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A Study of the Cognitive Potentials in Basic Science and Technology of Nigerian Adults with Varying Socio-Economic Status

UNE ÉTUDE SUR LES POTENTIELS COGNITIFS DANS LES SCIENCES ET TECHNOLOGIE FONDAMENTALES DES ADULTES NIGÉRIENS AUX STATUTX SOCIO-ÉCONOMIQUES DIVERS

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Abstract: In this study, efforts have been made to investigate the level of awareness in science and technology among selected adults in Lagos metropolis. A total of one hundred and twenty-five adults, seventy-eight males and forty-seven females randomly selected, formed the population sample. One composite questionnaire containing a hundred questions on different science areas vis-à-vis: health science, local food science, management and control of home hazards, gadgetry science, environmental science and basic facts in science and technology was the major instrument for collection of raw data. A supplementary interview schedule was drawn up based on the questionnaire and used for clarification of opinions. Both instruments were validated by experts. The data obtained were analyzed using ranking, percentage, correlation and chi-square computations. The major findings were that: all adults, irrespective of their socio-economic class need one form of science and technology or the other for self-realization; the nature of adult science and technology need for self-awareness is not related to one's occupation and socio-economic status; there is a general desirability among adults of all classes to learn those aspects of science and technology they are deficient in; the majority of adults showed preference for distance education, that is learning through television, radio and newspapers to a more effective teacher-learner interaction or face-to-face learning process. A clarion call has therefore been made for the commencement of adult science and technology education in an informal setting, with the existing adult education centres expanded to accommodate this all important scheme for national development.
Key words: Cognitive potentials; Socio-economic status; Nigerian adults; Science; Technology; Population sample

Résumé: Dans cette étude, des efforts ont été faits pour enquêter sur le niveau de la sensibilisation en science et technologie chez les adultes sélectionnés dans la métropole de Lagos. Une somme de 125 adultes, 78 hommes et 47 femmes sélectionnées au hasard, ont formé l'échantillon de population de cette étude. Un questionnaire contenant une centaine de questions sur des différents domaines scientifiques, y compris la science de la santé, la science de l'alimentation locale, la gestion et le contrôle des dangers à la maison, la science des gadgets, la science de l'environnement et des faits de base en sciences et technologie ont été l'instrument majeur pour collectionner des données de première main. Un calendrier d'entrevue supplémentaire a été établi sur la base du questionnaire et utilisé pour la clarification des opinions. Ces deux instruments ont été validés par des experts. Les données obtenues ont été analysées en utilisant le classement, le pourcentage, la corrélation et le chi-carré calculs. Les conclusions principales étaient les suivantes: tous les adultes, indépendamment de leur classe socio-économique, ont besoin d'une forme de science et technologie pour la réalisation de soi; le besoin de conscience de soi des adultes n'est pas lié à sa profession ou son statut socio-économique; il y a un désir général chez les adultes de toutes les classes pour apprendre des aspects de la science et technologie dans lesquels ils sont déficients; la majorité des adultes a montré leur préférence pour l'enseignement à distance, c'est-à-dire l'apprentissage à travers la télévision, la radio et les journaux, à une interaction plus efficace de l'enseignant-apprenant ou un processus d'apprentissage face-à-face. Un appel a donc été fait pour le

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commencement de l'éducation en science et technologie des adultes dans un cadre informel, avec les centres existants d'éducation des adultes agrandis afin d'accueillir ce dispositif important pour le développement national.

Mots clés: Potentiels cognitifs; Statutx socio-économiques; Adultes nigériens; Sciences; Technologie; L'échantillon de population

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1. BACKGROUND OF THE STUDY

The Christian missionaries who brought education to Nigeria were primarily concerned with literacy – making people able to read and write for the purpose of disseminating Christianity and adequate interaction to enable the colonial masters exploit us with our consent and approval. The establishment of the Hope Waddell Institute at Calabar in 1895 and later Yaba Higher College in 1934 were reluctant measures to correct the absence of technology in the colonial educational system.

But before the advent of western education, the Nigerian adult has perfected some skill which assisted him in obtaining food and exploring his environment. Such skills as black-smithing, carving, dyeing, pottery etc readily come to mind. Another excellent display of technology was the use of dazzling head-lamps by night-hunters for more rewarding hunting. If one argues that the pre-colonial technology originated and perfected by Nigerians was nothing to match the systematized and more complex modern technology of today, it is even more reasonable to believe that the colonial educational system prevented its development to modern standard. And so, the new 6-3-3-4 education scheme, with emphasis on "education for self-reliance and skills' acquisition" is a welcome corrective measure and a step in the right direction to technological development.

2. PURPOSE OF THE STUDY

This study was aimed at finding out:

The level of awareness in basic science and technology among adults of varying socio-economic status, with the view to estimating their scientific potentials, and understanding of their environment.

The desirability or otherwise, of these categories of adults to participate in any programme on adult science and technology.

The acceptable and suitable medium of communicating such a programme to interested participants.

3. RESEARCH QUESTIONS

This study seeks to answer the following questions:

What is the general level of awareness in science and technology among adults of various socio-economic statuses?

Do adults of high socio-economic status posses more knowledge and skills in science and technology respectively than adults of middle and low classes?

Is there any relationship between one's occupation and socio-economic class and the nature of science and technology one desires to learn?

Would adults prefer distance learning to face-to-face learning in an adult science and technology prgramme?

4. HYPOTHESES

Given the above problems, the following null hypotheses emerged:

One's need for science and technology is not closely related to one's occupation.

Adults of upper socio-economic class are not better aware in science and technology than adults of middle and low classes.

Majority of adults are not desirous of a programme on science and technology for self-awareness.

Adults generally do not prefer distance larning to face-to-face learning in a programme of adult science and technology.

5. OPERATIONAL DEFINITION OF TERMS

Cognitive Potential: Level of understanding or possession of knowledge in science and technology.

Technology: Skills or techniques and systematic application of knowledge to solve human problems.

Socio-economic Status: Economic level of respondents measured by salary scale and societal expectations.

6. RELATED LITERATURE

Science as a body of knowledge, systematically tested and generally acceptable ought to stress process (skills) rather than product (Bassir, 1981:186). By this assertion, Bassir has further justified the contention of Gaskell (1983:33), that "Advance in technology – which lays emphasis on scientific process – very often brings about a rescheduling of human values, influence economic conditions, forment changes in professional education, and open new possibilities for scientific achievement". In the main, technology, which primarily is the application of science should be geared towards solving human problems.

The multi-dimensional nature of adult education today has given rise to a more embracing multi-disciplinary approach to studies in the discipline. Consequently, the growth of adult education as a discipline must as of necessity include programmes in science and technology that are aimed at rectifying deficiencies in human potentials and capabilities to cope with problems encountered in the process of living. There is therefore the urgent need to explore all aspects of science and technology vis-à-vis science of management of home hazards, gadgetry science, environmental science and basic scientific facts in order to evolve curricula in these areas for adults of different interests and socio-economic groups. Bown (1980) recognizes this fact when she recommended that "science should be popularized among adults in Nigeria". Ogbe & Uche (1985) further lay credence to this growing awareness when they presented that "It has become imperative for those who cater for the educational needs of adults to go all out to identify which areas of science and technology adults require for their day to day lives and activities".

Although adult education has contributed immensely towards the improvement of agricultural skills in the developing countries through the extension services scheme, the impact and reward remains minimal. A lot more needs to be done and Williams (1981:199) agrees entirely when he asserts that:

> Because of the important role of agriculture in the economic development of many countries, and the narrow bases of education and widespread illiteracy in these countries and the rapid rate of change in technology of modernizing agriculture, there is a strong case for the establishment of an effective adult education system for these developing countries.

But adult education has more roles to play in the undiscovered area of science and technology for self-realization. In the final analysis, it is obvious that Nigerian adults are ascientific. How low their levels of scientific awareness, is the purpose of this study.

7. METHODOLOGY

This study was conducted round Lagos metropolis with one hundred and twenty-five people, randomly selected from ten different occupational groups. Among them were forty-seven females and seventy-eight males, all averaged 28.5 years. Based on their salary level, the respondents were categorized into three.

Table 1: Occupation, Gender and Socio-Economic Class of Sample Population

	OCCUPATION GROUP	GENDER		SOCIO-ECONOMIC LEVEL		
		Male	**Female**	**Upper**	**Middle**	**Low**
A	Army	6	4	2	5	3
B	Bank Workers	8	3	4	4	3
C	Civil Servant	8	5	2	4	7
D	Junior Workers	7	4	0	0	11
E	Lecturers	10	2	10	2	0
F	Nurses	1	10	2	7	0
G	Primary School Teachers	9	6	3	6	6
H	Private Practitioners	8	2	7	2	1
I	Secondary School Teachers	10	7	2	14	1
J	Post-graduate Students	11	4	2	8	5
	∑	78	47	34	52	39

A composite questionnaire of one hundred and one questions, and an interview schedule containing fifty questions were the instruments used for data collection. The instruments covered aspects of:

Environmental science,

Management of home hazards,

Effective use of local food,

Community health science,

Gadgetry science, and,

Basic scientific facts.

The approach adopted in the questioning was first to test the cognitive ability of the responding adult and then determine his desirability to learn those elements in science and technology he lacks. Data obtained were grouped, ranked and analyzed as shown eventually.

8. DATA ANALYSIS

Analysis carried out were strictly to verify the acceptability of the null hypotheses earlier stated.

8.1 Hypothesis One

Occupational background and cognitive potential of adults

First, the null hypothesis which assumed that one's need for science and technology is not closely related to one's occupation and socio-economic data on positive responses which favour the occupational background, and invariably the economic status of the respondents were groups and mean scores calculated. The same was done for non-occupation favoured positive responses as shown in table 2.

Table 2: Relationship Between Occupation/Socio-Economic Status of Respondent and Level of Cognitive Ability

Occupational/Socio-economic Group (Pop)	Occupation Favoured Positive Responses ($\bar{x}$ Score)	Non-occupation Favoured Positive Responses ($\bar{y}$ Score)
A – 10	18	12
B – 11	20	18
C – 13	16	21
D – 11	25	24
E – 12	19	10
F – 11	28	19
G – 15	20	24
H – 10	26	23
I – 17	30	27
J – 15	17	21
(n = 125)	$\sum(\bar{x}) = 219$	$\sum(\bar{y}) = 199$

r = 0.68

Using Spearman Rank Correlation Coefficient (r) the value of 0.68 was obtained at 0.05 significant level. Therefore the null hypothesis was accepted. The point established by this testing is that adults might posses knowledge and skills relevant to their respective occupations, but they also need to acquire potentials in other areas of life for the purpose of being fully functional (Rogers, 1961). In the final analysis, adults of all categories and occupations need one form of science and technology or the other.

8.2 Hypothesis Two

Level of technological awareness among adults

The second hypothesis makes a comparative claim on the level of technological awareness between two categories of adults: - high socio-economic group on one hand, and adults of middle and low socio-economic classes on the other. Scores of these categories of adults were arranged as indexed on table 3.

Table 3: Level of Technological Awareness between Adults of High Socio-Economic Class and Adults of Middle and Low Classes

PERCENTAGE SCORES	SOCIO-ECONOMIC GROUP		TOTAL
	Upper (Pop = 34)	**Middle & Low (Pop = 91)**	
Correct	52.7	45.9	97.6
Wrong	47.3	55.1	102.4
Total	**100**	**100**	**200**

The null hypothesis, that adults of upper socio-economic class are not more aware in science and technology than adults of middle and low classes was tested using 2 x 2 contingency table at 0.05 significant level and chi-square value of 4.179 obtained as against the critical value of 3.84. The null hypothesis was therefore rejected.

The evidence provided ample impetus to conclude that the higher the socio-economic class, the greater the level of awareness in science and technology. While we cannot disprove this result, it is pertinent to remark that adults of upper socio-economic status still need some aspects of science and technology like others in middle and low classes.

8.3 Hypothesis Three

Desirability of science and technology for adults

It is important to ascertain what adults require for science and technology awareness, but more important is the need to determine their willingness or desirability to participate in any programme for the realization of such objectives, without which any study of this nature would be meaningless.

For the purpose of determining actually what adults desire in science and technology programme, the responses were grouped into two:

(1) Skills training

(2) Basic scientific facts

Table 4 below clearly indicates that adults are more willing to acquire skills relevant too existential needs than imbibe scientific facts even when they do not know the latter. This finding is in keeping with adult characteristic of purposeful learning.

Table 4: Desirability of Science and Technology Curriculum for Adults

SOCIO-ECONOMIC GROUP	PERCENTAGE DESIRABILITY FOR:		
	Pop	**Skills Training**	**Basic Scientific Facts**
Upper	34	76	24
Middle	52	82	18
Low	39	79	21
Mean Percentage		79	21

8.4 Hypothesis Four

Learning medium preference scale

This study has established one fact that "Adults of all socio-economic groups desire to acquire certain skills for the self-attainment". But one issue remain to be clarified – the preferred medium of communication. This null hypothesis has claimed that adults do not prefer face-to-face learning to distance learning. But the chi-square computation below definitely shows the contrary.

Table 5: Communication Medium Preference Scale For Science And Technology Programme For Adults

Class and Population of Respondents	Preference for Distance Learning	Preference for Face-to-Face Learning	Total
Upper (Pop = 34)	24	10	34
Middle (" = 52)	27	25	52
Low (" = 39)	14	25	39
Total (n – 125)	65	60	125

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$X_2 = 6.24$

Using the 2 x 3 contingency table at 0.05 level of significance, the calculated value of chi-square was 6.24, a little higher than the critical value of 5.99. The hypothesis was therefore rejected. In fact, adults prefer to learn skills through audio-visual channels such as television, radio etc. to the much effective teacher-learner, face-to-face interaction. Perhaps,

this choice can be attributed to the busy nature of adults. But one observation that must be made is that teaching of skills can best be executed in a close interaction, preferably classroom/workshop atmosphere.

CONCLUSION AND RECOMMENDATION

The study has made some revelation. First, that no matter how highly placed or one's level of education or even the nature of one's occupation or career, one lacks some aspects of scientific knowledge and technological know-how, vital for self-actualization and "wholeness". If anyone can claim competence in one field of life, he cannot boast of absolute knowledge and skills in other fields. For self-development which invariably will give rise to national development, adults ought to be exposed to well-articulated programmes on science and technology. Notably, adults of high socio-economic status show greater understanding of certain technology, an indication that adult education should intensify efforts in uplifting the technological potentials of adults in the middle and low socio-economic groups.

Secondly, the desirability of a programme on "adult science and technology" has over-whelmingly received approval by potential participants. It is a crucial need identified. It is a yearning technological vacuum. In doing so, it must be taken into cognizance that adults are yearning for skills, acquisition of technology to uplift their self-confidence and arm themselves adequately to face their environmental problems. They have said absolute "no" to regurgitation of scientific facts that is reminiscent of schooling.

Finally, they have passed a "voter of dislike" on the face-to-face learning process. To them, it is a reflection of the formal school system. They want to know, what they desire to know through distance learning process. The issue in focus is not how effective and rewarding, this choice might be. It is an adult choice that must not be over-ruled if androgogical principles mean anything to modern adult education.

In the light of these revelations, adult education has enormous task to accomplish. First and foremost, a curriculum should be designed for all categories of adults on skills' training. Such a package must incorporate all aspects of relevant and indigenous technology as tested in this study and even beyond. The guiding principle must be a consideration for the needs of the participants. Such a curriculum must be cooperatively designed.

Again, the paper has suggested a modular approach for the curriculum. The main reason for this suggestion is to allow participating adults the choice of any given area of interest of the curriculum and more skill, entry into, and exit from the programme at will.

The selection of venue for such a programme is crucial. It ought to consider proximity to participants. Because of the infrastructural and personnel need for the implementation of this programme, I have suggested the expansion of all existing adult education centres in the country, to accommodate this "technological unit". Available man-power should be retrained for this purpose, while experts from the various technological areas would not hesitate to pay for the acquisition of beneficial skills. For all these arrangements, the starting point is the commencement of science and technology studies in the respective institutions and agencies that oversee adult education programmes. For instance, it is necessary that curriculum developers in the universities consider it worth while to include science and technology unit. If adult education students study history, psychology, philosophy etc, what prevent them from studying science and principles of technology?

Inevitably, it is when adult educator themselves are conscious enough on the need for science and technology for adults, that the mistakes of the past, and the urgency of a science and technology curriculum for adult can best be appreciated.

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