IMPROVISATION OF INSTRUCTIONAL MATERIALS FOR THE TEACHING OF BIOLOGY/AN IMPORTANT INNOVATION IN NIGERIAN EDUCATIONAL SYSTEM

By

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Abstract

Instructional materials are materials used to impact knowledge into the mind of learners. This material can either be visual or audio-visual. Improvised instructional materials are those teaching and learning materials produced using locally available resources with the help of experts. The paper visualized the importance of improvised instructional material for the teaching of Biology at all levels of education, highlighted some of the improviseable alternatives to standard equipment, pointed out the role of students, school authority and government in this important educational innovation so as to achieve the stated educational goals.

Innovation in education is the act of producing new things that are important and that will enhance teaching and learning effectively. Improvisation is the act of making science teaching and leaning materials from locally available resources (Olarewaju, 1994). Eniaiyieju, (1985) view improvisation as the "art of substituting for the real thing". Another important view about improvisation is by Alonge (1983) who sees improvisation as not only the production of import-substitution of materials or real thing, rather it is an activity in promoting curiosity, alertness, endurance and perseverance, all of which are indispensable to science, scientists and learning as a whole. Johnson (1994), defines improvisation as the process of productive thinking that can generate tangible outcome or product.

Similarly, for those concerned with applied fields, improvisive productivity means the quality of output in the form of socially and technologically recognized products. However, in science it implies another kind of quantity output as a result of production. The products in improvisation must be less in cost when they are compared with the commercially constructed ones. Improvisation could be modeling of an original object, or copying the construction of an object or equipment to a high degree of accuracy (Lowe, 1983).
Learning is a permanent change in behaviours. Learning is assumed to have taken place if a change is confirmed. This could be through the new activity the learner is able to perform. Instructional material simply means the teaching device that helps the teacher to clarify, establish, correlate and coordinate various concepts, interpretations and applications. (Balogun, 1982). As a proverb says "A picture is worth a thousand words".

Instructional materials are learning resources that help in teaching and learning processes, which help the teacher to deliver his lesson during the course of his teaching. They can also be referred to as relevant and cheaply selected tools or equipment that are usually incorporated in the teaching/learning process in order to boost or enhance effective teaching and learning activities in the classroom or any other environment where formal educational system takes place. National Teachers Institute (NTI, 2007).

In a nut shell, improvised instructional materials are teaching materials design and produce from the available local materials in order to enhance effective teaching and learning in schools.

Use of Improvised Instructional Materials in Teaching Biology

Improvised instructional material is a method or way of minimizing loss of equipment and materials and an inexpensive method of widening the scope of inquiry. Improvised instructional material is a meaningful attempt towards finding suitable substitute or alternative to conventional science materials. Due to state of our nation's economy, Teachers, students, school authorities and communities should engage in improvising instructional materials in order to:

- Develop in students and teachers adequate skill for improvisation. This will generate interest and motivation for indigenous technology.
- Have practical and physical links between science and theory
- Eradicate the menace of lack of or inadequate instructional materials for science
- Sensitize both students and teachers that alternatives for some of the conventional science teaching materials are possible.
- Achieve the set out educational objectives through the use of improvised instructional materials in teaching.

Biology teachers should find out those materials that could be improvised without;

- Much cost
- Many complications in handling
- And losing the originality of the concepts to be taught
Improvised Alternatives for Teaching Biology as Against Standard Equipment

<table>
<thead>
<tr>
<th>S/No</th>
<th>Standard Equipment</th>
<th>Improviseable alternative Items</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tropod stand</td>
<td>Unused stove frame</td>
<td>For supporting during heating</td>
</tr>
<tr>
<td>2</td>
<td>Bunsen burner</td>
<td>Kerosene stove</td>
<td>Source of heat</td>
</tr>
<tr>
<td>3</td>
<td>Funnel</td>
<td>Plastic bottle open at base</td>
<td>For transferring liquid</td>
</tr>
<tr>
<td>4</td>
<td>Plant press</td>
<td>Wood/plywood, khaki cloth, shoe buckles.</td>
<td>For drawing moisture or water away from plants</td>
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<tr>
<td>5</td>
<td>D.N.A model</td>
<td>Stripped cardboard</td>
<td>For illustration in genetic</td>
</tr>
<tr>
<td>6</td>
<td>Round bottom flask</td>
<td>Electric bulbs</td>
<td>For measuring liquid volume</td>
</tr>
<tr>
<td>7</td>
<td>Measuring cylinder</td>
<td>Graduated feeding bottle</td>
<td>For measuring liquid volume</td>
</tr>
<tr>
<td>8</td>
<td>indicators</td>
<td>Flower extract (after conducting chemical analysis)</td>
<td>As indicator for acid and base</td>
</tr>
<tr>
<td>9</td>
<td>Indicator catching net</td>
<td>Mosquito net wooden ring/iron, thread and needle</td>
<td>For collecting of insects or catching insects</td>
</tr>
<tr>
<td>10</td>
<td>Test-tube holder</td>
<td>Cloths hanger (peg)</td>
<td>For holding test-tube during experiments</td>
</tr>
<tr>
<td>11</td>
<td>Pooter</td>
<td>Vaseline bottle, white electronic pack, biro case or straws</td>
<td>For collecting small insects</td>
</tr>
<tr>
<td>12</td>
<td>Spatula</td>
<td>Cut handle of table spoon</td>
<td>For putting chemicals into test-tube</td>
</tr>
<tr>
<td>13</td>
<td>Watch-glasses</td>
<td>Cover of Vaseline bottle</td>
<td>For stocking and putting specimens</td>
</tr>
<tr>
<td>14</td>
<td>Aspirator</td>
<td>Transparent drug bottle horse, white electric pack, straw and mosquito net</td>
<td>For respiration experiments for diffusion</td>
</tr>
</tbody>
</table>
Improvised instructional materials make teaching biological concepts more interesting to both students and teachers in the classroom, improvised materials are usually simple and may not have perfect finishing, because they are made from local raw resources that are acceptable to students. Improvised instructional materials help Biology and other science students to realize that science has to do with ordinary things and will possibly motivate them to carry out experiments and learning activities themselves using such improvised materials, Johnson (2000).

Zarewa (1991) as sited by Johnson (2000), noted that no matter how rich and generous educational authorities might be they are not always in position to provide their schools with all the materials they may need. Therefore, the schools, students and teachers might be obliged to make the most of what they can get or construct from locally available raw materials.

For instance certain things like herbarium press, aquarium tank, and wooden splint can easily be improvised by competent science teachers instead of waiting for supplies by the educational authorities.

**Role of Students in Improvisation**

According to Zarewa, (1991), improvisation helps to change students attitudes towards science. This portrays that if we can encourage students to partake in the improvisation exercise, they stand a better chance of having a positive

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<tbody>
<tr>
<td>15</td>
<td>Diffusion chamber</td>
<td>Syringe, straw, rubber balloon, transparent bottle, white electronic pack, syringe</td>
<td>For diffusion experiments and rate of diffusion</td>
</tr>
<tr>
<td>16</td>
<td>Enzymatic reaction chamber</td>
<td>Market/tempo case, white electronic pack, syringe</td>
<td>For experiments on enzymes</td>
</tr>
<tr>
<td>17</td>
<td>Reptile-hook</td>
<td>Metal, iron, eyed-screw, washer-ring bolt and nut, spring</td>
<td>Catching reptiles for studies in biology topics</td>
</tr>
<tr>
<td>18</td>
<td>Ball globe</td>
<td>Wembley ball or round calabash, support stand iron handle of bucket, market paint, brush, biro</td>
<td>For teaching topics in ecology</td>
</tr>
<tr>
<td>19</td>
<td>Photometer</td>
<td>Graduated wood, cardboard, tube or biro cases, wood stand, wide mouthed bottle, electronic pack, hose.</td>
<td>For measuring the arte or speed of plant transpiration</td>
</tr>
<tr>
<td>20</td>
<td>Clinostat</td>
<td>Can of Niddo, plank wood, flat wood support and handle</td>
<td>For demonstrating direction of plant growth in response to light</td>
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</tbody>
</table>
attitudinal change towards sciences. Therefore, students should be engaged in the collection, assembling, fixing, e.t.c of some basic and non-injurious items for improvisation. This will relate the abstracts concept, theories, laws e.t.c. of Biology to the real life situations.

**Role of School Authorities in Improvisation**
The fundamental role to be played by the school authorities are:
- To assist the teachers financially in the production of improvised materials.
- Solicit the support of parents to assist to procure improvised materials or materials meant for improvisation.
- Render motivations to deserving teachers
- Provide storage facilities for the improvised materials in order to maximize usage within their life span.
- Solicit the support of experts within the community to assist in the improvisation exercise

**Role of Government in Improvisation**
State and Federal Governments have important roles to play in the improvisation exercise at all levels of the educational system. Among are the following

- Improvisation should be made a core course in all fields of sciences by curriculum developers (Olarewaju, 1994).
- Government can provide fund/cash to motivate teachers and book authors on improvisation
- Government can mount public enlightenment campaign on the importance of improvisation to the society as an integral part of technological development.

A test was conducted using National Certificate in Education (NCE) students of Biology Department Federal College of Education Kano, Two groups of 15 students each, were taught a topic in Biology (Plant physiology) on the rate of transpiration in plants. One group was taught using improvised photometer while the control group was taught without basic improvised instructional materials, and a test was administered. It was observed that 98% of the students taught with improvised instruments/materials passed the test, while only 15% of the of the control experiment group passed. Other researches carried out by different educationists such as that conducted by Zarewa (2005), revealed that students taught with improvised materials performed better than those taught without such materials in teaching some components of physics.

Due to alarming rate of admission into our secondary as well as tertiary institutions and the nation's economy, and the importance of Biology to humanity, the task of improvisation becomes an important one due to the following reasons; it

- Relates concept, law and theories in Biology
Pristine

- Minimizes abstraction and monotony in handling Biology topics (more especially those with physiology).
- Provides to the student a first hand experience in the use of the improvised materials.
- Saves cost from the government side

According to Johnson (2004), provided that "teachers should not take advantage of inadequate facilities and lack of equipment as an excuse to resort to both poor teaching and non teaching, but instead they should learn to improvise instructional materials.

Conclusion

Improvisation tends to remove abstraction(s) in learning theories because the products of improvisation are tangible, handy and concrete. Improvised instructional materials must be very safe to use during demonstrations and experiments. It must be hazard free or danger free. The ^ product must not be capable of inflicting injuries on the user or person operating it. Improvised instructional materials should be used effectively in teaching Biology and other science subjects, at all levels of education.

References


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