

## **It Can be Done: Innovative Biology Practical Activities that Learners Can Identify with**

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### **Abstract**

I taught biology for a long time in the usual way – textbook in hand and textbook prescribed activities were the norm. The result? Your guess is as good as mine. The students were bored and remained disinterested in the subject. I tried to come up with innovative activities – those that did not exist in biology textbooks and modified existing ones to make them learner-friendly. The results were amazing. My teaching has become easy and fun and my learners always look forward to that next lesson. I have purposed to continue exploring and coming up with more such activities. In this article, I share one such activity. I conclude the article with a call to teachers to try this strategy with their students.

### **Keywords**

*Innovative activities, Learner-friendly activities, Practical activities*

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### **Introduction**

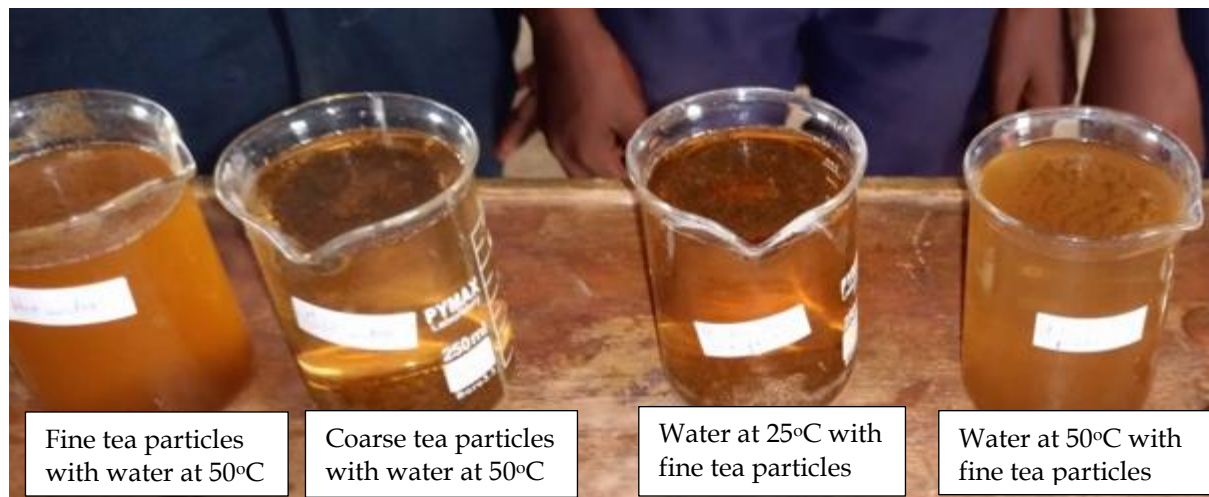
Biology like any other science should be taught through a practical approach. Teaching it otherwise erodes its scientific aspects and makes its content one that learners should partake of passively. I came to this realisation after many years of teaching biology where I disregarded the practical aspects of the subject. I was convinced beyond reasonable doubt that I was doing the right thing and always hid behind the excuse that certain concepts had no practical activities due to their abstract nature. The result of all these was a bored and disinterested group of students.

The turning point happened one day when the learners got fed up with my way of teaching and reported the matter to the principal. The principal summoned me to his office and asked me to change my way of teaching to ensure that students were engaged meaningfully in the teaching and learning process. This left me with no option but to reflect and reconsider my teaching approaches. From there henceforth I purposed to ensure that every lesson I taught, had practical activities conducted by the students. The following is a description of one of the activities I have used in teaching the concept of diffusion in biology.

### **The Concept of Diffusion**

Diffusion is one of the concepts in secondary school biology. Students encounter this concept for the first time in Form One and one of the key ideas students need to learn and understand involves factors that affect the rate of diffusion. Interestingly; many recommended course books for biology have activities for demonstrating diffusion but none for investigating the factors of the process. For example, in the *Secondary Biology book* (KLB, 2017), there are two confirmatory activities used to demonstrate diffusion. In one of them, potassium manganate (VII) is used where learners observe diffusion as the purple colour spreads in water making the water turn purple. In the second activity, a visking tubing is used with starch and iodine solution to show diffusion, based on the concept of test for starch (p. 39-41). Unfortunately, the starch test is covered in the topic 'Nutrition' which comes after Diffusion. This makes the activity inappropriate for the Form One level.

In teaching about factors that influence diffusion, I came up with an activity the learners could identify with easily. I chose tea leaves because students are familiar with it. In one of the lessons where we needed to investigate the effect of the size of molecules and temperature on diffusion, we used coarse and fine tea leaves for the size of molecules and hot and cold water for temperature respectively. When we experimented, the differences in containers for the same factor (i.e., size of molecules or temperature) were visible for the same amount of time. Figure 1 shows the set-up and outcome of the experiment.



**Figure 1: Set-up showing results of an investigating effect of size of molecules and temperature on diffusion**

The results of this activity were very encouraging not just for me but also for students. Indeed, one student remarked, “Wow! *Mwalimu*, you mean that the tea we make is by diffusion?!” The student referred to me as *Mwalimu* which is Kiswahili for a teacher. But more important, it was clear from this remark that the student was able to relate the ideas in class to the everyday experiences – tea making process at home. My journey of developing practical activities that could engage learners and make them experience science had begun and there was no turning back.

This incident took place when we were just about to undertake a mid-term examination. I decided to include in the examination one question on diffusion just to gauge the students’ understanding of the idea of diffusion. The question I gave to the students is shown in the box below.

*In an experiment to investigate factors that influence diffusion, a student prepared and used the following materials, coarse and fine crystals of copper sulphate, two 100ml beakers, a stopwatch, and water at room temperature.*

- What factor did the student intend to investigate? (1 mark)*
- What was the purpose of the stopwatch? (1 mark)*
- State and explain the results of the investigation for the factor named in (i) above (3 marks)*

The total mark for the question was 5. On grading the students’ responses, I noted that none of the students scored a zero on the question unlike other questions involving content I had taught using my usual method – textbook in hand and textbook prescribed activities. Table 1 shows the distribution of students’ scores on the diffusion question.

**Table 1: Distribution of Scores for the Question on Diffusion**

Marks	Frequency (N=38)	%
5	18	47.4
3-4	10	26.3
2	6	15.8
1	4	10.5
0	0	0.0

### **Conclusion**

It is true that most areas in our biology syllabus are abstract and lack activities to make them clear to the learners. Other concepts have suggested activities in the books but the activities are also abstract themselves or too involving and out of touch for the average learner. It is, therefore, necessary for the teacher to be innovative and come up with activities that would help them teach biology through a practical approach while helping the learners to learn with ease. This also requires the teacher to be keen in determining which available activities may not work well for his/her situation and modify them to suit his/her needs. This way, the teacher will be helping learners to be active constructors of their knowledge. The learners are likely to develop the requisite 21<sup>st</sup>-century skills that include critical thinking and problem-solving, as well as communication and collaboration as espoused in the Competency-based Curriculum (CBC). Certainly, it may not always be an easy task to develop innovative activities or modify existing ones to make them relatable to students' experiences but the outcome in the instructional practice outweigh the strain.

### **References**

KLB [Kenya Literature Bureau] (2017), *Secondary Biology Form One Students book* (5<sup>th</sup> ed.), KLB, Nairobi, Kenya

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