

Application of Chemistry Practical as a Tool for Self-Reliance and Economic Development Using Chalk Production

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Abstract: *The rate at which the unemployment issue is going now in the country has become a cankerworm that is affecting the development and the growth of the nation mostly in Nigeria today; so there is the need to look for an alternative ways or methods to reduce the rate of unemployment as a way of transformation that would bring about self-reliance and economic development. This paper looked at practical application of chemistry concept through chalk production. Twenty schools were randomly selected that consist of 10 primary and 10 secondary schools. In each school ten teacher were chosen making a total population of two hundred respondents and each school were giving one packet of chalk equivalent to five pieces per each teacher to teach in the classroom within Lafiagi metropolis in Edu Local Government of Kwara state, Nigeria. To compare laboratory produce chalk with commercially produced one, the results from the respondents were collected and analyzed using frequency and simple percentage. From the findings it was observed that laboratory produce chalk can compete favorably with commercially produce chalk both in texture, size, and durability. It was suggested that the mold should be properly cleaned, must be tightened to avoid splitting of chalk mixture, appropriate measurement of materials and addition of kerosene as a lubricant. The recommendations include making practical compulsory in chemistry teaching, introduction of chalk production into school curriculum of tertiary institutions, giving adequate required facility and encourage students for skills acquisition.*

Key Words: *Development, Economic growth, Practical and Chalk*

I. Introduction

The day to day production of graduates in our tertiary institutions i.e Universities, Monotechnics, Polytechnics and college of Education is increasing yearly and most of these graduates knowledge are theoretically based. This made a lot of them to be so dependent on government jobs instead of becoming self-dependent. If countries in West Africa are to excel in this scientific age, it is imperative for them to have adequate science education at secondary school level that will equip the rising generation to have an adequate appreciation of scientific principles and application [6].

The best way of giving quality education is by making individuals to be developed and self-reliance through acquisition of knowledge be it formal or informal. Education generally is regarded as a necessary and essential requirement for national development which plays a central role in the socio-economic and technological advancement and it is critical to self-sustaining and self-generation process of positive transformation of our modern society. Education is a tool for the integration of individuals into the society so that he/she can achieve self-realization, develop national consciousness, promote unity and strive for socio, economic, scientific, cultural and technological progress [2].

To achieve an effective and productive education both the teachers and the students need to be well trained in some scientific concepts. Due to the abstract nature of some scientific concepts, most especially in Chemistry as a course or program. Some concepts that look difficult can through practical be demonstrated and made real and understandable. Such concepts include the practical production of some materials in the laboratory which can compete favorably with some commercially produced ones and serve almost the same purpose. Quick production of school chalk in the laboratory by both the students and teachers of Chemistry will go a long way to serve many purposes. It is along this continuum that this paper posits to choose practical production of school chalk for self-reliance and economic development.

Development does not take place in a vacuum but it shows indicators in form advancement such as educational, technology, and economic status of a nation but the way people sees development and the extent to which development means is quite different. Development is seen as a process by which man overall personality is enhanced and their societal development, this means that development is a collective personality of the society [14]. Looking at this definition it's observed that the world development is in related to technology, economic and geographical advancement.

Human development concept was first laid out by Amartya Sen, and Nobel laureate in 1998, which was expanded upon by Martha Nussbaum, Sabina Alkire, Ingrid Robeyns, and others that human development encompasses more than just the rise or fall of national income [8]. Development is thus about expanding the choices people have, to lead lives that they value, and improving the human condition so that people have the

chance to lead full lives. Thus, human development is about much more than economic growth, which is only a means of enlarging people's choices. Human development disperses the concentration of the distribution of goods and services that underprivileged people need and center its ideas on human decisions. By investing in people, we enable growth and we empower people to pursue many different life paths, thus developing human capabilities.

Economic development generally refers to the sustained, concerted actions of policy makers and communities that promote the standard of living and economic health of a specific area. Economic development can also be referred to as the quantitative and qualitative changes in the economy. Such actions can involve multiple areas including development of human capital, critical infrastructure, regional competitiveness, environmental sustainability, social inclusion, health, safety, literacy, and other initiatives [12]. Human Development Reports [10] Economic development differs from economic growth. Whereas economic development is a policy intervention endeavor with aims of economic and social well-being of people. Economic growth is a phenomenon of market productivity and rise in GDP. Consequently, as economist Amartya Sen points out: "economic growth is one aspect of the process of economic development.

The use of practical approach in the teaching and learning of sciences is inseparable from theoretical aspect of teaching science as this will enable the students to acquire practical skills which are also needed in learning of scientific concepts most especially in Chemistry application. Chemistry is viewed as a subject that allows and teaches human how they can manipulate the resources around them to a meaningful material as a way of satisfying of their needs through practical application.

Practical acquisition could be defined as capable of being turned to use which is quite different from ideal or theoretical approaches. Practical is the act of practice or a way capable of applying knowledge to some useful end. Most of these practical experiments can be done in the laboratory [13]. [1], sees laboratory as a facility that provides controlled conditions in which scientific researches, experiments, and measurement may be performed. The word laboratory is also used for certain other facilities where the processes or equipment used are similar to those in scientific laboratories.

Science practical exercises in the laboratory in school have been most exciting for some students. In fact, some of them look forward to days when they have science practical and could display their skills because of the complexity and abstract nature of the subject that some students find it difficult to understand and grasp the concepts. Without manipulation, student might end up memorizing the concepts without understanding. That is why Nigerian science students are called "re-callers" rather than "appliers" [15].

II. Statement of the Problem

The joblessness of the youth had become a serious threat to the government because the available jobs cannot cater for the Nigerian youth populace, this was a driving force that compelled the Government in conjunction with the Federal Ministry of Education to look for a way by which some of the scientific principles can be translated to practical and functional ones, so as to assist the students to be self-dependent. In this respect, some scientific practical that can assist in such areas had been introduced into secondary school curriculum through entrepreneurial studies which include chalk production, soap making, perfume production etc.

Concepts of Chalk and the Classroom

In any classroom teaching, chalk plays a significant role and cannot therefore be separated from teaching in the classroom setting at any school level. Chalk has been used for drawing since pre-historic time, when, according to archaeologists, it helped to create some of the earliest cave drawings. Later, artists of different countries and styles used chalk mainly for sketches, and some such drawings, protected with shellac or a similar substance, have survived. Although many people worldwide might consider chalk to be found mainly in England this is far from the case and many of the names associated with the Chalk originated from mainland Europe; Such as the Maastrichtian Stage, named after Maastricht in SE Holland. Indeed, Chalk facies occur over much of NW Europe (inclusive the North sea) and are known as far as Austin in Texas [7].

[16] Observed that chalk was first formed into sticks for the convenience of artists. The method was to grind natural chalk to a fine powder, then add water, clay as a binder, and various dry colors. The resultant putty was then rolled into cylinders and dried. Although impurities produce natural chalk in many colors, when artists made their own chalk they usually add pigments to render these colors more vivid. Carbon, for example, was used to enhance black, and ferric oxide (Fe_2O_3) created a more vivid red. Chalk production is the art or method of producing a chalk material for sale or for personal use. It is no doubt that school chalk production is very lucrative in Nigeria because of the ever increasing number of public and private schools nationwide. [6] opined that chalk is a white soft limestone used for burning into lime and for writing and drawing.

This present study posit to investigate the relationship between theoretical framework on chalk production and acquisition of practical skills involved in the production of school chalk and compare the

produced chalk with commercial/ industrial chalk with a view to bringing the understanding of scientific concepts and principle into reality for better use in the classroom for effective teaching and learning of the sciences.

[11] Due to ever increasing rate in students' enrolment in school, it is observed that the available schools cannot be enough to take care of the population so there is need for construction of more classrooms to meet the targeted populations. This often led to a correspondent increase in the demand for chalk. As a result of this increase in the demand the process involved in the manufacturing of industrial/commercial chalk can be complemented by small scale chalk production in the laboratory; the materials and equipment needed are also readily available.

Instrumentation to the study

The questionnaire consisted of about thirteen questions, divided into three parts; the first part was on quality of laboratory produced chalk compared with the commercially produced chalk. The second part is on determination of the effectiveness in the use of laboratory produced chalk, while the third part was testing of quality of produced chalk.

The collected data were analyzed using simple percentages, based on the structured responses using Strongly Agree (SA), Agree (A), Strongly Disagree (SDA) and Disagree (DA) and presented in tables respectively.

Sample and sapling techniques

Twenty schools were randomly selected within Lafiagi metropolis in Edu Local Government area of Kwara State, ten from UBE (Junior Secondary Schools) and ten from SSS (Senior Secondary Schools). In each school ten teachers were also picked making a total population of two hundred respondents. A school will be giving one packet of chalk that contain fifty pieces of chalk were individual teachers will take five pieces and they were expected to use it in their classroom teaching in an attempt to answer the questionnaire giving to them.

Research Questions

1. Is there any comparability between laboratory produced and commercially produced chalk?
2. Are there observable differences between the use of laboratory and commercially produced chalk?
3. Does laboratory produced chalk have the same value added quality as the commercially produced chalk?

III. Results

Table 1

Showing compatibility between laboratory and commercially produced chalk

| Questions | Total Agree | No | % Agree | Total Disagree | No | % Disagree |
|--|--------------------|-----------|----------------|-----------------------|-----------|-------------------|
| The laboratory produced chalk looks the same as commercially produced chalk. | 142 | | 71 | 58 | | 29 |
| The size of the laboratory made chalk is the same as the commercially produced school chalk. | 126 | | 63 | 74 | | 37 |
| The mixture of particles in the laboratory produced chalk is similar to commercially produced chalk. | 161 | | 80.5 | 39 | | 19.5 |
| The texture of laboratory chalk is similar to commercially produced one. | 144 | | 72 | 56 | | 18 |

The result from table 1 on laboratory produced chalk revealed that the compatibility between the laboratory produced and commercially produce chalk are the same, that if the same process, equipment and other characteristics used are followed closely to those used for commercially school chalk production, it will show close relationship in quality between laboratory and commercially produced chalk. This finding is in line with those of [3] who similarly observed that if the process, measurement and details of production are strictly followed, the result of any experimental process would be strikingly similar in quality in most cases. The laboratory produced chalk showed no observable differences in the quality for the two sets of chalks [9]. From the findings, it can be deduced that the commercially produced chalk can be produced in the laboratory using the same process and procedure and give the same quality.

Table 2
Showing Comparison between the effective use of both laboratory and commercially produced chalk in the classroom.

| Questions | Total No of agree | % Agree | Total No of disagree | % Disagree |
|--|-------------------|---------|----------------------|------------|
| The laboratory produced chalk compared favorably in use with the commercially produced chalk. | 154 | 77 | 46 | 23 |
| The laboratory produced chalk serve similar value as the commercially produced chalk in the classroom. | 161 | 80.5 | 39 | 19.5 |
| The brittleness of laboratory produced chalk compared favorably with the commercially produced chalk. | 145 | 72.5 | 55 | 27.5 |
| A stick of laboratory produced chalk last in writing as the commercially produced chalk. | 127 | 63.5 | 73 | 36.5 |
| Laboratory produce chalk last in storage as the commercially produced chalk. | 147 | 73.5 | 53 | 26.5 |

In table 2 on the observable difference(s) in the use of both laboratory and commercially produced chalk, result of this research showed no observable difference in the use of both laboratory and commercially produced chalks as they are found to be effective instructional tools in the classroom. [4] on effective instructional use of chalk reported that chalk did not become standard in schoolrooms until the nineteenth century, when class sizes began to increase and teachers needed a convenient way of conveying information to many students at one time. Not only did instructors use large blackboards, but students also worked with individual chalkboards, complete with chalk sticks and a sponge or cloth to use as an eraser. In line with those of [13] who reported that some teachers promote use of chalk on a carpet as an interactive teaching tool, for transferring drawings and tracing of lines.

Table 3
Showing the testing for the quality of laboratory produced chalk.

| Questions/ Responses | Total No agree | % Agree | Total No Disagree | % Disagree |
|--|----------------|---------|-------------------|------------|
| The laboratory produced chalk produce less dust as the commercially produce One. | 157 | 78.5 | 43 | 21.5 |
| The laboratory produced chalk writes consistently as the commercially produced school chalk. | 147 | 73.5 | 53 | 26.5 |
| Both white and coloured laboratory produced and commercially produced chalks are vision enhancing. | 163 | 81.5 | 37 | 18.5 |
| Both white and the coloured laboratory produced chalk can be recommended for futures use as the commercially produced chalk. | 154 | 77 | 46 | 23 |

Result of table 3 on quality assessment of laboratory produced chalk is also in line with those of [5] who similarly observed that any chalk that is intended for the classroom must undergo stringent tests on quality in order to perform well and be labeled nontoxic. All incoming materials are tested for purity before being used. After the chalk has been made into sticks, one stick from each batch is selected for tests. The density and break strength and size of the sample stick are determined. The sample is then used to write with, and the quality of the mark is studied. Erasability is also studied. First, the chalk mark is erased using a dry duster, and the quality of erasure is examined. Then, the chalkboard is washed, and again the amount of chalk left on the board is examined. As regard the size of the two sets of chalk, both are 7.7cm long and 1cm in diameter showing closeness in size and texture. Still on quality, properties and dustiness are equally examined. The result revealed that both are less dusty in classroom use. This result is corroborated by the work of [9] who also observed that commercially produced chalks are less dusty when used.

IV. Conclusion

The outcry for self-empowerment and self-development for our graduates to be self-employed is loud and clear and it is in the realization of this that the government has made entrepreneurship education an integral part of tertiary institutions curriculum. Skill acquisition in the sciences can be achieved through practical oriented programs in our science laboratories. Such practical skills such as those involved in Chemistry laboratory production of school chalk can be taught and learned by the students who could through application of such knowledge can practice after graduation and become self-employed. It is in this light that this research was designed and carried out to critically in a scientific way outline processes involved in the practical production of chalk, the assessment and usage of laboratory produced chalk in the classroom setting and

compared its quality with commercially produced chalk. This is a way of contributing to knowledge and ways of making theoretical aspect of chalk production practical.

V. Recommendations

1. The government should intensify efforts to introduce and make it compulsory to have practical skill acquisition programs such as chalk production into the school curriculum of tertiary institutions.
2. The government should adequately fund such programs by providing required facilities.
3. The parents should in conjunction with the government encourage their wards in the acquisition of skills for self-empowerment.
4. The Colleges should make adequate and appreciate the use of skill acquisition facilities that may be provided by government and the parents.
5. It is also recommended that the students are also advised to use the advantage of the facilities and equipment provided.
6. The equipment's should be properly cleaned; the mould should be tightened to avoid splitting of chalk mixture.
7. Appropriate measurement of materials and addition of kerosene and cooking oil as a lubricant is equally important.

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