Kasia
13.00 – 14.00	Lunch		
14.00 – 16.00	<ul style="list-style-type: none"> <li>Galaxies</li> <li>Gravity</li> <li>Newton's Laws of Motion</li> </ul> Tea Break in the meantime	<ul style="list-style-type: none"> <li>Ball (preferably football)</li> <li>Long string for tug of war</li> </ul>	Susana

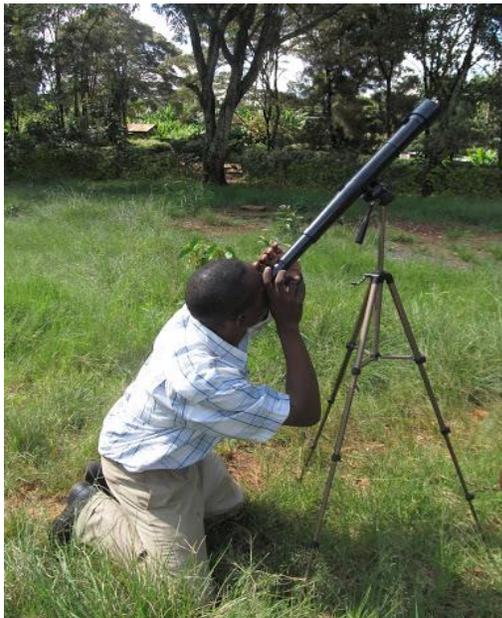
**DAY III**

TIME	ACTIVITY	MATERIALS NEEDED	TRAINER
09.00 – 10.30	SalsaJ (Image processing software)	Software Access to computers	Susana
10.30 – 11.00	Tea Break		
11.00 – 13.00	Assembly and disassembly of galileoscopes	Galileoscopes Manual Kitchen towels	Susana
13.00 – 14.00	Lunch		
14.00 – 16.00	Assembly and disassembly of galileoscopes Focusing Tea Break in the meantime	Galileoscopes Manual Kitchen towels	Susana

**DAY IV**

TIME	ACTIVITY	MATERIALS NEEDED	TRAINER
09.00 – 10.30	How to prepare effective Power Point Presentation?	Laptop and projector	Kasia
10.30 – 11.00	Tea Break		
11.00 – 12.30	Participants prepare Power point Presentation in pairs	Access to computers and Internet	Kasia and Susana

12.30 – 13.30	Lunch		
13.30 – 15.00	Participants present their presentations – feedback from trainers	Laptop and projector	Kasia and Susana
15.00 – 15.30	Tea Break		
15.30 – 16.30	Trainings of teachers – objectives and rules of involvement		Kasia and Edward
DAY V			
TIME	ACTIVITY	MATERIALS NEEDED	TRAINER
09.00 – 10.30	<ul style="list-style-type: none"> <li>Introduction to the Mathare Astronomy Exhibition</li> <li>Toys from trash - participants prepare astronomy toy from provided materials</li> </ul>		Kasia and Susana
10.30 – 11.00	Tea Break		
11.00 – 12.30	Toys from Trash continued		Kasia and Susana
12.30 – 13.30	Lunch		
13.30 – 15.00	<ul style="list-style-type: none"> <li>Q&amp;A</li> <li>Evaluation and closing of the training</li> </ul>		Susana, Kasia, Edward
15.00 – 15.30	Tea Break		



*Mathare Ambassaodrs of Astronomy – Training of Trainers*

All 17 participants completed the training and gave positive feedback in the evaluation questionnaires. The summary of the ToT evaluation is attached to this report, alongside the attendance sheet and photographs from the training.

## **2.2. Introduction of Astronomy to Mathare Schools**

The main objective of the introductory trainings was to provide teachers working in non-formal schools with Mathare with basic knowledge on astronomy, ideas of astronomy activities adjusted to the high poverty context of this informal settlements and educational resources: manual on astronomy and galileoscopes.

First step in the implementation of this activity was to recruit the trainers among the participants of the Mathare Ambassadors of Astronomy Training of Trainers. In order to assure commitment of the trainers and high quality of provided trainings we decided to announce a job opening for all those who wish to apply. The application of potential candidates was supposed to include: CV, letter of application, proposed training agenda and sample of power point presentation on one of the topics of the training (candidates were encouraged to use one of the power point presentations created during the ToT in April 2013. The applicants were invited for an interview with Susan Murabana, Kasia Tekien and Edward Ngumo. Behind the idea of the job was rather to probe the motivation of teachers and not to eliminate anyone. 13 trained teachers submitted their application and were invited for an interview during which they were couched and advised on how to perfect their training agendas and power point presentations. All applicants were selected to conduct the trainings and also to make follow ups with the participants. Further couching sessions with Susan Murabana. Kasia Tekień and Edward Ngumo took place in July. Trainers presented detailed programmes of the trainings, all presentations and received feedback from the project team. Mathare Ambassadors of Astronomy conducted in total 8 introductory trainings for 88 science teachers working in 38 non-formal primary schools in Mathare. The trainings were performed in pairs and took place in May, August and September. During the trainings the following topics were covered using interactive and hands on activities:

- What is astronomy? Astronomy vs. Astrology
- Constellations
- Solar system
- Stars and planets
- Stellarium
- Assembly and focusing of the galileoscope

The trainings received very positive feedback form the participants who requested more opportunities to develop their knowledge on astronomy and its practical and interesting delivery in the classroom. The summary of trainings' evaluation, attendance sheets and photographs are attached to this report.



*Introduction to Astronomy Training*

Apart from introductory trainings facilitated by Mathare Ambassadors of Astronomy, Education Effect Africa organized 8 additional trainings for primary school teachers on practical and experiential ways of delivering primary science curriculum with emphasis put on astronomy topics. The trainings were facilitated by Young Science Educators - group of science or science education university graduates who cooperate with Education Effect Africa in science programs and astronomy programs. In 8 trainings that took place in August 2013 99 teachers participated. Attendance sheets from these trainings are attached to this report.



*Practical approach to science and astronomy training*

### **2.3. Provision of Astronomy educational resources**

Each of 38 non-formal primary schools in Mathare received galileoscopes (10 schools received galileoscopes already in 2012 thanks to Polish Aid donation, the remaining 28 schools received galileoscopes during the introductory trainings organized in 2013 within IAU project). Each of 204 teachers trained within the framework of this project (ToT training, introductory trainings, training on science and astronomy facilitated by Young Science Educators) received a manual with basic theory on astronomy and suggestions of activities to be used in the classroom. The delivery acceptance acts documenting distribution of galileoscopes among the schools and the manual are attached to this report.

### **2.4. Astronomy classes for students**

Mathare Ambassadors of Astronomy and the teachers who had participated in introductory trainings conducted astronomy classes for 1617 children in Mathare. The attendance sheets are attached to this report.

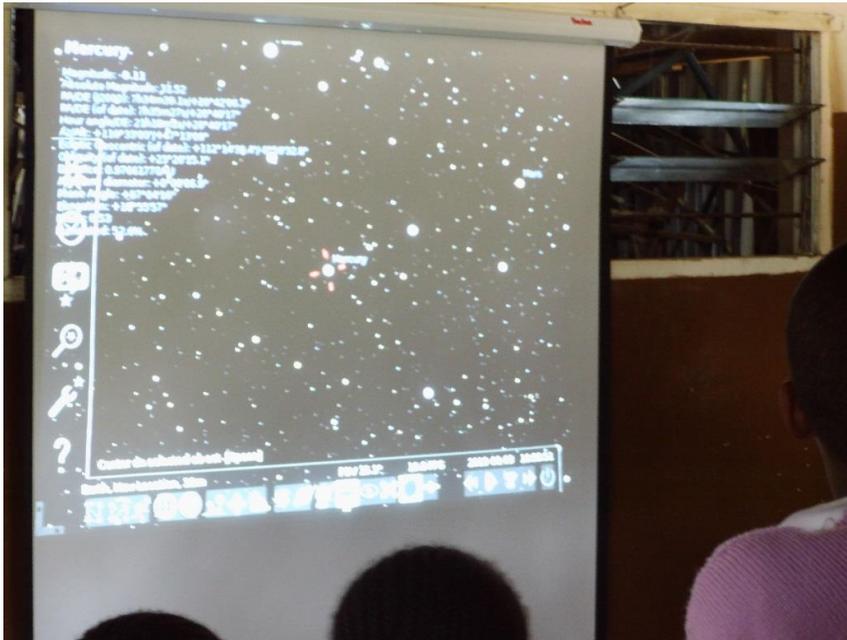
### **2.5. Mathare Astronomy Festival**



*Mathare Astronomy Festival*

Mathare Astronomy Festival was a grand finale of the project. Teachers and students had an opportunity to showcase their passion for Universe through display of astronomical artifact and activities. The Festival took place on 3<sup>rd</sup> August 2013 on the grounds of Mathare Special School. The event was open to the community of Mathare and all partner schools. 12 schools prepared exhibitions/activities during Mathare Astronomy Festival which covered the following topics:

- Astronomy and its history
- Constellations
- Solar system
- Moon and its phases
- Newton's Laws of Motion
- Stellarium (interactive workshop for students and teachers)
- Galileoscope (teachers and students had an opportunity to assemble and focus a telescope)



*Mathare Astronomy Festival*

In total approximately 46 astronomy artifacts (eg. umbrella planetarium, posters explaining different phases of the moon, models of planets and constellations etc.) were displayed. 259 teachers and students participated in the Mathare Astronomy Festival alongside approximately 500 members of the Mathare community. 10 Young Science Educators helped as volunteers with the logistics during the Festival.

We attach attendance sheets of teachers and students participating in the festival as well as photographs documenting the event. Education Effect Africa is planning to organize Astronomy Festivals every year. The funding for the edition in 2014 is already partly secured.



*Mathare Astronomy Festival*

### **3. OBJECTIVES AND DELIVERABLES OF THE PROJECT**

#### **Objectives**

- Through organization of astronomy trainings for teachers, workshops for students and distribution of related educational resources the project increased the awareness about the importance of astronomy in the community of Mathare slum in Nairobi and equipped teachers and students living in this settlement with basic knowledge of astronomy.
- Strong network and partnership around astronomy of science and social studies teachers working in Mathare was created. Thanks to participation in intense trainings and coaching sessions teachers became qualified astronomy trainers ready to spread their passion for the Universe among the students and other teachers.
- Non formal schools in Mathare were equipped with educational resources enabling them to deliver astronomy in the classroom: teachers working in 38 non formal primary schools in Mathare were equipped with a manual containing basic theoretical content on astronomy as well as suggestions of hands on activities, 24 schools received galileoscopes.

#### **Deliverables**

- 17 science teachers from non-formal primary schools in Mathare completed 5 day intense training on astronomy and facilitation skills that prepared them to promote hands on astronomy among their colleagues working in this informal settlement.

- 187 teachers from 38 non-formal primary schools were trained on basic astronomy, educational software and the use of galileoscopes.
- 1617 students from 38 non-formal primary schools in Mathare have basic knowledge on astronomy through participation on hands on workshops
- Educational software on astronomy (Stellarium, Celestia, SalsaJ) was installed in 20 laptops provided to teachers working in Mathare as well as 5 computer centres opened by Partners Poland and Education Effect Africa
- A manual with basic theoretical content on astronomy as well as suggestions of hands on activities was distributed among 204 primary school teachers in Mathare.
- 35 galileoscopes were distributed among 28 non-formal primary schools in Mathare.
- 12 schools prepared exhibitions during Mathare Astronomy Festival, in total approximately 46 astronomy artifacts were displayed.
- 259 teachers and students participated in the Mathare Astronomy Festival alongside approximately 500 members of the Mathare community.

#### **4. CHANGES IN PROJECT IMPLEMENTATION**

- Emphasis put on the use of low cost, readily available materials in teaching astronomy contributed to considerably big savings in the project's budget. This enabled us to upscale the activities of the project. We managed to organize 15 introductory trainings on astronomy and hands on science for 187 science teachers as compared to 6 trainings for 54 teachers proposed in the application.
- Organization of additional trainings for teachers and astronomy classes resulted in the longer period of project implementation – from four to six months.
- Due to unexpected changes in the academic calendar introduced by Ministry of Education in Kenya the project started in March 2013 instead of February.
- Instead of providing teachers with just a set of astronomy lesson plans, we created a manual including basic theory on astronomy in addition to ideas of interacting activities for primary school students.

#### **5. CHALLENGES FACED**

High taxes on imported galileoscopes to Kenya were the biggest challenge faced during the project implementation. Despite of numerous efforts to get the tax exemption from the Ministry of Education, the process took too long and was unsuccessful. We manage to cover unexpected payments through the project funds at the expense of the project leader's flight ticket to Kenya. The ticket was covered by the funding from Polish development assistance program – Polish Aid.

## **6. LESSONS LEARNED**

- When promoting astronomy in Kenya more emphasis should be put on linking astronomy topics with the primary science and social studies curricula. Our experience shows that many teachers are not aware that astronomy topics are present in the primary school syllabus. On top of that, astronomy content in Kenyan textbooks is often outdated and not correct.
- Although present in primary school curriculum, astronomy is not extensively covered in the primary schools in Kenya. Promoting of astronomy requires twofold approach – within the classroom teaching and learning as well as extracurricular activities e.g. astronomy school clubs.
- Evaluation of the project indicated that teachers seek more opportunities of professional development in the field of science and astronomy. They requested more regular meetings to exchange experiences, resources and methodologies.

## **7. SUGGESTIONS RECOMMENDATIONS TO OAD**

It would be great if OAD gave more expertise and content-related support to the projects teams. In Kenya we have few astronomers and not all of them are ready to support education in marginalized areas within the relatively small budget of IAU project. Trainings or e-learning astronomy course would be of great help to educators who already have educational background in science and wish to increase their competencies in astronomy.