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Enhancing the Attainment of Self-Reliance in Pre-Service Chemistry Students Through Proper Inculcation of Process Skills: Strategies and Constrains.

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ABSTRACT

This paper looked at the strategies and constrains of enhancing the attainment of self-reliance in pre-service chemistry students through proper inculcation of process skills. The study was carried out in three educational zones (Awka, Ogidi and Onitsha) of Anambra State. The sample for the study was one hundred and twenty-eight (128) chemistry teachers drawn from both public and private schools in the study zones. Questionnaire was used as instrument for data collection constructed by the researchers. The instrument was validated by experts in the departments of Chemistry and Measurement and evaluation. Reliability of the instrument was sought and found at 0.89 coefficient. Two research questions guided the work. Data obtained were analyzed using means and standard deviations for the research questions. Result obtained revealed those strategies accepted by the chemistry teachers for the inculcation of skills and also the result proved the possible constrains that may hinder the usage of these strategies. Recommendations were made based on the findings.

Keywords: Chemistry, students, Awka, Ogidi, Onitsha, Anambra

INTRODUCTION

Worldwide education is considered as an important tool for attaining national goals. Education provides learners with skills needed for survival. It is as a result of the important of education that the Federal Government of Nigeria introduced the Universal Basic Education whereby education is free and compulsory for all citizenry at all levels of education (FRN, 2004)[1].

Today's world is filled with changes and challenges in the area of science, technology and skill acquisition. Odesiri and Agadaighi (2008)[2], maintained that economic crisis and rate of unemployment in Nigeria today are thus emerging highly due to the fact that the leaders have non-challant attitude towards achieving the objectives of science and technology stipulated in the National policy on Education by non-provision of adequate infrastructural facilities needed.

The policy goals include

- Production of scientist for national development and service studies in technology.

- Production of knowledge and understanding of the complexity of the physical world (FRN, 2004)[1].

In the same view, Uzoechi (2007)[3], posited that the problems in many third world countries especially in Africa emanated substantially from lack of concern over the scientific and technological development of their citizenry. He continued to say that in such countries, majority of their populace are scientifically illiterate and lack desired skills and competence to be self-sustained and contribute to society. To achieve sustainability in development, a sound knowledge of science and technology are needed to address critical issues such as economic transformation and globalization, reduction of poverty, hunger and diseases and sustainable use of natural resources [2]. Hence, Kemp (2001)[4], observed that without scientific literacy and skill acquisition among a sizable proportion of the society, the introduction of modern technology which is believed to be one major new “magic” for achieving modernization will be made exceedingly “difficult”. This is why Oladimi (2002)[5] and Okolocha (2006)[6] agreed that the trend now in society shows that the level of one’s education does not have a significant effect on one’s growth, rather the effect is more pronounced on the level of skills possessed and ability to apply the skills in the real world of life or work. Little wonder Mba (2007)[7], pointed out that science education and its application to real life problems is one of the most powerful instruments for enabling nation face these new challenges. This is because he continued to say that science is an intellectual search and practical oriented subject involving inquiry and employment of powerful method that will encourage basic process skills in students for scientific explanations which is necessary in this current race of technological and industrial development.

Skill development has been man’s means of transformation from the earliest time especially in the medieval time, when apprenticeship became a normal method of entry to a craft guild. Foods and goods manufacturing emphasizes on industrial skills. In order to boost these skills in the Nigerian youths, Federal Government established in 1986, the National Directorate of Employment that has the following youth-friendly and inclined programmes.

- i. Vocational skill Development/Fashion designing, furniture, carpentry, metal work, iron bending etc,
- ii. Special public work programme
- iii. Small scale enterprise programme

Chemistry is one of the most functional and activity or practical oriented subjects of the natural sciences and it forms the bases for technology in the modern world [6]. It is a discipline with high standard of conduct and must be amplified by chemistry teachers in a

way that students cannot fail to observe and adopt. The complexity of tasks is such that one can no longer easily acquire the necessary skills without some formal instruction, strategy that are student-centered in order to drive home what students learnt. Skill acquisition of our students must take proper route. It has to stem from simple to complex. The overall goal is to ensure the development of survival skills by learners to live effectively within the global community. Knowledge, skills and attitudinal requirements are addressed as follows. These skills are Observing, Classifying, Measuring, Communicating, Predicting, Inferring, Collecting, Recording, Interpreting data etc. For these scientific process skills to be effectively inculcated in our youth at school; there is need for a shift from a teacher-centered pedagogy to effectors, skill-based-learners-centered pedagogy. The problem is that the older methods and approaches could not develop in the learner;

- a. Critical thinking needed
- b. Inquiring oriented-mind expected
- c. Explorative skills required for skilled jobs
- d. Change in behavior for self-reliant and national development (Udogu, 2009)[8]

Science is dynamic in nature and new or innovative methods and strategies are continually being evolved to facilitate its teaching and learning. This information-skill-packed-learner-centered pedagogy in contrast to the traditional teacher-centered pedagogy gives the learner the liberty to choose what to learn and when to learn it. There is need to ascertain the strategies to be adapted in this new method and adduce possible constrains that may hinder it application in the classroom.

PURPOSE OF THE STUDY

Specifically, this work was meant to

1. Ascertain the strategies for the inculcation of process skills in pre-service chemistry teacher for their attainment of self-reliance.
2. Ascertain the possible constrains that may hinder the proper inculcation of process skills in pre-service chemistry students.

RESEARCH QUESTIONS

The following research questions guided this work;

1. What are the chemistry teachers' perceptions on the strategies for the inculcation of process skills in students?
2. What are the possible constrains that may hinder effective inculcation of these skills to students?

METHODOLOGY

The study design was a descriptive survey type.

The area of the study was Onitsha, Ogidi and Awka Educational zones of Anambra state. The population comprises of all chemistry teachers in all the secondary schools both private and public. Using proportionate stratified random sampling techniques, ten public and ten private schools were selected from each zone. All the chemistry teachers in the sample schools constitute the sample for the study. This is made up of ninety-two (92) teachers from public schools and Thirty-six (36) teachers from private schools given a total of one hundred and twenty-eight (128) chemistry teachers. The instrument for data collection was structured questionnaire, that was validated by experts in the field and reliability co-efficient sought using cronbach alpha technique after pilot study and found to be 0.89. The instrument was of two sections A and B, Section A sought information on respondents' bio-data while Section B which is of two categories sought information on the strategies to be adopted in the inculcation of the process skills and possible constrains to it implementation in the classroom level. The instrument was based on a 4-rating scale of Strongly Agree SA-4, Agree A-3, Disagree D-2 and Strongly Disagree SD-1. Instrument was distributed to the respondents and collected by the researchers and 96% recovery was made. Mean and Standard deviation were used to analyze research questions. Mean rating of 2.50 and above was accepted as indicative of agreement while 2.49 and below indicated disagreement.

RESULTS

Table 2: Mean ratings and standard deviation of chemistry teachers perception on the strategies for the inculcation of process skills in chemistry students

Science Process Skills				
Skill	Students' Activity	Mean	SD	Decision
Observing	Allow students time to use their sense to determine properties of objects or events	2.61	1.11	Agreed
Classifying	Allow students to group objects or events according to their properties.	3.69	1.21	Agreed
Measuring using number	Allow students to describe quantitatively using appropriate units to record data.	2.77	0.93	Agreed
communicating	Use written words or verbally, graphs, tables, diagrams etc to present information.	3.19	0.74	Agreed
Inferring	Draw conclusion about events or objects based on observations, cause and effects.	2.98	2.00	Agreed
Predicting	Allow students to anticipate consequences of a new or changed situation using past experience and observation.	3.13	0.84	Agreed
Collecting, Recording and Interpreting Data	Allow students to manipulate data by self or others in order to give meaningful information.	3.29	0.27	Agreed
Defining operations	Allow students time to define terms based on their experience and observations	2.87	0.79	Agreed
Making Hypothesis	Allow them to propose on explanations based on experiences.	2.91	1.34	Agreed
experimenting	Allow them to investigate, manipulate materials and equipment to test hypothesis to determine results	2.53	0.92	Agreed

(Valentine 2000)

From the table above, it was very clear that all the strategies enumerated are good and accepted by teachers since their rating are quite above 2.50.

Table 3: Mean ratings of chemistry teachers perception on the possible constrains towards the inculcation of process skill in chemistry students.

S/N	Possible Constrains	Mean	SD	Decision
1	Teachers are yet to understand the philosophy and objective of chemistry curriculum.	2.41	0.73	Disagree
2	Teachers are to be capacity built.	2.29	1.31	Disagree
3	Quality of curriculum delivery	2.31	1.77	Disagree
4	Problem of provision of adequate instructional material	3.11	0.84	Agreed
5	Lack of right equipment for practical works	3.91	0.87	Agreed
6	Poor environment	2.39	0.91	Disagree
7	Problem of large class size	3.65	1.73	Agreed
8	Identification of new areas of emphasis	2.11	0.84	Disagree
9	Lack of adequate infrastructural facilities.	3.47	0.88	Agreed
10	Lack of fund to maintain sponsor or chemistry teachers training	3.86	0.93	Agreed
11	Monitoring ability of the Government for proper records and implementation.	2.28	1.43	Disagree

Key = A = Agreed

DA= Disagree

From the table above and teacher rating value of the items, it is very clear that item 4, 5, 7, 9 and 10 were not problem towards implementation of the new method, while others are seen as major constrain by teachers.

DISCUSSION

The findings obtained from the study reveals that teachers of chemistry are in support of all the suggested strategies for the application of this new emerging pedagogical method. This is to say that, they are all aware that chemistry teaching in schools should be practical oriented and should be done using learners-centered activity based method which this new method is all about. This finding actually agreed with what Mba (2007)[7], posited that science at all levels require a powerful process skill inducing method that will encourage inquiry spirit in the learner.

The findings also revealed that they disagreed with the use of traditional pedagogical method which is purely teacher-centered and has nothing to offer in terms of process skills acquisition. This is in line with what Udogu (2008) [8],observed that the old method of teaching science is not powerful enough to inculcate; creatical theory, creative spirit, inquiring mind, explorative skills needed in this modern world of science and technological growth.

From the findings, teachers were of the opinion that adequate infrastructural facilities, material and equipment are lacking which are enough to hinder proper

application of this new method. This again tallied with what [6] who maintained that government is non-challant toward achieving the objectives of science education in Nigeria by non-provision of adequate infrastructural facilities needed.

CONCLUSION

In conclusion therefore, it was gathered that chemistry teachers are ready to apply the new emerging pedagogy if everything needed for it to take off are put in place. Government should try as much as possible to provide the needed infrastructural facilities, as it is believed that the employment and application of this new strategies in the teaching of chemistry in schools, will no doubt go a long way to make our youths problem solvers, innovators, inventors, self-reliant, logical thinkers and technologically literate at their early stage of education.

RECOMMENDATIONS

The following recommendation were made on the findings

- ❖ Government should recognize the importance of developing science skills in students early enough.
- ❖ Recognition should be followed by adequate supply of needed infrastructures.
- ❖ Teachers should provide learners with hand-on, mind-on activities such as experiments, project works, observation, problem-solving activities and debts to arrive at solutions.
- ❖ Create laboratory as classroom workspace for groups to work and share resources.
- ❖ Show learners how to formulate hypothesis, conduct experiments to test them.

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