

REINFORCING SCIENCE TEACHERS IMPROVISATION SKILLS FOR EFFECTIVE TECHNOLOGICAL DEVELOPMENT

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Abstract

Improvisation of school science equipment cannot be divorced from the teaching and learning of science at all levels of the Nigerian education, if the national scientific and technological developmental stride is to become a reality. The paper examines improvisation, vis-à-vis skills required for improvisation and the basic tools that will make improvisation of school science equipment easy and possible for a science teacher, the paper also makes suggestions to stakeholders on how to achieve the goal of scientific and technological development through the acquisition of skill on improvisation by science teachers.

Improvisation according to Olarewaju (1994) is the making of science teaching and learning materials from locally available resources. Ogunbiyi, Okebukola and Fatunwase in Johnson (2000) were of the opinion that improvisation is the “art of substituting for the real thing”. Alonge (1983) in Johnson (2000) perceived improvisation not only as the production of import substitution of materials real things, but rather he sees improvisation as an activity aimed at promoting curiosity, creativity, alertness, endurance and perseverance, all of which are indispensable to science, scientists and learning as a whole. No meaningful development world over today is divorced from scientific and technological embracement.

Science Education in Nigeria

The nations of the world today are divided into developed and underdeveloped depending on the nation's level of embracement of science and the application of technological skills in their developmental strides. It is no gainsaying that science and technology is the bedrock of National development. Nigeria as a nation has made several policies and pronouncements in a bid to meet up with global challenges and current economic realities aimed at repositioning her science and technological education to a vantage position. Admissions into Universities in Nigeria according to the National Policy on Education (1998) is 60 – 40% in favour of the sciences in conventional universities, while in Universities of Technology, it is 70-30% in favour of the sciences. The polytechnic education is not left out; it is aimed at producing individuals with hands-on skills for the technological development of the nation. The Colleges of Education are equally not left out too, emphasis is on science education. Infact, it is expected of an adequately trained science teacher to be able to arouse students interest in science. He/She is trained to be an individual that can make his students/pupils love him first then love sciences, that is why he/she is being exposed to a long period of training so as to inculcate in him/her the professional qualities that would revolutionalize the way of doing science in Nigeria and ultimately equip the science teacher with the necessary skills required for scientific and technological development of Nigeria.

That Nigeria is experiencing serious economic and developmental challenges today cannot be divorced from the incompetency or negligence on the part of the science teachers. How else do one explain the fact that a child in JSS I already perceives Biology, Chemistry and Physics to be difficult subjects and as such, would not offer sciences in SSS I when the child has never offered these subjects before. At the primary and junior secondary school level, the child is expected to offer Basic Science and Technology at these levels. These subjects are structured in a way that the child is expected at the end of the day to be exposed to scientific methods and principles, it is the duty of a well trained professional science teacher at this level to utilize locally available resources in the child's immediate environment in the teaching and learning of science, the science teacher is also expected to make the child understand that he is offering integrated science does not imply that we have more than one science and at the end of the day, some quite useful scientific skills required for further studies in sciences would have been inculcated into the child and consequently preparing the child for scientific and technological development of himself, his immediate environment and by implication the nation as a whole.

Science Teaching and the Senior Secondary School Science Teacher

Science Teachers at the senior secondary school level are the worst culprits in terms of non-implementation of Governments science and technological policies and programmes. Most secondary school science teachers are still in the habit of loading

students with theoretical facts with very little or no practical experiences. No wonder, the students cannot see any practical life application of the scientific rigour they are being exposed to; consequently, the students resort to rote learning and mere regurgitation of facts during exams.

Government and other stakeholders have also been implicated as the cause of the setback in the nation's scientific and technological developmental strides. This is clearly evident in situations where individuals without scientific background, orientation or interest are placed at the helm of affairs in the implementation of science and technological educational policies,, no wonder the release of fund for most science oriented projects are very difficult and when they manage to release such funds a science teacher would not be involved in the procurement of laboratory equipment, science teaching aids or even the construction of science laboratories. According to Oni (2010) most of the federal government budgets always allocate a "lion's share to education". But experience has shown that not too long the lion returns and take back it share, Oni further stress that for posterity sake, lion share should be given to lion while educations share should be given to education to ensure the attainment of the desired scientific and technological transformation.

In view of the aforementioned and other myriads of problems bedeviling Nigerian science education, there is an urgent need for science teachers especially, to embrace improvisationso as to acquire the basic skills required for the improvisation of school science equipment so that Nigeria's dead science education can rise back to life.

Improvisation is of great significance because the materials required are readily available and are at a far lower price, it also helps to indigenize the teaching and learning of sciences, thus making science real to the learner. Johnson (2000) stresses that there is an urgent need to remove obsolete theoretical learning experiences from our school curriculum and replace them with current learning experiences that haveachievable application so that we can move faster than before on to progress through science and technology. The following basic improvisation skills as advocated by Murray (1957), Olarewaju(1991) and Johnson (1994) if religiously acquired by the science teachers, would help to ameliorate the deplorable condition of science and technological education in Nigeria.

1. Elementary Woodwork
2. Elementary Metal work
3. Soldering in Electronics
4. Iron Bending
5. Glass work and cutting
6. Glass blowing and drawing glass
7. Cork boring

Academic Scholarship

8. Painting
9. Electronic technology
10. Lettering and fine arts/drawing
11. Calligraphy
12. Glueing
13. Sewing (tailoring)
14. Cutting botanical sections
15. Knitting
16. Basic shoe making
17. Elementary carpentry
18. Radionic mechanic work
19. General motor mechanic work
20. Plumbing service
21. Brick-laying
22. Laboratory science and technology
23. Watch and clock repairing
24. Clay and ceramic modeling
25. Wood carving and designing
26. Plastic moulding work
27. Refrigerator mechanic work
28. Blacksmithing work
29. Battery recharging and recoiling
30. Motor and engine recoiling
31. Photography
32. Decoration work

The above skills though important, are difficult to come by in an average science teacher, but the services of artisans in the local community can be sought for, to enable both the teacher and students acquire these skills and be able to train others.

However, beautiful as the above mentioned skills seem, Johnson (2000) advocated that the following basic hand tools are required to put these skills into proper use

1. Jackplane: for smoothing of rough wood surfaces
2. Screw driver: for setting and fastening of screws
3. Tenon-saw: for making tenon
4. Hammer: for driving in and removing nails from wood.
5. Pincers/Pinches/Punches: for removing various kinds of nail from different parts of wood.
6. Cross Cut-Saw: for cutting across grain of woods
7. Bradawl: for boring devices
8. Pliers: for gripping securely, riveting and fastening wire on objects
9. Mallet: for driving chisel into wood

10. Try-Square/T-Square: for checking right angles and making lines on wood.
11. Square Awl: for making and boring wood and metal
12. Wood saw: for cutting wood
13. Wret saw: for making curved cut in wood.
14. Hach saw: for cutting thin wood like plywood.
15. Ratchet brace and Bit: for boring holes in wood.
16. Table vice: for securing work to table.
17. F-Cramp or G-Cramp: a holding device to working surfaces
18. File: for smoothening wood, plastics and metals and for widening holes on object.
19. Marking Knife: for marking dimensions or measurements on wood.
20. Roller: for painting finished products.
21. Paint-Brush: for painting finished products.
22. Pair of scissors: for cutting fabrics like cardboard and cloth.
23. Thimble: as a protective device.
24. Tailor's tape: for measuring fabrics.
25. Smooth plane: for smoothening wood for fine work.
26. Steel tape: as a measuring device.
27. Sand paper: for smoothening surface of wood and metals.
28. Rotary glass cutter: for cutting glass.
29. Soldering iron: for joining wires and plastics together.
30. Chisel: for chopping wood and for making holes into woods.
31. Coping saw/Metal cutter: for cutting iron and small wood.
32. Hand plane: for effective finest smoothening of wood.
33. Wire cutter/Strippers: for cutting wire and removing the back of wire.
34. Spanners: for fastening bolts and nuts.
35. Syringe: for injecting animals for experiments and for demonstrative experiment.
36. Can-Opener: for opening cans/tins

The above mentioned basic hand tools need to be properly kept, greased or oiled as the case may be to ensure their longevity, also appropriate tools should be used for the appropriate job to reduce incidence of damage to tools.

Conclusion

If Nigeria's desire to be among the top 20 most developed economies by 2020 is going to be realized, science teachers at all levels should be encouraged and mobilized to acquire skills in improvisation and put same to use for effective scientific and technological transformation of the Nigerian economy.

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