

Project Title: Development of Open-Source Resources for Teaching Synthetic Biology in Low-Resource Settings.

Report Title: Implementation of Project in Ghana with Prac-Science Lab.

NB The original project proposal was submitted under the name of Kumasi Hive's Lab13 program. During the course of the project, Lab13 was renamed as Prac-Science Lab. Only the name changed.

Summary

A very short summary or abstract of your project and the main outcomes (200 word max)

The team developed lesson plans on the basics of Biology and Synthetic Biology that were adapted to the curriculum of Junior High Schools in Ghana by the project lead of Prac-Science Lab to ensure that they were suitable to be taught to High School children in low-resource settings. The lessons were trialed in Ghana with some of the Prac-Science Lab High School children from 18th-29th June, 2018. The lesson trials were done in 2 schools, Ejisu Roman Catholic Junior High School and Weweso Municipal Assembly Junior High School. The facilitators for the program were Alexis Moscopoulos and Harry Akligoh. Generally, they taught the same lesson concurrently to 2 different sets of children in each school for each session. Each lesson lasted for about 70 minutes and the **total number of students reached was 375**.

The main outcome was the broadening of the students' scope on Biology as some of the topics taught are not fully captured in their curriculum.

Report and outcomes

The report should be a short written description of what you accomplished and how, including an evaluation of where things didn't go to plan! Please include links to or copies of any outputs (papers, posters, data, code, hardware designs, photos, blogs, videos) - these do not need to be duplicated in the report. If you are attaching supplementary files, please refer to them in the text or add a list with a brief description at the end e.g. OpenPlantReport.pdf: Formatted version of full project report. FooSequences.fasta: Sequence file for DNA parts ACB123 and DEF345. Refer to the reporting guidelines for more information.

Over the six month period, six lesson plans were made which were taught to different groups of students over the trial period of two weeks. The lessons were:

1. An Introduction to Genes with the Bingo Traits Game
2. Living Cells and Microscopy with the WaterScope
3. Grow your own Microbes - Part1 (Setting up of the Experiment)
4. Grow your own Microbes - Part2 (Measuring of the outcome)
5. DNA extraction from Fruits
6. Introduction to Synthetic Biology

Generally, students understood the concepts of cells, DNA and traits and were excited to perform practical activities on them as their lessons at school are quite theoretical and lack practicals.

The lesson on Synthetic Biology however, was quite difficult for the students to grasp. The team concluded that it would be best to teach such a topic at the Senior High School level where it would be much appreciated as those students have more knowledge in Biology to understand it.

Personnel from Prac-Science Lab recently participated in the Biology Experience Day in Accra, Ghana to speak about the project and advise the audience on how the lessons can be used and adapted for future projects.

Photos: <https://drive.google.com/open?id=10lb3XSfflCNiS5d81jaggoV0kfBZ46zn>

Video: <https://drive.google.com/file/d/1Wv-LxwUZ-SH2e-BqjM6U2JJn6JMAAdHJF/view?usp=sharing>

Changes to team

Please include here a note if there have been any changes to the team so that we can make sure the information on the www.biomaker.org website is up to date. If additional team members have joined, please provide a photo together with their name, job role and affiliation.

Harry Akligoh, a Medical Laboratory Scientist and currently the Project Lead of Prac-Science Lab was added to the team. He helped to adapt the curriculum to make it suitable to be taught in low-resource settings and has worked on developing some of the lessons for the project, as well as delivering the first versions of the lessons and then contributing to adapting them based on feedback received.



Harry Akligoh

Project Lead of Prac-Science Lab

Kumasi Hive

Expenditure

A summary of how you have spent the £4000 budget so far.

Travel	1959.77
Input from Ghana Education Specialist	800.00
Parts & Materials for Testing	465.75
Film (to help disseminate results)	245.73
Other	389.70
 Total	 3860.96

(NB There are some remaining parts & materials expenses to be added to this, the full £4000 has been allocated)

Would you like to claim the £1,000 follow-on fund?

Yes, we would like to claim the £1,000 follow-on fund to be used as described below.

Follow on Plans

A short description of your plans for follow-on work with a breakdown of how you will spend the additional £1000 (if requested) and any remaining funding from the initial £4000. Please include timings as it is expected that all funds will be spent within six months of this report, after which point a brief report from the follow-on activities and return of the remaining funding will be requested.

We plan to finalise the lessons based on the experience of delivering them in Ghana and the feedback received, then publish and disseminate the full set of lessons in the following ways:

In Ghana:

- Continue to offer these lessons to children in the Kumasi area via the Prac-Science Lab program
- Disseminate the lessons to other organisations and networks involved in teaching practical science in Ghana, that we are already connected to (including GH Scientific, which plans to implement these lessons in their Bio Girls Day and NeuroCamp next year; Ghana STEM Network; PEN Practical Education Network; Exponential Education; and the Ghana Tech & Business Hubs Network).
- Trial the Synthetic Biology lessons with Senior High School level students

Worldwide:

- Publicise the availability of the lessons to the GOSH community – Harry Akligoh and Anna Lowe will attend GOSH 2018 and share information about this project.
- We are investigating appropriate places to post information about the lessons, such as by submitting them to wikiversity which is one of the highest Google results for Biology lessons
- All team members will share information with their personal networks and relevant new contacts, including on forthcoming trips to Ethiopia (Anna), and Kenya (Hans).

How we will spend the additional £1000:

Provision of 200 Foldscopes to allow teaching of the lessons in more schools in Ghana that do not have computers that allow waterscopes to be used (including shipping and import tax) £820

Additional materials costs £180

These will be spent in the period September – October 2018.