

# Using Simple Improvised Materials to Explain Some Concepts in Science

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**Abstract:** Since Teaching and Learning Resources play a very vital role in the teaching and learning process, there is the need to continuously develop them using easily accessible materials found in the environment. This will contribute to the current trends in Context-Based teaching in science in that learners are able to connect contexts to concepts and make meaning of what they learn.

The aim of this paper was to explore the use of improvised materials found in the environment to help explain the concepts of separation of two immiscible liquids and that of converting millimeters to liters. The plastic bottles, usually discarded materials were used for the simple processes. College of Education student-teachers who were taken through the processes were really appreciative and highly motivated to learn more. They were of the view that using low cost or discarded materials that they are familiar with makes the teaching and learning of science much easier and the learners are practically engaged throughout the process. They are also very excited that scientific concepts can be explained with very simple materials around them.

**Keywords:** Teaching and Learning Resources, improvised materials, science, environment.

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## 1. INTRODUCTION

From the constructivist point of view, individual learners construct their own meaning from the experiences they encounter. (Bennett, 2003 as stated in De Putter- Smith et al, 2013) and interacting with Teaching and learning materials now known as Teaching and learning resources is one of the experiences which play a vital role in aiding the learning process learners go through. Teaching and learning resources are used by teachers in the classroom or any learning environment to support learning (Lewis B., 2019) These resources include printed books, sample writings, videos, software, Apps, transparencies, things that can be manipulated etc.,( Lewis B., 2019, T –TEL, Professional Development Guide for Tutors Theme 5, 2016) With these materials, learners' interaction with one another, their attention and engagement is maintained their self-learning and transfer of learning are all enhanced.(Nyantwi, 2016) . With the importance of using teaching and learning resources in the classroom during instruction, it is not out of place that Taconis R. et al ( 2016) researched into teachers creating Context-Based learning environment in science. They were of the view that the “most important characteristic of the Context-Based environment is the use of realistic contexts as the beginning and anchor of learning science,” These contexts link scientific concepts to everyday life and also brings out the relevance of what is learnt. Meanwhile the definition of ‘context’ also includes “circumstances that form the setting for an idea and in terms of which it can be fully understood.” And it must be the kind that learners are familiar with to enhance the learning of concepts. Since the context of teaching also include anything physical in the surrounding environment, that influence teaching, then it means that teaching and learning resources are part of the physical environment like the physical classroom. In view of this, this paper introduces two simple concepts that can be explained using simple items in the environment that are easily accessible.

## 2. SEPARATION OF WATER FROM OIL (TWO IMMISCIBLE LIQUIDS)

Separation of Mixtures is a topic in Chemistry that has a lot of practical applications for us.

Preparation of the local gin from (e.g., fermented palm wine ) by used of distillation, tailors using magnets to separate their pins from other items, separation of salt from sand by the use of filtration and evaporation, separating solid insoluble particles from water by the use of filtration.

With the separation of water from oil, learners can easily demonstrate it using an improvised material( empty plastic bottles) that are readily available in their environment at a very low cost in the absence of a separating funnel.

### Method

- i) The local separating funnel is made by making a small hole in the cap using a hot nail.
- ii) The beaker is made by cutting into half another plastic bottle horizontally. The lower part is used as a beaker.
- iii) Water and oil are poured into the plastic bottle and the cap with the hole is used close it by turning to make sure it is tightly closed.
- iv) If the learners decide to shake the mixture of the two immiscible liquids then, it should be allowed some few seconds to found out if they would ever mix.



**Fig. 1. Items needed to set up the improvised separating funnel**



**Fig 2. Water flows through the hole to separate it from the oil**

The plastic bottle containing both water and oil which are two immiscible liquids with different densities, can be separated by inverting the bottle with the water being denser than that of the oil goes to the bottom of the plastic bottle and comes out first through the hole.. The bottle is squeezed until all the water pours into the beaker thereby separating the oil from the water. When there are still tiny droplets of water in the oil after the process, the oil can be heated for the water to evaporate.

### 3. CONVERSION FROM MILLILITERS ( ML) TO LITERS ( L) USING PLASTIC BOTTLES.

In Chemistry, under the mole concept, in dealing with the concentration of a solution in mole per decimeter cube (  $\text{mol/dm}^3$  ) the volume of the solution has to be converted into  $\text{dm}^3$  of liter. In the basic school, pupils also learn about conversions in mathematics in which converting from mL and L is part. For learners to appreciate the concept of changing mL to L, they should be able to interact with some simple materials before tackling the calculation aspect



Fig. 3 Empty plastic bottles for converting milliliters to Litres

#### Method

- 1) Empty bottles of different sizes and capacities such as 500ml, 0.5L, 750ml, 0.75L, 1L are collected.
- 2) Those bottles that look similar has one filled with water and poured into the other. Example, a 500mL bottle is filled with water and the water is poured into a 0.5L bottle.
- 3) When the water fills the 0.5L bottle, then it means that 500ml is equivalent to 0.5L. The same thing is done for 750ml and 0.75L capacity bottles.
- 4) Looking at the trend, it means that 330ml can be converted to 0.33L.
- 5) With the information gathered by the learners on the conversion using the bottles, they can now do the calculation for the conversion from ml to L with so much motivation.
- 6) Before the exercise, learners should visit a shop and gauge the mark for each bottled water since some plastic bottles can be longer or bigger than others of the same capacity.

### 4. DISCUSSIONS

From the Pre-service teachers' comments given after they had gone through the process of separating oil from water and converting mL to L using plastic bottles, it came to light that using the improvised teaching and learning resources around them would make scientific concepts become easy to understand and the students would become creative and innovative when it comes to the teaching and learning of science ( Ndiokubwayo et al, 2018). They also made mention of the fact that they have had the opportunity to understand the concepts much better and they would use this strategy to teach others and make learning science fun using the simple materials.

### 5. CONCLUSION

Since providing varieties of teaching and learning resources, especially those made from local materials, for science lessons, help the teacher to explain concepts to learners easily without having to provide very long explanations the process of separating oil from water and that of the conversion from mL to L using plastic bottles goes a long way to contribute to the teaching and learning of science.

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