

## **Making Science Fun in the Classroom: Exposing young science students to science concepts**

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Despite the importance of science in societal developmental, in Africa cultural and religious misconceptions about science highly reduces the extent to which science is appreciated. In Nigeria, Africa's most populous nation, science literacy has been estimated as below 10%. In most schools, science teaching is too often based on outdated models that are long known to be ineffective. Additionally, science teachers rarely employ innovative teaching approaches, and, as a result, many students never develop a passion for science. These collectively contribute to low student enrolment in sciences and the generation of poorly qualified teachers and scientists, which additionally contributes to low science awareness and thus poor science policies.

To begin to tackle these problems, with support from the Biochemical Society UK, we previously organised science outreach activities in primary and secondary schools and a "Teach the Teachers Workshop" on Bioscience approaches in Northeastern Nigeria. The workshops targeted science teachers and students, and we received overwhelmingly positive feedback from these events. To continue to inspire students and teachers about science and to dispel science misconceptions, we organised a second hands-on outreach activity at Maude International School, Zaria, Nigeria, with further support from the Biochemical Society. This workshop explored the applications of some basic science experiments in the Nigerian classroom. To this end, at least ten (10) science teachers and about one hundred and fifty (150) senior secondary school students from Maude International School Zaria participated in a one-day hands-on science workshop on running simple and enjoyable experiments for a low-cost setting that can be adopted for the classroom.



Some participants with their density columns

To enable students to fully benefit from the workshop, the activity was run in three sessions; an introduction to basic science concepts and career in science, an experimental session covering chemical interactions, cells and system physiology, electrophysiology (EMG) and a “do it yourself session” where the students were divided into groups to carry out simple experiments, such as density columns, microscopy (Blood cells) and electromyogram. To enable better learning, session two and three were run concurrently.

The first session started with a talk on how to become a scientist and use simple equipment at one’s disposal to do science. This is the case in Africa, where people are left with no option but to improvise and do science with what is available. Young students need to realise science can still be done in a setting with poor science infrastructure and support.

The second session started with experiments on how to create density columns. After demonstrations, students were tasked with creating density columns using varying components (e.g. honey, oil, rubbing alcohol, water and plate wash). This greatly stimulated and made them engage in brainstorming sessions, especially on how according to the various densities, they could produce an ideal rainbow density tube (figures below).



Faculty creating a density column



Students creating a density column



Microscopy was also part of the experimental session, as many science teachers lack basic microscopy skills, such as how to prepare microscope slides. Consequently, many students end up knowing little about microscopy. Therefore, in this session, experiments on how to make slides for microscopy from blood cells were demonstrated to the teachers and students. The students were shown how to identify the cells on the slides, with or without methylene blue and the importance of methylene blue was explained to students. They were further shown various tissues (e.g. Testis and Spinal cord) under the microscope using already prepared slides. This greatly excited the students and introduced them to cell physiology.



Students viewing red blood cells

Backyard Brains Electromyography (EMG) Spikerboxes were used in the last session to introduce students to basic electrophysiology. As the experiment was designed to focus on muscle electrical activity, the participants first received a basic lecture on brain-muscle relationship, followed by demonstrations on how to measure muscle activity. This session tremendously stimulated both the students and the teachers, especially the realisation that fatigue could lower muscle potentials. Many students were thrilled to see how their muscle activity was recorded using the EMG.



EMG recordings

In the end, some of the apparatus for running simple and fun science experiments were donated to the school. They also received leaflets, pens, tags and other freebies on neurosciences and molecular sciences.



Reagent left over donation to the teachers for science teaching

To ascertain the impact of the event, we had an interactive session with the participants about what was learned during the day, such as how does density column work? What is EMG? Why do we use animals for experimental research? Their responses was superb, and it demonstrated that they actually understood what they have been taught. Generally, the event was successful. The school thanked the faculty and support given by the Biochemical Society. All the teachers agreed that they have learned something new that they can now employ in teaching science.