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**Special Issue**

**Vol. 3, No. 14, November 2012**

**Guest Editors**

**Jacinta A. Opara,PhD**

**Ivan C. Siqueira,PhD**

**Austin N. Nosike,PhD**

**M.P. Pagar,PhD**

**Asoluka C. Njoku,PhD**

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**Introduction**

This is a collection of some selected papers presented at ICTL2012 and TEEC012 held in Abuja, Nigeria. Our conference series are academic activities for interested scholars, scientists, technologists, policy makers, corporate bodies and graduate students. The aim of the conferences is to diffuse research findings and create a conductive environment for scholars to debate and exchange ideas that lead to sustainable development.

Following the call for papers by the International Scientific Commission, we received more than 200 proposals from 25 different countries from all continents. As a commitment to the vision and mission of academic excellence and integrity, each paper was anonymously reviewed by two members of the editorial sub-committee of the Commission. This Special edition contains a selection of some best papers presented at the conferences now published as journal articles for wider readership.

We thank the Management and staff of Mediterranean Center of Social and Educational Research for their support and continued collaboration.

**Jacinta A. Opara**, PhD

*Visiting Associate Professor*,Universidad Azteca,Chalco-Mexico

and *President*, African Association for Teaching and Learning

**Table of Contents**

1. **Education and Learning in the 21st Century : An Emergency Agenda for Sustainable Development………………………………………………................…… 11**

*Ivan Siqueira*

1. **Charting a Course of Development Through Proper Technical,**

**Technological and Engineering Education………………………………...….....… 19**

*Olawale Olaniyi Emmanuel Ajibola*

1. **Quality Assurance Concepts of Institutionalization : Some Indicators**

**Toward Higher Educational Development Policy in Libya………………......… 29**

*Milad EL Harathi*

1. **Assessment of Creativity Level of Secondary School Students in Moro**

**Local Government Area of Kwara State, Nigeria……………………………….... 36**

*Saadu Usman Tunde*

1. **Sources of Information for Social Studies Teachers and their Level of**

**Usage in Abeokuta, Ogun State Nigeria…………………………………….........… 42**

*Adediran Adekunle Amos, Y. Abdukareem*

1. **Comparative Study of Data Mining and Statistical Learning Techniques**

**for Prediction of Cancer Survivability……………………………………………..… 49**

*Charles Edeki, Shardul Pandya*

1. **Enhancing Quality Education In Nigerian Unity Schools Through Effective**

**Supervision in a Changing Environment……………………………………........... 57**

*Francis Briggs*

1. **Changes in the Structure of Educational System in the Function of Millennium Tendencies……………………………………………..…......................... 63**

*Miroslav Kuka, Jove Talevski, Ksenija Jovanović*

1. **Competency Strategies in Alleviating Poverty for Sustainable Development in the Teaching and Learning of Home Economics Education…………….… 67**

*Obasigie, I.O, Omoregbe, I.I*

1. **Colonialism and Education: English Language Education in Sri Lanka…..… 73**

*Marie Clare Fernando*

1. **Effect of Self – Regulated Learning Strategies on Secondary School Students’ Performance in Home Economics Education……………………….… 80**

*Ihensekhien, Isoken, Salami, L. I*

1. **Analysis of the Frequency of Academic Staff and Students` Use of Information and Communication Technolog (ICT)........................................ 91**

*A.E. Mbaba, I.M. Shema*

1. **Handling Perishable Food Stuff for Quality Assurance and its Effect on Quality and Price. A Study of Yanlemo Market, Kumbotso L.G.A of Kano State…………...............................................................................................……… 98**

*Hadiza Lawan*

1. **Schools’ Records: A Deficiency Analysis of English Language Exercises in Public Schools………………………………………….……………..................………. 104**

*Ataisi Emiya Gladday*

1. **Girl-Child Education: A Challenge for Sustainable Development in Nigeria…...................................................................................................……… 111**

*Grace C. Atama*

1. **Instructional Variables and Students’ Acquisition of Employable Skills in Vocational Education in Nigerian Technical Colleges………………….……… 118**

*Udofia, A. E, Ekpo, A. B, Nsa, S. O. and Akpan E. O.*

1. **Ethical Considerations in Software & Information Systems Engineering:**

**The Case of a Local Hospital in Adamawa State of Nigeria. ……………....… 128**

*Arthur U. Ume*

1. **Quality Assessment of Rain Water Around A Cement Factory in**

**Benue State, Nigeria…………………………………………………………………..… 135**

*Ipav, Selumun Solomon; Dasofunjo, Kayode and Asaar, Godwin Bem*

1. **N’dama Cattle Conservation: The Potential Roles of Artificial Insemination**

**and the National Policy………………………...............................................…… 144**

*Olaniyan, Olawale Festus, Hiemstra, Sipke-Joost*

1. **Student Variables and Senior Secondary Students’ Achievement**

**in Mathematics in Rivers State, Nigeria……………………..……………………..**

*Daso Peter Ojimba*

**Education and Learning in the 21st Century: An Emergency**

**Agenda for Sustainable Development**

**Ivan Siqueira**

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***Abstract***

*The 21st Century has observed an increase transformation on the basis of economy and social patterns. The challenging of education is now prepared for the future, not for the present. The changing environment of learning is related to competencies and skills rather than in particular subjects and theories. How to teach what is not present yet? Why education must be profoundly related both to Information and Communication Technology and human ethnic? This paper is dedicated to highlight some of these points, bringing some reflections regarding these topics about the relationship between Africa and Latin America, especially Brazil.*

***Keywords:*** *Education, Sustainable Development, Information and Communication Technology*

**Introduction**

In 1992, the Rio de Janeiro city (Brazil) hosted the United Nations Conference on the Environment and Development, also known as “ECO92” or “Earth Summit”. About 100 heads of state and more than 15.000 activists from several places in the World went to Rio to discuss about Biodiversity, Climate Change and Forests survive. After long debates, came to light the Agenda 21, a report with 2.500 recommendations to promote the so called sustainable development. The focus were in climate change, forestry biodiversity, biofuels, research for sustainability, reducing carbon emissions, economy, population and development indicators. Ten years later, the World Summit on Sustainable Development (Rio+10) was held in Johannesburg (South Africa). It was clear that there were so much to do, on the other hand, a little list of effective actions was done to accomplish any form of sustainability. In mid-June this year, again in Rio de Janeiro (Rio+20), the World Summit discussed the problems of a equitable use of natural researches, promotion of good food, health, habitation, sociability among different people across the globe, respect for ethnic differences, in short – a good life for all mankind.

Nevertheless, the economists said that this “earth paradise” is doubtless associated with the conditions of world economic growth, particularly after the Leman Brothers’ crash in 2008 and the following global financial crisis (2008-2012), (The World Bank, 2012). The enlargement of crisis in Euro zone practically discourages any optimism associated with efficient sustainable actions that were discussed in Rio+20. In today’s Europe, the unemployment rates are about 5% for Germany, 10 for France but 24 for Spain, and the project 2012 economic growth rates of 0.6% for Germany, 0.5 for France but a dramatic rate of -3.3% (minus 3.3) and -1.8 (minus 1.8) for Portugal and Spain, respectively (The New York Times, 2012).

The first of these thematic conferences promoted by United Nations was held at Stockholm, Sweden, in 1972. All of conferences have shown the emergence of an International Agenda about these topics. Unfortunately, in none of then we have seen education ranking the central point of the subject. Is it possible a sustainable development, a responsible use of natural researches, respect for ethnic differences or other patterns of consumption without a new model of education? Even the deliberations about human’s rights state by The Committee on Economic Social and Cultural Rights, that everyone should have access to safe and potable water, adequate sanitation, supply of safe food and healthy occupation, is it possible and sustainable without a new education? (United Nations High Commissioner for Human Rights, 2012). By new school I understand a model of education where students learn that respecting nature leads to respecting people, no matter if they are close or far way. I think we must become aware of the connections between our lifestyles and the education we have had. And what about the impact of Information and Communication Technology (ICT) on all levels of education: early childhood, primary, secondary and tertiary? If what we really desire is walk towards a new world, then we need to revolutionize the shape of our education. The school should provide exciting experiences and valuable understanding of how the world works. How to do it without understanding that computers are profoundly changing the way we communicate, engage in politics, and learn?

But a new education program that includes the ICT objects requires investments and public policy. In this subject, Brazil and most of Latin America and Caribbean have lived roughly the same difficulties as nation like Nigeria, South Africa and other developing countries: lack of qualified ICT staff, cost of equipment and mainly non-inclusion of ICT programs in all levels of teachers’ training (Kwache, 2007, p. 397; Brunner, 2004; Lopez Segrera, 2007).

Many studies claim that the model of economic progress that brought comfort and welfare state in developed countries of Europe and North America, which have been exported to developing countries like Brazil, Russian, India, China and South Africa (BRICS), is not possible for the entire population of the planet (Meadows et al., 1972 and 1992; United Nations, 1997; Aspalter, 2003). If the conferences of United Nations of the last 40 years have not achieved their goals yet, at least they highlighted that world economic and its social basis are not sustainable; especially if we considered that we going to live in a planet where the population is expected to be about 10 billion by the year 2050 (United Nations, 2010). More and more, we see that social conditions that favor wasteful behaviors, an economic dependence on non-renewable fossil fuels, and an exploitative of renewable resources so much faster than environment regenerates can’t go on forever. Here, the point is not if the concept of sustainability is or is not innocuous enough. The main idea is that development and social welfare are deeply related to education possibilities.

The central argument of this lecture is that the general conditions of sociability in this planet which produce at the same time chronic hunger and obesity epidemic, waste and need, and the consequence discarding of products that pollute rivers, oceans and atmosphere are not an utterly problem of economy, but fundamentally a matter of education. In fact “None of us today, whether we're managing a house or running a business, is living in a sustainable way” (Shapiro apud Magretta, 1997: 80).

So, we need to modify our view about life and who we are, something like to be aware that happiness is not reach by an immeasurable increase of consumption. More and more, there are evidences to support that education has a essential position in our present world, not only because one of the strongest purposes of education is to provide new knowledge and innovation to solve problems; but because education, from now on, has a primary role in an increasingly urban planet, where the conditions of life will be progressively more related with the powers of education. But we are in a dramatic situation – most of education systems the world has seen are not comparable to the crucial troubles we observe. I would like to point out some ideas about the complex role of education, especially for development countries, highlighting analogous aspects that could step up a welfare state with social and spiritual values, economic growth and good cultural relations between the two continents: Africa and South America, especially Brazil.

I would like to remember the approach suggested by Lévi-Strauss (1964), in which he showed the effectiveness of music as a natural framework, whose properties would allow both devise logical thinking and the aesthetic virtues of societies. I assume that there is a profound crisis in the values and social functions of education in the 21st century, mostly because we are not “listening” properly the complex and organic structure in which the education is inserted. We are trying to pick up “notes” of a great musical device when what we need is to develop a capacity of “structural hearing” (Salzer, 1982). So, a thoughtful understanding of the new economic logic and sociological conditions in which education is based may favor knowledge of its nature and possibilities in the present time, mainly for developing countries.

**Informative and Cognitive Capitalism**

During the 1980s and 1990s, a related economic situation was seen in several countries in Latin America. It was a set of 10 general principles that US government and International Financial Institutions like International Monetary Fund and World Bank believed were indispensable to poor and developing countries increase their economies rates. This economic vision suggested the importance of macroeconomic stability and integration into the international economy. That neo-liberal view of globalization included, among others: deregulation, i.e., the elimination of regulations that obstructed the entry of new companies or restricted competition; privatization of state enterprises; trade liberalization and increasing of foreign investment; secure and respect for intellectual property right and above all the reduce role of the state (World Health Organization, 2012).

This policy was later called of Washington Consensus, a neoliberal platform that invited poor and developing nations to adhere to a new movement of economic progress and wealth improvement. If the countries followed what was prescribed, they would accomplish a virtuous circle of development. Although there were many differences stages in economic patterns in Latin America, the consequences of this orthodox *laissez-faire* produced similar outcomes in many countries: the weakened of government institutions in favor of corporate profits, the subsequent expansion of unemployed workers, and a perverse concentration of wealth. During 1980s, Latin America International Debt increased up till a rate of 45% of its full export marked. In comparison, after the I World War, Germany paid no more than 8% of its exports (Sobrinho, 1994).

I have not a deep insight about “Structural Adjustment Programmers” (SAPs) in Africa, also promoted by International Financial Agencies but it appears that the results were very close to what I described about Latin America (especially Brazil and Peru): privatization of state companies in order to attract foreign direct investments (FDI), closure of small local enterprises, trade liberalization and incorporation of the great part of national food production by export trade systems. What does all this have to do with education? Well, for me, this movement of liberal capital has culminated in the current situation we are facing. The situation before is really important to understanding why the ideology of liberal capitalism in the 20th century never promoted education idea as a fundamental tool for developing countries; and why the discourse of education became a new worldwide expression. I haven’t enough time here to carefully explore this subject-matter. I just wanted to mention that my opinion is that we are living in another movement of capitalism expansion, and this movement is powerfully associated to what occurred in the 1990’s – the internet phenomena and the transformation it has provoked.

Today, it seems clear the links between the worldwide boom of internet in the 2000s and the deteriorating of the previous economic model. Therefore, the paradigm of digital economy has been used to justify the need of a new education model. Well, at this point I shortly would like to focus on the links between this need of a new paradigm for education and the tremendous transformation of world economic base, which has affected the way people live all over the world and especially provoking a lot of noise at the university. I assume that the policies that provided no effective eradication of poverty or a progressively reduce of inequality between the northern and southern populations in 1980 and 1990s also favored the coming out of the so called cognitive capitalism. The situation we live now is directly related to circumstances that have been occurring in the last thirty years. We, in African and in Latin America, did not prepare ourselves for the challenges we are and will face throughout the 21st century. And finally I got to the point of this lecture – the economic growth may or not improve education, but an effective change in education has more chance to bring new outcomes to social lives, including those related to economy issues.

**New Schools for New Times**

One of the most influential thinkers of Brazilian education, Paulo Freire (1921-1997) believed that literacy education must be a tool not only for reading words, but also for reading the world (Freire and Macedo, 1987). He made import contributions about the relationship between social class and the process of acquire knowledge in tradition schools. At young age, he lived among poor families and country workers in the northeast of Brazil, so he reached a deep comprehension about the disconnections between the elitist educational system we had and the real lives of the working class. As he later saw, that situation was not restricted to Brazil. Freire’s pedagogic view pointed out that education should provide tools and practice for students’ development of critical think, which would allow the understanding of the historic, social and economic conditions. The student then would face the problems as subject of his own conviction (Freire, 1973). Freire frequently said that classes should be an exchange dialogue between teacher and students. As we may seem, he was already concerned of what we have been lately calling “autonomy” and “competence”. Much of Freire’s education thought, like his “banking concept of education” (the teachers teach and the students are taught), is still very common in most forms of current worldwide schooling. Freire’s theory of learning was discussed and applied in United States, Europe and Africa, especially Guinea-Bissau (Freire, 1978).

Freire’s pedagogy was not a priori technique to be imposed, but a political practice that provides the knowledge, skills and social approach. While enable students to expand their own possibilities of being critical citizens, it favors their participation on the destinies of effective democracy. For Freire, critical thinking was a tool for self-determination and social engagement, not a routine of simply reproducing the past and understanding the present. We could say that, in Freire’s terms, critical thinking and learn to learn were a way of thinking beyond the present and beyond the immediate confines of one's experiences. In short, education should introduce students into a critical dialogue with themselves, with history, love and passion, with reality and imagination.

At his time, Freire’s pedagogy provided intellectual support and theoretical tools for poor students struggled against the oppression of lack of information. Now we are living in a world that for the first time in human history we are not dealing with the lack of information but with a big amount of it. There is more information that anyone can assimilate. On the other hand, we have to consider that modern school is an example of an extremely problematic institution which offers highly resistant to essential reforms. Many works show that we have an education unsuited with the principles of knowledge society (Bohme and Stehr, 1999; Aronowitz, 2000). But what principles are these?

Many detailed studies on this subject were made by French and Italians (Corsani *et al*. 2001; Rullani, 2004; Fumagalli and Vercellone, 2007; Moulier-Boutang, 2007). Rullani say that the central idea is that the value of knowledge is fragile and tends to turn down. His notion about the value of knowledge comprises the composition of three drivers: the performance and application (maximizing); the number of multiplying effectively; and sharing rate among people. So the paradox is that there is a capitalist necessity of free reproducibility of knowledge and, at the same time, the non-reproducibility of the material. That’s why the knowledge-based economy requires constant innovation. So, to play this game, our students must learn the rules. Therefore, the creation of value upon material is made through the production of knowledge. This explains the necessity of the monopoly of patents, copyright and all intellectual property rights.

In order to compete in this knowledge-based market, our students must learn the mechanism of the reproduction of the cognitive and relational abilities, i.e., understand the structure and nature of reproduction of this quite easy, faster and ubiquitous immaterial object – the knowledge in the digital environment. So, that’s the point in which tools and technologies become essential. It’s impossible to be easy, faster and ubiquitous without the support of digital technologies and internet. The effect of this reality may be observed in any sector: health, agribusiness, education, software etc.

But how teachers and students in developing countries can face this complex situation working in public schools that more and more resemble prisons: closed rooms, pupils in line, the familiar sound of a ringing bell, violence? The teacher’s mission still looks like the priest who preaches canonical themes disconnected of the students’ lives, wrote freshly a Brazilian sociologist (Sodré, 2012). Furthermore, developing countries have a long tradition of importing educational models without the reflection that education is in essence a political issue. A complete understanding of the society is required to propose a new model of educational, simply because education reshapes the cultural and sociological base of an entire society. As McLuhan (1964) said: “We shape our tools, and afterwards our tolls shape us”.

In addition, the importing practices often demonstrated a blind cultural superiority that we can’t agree anymore. A clearer view of the education, its possibilities and foundations, involves a well-funded observation on the basis and principles of the model education. But I guess we should look objectively at both positive and negative consequences effects of any education model, not with the priori assumption that any model is always positive or if it is good for others will be for us.

First things first – if we agree that modern education may be seem as a complex framework connected to the history, society and its economic structure in a given cultural stage, then we must underline that education is essentially a political construction. Consequently, we can’t go on working with educational models ignoring what they have been done in our societies – discarding millions of kids and persons, treating them as collateral failures or statistic, despite we know that an uncountable amount of them is extremely intelligent. Systems that produce these circumstances would never provide effective solutions to developing countries; because one of the pillars of countries in development is the extreme inequality and I sure we want to move away from these circumstances. But in order to innovate with learning at home it’s advantageous a widespread vision of abroad, something like act locally but thinking globally (Morin, 1999). Most important, if we want to use the profitable side of this capitalism phase, we have to consider that, different from mercantile and industrial times, in cognitive capitalism the value is on immaterial assets (Cvijanovic, Fumagalli and Vercellone, 2010).

In most countries of Latin America, this picture of educational gears is also worsened because institutional systems of education frequently neglected that the majority of population is formed on oral cultures; on the contrary, what we have seen is that oral cultures are general assumed as an inferior realm, associated with non-literates people that should take the culture of writing. We have to change what at first sight seem disadvantageous into advantageous and reject educational models that do not recognize the real value of the intellectual traditions of non-literate cultures, do not respect the traditional livelihoods, its knowledge system, and the diversity that characterizes mankind. The cleavage between elitist ideas of higher culture of writing against a supposed inferior oral culture was one of the greatest obstacles towards an authentic democratic society in Latin American. In this scenario, education was only a little part of a foreign realm structure imposed for most of the population.

The educational history of this social struggle in Latin America denotes why only in the 20th Century the universal suffrage was finally reached: Mexico (1917), Colombia (1936), Chile (1971), Brazil (1988). In this sense, Argentina, Cuba and Uruguay were exceptions, building effective policy of public education with good results in the 20th century. In most of its existence, education in Latin America was a privilege, a strategy to obstacle the full participation of majority people, restricting the access and the welfare to a minority. Is this situation completely overcome? The answer is not! And that brings another difficulty; we are still fighting with the fact that oral culture is not fully integrated to writing culture. But at the same time, we are dealing with the challenges of a digital economy. However, internet culture may favors these transformations, especially if we learn to integrate education and the culture shaped on political agenda as open source architecture, free software movement and knowledge sharing. The idea of a multitude in the heart of cognitive capitalism can be a gateway to transform education in developing countries (Hardt and Negri, 2004).

A sustainability model for developing countries certainly will involve a concept of nation where the differences can be a matter of advantageous. In addition, none of us is enough sufficient to despise the culture and help of others. For better and worse, we are on the same nave – the earth planet, sharing the lucky or unlucky of the universal destination of mankind.

I also would like to mention that education in the 21st century should be more concerned in provide a framework to students understand how our present world works than teaching contents that easy become out of date. From Greece to the late 19th Century, the chief body of western education was influenced by Aristotle’s Rhetoric (350 BCE) – Ethos, Pathos and Logos. In the medieval time, the elitist model of *trivium* (grammar, logic, rhetoric) was a step toward the *quadrivium* (arithmetic, geometry, music, astronomy), which prepared by comprehensive studies in philosophy and theology (Cope, 1970). It is not difficult to see the remained conceptions of these models even in today’s university.

Most of contemporary policymaking rhetoric of current education point out that education should be based in the paradigms of knowledge society, which means democratic society, multicultural society, globalized society and sustainable society. The complex relationship between the economy, society and the environment and scientific knowledge requires a cross and multi-disciplinary approach. But in learning only this, the students are surfing on the waves of events. In order to understand the machine inside it is necessary to go deeper. We are living in a time where education is viewed as a market-driven economic force. But more than a utilitarian model of livelihood, education should embrace other functions, especially if developing countries want to accomplish better life conditions for the majority of society.

**Conclusion**

Notwithstanding the technological literacy related to internet, search tools, mobile apps, tablets, Content Management Systems (CMT), games and the so called learn to learn; the fundamental skills should be related to the requirements of the world’s game. Today’s education should provide frameworks in which the students learn the intrinsic movement of energy that characterizes our present lives (Bataille, 1949). It has already been said that Capitalism is a machine of appropriation and control of desire, which means repression, submission, and reproduction. The essential paradox is that the system simultaneously encourages and strengths the natural movement of desire; and also attempts to control and limit the flow of energy. The external tools to accomplish are laws, bureaucracy, property, work division and scarcity; the internal are guilt and internalization of debt, among others (Deleuze and Guattari, 1972).

Last but not least, the magic of this time is that with internet, technological apps and without the restriction of space and time, education can finally offers the opportunity to access knowledge and the essence of human-being to a great number of students. And to know more about our long journey through the earth – which began in Africa, and made us a body and soul filled with of desire, passion, intellectual thoughts, symbolic and non-symbolic, figurative an non-figurative energies. The current model we know attempts to control and limit, but there is a way to open the door and make a different journey – the key is education. This education model may preserves nature and traditional cultures, supporting innovative approaches to learning and understanding what’s going on in home and abroad; and finally stopping to feed the *modus operandi* of this inequality-generating machine.

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Charting a Course of Development Through Proper Technical, Technological and Engineering Education

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Abstract

Knowledge refers to the possession of information, facts, ideas, truth or principles. The imparting and acquiring of knowledge through teaching and learning refer to education. The nucleus of education is knowledge. A well directed education is the process that yields knowledge. Engineering is the application of science in the design, planning, construction and maintenance of manufactured entity while Engineering education is the training of engineers for the purpose of initiating, facilitating and implementing the technological development of a Nation. Engineering uses scientific ideas to develop technology but technology provides the ingredient for Engineering. Technical education engenders formal preparation of Technicians for occupations between the skilled trades and the professions based on underlying sciences and supporting mathematics as well as methods, skills, materials, and processes of a specialized field of technology. In this work, the roles of these tier of education in the development of a nation was discussed in relation to the existing developmental efforts made towards achieving technological advancement in Nigeria. It is hoped that the policy makers in Nigeria will find the paper useful for the betterment of hoi polloi by charting a course of developing the entity called Nigeria through well-found technical, technological and engineering education.

**Keywords:** Course of development, technical education, technological education, engineering education

**Introduction**

Technology refers to the application of scientific knowledge to the practical aims of human life or, as it is sometimes phrased, to the change and manipulation of the human environment, Britannica (2008). It is the study, development and application of devices, machines and techniques for manufacturing and productive processes; the sum of a society’s or culture’s practical knowledge, especially with reference to its material culture, Microsoft Encarta (2009). Technology could also be conceived as a method or methodology that applies technical knowledge or tools. In the most casual form, it could mean machines, equipment and systems considered as a unit. Technology is the nucleus of the subject matter of this paper. Technology is sometimes confused with engineering; it is often mistaken for machinery or computing device but Technology embraces more than machines as it also involves processes. Engineering uses scientific ideas to develop technology, Falade, (2010). And the scenario is the same for technological and engineering education.

Technical education is the academic and vocational preparation of students for jobs involving applied science and modern technology. It emphasizes the understanding and practical application of basic principles of science and mathematics, rather than the attainment of proficiency in manual skills that is properly the concern of vocational education. Technical education has as its objectives the preparation of graduates for occupations that are classed above the skilled crafts but below the scientific or engineering professions. People so employed are frequently called technicians. Technical education is distinct from professional education, which places major emphasis upon the theories, understanding, and principles of a wide body of subject matter designed to equip the graduate to practice authoritatively in such fields as science, engineering, law, or medicine. Technical occupations are vital in a wide range of fields, including agriculture, business administration, computers and data processing, education, environmental and resource management, graphic arts and industrial design, and health and medicine; technical educational curricula are correspondingly specialized over a broad range of disciplines. Technical education is typically offered in post-high-school curricula that are two years in length, but they are not designed to lead to a bachelor's degree, and are offered in a wide variety of institutions, such as technical institutes, junior colleges, vocational schools, and regular colleges and universities, Britannica (2008).

In the early millennia of human existence, a craft was acquired in a lengthy and laborious manner by serving with a master who gradually trained the initiate in the arcane mysteries of the skill. Such instruction, set in a matrix of oral tradition and practical experience, was frequently more closely related to religious ritual than to the application of rational scientific principles. Craft training was institutionalized in Western civilization in the form of apprenticeship, which has survived into the 20th century as a framework for instruction in technical skills. Increasingly, however, instruction in new techniques has required access both to general theoretical knowledge and to realms of practical experience that, on account of their novelty, were not available through traditional apprenticeship. Thus the requirement for a significant proportion of academic instruction has become an important feature of most aspects of modern technology. This has accelerated the convergence between science and technology in the 19th and 20th centuries and has created a complex system of educational awards representing the level of accomplishment from simple instruction in schools to advanced research in universities. French and German academies led in the provision of such theoretical instruction, while Britain lagged somewhat in the 19th century, owing to its long and highly successful tradition of apprenticeship in engineering and related skills. But by the 20th century all the advanced industrial countries, including newcomers like Japan, had recognized the crucial role of a theoretical technological education in achieving commercial and industrial competence.

The application of science in the design, planning, construction and maintenance of manufactured entity is called Engineering. Engineering education is the training of engineers for the purposes of initiating, facilitating and implementing the technological development of a nation, Ajibola (2011). It is a very important area of human endeavour in the sense that engineering is the life support for developing, growing and maintaining the economy of any nation irrespective of the level of economic advancement attained by the nation. Engineering is the application of Science for the efficient utilization of natural resources to produce wealth. It has also been defined as the “application of laws governing forces and materials of nature through research, design, management and construction for the benefit of mankind, Musa Alabe (2009).

**Engineering Education and Practice in the United States**

The recognition of the importance of technological education, however, has never been complete in Western civilization, and the continued coexistence of other traditions has caused problems of assimilation and adjustment. The British author C.P. Snow drew attention to one of the most persistent problems in his perceptive essay, The Two Cultures (1959), in which he identified the dichotomy between scientists and technologists on the one hand and humanists and artists on the other as one between those who did understand the second law of thermodynamics and those who did not, causing a sharp disjunction of comprehension and sympathy. Arthur Koestler put the same point in another way by observing that the traditionally humanities-educated Western man is reluctant to admit that a work of art is beyond his comprehension, but he will cheerfully confess that he does not understand how his radio or heating system works. Koestler characterized such a modern man, isolated from a technological environment that he possesses without understanding, as an “urban barbarian.” Yet the growing prevalence of “black-box” technology, in which only the rarefied expert is able to understand the enormously complex operations that go on inside the electronic equipment, makes it more and more difficult to avoid becoming such a “barbarian.” The most helpful development would seem to be not so much seeking to master the expertise of others in our increasingly specialized society, as encouraging those disciplines that provide bridges between the two cultures, and here there is a valuable role for the history of technology.

America, the prime of technology, has an outstanding history of technology. The case of God’s own country is a pointer to the fact that Nigeria is not yet prepared to plan for the much desired technological development and so the dream of vision 20:2020 will ever remain a mirage because none of the indicators for the take-off of successful planning has been put in place. To start with, Nigeria cannot make an accurate statement about her population. The United States of America that is primed as the world’s best economy and the world’s power is no doubt the most advanced country in the world. Despite her technological prowess, the government of the United States in recognition of necessity to further climb the ladder of development attempted to redefine the blueprint of her economy. The government commenced her planning from the basis; the Committee on the Education and Utilization of the Engineer to investigate educational aspects of the preparation of engineers in the United States was commissioned to provide the springboard to kick-start the new phase of development in technology. One of the four panels established by the committee is the panel on Technological Education, Engineering Technology Education (1985). The recommendations of the panel as contained in the executive summary of their nine chapter report include:

* Student chapter of engineering related associations be encouraged by the associations and faculty sponsors in order to provide students with additional contacts and activities with national societies and their representatives
* Cooperative education in all of its forms should be expanded through greater industrial, institutional, and governmental support, with faculty industry linkages being encouraged
* “Hallmark” programs in engineering technology should be identified, publicised, and supported nationally
* Appropriate accrediting agencies should play a greater role in efforts to increase the quality of engineering technology programs
* Students should be prepared for and encouraged to seek technician certification
* Professional registration or certification of engineering technology faculty should be encouraged
* Manpower statistics on enrolment, degrees, and salaries should be maintained at the college, state and national levels.

Finally, the panel considered resource allocation pattern of various institutions as regards areas of engineering technology, and the following recommendations were developed:

* Institutions should plan to develop a limited number of “centres of emphasis” in subspecialties
* Continuing efforts should be made to upgrade laboratories and shops, recognizing the importance they play in the education of engineering technicians and technologists
* Linkages with industry should be developed to share specialized laboratory and shop facilities, both in industry and on campus.

Other recommendations referred to as “specific recommendations” were not considered this paper for lack of space. But one thing that is sure is that these recommendations among others shall be implemented to the letter because the factor of “corruption” will not come into play in the US. The consideration here is that ‘if a country like the US could still place emphasis on all the facets of Engineering education with special consideration for technical education’ then Nigeria should as a matter of urgency revive engineering education at all levels

**Engineering Education and Practice in Nigeria**

The ultimate goal of any nation striving to develop its technological prowess concerns the quality of life of her citizenry hence the relationship between technology and the society cannot be overemphasized. There is no doubt that technology has brought a higher standard of living to people in advanced countries, just as it has enabled a rapidly rising population to subsist in the developing countries. It is the prospect of rising living standards that makes the acquisition of technical competence so attractive to every country the world over. Although it is a worthy desire to possess a comfortable sufficiency of material goods, and leisure for recreative purposes, the quality of a full life in any human society has other even more important prerequisites, such as the possession of freedom in a law-abiding community and equality before the law. Certainly, highly oppressive regimes have used technological devices to suppress individual freedom and to secure obedience to the state especially in Africa. However, high technological competence requires a high level of educational achievement by a significant proportion of the community holds out the hope that a society that is well-educated will not long endure constraints on individual freedom and initiative that are not self-justifying. In other words, the high degree of correlation between technological success and educational accomplishment suggests a fundamental democratic bias about modern technology. It may take time to become effective, but given sufficient time without a major political or social disruption and a consequent resurgence of national assertiveness and human selfishness, there are sound reasons for hoping that technology will bring the people of the world into a closer and more creative community. And Nigeria must not be left out in the scheme of things.

The hope of anybody who takes a long view of the history of technology as one of the most formative and persistently creative themes in the development of mankind from the Palaeolithic cave dwellers of antiquity to the dawn of the space age in the 20th century is deep-rooted in the ability of technology to promote the quality of life. Above all other perceptions of technology, the threshold of space exploration on which mankind stands at the end of the 20th century provides the most dynamic and hopeful portent of human potentialities. Even while the threat of technological self-destruction remains ominous, and the problems of population control and ecological imbalance cry out for satisfactory solutions, man has found a clue of his own future in terms of a quest to explore and colonize the depths of an infinitely fascinating universe. As yet, only a few visionaries have appreciated the richness of this possibility, and their projections are too easily dismissed as nothing more than imaginative science fiction. But in the long run, if there is to be a long run for our uniquely technological but wilful species, the future depends upon the ability to acquire such a cosmic perspective, so it is important to recognize this now and to begin the arduous mental and physical preparations accordingly. The words of Arthur C. Clarke, one of the most perceptive of contemporary seers, in his *Profiles of the Future* (1962), are worth recalling in this context. Thinking ahead to the countless eons that could stem from the remarkable human achievement summarized in the history of technology, he surmised that the all-knowing beings who may evolve from these humble beginnings may still regard our own era with wistfulness: “But for all that, they may envy us, basking in the bright afterglow of Creation; for we knew the Universe when it was young.”, Britannica 8.0 (2008).

There are so many technical institutions in Nigeria today; so many technical institutions have been developed at the technical college, polytechnic and university levels. However, many of these institutions don’t have adequate infrastructure. There are no teachers of high quality; even the motivation among students is very low because of the societal disdain that doesn’t accord the necessary recognition to technical education such that many students don’t want to attend technical institutions, Aina (2011). Other identifiable problems facing the trio of technical, technological and engineering education as enumerated by Ajibola, O.O.E, in his paper title “an expository analysis of problems and prospects of engineering education in Nigeria” are:

* Inadequate Funding from the Federal Government
* Inadequate Government Allocation to Education in Nigeria (1970 -2002)
* Inadequacy of the Academic Content
* Staffing Problem
* Poor Infrastructural Facilities
* The Disconnect between Classroom and the Industry
* Intermittent Parental Intrusion into the Educational Structure
* Students’ Lack of Will to Invest in their own Future
* Negative Influence of Political Office Holders on On-coming Generation
* The Erasure of Moral Fabric in Africa
* The Ill-implemented Industrial Training Programme

Our reward system is also faulty. A psychological reward is a process that reinforces behaviour; something that, when offered, causes a behaviour to increase in intensity. Reward is an operational concept for describing the positive value an individual ascribes to an object, behavioural act or an internal physical state. Natural rewards include those that are necessary for the survival of species, such as eating, drinking, sex, and fighting. Secondary rewards derive their value from the primary reward, and include shelter, money, pleasant touch, beauty, music, etc. The functions of rewards are based directly on the modification of behaviour and indirectly on the sensory properties of rewards, Wikipedia (2011). For instance, altruism may induce a larger psychological reward, although it doesn't cause sensations. Rewards are generally considered more effective than punishment in enforcing positive behaviour. There is no doubt that it is the best brains that study technological based subjects. However, the reward system in Nigeria is to say the list, awkward. Remunerations and other inducing factors for engineering related disciplines are embarrassingly insulting even in an engineering firm:

* While an accountant is placed on a salary of N250,000.00 and above, the engineering graduate is expected to receive N15,000.00.
* His office is housed in a wooden carton whereas his counterpart who read Personnel management is housed in the Management building with full blast air-conditioning system.
* He does not get promoted at the same time as his counterpart Legal department of the same establishment, and
* The responsibility of maintenance of all the facilities which others enjoy with an exception to him rests on his shoulders.

In his paper titled “Technical and Vocational Education: Key to Nigeria’s Development”, Dike, V.E. did an extensive exposition of the implications of the deletion of technical education from the educational structure of a hitherto developing nation called Nigeria. He reiterated the fact that our engineering educational system has collapse for lacking in foundation. “While technical and vocational education has continued to strive in many societies Nigeria has neglected this aspect of education. Consequently, the society lacks skilled technicians: bricklayers, carpenters, painters, and auto mechanics; medical laboratory and pharmaceutical technicians, electrical/electronic technicians and skilled vocational nurses”. The consequence of the aforementioned is the dearth of technically skilled labour which translates to the lack of lubricant necessary to facilitate the smooth running of the engine of development in Nigeria. The aftermath of excluding technical education in the scheme of development in Nigeria is the collapse of the technological education and by implication, the university education. The absence of the technical inputs from the products of technical and vocational institutions in the graduates from both institutions has reduced such graduates to diploma/degree certificates carrying apprentices. The shabby performance of builders; building technologists, mason and bricklayers is no longer news. That individual or enterprise that has important projects to execute in Nigeria relies on the competence of technicians from neighbouring countries to draw his workforce from. It therefore behoves on the stakeholders to embrace technical education and fine-tune all the other parameters required to strengthen both the technological and university education.

Although technical education produces the apparatus for running the technological and engineering education, the latter produces new technology while the formal acts as the interface between the technical and the engineering education. Technicians, technologists and engineers are produced from technical colleges, polytechnics and universities respectively. The availability of these personnel in the right proportions in an organization promotes rapid industrialization in the presence of enabling environment and appropriate infrastructure. The thrust of research in engineering education is the generation of scientific knowledge and application of it in the production of scientific and technical manpower, the development of material processing systems, the production of machinery and equipment for general and specialized functions and the application and service needs of the society. Research is generally directed at discovering, creating and adding to a pool of knowledge. Such research results are disseminated by researchers to the industry through the training of the students by incorporating the research findings in their classroom activities thus enriching both teaching and learning situation within the department; and the students are later employed to work in the industry where ideas are shared among the other employees. The findings can also be transferred directly to the industry via seminars, workshops and conferences etc. This promotes the development of endogenous technology and advancement in productivity, Falade (2004). The difference between a developed, rich and prosperous country and the developing or underdeveloped country is the difference in their level of scientific, engineering and technological advancement

**Discussions**

Nigeria was a forerunner in the development and exploitation of technical education for the improvement of the life of her citizens. In the pre-colonial era, the workforce of the country was technical education driven. The evidence of the assertion can be seen in decayed infrastructure called Federal Government Technical College, Yaba which glory had been subsumed by that of Yaba College of Technology which shares the same fence with the institution. In 1960s, 1970s and early 1980s for instance, there were standard automobile, carpentry and metalwork workshops which provide qualitative services at modest prices to members of the populace who appreciate the quality of services they offer. The Federal Government of Nigeria, recognizing the prospect of Technical education formulated a policy that made it mandatory for every State and Local Government in Nigeria to establish at least a Technical College in its domain. Most State government conformed to the policy; there was no record of any Local government that executed the policy largely due to their lack of political will or their ignorance of the import of technical education. Although compliance with the policy statement was not total, the impacts of the Technical colleges were felt and the economy was better it. The technical education at that time provided the knowhow for the low-level manpower the purpose for which it was meant to achieve. However, funding as it is the case with any other institution owned by government was grossly inadequate causing the fortune of technical colleges to dwindle. The advent of the Colleges of Technology/Polytechnics and the Universities with multifarious areas of specialization designed to cater for middle level and high level manpower respectively have exacerbated the success records of technical colleges as the attention of governments at various levels shifted from the low level manpower production.

Technical education is no doubt very expensive so it requires strong political will to for people to put the money where their mouth is. Also at the policy formulation level majority of the technocrats who are in charge of policy formulation don’t have technical education background, so they tend to concentrate more on their fields at the expense of technical education so when experts are required they seldom invite experts on technical education and consequently, technical education is rarely talked about. That foreigners constitute the large chunk of the technical labour force in Nigeria portends that we lack leadership and adequate manpower in that area. It also portends that we lack planning, that is based on manpower cannot be adequately done especially when you remember that many of the national developmental plans have failed, not as a result of inadequate paper work, but as a result of inadequate manpower particularly in the middle level cadre. It is a pity that technical education, with all its potential, has not been fully realized in Nigeria and the omen is not good, Aina (2011). Very recently, giant strides were taken by government at various levels to resuscitate technical education, some of which were considered below, viz.:

1. **Committee on repositioning technical education in Nigeria:** The cycle of technical education which must translate to development must be based on the tripod stand with the three levels of education as its legs such that the university education provides the pedestal for modeling an idea as conceived by science, design the model based on the model and interpret the design to the technologist(s); the product of technological education that supervises the execution of the design with the technicians, product of technical education as the foot soldiers who carry out the actual execution under strict supervision of the technologist. Shortly after his election in the year 1999, President Olusegun Obasanjo, who seemed to have recognized that there was a missing link in the education cycle of development commissioned a Committee on repositioning technical education in Nigeria; the committee that was headed by Professor Olu Aina came up with a blueprint, which was a terrific report that would have been a springboard for the realization of technical education in the country; unfortunately, like several other reports, it languished on the shelf for a very long time until sometimes in year 2003 when the Education Trust Fund dusted the report for possible implementation. The substance of the attempt has not been translated into tangible development; it hoped that efforts will transform to visible result in the nearest future.
2. **Seminar on repositioning of education:** Driven by the hue and cry about decadence in education in the country, stakeholders in education were making contributions in their own ways; one of such stakeholders is the National Assembly; about three years ago, the National Assembly organized a seminar with the aim to reposition education where notable stakeholders in technical and technological education presented papers and the import of technical education was brought to the fore as a prerequisite to Nigeria’s pursuit of developmental goals and consequent attainment of vision 20:2020. If action could match words from such fora then Nigeria’s hope of achieving the much touted Millennium Development Goals (MDGs) will come alive. Nevertheless, no visible action succeeded the seminar except further disintegration that had further aggravated the state of education in Nigeria. For instance, the epileptic power supply that had crippled the manufacturing sector in the country had not been traced successfully to inadequate power generation but there is clear evidence that the technical insufficiency of the staffers of technical departments of PHCN contributed to the systemic malaise of the organization. And the fact that corruption in PHCN matches that of the Nigerian Police, according to Transparency international, is a product of technical incompetence. Competent staff has integrity. The reason why the members of the three arms of the military namely; the Nigerian Air Force, the Nigerian Army and the Nigerian Navy have not found dignity in massive corruption as opposed to their counterpart in the Nigerian Police is attributable to discipline born out of competence. An engineer in training without input from vibrant set of technicians is a disaster. An engineering design without proper implementation by unlettered labourer results in underdevelopment.
3. **Giant stride by State Government:** The present government of Osun state is fascinated about skill development especially for the youth and she is prepared to facilitate the process of achieving a hundred percent skill acquisition for her teaming youth in a scheme tagged “Life Skill”, Aina (2011). To this end, the administration of Governor Aregbesola had refurbished the state government owned technical college in Osogbo and he is willing to replicate the action in all other such institutions in the state. Nevertheless, the situation will remain unchanged if competent staffs are not sourced to provide the necessary impetus needed to achieve the desired goal. In addition, there must be an enduring policy to back the actions taken today to procure the future for the effort.

Lagos State is one state that is striving to live up to its slogan, “Centre of Excellence” by aggressively embarking upon reconstruction of her educational structures in general, replacing dilapidated building by mega-structures, introducing functional cancelling departments in all secondary schools to mention but a few. However, very little has been done in the area of technical education in the state.

1. **The 6-3-3-4 System of Education:** According to Professor Olu Aina the 6-3-3-4 system of education did not succeed but it did not fail completely. The system fell short of the level of expectation of the planners due to the following factors:

* Lack of political will
* Improper planning, and
* Inadequacy of data

He opined that, within a few years of the commencement of the programme, there was an explosion in school population far in excess of expectation and what was planned for. For instance, classroom that was built for 20 was housing 50, so there were 30 children who could not find seats thus reducing the contacts between pupils and teachers from 30 to 1, to 50 to 1. Other problems that robbed the system of success include “poor planning”. For example, there was no provision for the laboratories/workshop to provide shelter for the multimillion equipments the government supplied to various secondary schools at the commencement of the programme. I was privileged to serve in a secondary school in Ikere-Ekiti on the National Youth Service Corps (NYSC) scheme. In the school where I serve, all the equipment supplied to the school for the implementation of the Junior Secondary School (JSS) scheme had rotten for lack of shelter. There was not a single technician of technologist on the staff list of the school which translate to lack of manpower to operate and maintain the equipment in case the systems were to be put to use. It became clear that the progenitors of 6-3-3-4 system of education may not be sincere with the programme after all.

**Conclusion**

South Korea was at a time at the same level of development with Nigeria and India but they are far ahead of Nigeria now because they paid attention to technical education. The advanced nations of today were Neolithic communities of yesterday. Nigeria is not an underdeveloped state since it has surpassed the Neolithic stage; just that it is still a toddler at 50. Rather than dissipating all its energy on political zoning formula the ruling class should summon the political will required to foster rapid development of purposeful engineering technological education with credible impetus garnished with dedication, determination and devotion.

**Recommendations**

Nigeria is a nation of oddity where the unconventional is the convention. Nevertheless, it is recommended that:

* In the scheme of development, the role of the three tiers of engineering education namely; technical education for technician, technological/polytechnic education for technologist and university education for engineers should be clearly defined so that whatever the background of the technocrats in charge of technical education at any point in time, the substance of the project will not be altered.
* The current trend where emphasis is placed on paper certificate has eroded the ethic of commensurate reward for hard work. The university certificate is fast become of less quality to the secondary school certificate of the 70s because people who seek degree do so as an end and not as a means to an end. Those who do have business being in the university are seeking to graduate with a first class. Someone whose destiny is contented with technician certificate will definitely be a failure with First class in Electrical engineering.
* In line with the mind of the government of the USA, it is recommended that the document policy on engineering technology education as summarized in this paper be adopted wholly with amendments to accommodation our peculiar situation. However, the peculiarity should not be accommodative of corruption and other vices that share the peculiarities of corruption.
* The federal government should stop the award of licence to corrupt official and organizations under any guise to establish universities whose products cannot compete with technicians from India. They should rather concentrate on the technician cadre development for now so that the ratio of technician/technologist to engineer can be improved upon.
* Existing federal universities should be audited and well funded. Programme rationalization should encourage in line with strength of existing institutions and the peculiarities of geographical areas.
* Establishment of new polytechnics and universities should be stopped forthwith to pave allowance for adequate planning and funding of existing ones. The current where government just establish an institution of higher learning to satisfy geographical distribution is not profitable in anyway.
* After all the aforementioned are properly implemented, the federal government should design a viable blueprint that will serve as a springboard for national development.

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Quality Assurance Concepts of Institutionalization: Some Indicators Towards Higher Educational Development Policy in Libya

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Abstract

The aim of this paper is to lay down some indicators for establishing new Libyan national development policy in the higher education sector, after the political changes in Libya in 17-2-2011 uprising and demolishing the old mechanism of controlling the higher education system in Libya. Its attempt shall be based on rediscover ways of achieving quality and sustaining it in the Libyan higher education system. This therefore, is the task of this paper. It will examine the concept of quality assurance and apply it to a Libyan University Institute.

**Keywords:** Institutionalisation, Higher education policy, Libya

**Introduction**

The strategic position of the university in any national development policy is beyond doubt. The original mission of any given university is primarily to promote knowledge through research and teaching. It is also to explore solutions to the country’s problems and assist the larger society to achieve its objectives in the areas of human social and economic development as following:

1. Contribute to national development through high-level relevant manpower training.
2. Develop and inculcate proper values for the survival of the individual and society.
3. Develop the intellectual capability of individuals to understand their local and external Environments.
4. Acquire both physical and intellectual skills, which will enable individuals to be self reliant and useful members of the society.
5. Promote and encourage scholarship and community service.
6. Promote national and international interaction

**The University Objectives**

These goals will pursue through teaching, research, virile staff development programmes, generation and dissemination of knowledge. The policy expects the Libyan universities specifically to make optimum contribution to national development by intensifying and diversifying their programs for the development of high level manpower within the context of the needs of the new Libyan society`. The professional course contents of university education should also reflect national requirements and Libya's society needs of knowledge. The policy Also provides that university research will be relevant to new Libya’s development goals and needs.

It is evident from these policy expectations that the university institution should be the basic think tank of the Libyan society in all areas. It should continuously generate ideals and knowledge and disseminate them, develop skills and abilities in all who seek knowledge within its walls. The university institution in new Libya should be the vanguard of societal responses to emergent political, economic, social and environmental problems. The advancement of humankind through the ages has been knowledge driven and knowledge is the basic product of universities.

For the Libyan education higher institutions to fulfill its mission, in general, it must devise ways of reversing the downward spiral in the quality of knowledge at produces and the services its delivers to its stakeholders and society. It must rediscover ways of achieving quality and sustaining it. This therefore, is the task of this paper. It will examine the concept of quality assurance and apply it to the Libyan education higher institutions production function in general.

For instance, why should the education institution in Libya assures of its products and services, its inputs and its outputs? What strategies can Libyan education higher institutions adopt with regard to these elements to assure quality? These questions shall be addressed in this paper through an educational quality Assurance thoughts and indicators, and how it can institutionalized in Libya?

**Quality Assurance Concept**

Quality assurance is a holistic term, which directed toward education as an entity. It entails the supplier and consumer and the various activities put in place to produce quality products and services. To further examine this concept meaningfully, three approaches to the definition of quality will be used. These are "*the reputational approach, the outcomes approach and the total quality approach".*

* **The Reputational Approach:**

This approach sees quality as exceptional, it is seen as exclusive. It is something that "some have at the exclusion of others". It is distinctive and intuitively recognizable. This approach regards quality as excellence, it is a standard attained in our context by exceptional universities and or their products.

* **The Outcomes Approach:**

This regards quality as efficient production. Here, there are no absolute standards but specifications. The quality of a product is measured by the extent to which it meets customer’s specifications. This approach is more related to practices in industry.

* **Total Quality Approach**

Here quality is seen as value added. How much value has been added to the abilities of students for instance, who have passed through the system regardless of their ability levels? These are different views of quality when put together. However, we can accept that quality with regard to the output of university education is ‘the level of excellence in performance on the strength of the quality of the context, inputs, process transaction and output”... This shows that to attain or assure quality in output a lot quality inputs and processes would have made. Quality in output does not come by chance. It requires carefully planned and deliberate efforts.

**Meaning of Quality Assurance**

The general meaning of quality assurance is very applicable to the production function of universities. It is the management of goods, services and activities from the input stage, through processes, to the output stage of production, Quality assurance aims at preventing quality problems and ensuring that only conforming products reach the customer. The characteristics of an effective quality assurance mechanism are an effective quality management system Periodic audit of the operation of the system, Periodic review of the system to ensure it meets changing requirements.

It is clear therefore that an assurance process recognizes the need for a university to accept responsibility for its own management processes. This is the difference between quality assurance and inspection or evaluation. Quality assurance is a total, holistic process concerned with ensuring the integrity of outcomes. This places the responsibility for quality with the factory (university) itself, and thus expressed through its relationship with its customers.

Quality assurance recognizes the autonomy of organizations and seeks to enhance their capacity to operate in a responsive way. We can see here that individual universities have a responsibility of assuring the quality of their product and that is why our focus here is on quality assurance mechanism of the Libyan University Institution, in general.

**Quality in Higher Education Meaning**

According to the author, it is possible to identify at least five definitions (Harvey and Green, 1993). First, is to see it as "producing perfection through continuous improvement by adopting Total Quality Management (TQM) to create a philosophy about work, people and human relationship built around shared values". This is a definition that points to the ideal, against which all other achievements are measured.

The second and less formidable definition is to see quality as" performance that is exceptional, attainable only limited circumstances and only when very able students are admitted ".

The third is to see it as the "ability to transform students on an on-going basis and add value to their knowledge and personal development".

The fourth definition is to see it as" the ability to provide value for money and to be publicly accountable ".

The fifth definition sees "quality as something which fits the purpose of the product or service, once the purpose has been decided" (Bogue and Saunders, 1992

**Quality Assurance Requirements**

The experiences of the most developed countries suggest that the adoption of an instrumental approach to quality assurance in higher education can only work if a number of conditions are met.

The first condition is that academic staff members are qualified. Research and teaching up to an acceptable level and the valuable nexus between them can only be produced two three when basic knowledge of the subject and the methodologies for research and teaching is present. Without this, research will be poorly formulated and executed, teaching lacking in breadth, depth and effectiveness, and the introduction of quality assurance not do much to increase standards to the desired level.

The second condition is that academics need only to be employed in one full-time job in one institution to live comfortably with their families. They can earn extra income by doing short-term consultancy work for industry, government or international organizations as part of their direct community service function.

The third condition is the presence of adequate physical, electronic and administrative support services, such as well equal.

**Indicators of Quality in Higher Education**

There are indicators that are associated with quality education: These indicators are crucial to quality. They include:

**The students**

In industry, product quality to a certain extent depends on the quality of raw materials input. Quality leather, all other variables being favorable would invariably lead to quality shoes. Quality grapes to quality drink. In university education, the quality of student input is crucial to their eventual outcome what knowledge and abilities do they already possess? Some assumptions are made regarding those when students are admitted to universities.

We assume they had learned what they were supposed to learn at the lower levels of educational structure. If they did not and somehow cheated their way into the universities, the deficiencies will persist and eventually manifest in them as low quality products. The university does not perform miracles. If the society offers defective raw materials, it can only at best ameliorate the effects at the output end of the processes. To assure quality in student output by the universities, the primary and secondary levels of the system must also ensure quality in their productivity.

**University Professors**

The public policy on higher Education recognizes that no education system may rise above the quality of its teachers). The quality of lectures in the universities determines largely, *the quality of those that they produce and the quality of their research output*. In the fifty years of the development of university education in Libya, there was a lack of orderly and prosperous growth, especially during the "People's Committee Rule of the education sector in Libya. The lecturers in the universities at the time were less world class. They had not integrity both personal and intellectual. The system was always not improving them through training and retraining in the best universities in the world.

**Context**

If the university has well, quality learners and professors but run irrelevant programmes that do not relate to the needs of the society nor with the “specifications” of the stakeholders and consumers, and then does quality in this context suffer. The national policy on education enjoins the universities to design course content that will reflect our national requirements.

It there is a continuing mismatch between what is offered in the universities and what society needs, then regardless of the nature of what is offered, it would still in this quality context be of poor quality. Context here must also be aligned with adequate and appropriate materials, and equipment for teaching and learning. Workshops, laboratories, libraries and modern technology like ICT go as required with the context.

**Teaching:**

Teaching is separated here from teachers as a quality indicator because not much teaching goes on in the universities even with highly qualified academic staff in the department. Quality teaching involves not only possession of knowledge but also the ability to transfer knowledge, skills and attitudes to the learners. This is why the Educational public Policy envisages that all teachers in our educational institutions shall be required to undergo training in the methods and techniques of teaching these calls for training in methods and techniques in teaching.

**Teaching/Learning Environment**

Good learning environment promotes quality higher education. Environment here goes beyond the physical structures and beautiful aesthetic landscaping. Important though these are to quality learning, it includes adequate policies and practices, which prohibit students and teacher harassment, examination malpractice, cultism and attendant violence. It connotes good academic culture. At the early stages of University development in Libya there was adequate classrooms, offices hostel accommodation for students, large auditoriums for universities wide activities. The campuses were student friendly. With the radical increase in student enrolment that were not matched with corresponding improvement in facilities and funding, the existing facilities were over-stretched and ill maintained. They can no longer support the programmes of the universities leading to improvisation that have affected quality:

**Measurement and Evaluation**

Quality must be measurable and clearly defined. In other words, there should be clearly defined learning outcomes such as knowledge, attitudes and skills expected of anyone who has gone through any course of study in the university. There must be suitable ways of assessing these at university and national levels. From our discussion of indicator of quality education, we can identity possible assurance mechanism in the university. These are

1. Students admission policy
2. Recruitment and selection policy of academic staff
3. Circular policy (academic programmes)
4. Supervision of instruction and teaching effectiveness.

We here discuss how these mechanisms can be put in place if they are not already being used and or strengthened if they are:

**Student Admission policy:**

Students are the raw materials that are taken into the university, processed and turned out on graduation as finished products to employers and society as customers. Admission standards in excellent universities are very high indeed. Only the finest candidates meet the requirements. The position of this presentation is that this move be strengthened to recover the autonomy of universities in determining their raw materials. Also that policy enrollment and admission to the university level requirements.

**Recruitment and Selection of Academic Staff**

The universities have autonomy in this regard. They recruit and select their staff. The only limitation here is that they cannot fix their remuneration outside the authority approved structure which unfortunately cannot attract desired teaching personnel from anywhere in the world. Even at the present level of enhancement, the remuneration package of the Libyan university teacher is still lower than the average in the Arab world and this becomes an impediment to attracting lectures in relevant areas from some Arab countries, Europe, America, Japan and other key Asian countries.

The concept of the university requires that its academic staff disposition is universal in profile. That is why some culture specific programmes like foreign languages and high technologies, modern studies, Institutions of American and European Studies etc should for purposes of universal relevance and comparison have on their teaching staff, specialists from those cultures. Since quality has to do with relevance this obviously has a quality assurance implication.

**Circular policy**

This is a quality context. Quality assurance in the university must have to do with the relevance of the programmes. There must be societal justification for every programmed on the curriculum. It must be social, economic, political, cultural, environmental or some or all of these. This sees quality as relevance. It must have utility. It must not be an abstraction. Any Libyan University in the following areas can assure these:

1. Periodic review of existing programmes to check on flaws breakdowns. This can be done every two years or by one year.
2. Review of objective in the light of changing needs and demands of the society.
3. Ensure that the procedure for modifying programmes (deletion and addition of courses) is not cumbersome. This way, outdated and irrelevant courses are quickly removed and new ones added.

**Supervision of Instruction and Teaching Effectiveness**

The quality of teaching has considerably declined in the Libyan universities. This may well be the reason why the National Policy on higher Education provides that all teachers in our national institutions shall be required of undergo training in the methods and techniques of teaching. Possession of knowledge is one thing; ability to transfer it to others is another. That is why university professor is discipline and teaching a profession.

In his inaugural lecture on the improvement of instruction and teacher effectiveness in our higher educational institutions, recommended among other things that student ratings of lecturers teaching at the end of courses) should be augmented by other approaches in making promotion decision on lecturers. That is why one cannot publish at the expanse of teaching and expect a favorable appraisal. They should complement each other.

**Conclusion**

This presentation have examined the necessity for quality assurance institutionalization in the Libyan university institution, and provided her as an indicators and concepts presented to the new public policy makers in new Libya. The indicators of quality, the production function of the university and the strategies universities can adopt, in the Libyan education system, to assure quality of their products.

It has becomes clear that universities have heavy responsibility in this regard. A task must be done because a system that does not assure quality of its products in a global market that is competitive will eventually become unsustainable. We must however realize that many if not all the strategies discussed here have funding implications. Those whose responsibility it is to fund universities should take those it is to manage these funds should take even more note actions so that the university institution in new Libya can truly begin to fulfill its mission.

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Assessment of Creativity Level of Secondary School Students in Moro Local Government Area of Kwara State, Nigeria

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Abstract

This study examined the creativity level of Upper Basic Secondary School Students in Moro Local Government Area of Kwara State. Descriptive survey was adopted for this study. Simple random sampling technique was used to select seven ( 7) Universal Basic Education (UBE) schools out 21 UBE schools in Moro Local Government Area of Kwara State. Also, thirty (30) students were randomly selected across 7 schools and the total numbers of 210 students were selected. Creativity assessment scale, adopted from Animasahun (2007) was used to measure the creativity level of the students. Two research questions were postulated and answered with percentage. The findings of the study revealed that the creativity of Universal Basic Education students was low and that male students are more creative than female students. On the basis of these findings, the following recommendations were made among others that teachers should always use methods that would promote creativity among students. Similarly divergent thinking should be promoted among students by encouraging open-ended questions. Conducive learning environment should be provided for the students so as to enhance creative potentials.

**Keywords:** Creativity level, Kwara state, Nigeria

**Introduction**

Creativity is a basic tool for progress in any society or a community. It is so important that any society that wants to make headway in any area of development must not lose sight of it. The conditions of modern day living, characterized by complexity and interdependence, technological and communication advances and rising expectations, call for increased levels of creativity (Mars, 1981).

Getzel (2003) stated that creative thinking is the highest of mental function and creative production, the peak of human achievement. According to Nwazuoke (1991), million of people lived in miserable conditions in life. The situation today is much more terrible when compared with the assertion of Nwazuoke (1989). The society needs creative talents to promptly attend to the resurging problems which emanate from miserable conditions of the present time. The creative talents have the responsibility of transforming the economy so that the populace would benefit from the products of their creative genius.

As the society becomes complex, there is a gradual increase in the awareness of people that the methods used yesterday do not effectively solve contemporary problem of the society (Akinboye,1985). This probably because innovations are needed in nearly on the facets of the society. It would appear, therefore that creativity, initiative and originality are typical attributes needed to solve the problems of the society. Similarly, the brain is believed to have a significant role in creative ability of individuals.

According to Craft (2000), each of the two hemispheres of the brain appeared to have its own area of specialization, and processes information in its own ways. In the normal brain, the hemispheres communicate with each other through the corpus callosum, the mass nerve fibre which bridges the hemispheres. For the great majority of the population, it is the left hemisphere that controls logical, linear thinking. This is the side that can compute mathematics, remember names, learn to read and memorize. By contrast, the other hemisphere is the part of the brain where metaphors are understood, where emotions are felt and where dreams, imageries and fantasy occur.

According to Swassing (2002), to use creative ability and work creatively are considered admirable goals by majority of people. People viewed creativity as the ingredient needed to solve world problems. Therefore, there is need to provide specific direction and encouragement for our school children to nurture creativity in them. Creative potentials begin between ages six and twelve years. Oduolowu (2001) asserted that a child is not like a piece of wax or a lump of clay but self-generating force. Children’s growth and development are seen as unfolding latent abilities according to natural plan. There is need to provide variety of activities for the students to explore their creative potentials.

Studies conducted by Okon (1983), Olasehinde (1986) and Akinboye (1987) showed that from the beginning of human race, very important inventions have been made possible through the creative ability of individuals. The inventions made by the early man could be seen as a manifestation of man’s creative ability, resulted in the production of fire and some hunting implements to satisfy his immediate needs. Due to the complex and sophisticated nature of the society, old methods are no longer adequate for handling the modern day problems. Hence, the need for today’s future leaders to be more creative than the older generations.

**Statement of the problem**

Creative potential has been eroded away gradually in Nigerian educational system due to methodology adopted by most teachers in both the public and private schools. This perhaps results into the perpetual failure of students in public examinations. The rate of unemployment increases in Nigeria every day as a result of failure to give recognition to the issue of creativity in schools. Most of the developed countries like China and Japan recognized the importance of creativity and pay attention to it right from the formative stage of their children and this has helped their youths to be productive, innovative and make use of their creative potential to develop the society. For Nigeria to improve technologically, efforts should be intensified to promote creativity among the youths starting from the primary school up to the tertiary level.

In a research conducted by Sunday (2000) at University of Ilorin where he found that there is a significant difference between creativity and students’ achievement in science subjects. Similarly, Ijanaku (2007) examined the relationship among creativity, intelligence, achievement motivation and academic performance at University of Ilorin. Also, Akande (2004) examined the relationship between intelligence and creativity where he found out that there is positive correlation between creativity and intelligence. From the foregoing, there is a gap to fill in term of measuring the creativity level of Universal Basic Education Students (UBE) in Moro Local Government Area of Kwara State.

**Purpose of the Study**

The purpose of the study is to examine the creativity level of Universal Basic Education students in Moro Local Government Area of Kwara State. Specifically, this study would examine the creativity level of male and female Universal Basic Education students in Moro Local Government Area of Kwara State.

**Significance of the Study**

The findings of this study will assist the school administrators to know the importance of promoting creativity among students and create enabling environment that will enhance creativity. It will also help the teachers at the various levels of the institutions to know the appropriate methods to be used in order to encourage creative thinking among their students. In addition, students’ inquisitiveness and curiosity should be nurtured by the teachers. Parent is the first teacher a child is usually exposes to immediately after birth, for this reason, parents need to know what creativity is all about so that they will not ignorantly kill the spirit of creativity in their children. This study will sensitize them on how to promote creative acts among their children and help them to sustain it.

**Research Questions**

The following research questions were postulated for this study:

1. What is the creativity level of Upper Basic Secondary School Students in Moro Local Government Area of Kwara State ?
2. What is the Creativity level of Upper Basic Secondary School Students on the basis of gender in Moro Local Government Area of Kwara State?

**Literature**

Creativity and innovation are the most fundamental of all human resources and skills. The quality of thinking determines the quality of human prosperity and well being. This is why the more creative and innovation a person is, the more self-reliant he becomes to enrich the quality of his own life, his family, group, community and society at large (Akinboye, 2003).

Creativity enables human beings to get the most out of experiences and resources. Creativity and innovation are cheapest way of getting benefit from any existing assets. Creativity and innovation are the ways of dynamic change, leaps of progress and channels of success. Creativity and innovation propel organizations, catapult careers, and generate potent growth and viable outcomes. Creativity and innovation generate wealth and success, thus creativity plus innovation equals success (Akinboye, 2003)

Creativity produced actionable ideas, new concept, designs and opportunity, while innovation adds value to the creative outcomes. This is why creative is described as the currency of contemporary economy. Without creativity, man is not able to make full use of innovation and resources available, but locked up in old habits, structures, patterns, concepts and perceptions. Creativity, general thinking, perception dynamics, constructive and design thinking plus innovation, should form the basis of any programme designed for sustainable development ( Akinboye, 2007)

Creativity is a mental and social process involving the generating of new ideas or concept. Creativity is fueled by the process of either conscious or unconscious insight. Creativity is the most essential of all human resources and skills. Any society that lacks creative knowledge will not develop. In other words, there is no nation or society that can develop without the creativity. Akinboye (2004) viewed creativity as a tool that propels organization, catapults careers and generate potent growth and viable outcomes. For a sustainable development in any field of human endeavour, generative thinking, perception, dynamics, construction and design should be the key.

**Creativity and Intelligence**

A lot of studies have been conducted to examine whether creativity and intelligence have positive correlation. Some of the researches found negative correlation between creativity and intelligence. For example, Getzels and Jakson (1988) found out in their study of gifted students that intelligence plays a smaller role than personality, in determine creativity. This agreed with Tylor (1986) earlier study which found intellectual ability to less important than special kinds of thinking and motivation factors. Baron (1988) maintained that the creative power of an outstanding order is marked by the voluminous production of acts, which can claim a notable degree of originality, summarily all creatures and creators. But we are different both in our quality as creators, and in our prayer to create. This because, the great original thought or ideas are those which are not only new to the person who thinks them but new to almost everyone else.

Ripples and May (1992) compared children representing the entire range of intelligence quotient from very low to very high in sample as moderate. Positive correlations were found between intelligence quotient and measures of specific divergent thinking abilities. Although, there were moderate positive correlations between divergent thinking and intelligence quotient, the correlations are not high enough to justify using intelligence test to identify students who are high in creativity (Good and Brophy,1995).This is in agreement with Egan and Kauchak (1999) who observed that many children who are very high in intelligence as measured by intelligence quotient are not concomitant high in such other intellectually functions as creativity. Also, many children who are high in creativity are not concomitantly intelligence, as measured by intelligence tests. It is a fact that students of high intelligence quotient vary markedly in creativity, while highly creative children do not perform brilliantly well in intellectual tasks.

**Methodology**

This study employed descriptive survey research. Descriptive survey method was adopted for this study. According to Oniye (1995) descriptive survey is a systematic description of an event in a very factual and accurate manner. In this design, data obtained were used to analyze the conditions as they exist. There are 21 Universal Basic Education (UBE) Schools in Moro Local Government Area of Kwara State, out of which seven (7) schools representing 37% of the population were randomly selected. Thirty (30) students were randomly selected from each sampled school total 210 students used as sample.To obtain data from the respondents, the researcher adopted Creativity Innovative Scale (CIS) of Animasahun (2007). This test was used to measure the creativity level of the students. The test contains 20 items which are basically constructed to measure the creativity level of the students. Out of these items, 12 items were reversed because they are negative items. The test was rated on four likert scale Strongly Agree, Agree, Strongly Disagree, Disagree. The scores obtained from the test were interpreted using these categories;

High Creativity Level: The students that scores up to 130 on creativity and innovation scale adjudged to have high level of creativity. Moderate Creativity Level, the student that scores within the range of 120-130 on creativity and innovation scale. Low level of creativity, the students that score below 119 on creativity and innovation scale. To analyze the data obtained from the study, the researcher used percentage to answer the two research questions generated.

**Results**

Percentage was used to answer the two research questions postulated for this study.

**Research Question One**:

What is the creativity level of Universal Basic Education Students in Moro Local Government Area of Kwara State?

***Table One:*** *Percentage showing creativity level of Universal Basic Education (U B E) students*

*in Moro Local Government Area of Kwara State.*

|  |  |  |
| --- | --- | --- |
| Creativity Level | Frequency | Percentage |
| High level of creativity | 59 | 28% |
| Moderate level of creativity | 57 | 27% |
| Low level of creativity | 94 | 45% |
| Total | 210 | 100 |

Table 1 Shows that 210 respondents participated in this study, out of which 59 (28%) have high level of creativity, 57 (27%) of the students have moderate level of creativity and 94 (45%) have low level of creativity. This implies that reasonable percent of the students sampled have low level of creativity in Moro Local Government Area of Kwara State.

***Table Two:*** *Percentage showing the creativity level of male and female students of*

*Universal Basic Education (UBE) in Moro Local Government Area of Kwara State*

|  |  |  |  |
| --- | --- | --- | --- |
| Gender | Creativity level | Frequency | Percentage |
| Male | High level of creativity | 54 | 26% |
| Moderate level of creativity | 23 | 11% |
| Low level of Creativity | 13 | 6% |
| Female | High level of creativity | 15 | 7% |
| Moderate level of creativity | 26 | 12% |
| Low level of creativity | 79 | 38% |
| Total |  | 210 | 100 |

From Table, 54 (26%) of male students out of 210 students have high level of creativity, twenty three (11%) have moderate level of creativity while 13 (6%) have low level of creativity. Conversely, 15 (7%) out of 210 students sampled have high level of creativity, 26 (12%) of the male students have moderate level of creativity and 79 (38) have low level of creativity. From the table, it shows that more male students have high level of creativity that is 54 (26%) than female students.

**Discussion**

The finding of the study revealed that 28% of the students have high level creativity while 45% have low level creativity. The finding of this study supports the assertion of Nwosu (2004) which he affirmed that creativity cannot be created but be nurtured or cultivated and destroyed. The problem with educational system is that students are not taught in a way that enhances creative thinking and the assessment procedures do not reward creativity. This reason perhaps results into low creativity level of secondary school students in Moro Local Government Area of Kwara State.

Similarly, the finding of this study also revealed that boys are more creative than girls. The finding corroborated the work of Turker and Disser (1989) where they established that male performances are superior to their female counterpart in creative tests. Females are not allowed to take risks in the Africa context because of their nature. Stereotype is another obstacle because jobs are assigned on the basis of gender.

**Conclusion and recommendations**

Creativity is fundamental to self-reliance, the more self-reliant a person becomes, the better the quality of his/her life, family, community and society at large. Creativity enables human beings to get the most out of life experiences and resources. Creativity produces actionable ideas, new concepts, new designs and new opportunity while innovation adds values to the new products. In the light of this, effort should be intensified to promote creativity among students. Also, teacher is the gardener who needs to cultivate students’ potential so that they will grow into creative adults. From the foregoing, teachers at various level of the educational system should always encourage divergent thinking among their students as this will enhance their creative potentials. Also, good learning environment should be provided for the learners so that they can maximally tap their creative potential.

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Sources of Information for Social Studies Teachers and Their

Level of Usage in Abeokuta, Ogun State Nigeria

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Abstract

The study examined sources of information for teachers in social studies and their level of usage in secondary schools. The design of this study was descriptive of survey type. Data was collected from twenty-four (24) secondary schools and was randomly selected from Abeokuta north local government and Abeokuta south local government area of Ogun state, Nigeria. A total of ninety-seven (97) secondary schools female and male teachers of different age- grades, qualifications and experience were used as sample. Questionnaire was made use of for data collection. The questionnaire was the close ended likert- type technique that expresses degree of agreement or disagreement with he supplied statement. Data was analyzed using standard deviation, students- t-test statistics, mean and rank order. The findings of the study revealed that, teachers’ sources of information for social studies include reference materials, news papers, journals, literary materials, historical monuments and artifacts, television, textbooks, resource person, magazines, pamphlet, bulletins and radio. Computer component, such as e-mail, file transfer protocol, World Wide Web (www) rarely used by social studies teachers. Recommendations were made which includes computer training be provided for social studies teachers at all level of education in Nigeria and modern information centers with integrated circuits and digital communication to link schools should be provided at local levels for the use of teachers, particularly for social studies teachers.

**Keywords:** Information, Social Studies Teachers, Communication, Sources, Computer Component

**Introduction**

Social studies is a subject that depends on the use of a number of resources to ensure that its objectives are realized (Osakwe and Itejare 1993). Some of these resources maybe textual like books, audio-visual and human resources (Ahmed and Anmed 2005). Consequently, these resources are either used individually or collectively in any meaningful social studies teaching and learning situation. According to Adekunle (2003) instructional materials in themselves are not self instructing; they are only intended to be used to supplement normal daily teaching activities directed by the teachers. The extent teachers use multimedia strategies varies. It is only the unimaginative and unremorseful social studies teacher that would have students use only a single source of data, such as textbooks, magazine, newspapers and radio or more of these resources (Anyanwu 2003).

Ololube (2006) submitted that, employing instructional resources in the social studies classroom would require the teacher to exercise professional judgement about their relevance, how they are to be used, and for what purposes. Consequently, the use of any teaching resources in social studies would depend to a large extent on the professional competence and knowledge of the subject matter by the teacher (Adeyanju 2003). Through the computer/internet, teaching – learning process is made more effective, productive and enjoyable.It becomes expedient for nations and individuals to avail themselves the opportunities existing in this up-to-date information on virtually all issues. Social studies being a value-teaching subject and its teachers being driven and directed by value goals should align with new means of obtaining relevant information to complement and update the content of the subject. Social studies is flexible, dynamic and easily amenable to new information. Social studies teacher has the prerogative to include latest facts and ideas into the content (Babalola 1999).

Therefore, social studies teacher has the challenge to bring in every relevant information around the globe that can facilitate the acquisition of the necessary competencies. Hence, this study investigates resources of information for social studies teaching and their level of usage (Yusuf 1998), Osofisan (1998) iterated that the fluidity of information flow in the world today is very high. Information technologies have made the spread of facts, opinion, ideas, discoveries, innovation and inventions across national and continental boundaries so easy. This is hyper-generation of information all round the world now. And these means are necessary to adequately complement the need to diffuse this information for the use of people of the world (Radlowed 1986). There is no doubt that, widespread education and information technological inventions had opened up the world into an era of easy access to social, economic, political and scientific information. And by this, dynamic change occurs in value system of societies at highly short moment (Shibanda 2002, Akintunde 2003).

Adekunle (2003) examines the sources of information for social studies teachers and challenges for computer education in Oyo State. In the same vain, Akintunde (2003) examines the social studies teacher and global information dissemination in the classroom. Also Adeyanju (2003) examines teachers’ perception of the effects and use of learning aids in teaching. Their studies revealed that teachers generally appeared less enthusiastic about utilizing the computer as source of information.

**Purpose of the Study**

The purpose of this study are to:

1. Reveal teachers sources of information for social studies teaching.
2. Unfold the extent of use of computer as a source of information.
3. Afford social studies teachers easy means to fact, ideas and opinion around the world through which they could obtain fresh information to up-date their content.

**Research Questions**

1. What are the sources of information teachers utilize in social studies?
2. What is the level of use of computer as source of information for social studies teachers?
3. Is there any significant difference between male and female teachers on their level of use of computer as a source of information?
4. Is there any significant difference between junior and senior teachers on their level of use of computer as a source of information?
5. Is there any significant difference in the sources of information being used by male and female teachers?
6. Is there any significant difference in the sources of information being used by junior and senior teachers?

**Methodology**

The design of the study is descriptive survey. The population of this study consisted of social studies teachers in twenty four (24) secondary schools, in both Abeokuta South and Abeokuta North Local Government Area of Ogun State, Nigeria. Stratified random sampling technique was used to select ninety –seven (97) participants. A structured questionnaire was the instrument for data collection. The instrument contains twenty items that enable the researchers test the research questions. The collected data was analyzed using standard deviation, mean, rank order and student t-test statistic.

**Research Question 1: What are the sources of information teacher utilize in social studies.**

***Table 1:*** *Sources of Information for Social Studies Teachers.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Items** | **Mean** | **STD** | **Rank** |
| 1. | Textbooks | 3.00 | 0.99 | 2 |
| 2. | Journal | 2.96 | 0.78 | 5 |
| 3. | Newspaper | 3.02 | 0.91 | 3 |
| 4. | Magazines | 2.81 | 0.88 | 8 |
| 5. | Pamphlet & bulletin | 2.78 | 0.89 | 10 |
| 6. | Reference materials | 3.30 | 0.79 | 1 |
| 7. | Literary material | 2.96 | 0.85 | 5 |
| 8. | Television | 2.81 | 0.88 | 8 |
| 9. | Radio | 2.55 | 1.00 | 11 |
| 10. | Monument and artifact | 2.99 | 0.80 | 4 |
| 11. | Resource person | 2.82 | 1.00 | 7 |

Table 1 shows that item 6 has the highest mean followed by items 1, (textbook) 3, (newspaper) 10, (monument and artifact) 2, (journal 7, (literary materials) 4, (magazine) 8, (television) 5, (pamphlet and bulletin and 9 (radio) respectively. It therefore shows that the sources of information is through reference materials followed by textbooks, newspaper, monuments and artifact, journals, literary materials, resource person, magazines, television, pamphlet and bulletin and radio which is the least source of information. Under this table all the means are greater than 2.5 which indicate that they are high values i.e. they are all good sources of information for social studies teachers.

**Research Question 2: What is the level of use of computer as source of information for social studies teachers?**

***Table 2:*** *Level of Use of Computer in Social Studies Education*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Items** | **Mean** | **STD** | **Rank** |
| 12. | e-mail | 2.29 | 1.03 | 5 |
| 13. | File transfer protocol | 2.11 | 1.03 | 6 |
| 14. | News groups | 2.88 | 0.93 | 1 |
| 15. | World wide web | 2.40 | 1.12 | 4 |
| 16. | Internet | 2.70 | 1.08 | 2 |
| 17. | Computer generally | 2.64 | 1.06 | 3 |

From table 2 item 14, (news group) has the highest mean followed by items 16, (internet) 17, (computer generally) 15, (World Wide Web) 12 (e-mail) and 13 (file transfer protocol) respectively. This implies that the use of computer is majorly on news group followed by internet, computer generally; World Wide Web, e-mail and file transfer protocol is the least. Out of the six items here, the means of 3 are high i.e. items 14, 16 and 17 while the means of others are low i..e items 15, 12 and 13 because their means are less than 2.5.

**Research Question 3:** **Is there any significant difference between male and female teachers on their level of use of computer as a source of information?**

***Table 3:*** *Difference in the Level of Use of Computer between Male and Female Teachers.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **N** | **X** | **SD** | **df** | **tc** | **Sig.** |
| Male | 35 | 14.23 | 5.07 | 95 | 1.34 | 0.18 |
| Female | 62 | 15.41 | 3.92 |

Table 3 shows a small t-value (1.34) and a significance (0.18) higher than 0.05. This indicates that the difference is not significant at 0.05 level. Therefore there is no significant difference in the level of use of computer between male and female teachers.

**Research Question 4: Is there any significant difference between junior and senior secondary schools teachers on their level of use of computer as source of information?**

***Table 4****: Difference in the Level of Use of Computer by Junior and Senior Secondary School Teachers.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **N** | **X** | **SD** | **df** | **tc** | **Sig.** |
| JSS | 80 | 15.1 | 4.5 | 95 | 0.14 | 0.89 |
| SSS | 17 | 14.9 | 4.2 |

From the table, the t-value (0.14) is small and the significance (0.89) is greater than 0.05. This indicates that the differences is not significant at 0.05 level. Therefore, there is no significant difference in the level of use of computer by the junior and senior secondary school teachers.

**Research Question 5: Is there any significant difference in the sources of information being used by male and female teachers**

***Table 5:*** *Difference in the Level of Access to Source of Information for Male and Female Teachers.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **N** | **X** | **SD** | **df** | **tc** | **Sig.** |
| Male | 35 | 31.34 | 5.06 | 95 | 0.94 | 0.35 |
| Female | 62 | 32.31 | 4.76 |

The table reveals at t-value (0.94) and a significance (0.35) which is greater than 0.05. This indicates that the difference is not significant at 0.05 level. Therefore, there is no significant difference between the sources of information being used by the male and female social studies teachers.

**Research Question 6: Is there any significant difference in the level of sources of information being used by Junior and senior secondary school teachers?**

***Table 6:*** *Difference in the level of access to sources of information for Junior and*

*senior secondary school teachers*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **N** | **X** | **SD** | **df** | **tc** | **Sig.** |
| Male | 80 | 31.95 | 4.73 | 95 | 0.04 | 0.97 |
| Female | 17 | 32.00 | 5.64 |

From the table, the t-value (0.04) is very small compared with the large significance (0.97) which his greater than 0.05. This shows that the difference is not significant at 0.05. Therefore there is no significant difference between the sources of information being used by junior and senior secondary school teachers.

**Discussion of Findings**

The result of the research question 1 according to the table shows that there is almost no significant difference between female and male teachers on their level of use of computer. In particular, the use of computer (i.e. internet as source of information is about (0.18) high than 0.05. This indicates that the difference is not significant at 0.05 level. That is, what male teachers use in getting information does not affect what female teacher use and vice versa. The findings of the study corroborates Adeyanju (2003) that through the computer/internet, teaching and learning process is made more effective.

In order to master how to get necessary information, the social studies teachers have to acquaint himself with information system. The primary vehicles for the purposeful, orchestrated processing of information are called information systems. There are the constructs that collect, organize, store, process and display or retrieve information in all its form raw data, interpreted data, knwoeldge and expertise and formats (video computer/internet and voice). The purpose of such system is to have access to and use knwoeldge that has been recorded (Adekunle 2003).

From the table, the t-value (0.41) is small and the significance (0.89) is greater than 0.05. This indicates that the difference is not significant at 0.05 level. Therefore, there is no significant difference in the level of use of computer by the junior and senior secondary school teachers. This was buttressed by the study of Akintunde (2003) that social studies teachers rarely source for information from internet to teach their students.

The level of use of computer as a source of information is very poor, most probably because of its accessibility and cost. Therefore the senior and junior teachers in both local governments in Abeokuta township of Ogun State find it difficult to use computer as a source of information. The findings of the study tallies with the study of Adekunle (2003) that social studies teachers hardly use computer to teach.

However, recent studies have shown an increase interest of teachers to use computer in social studies teaching, (Adesoji, 1996 and Yusuf, 1998).

The Table reveals t-value (0.94) and a significance (0.35) which is greater than 0.05. This indicates that the difference is not significant at 0.05 level. Therefore, there is no significant different between the sources of information for male and female teachers. The Table clearly shows that social studies teacher in public and private school in both Abeokuta North Local Government and, Abeokuta South Local Government Area, regardless of their gender and level of placement use all the media of information. Result from the table also shows that there is almost no difference between how male teachers source for information and how female teachers source for theirs.

From the Table the t-value (0.04) is very small compared with the large significance (0.97) which is greater than 0.05. This shows that the difference is not significant at 0.05. Therefore, there is no significant difference between the sources of information for junior and senior secondary school teachers.

We can deduce from the table that there is no level of significant difference in what senior staff use in getting information and what junior staff used. As such, whichever media the senior members of staff use is exactly what the junior members of staff would use and vice versa. Probably, the senior staff mandates the junior staff on what to use or junior staff challenge the senior staff on what to use as source of information. Ass additional information, it does not matter whether they are teachers teaching in public school or private, the percentage of the use of textbooks and other printed materials are very high, virtually higher than the percentage of use of other sources of information (Osofisan, 1998).

**Conclusion**

The result of this study indicates that generally, most teachers are not aware of the wealth of information available for enriching, social studies education in the areas under study. This may be due to their limited exposure to computer, magazines, television, Radio, Journals, Historical monument and Artifacts, Pamphlet and bulletin. The low ranking and low percentage of the level of use of computer, Radio, Television, bulletin and Pamphlet, magazines are indications that teachers depend mostly on textbooks, reference materials, Literary materials and newspapers are sources of information in social studies. The heavy reliance on textbooks and other printed materials as the source of information needs to be de-emphasized in favour of the array of world-wide latest information on the internet, radio, television, journals and magazine.

The most significant technological trend in information technology over the next decade or two appears to involve the digitizing, storage, retrieval and distribution of any kind of information, linguistic or graphic to our numerous homes. It is evident that electronic document will gradually replace printed documents. Hence the need to improve our orientation to match with time and prevailing changes. Against this background therefore, the government and educational implementer should enhance globalization of social studies education through information technology.

**Recommendations**

Based on the findings, the following recommendations were made.

* There should be an awareness programme on the benefit of using computer as a source of information.
* The government and private schools owners should make online services very accessible and affordable.
* The government and private schools owners should provide current textbooks, magazines and journals in schools.
* The senior members of staff should use up-to -date medium of information as the junior members of staff look up to them.
* More computers should be made available in all secondary schools for benefit of both teachers and *the* students.
* Teacher should be given allowances to use in sourcing for information from internet through computer.

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Comparative Study of Data Mining and Statistical Learning Techniques for Prediction of Cancer Survivability

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Abstract

Huge efforts are being made by computer scientists and statisticians to design and implement algorithms and techniques for efficient storage, management, processing, and analysis of biological databases. The data mining and statistical learning techniques are commonly used to discover consistent and useful patterns in a biological dataset. These techniques are used in a computational biology and bioinformatics fields. Computational biology and bioinformatics seeks to solve biological problems by combining aspects of biology, computer science, mathematics, and other disciplines (Adams, Matheson & Pruim, 2008). The main focus of this study was to expand understanding of how biologists, medical practitioners and scientists would benefit from data mining and statistical learning techniques in prediction of breast cancer survivability and prognosis using R statistical computing tool and Weka machine learning tool (freely available open source software applications). Six data mining and statistical learning techniques were applied to breast cancer datasets for survival analysis. The results were mixed as to which algorithm is the most optimal model, and it appeared that the performance of each algorithm depends on the size, high dimensionality of data representation and cleanliness of the dataset.

**Keywords**: Data Mining, WEKA, R tool, Computational Biology, Bioinformatics

**Introduction**

The advancement of medicine now relies upon the collection, management, storage, and analysis of large biological datasets. Data mining, statistical and machine learning techniques are the process by which new knowledge is extracted from a dataset. According to Mitchell (1997), the definition of machine learning is as follows: “A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P, if its performance at tasks in T, as measure by P, improves with experience E” (p. 2). Data mining, statistical and machine learning are based on inductive inference, a process of observing a phenomenon, then building a model for that phenomenon and making predictions using the model.

In this study, the results of a comprehensive comparative study of the following data mining, statistical and machine learning algorithms was examined:, Support Vector Machines (SVM);, RandomForest;, AdaBoost, Bagging;, Boosting;, Decision Trees and Artificial Neural Networks (ANN) classifiers algorithms. The main focus of this research was to study the effective classification learning techniques for prediction of breast cancer survivability. In other words, can one algorithm or techniques be more effective at predicting survivability over others.

There are two main aspects in prediction of cancer survivability: accuracy (how true is the algorithm’s prediction), and efficiency (how fast can the algorithm execute the prediction task). Data reduction technique was applied to the dataset and obtained a reduced representation of the breast cancer dataset. The resulting data set was much smaller in volume, yet closely maintained the originality of the data (Han, & Kamber, 2006). The R PCA function was used to reduce the large dataset (the patients in this case) to smaller components of objects related according to their expression patterns with tumor size.

Classification algorithms are the most common data mining and machine learning algorithms, often used for data analysis in both industry and academia. Classification is a supervised learning algorithm used to map a dataset into predefined groups or classes. The biological datasets from the National Cancer Institute (NCI) biological database system was used to find the prediction rate of each algorithm and comparative studies of the algorithms were performed in order to find the optimal classification model.

R and Weka software were used to analyze the breast cancer dataset. R is open source statistical analysis software (R Development Core Team, 2010), and Weka is open source machine learning application software that can be used to normalize and analyze datasets.

**Methods**

The exponential growth of the amount of biological data available raises two problems: on one hand, efficient information storage and management, and on the other hand, the extraction of useful information from these data. The second problem is one of the main challenges in computational biology, which requires the development of an effective computational analysis tool and is the problem that was presented in this study.

For many studies in medicine, researchers are interested in assessing the time it takes for an event to happen. Very often, the event is an outcome, such as diagnosis or death, but the outcome may also be other measurable parameters, such as onset of disease or relapse of disease. There is a term that describes the period leading to the event, called survival time. Furthermore, survival analysis is the term used to describe the investigation into the patterns of these events that occur within one or more cohorts in a study (Thongkam et al. 2007). In dealing with the analysis of survival data, researchers are interested in the length of time it takes a patient to reach an event rather than simply the fact that the event has or has not occurred.

There are at least two ways to motivate why particular data mining and statistical learning techniques were suitable for a particular learning task (Joachims, 2001). One way was through comparative studies and the other was through benchmarking (Joachims, 2001). This research study was based on comparative study of data mining and statistical learning techniques. Each of the data mining and statistical learning techniques is briefly discussed below.

Support Vector Machine (SVM) was mainly developed by Vladimir Vapnik and is based on the structural risk minimization principle from statistical learning theory. SVM algorithm uses a nonlinear mapping to transform original training data into higher dimensions. Then SVM searches for the linear optimal separating hyperplane within the new dimension. The hyperplane is the decision boundary separating the datasets of one class from another. The SVM finds this decision boundary using training sets or support vectors, and margins defined by the support vectors. SVM is very accurate due to its ability to model complex nonlinear decision boundaries and is, less prone to overfitting problem, but according to Han & Kamber (2006), SVM is very slow when compared with other classification algorithms (Vapnik, 1998, Han & Kamber, 2006).

The decision tree algorithm is the most popular algorithm in data mining classification technique because it is easy to understand how it makes predictions. There are many decision tree algorithms for constructing a decision tree, such as ID3, C4.5, SLIQ, Scalable Parallelizable Induction of Decision Tree (SPRINT), etc. There are two phases in generating or creating a decision tree, namely the tree-growing phase and tree-pruning phase. In the tree-growing phase the algorithm starts with the whole data set at the root node. The data set is partitioned according to a splitting criterion into subsets. This procedure is repeated recursively for each subset until each subset contains only members belonging to the same class or is sufficiently small. In the tree-pruning phase, the decision tree is reduced in order to improve time complexity and prevent overfitting (Kleissner, 1998, Sattler & Dunemann, 2001).

AdaBoost is one of the most powerful learning ideas introduced in the past twenty years. It was originally designed for classification problems, but has been extended to regression as well (Hastie, Tibshirani, & Friedman, 2001). AdaBoost is a popular ensemble method and has been shown to significantly enhance the prediction accuracy of the base learner (Thongkam, Xu, Zhang, & Huang, 2007). It is a learning algorithm used to generate multiple classifiers and to utilize them to build the best classifier (Schapire & Singer, 1999). The process of boosting is to combine the outputs of many weak classifiers to produce a powerful classifier. The predictions from the weak classifiers are then combined through a weighted majority vote to produce the final prediction (Hastie, Tibshirani, & Friedman, 2001). The advantage of this algorithm is that it requires less input parameters and needs little prior knowledge about the weak learner (Thongkam, Xu, Zhang, & Huang, 2007).

The study of artificial neural networks (ANN) was inspired by attempts at mimicking the brain functionality (Tan, Steinbach, & Kumar, 2006). Neural networks represent an alternative computational paradigm, which has received much attention in the past few decades (Hertz, Krogh & Palmer, 1991). Neural networks are capable of predicting new classes based on past examples after executing a process of learning. There are two phases in the processes of training the artificial neural network: learning and recalling. Networks are trained by inputting a training dataset with the target data. Weights are adjusted until the outputs reach the desired training outputs. The goal is to minimize the error, which is the difference between the target output and desired output. After learning, the testing dataset would be applied to the artificial neural network to estimate the desired output and determine the performance of learning.

The general approach that was used for predictive model building in this research is as follows:

1. Create training and testing datasets.
2. Apply a data mining/statistical learning technique to the training set.
3. Generate the predictive model.
4. Evaluate model using testing dataset.
5. Repeat step# 2 with other techniques.
6. Compare performance between techniques.

The breast cancer dataset consists of five categories of patient data, as shown in Table 1, that exist for more than 62,000 breast cancer patients diagnosed in the United States between 1990 and 1997. Thus, all files contain variable data for the same group of patients. The dataset originated from The Surveillance, Epidemiology, and End Results (SEER) Program of the NCI. Most of the data, including pathology, diagnosis, and treatment, are real and excellent biomedical dataset. The demographic data, however, was partially artificial due to patient’s privacy, as the original dataset from SEER is completely anonymous. This identifier acts like a hospital record number of a patient but is purely fictitious, as the original data is anonymous. Variables for the complete patient dataset are shown in Table 1.

***Table 1.*** *Patient Dataset Variables*

|  |  |  |
| --- | --- | --- |
| **Table Name** | **Attribute Name** | **Attribute Description** |
| Demographic data | patientid | unique patient identifier (artificial) |
|  | dateofbirth | patient date of birth (artificial) |
|  | maritalstatus | marital status at diagnosis |
|  | race | patient ethnicity |
|  | ageatdiagnosis | age at diagnosis |
|  | alivestatus | patient alive or dead |
|  | survivaltime | survival time from date of diagnosis |
|  |  |  |
| Diagnosis data | patientid |  |
|  | yearofdiagnosis | year of diagnosis |
|  | histology | histologic type of tumor |
|  | primarysite | site of primary tumor |
|  | numberofprimaries | number of primary tumor |
|  |  |  |
| Pathology data | patientid |  |
|  | Grade | tumor grade |
|  | Nodesexam | number of lymph nodes examined |
|  | Nodespos | number of positive lymph nodes |
|  | Extent | extent of disease |
|  | Nodalstatus | status of lymph node involvement |
|  | Size | size of tumor |
|  | Pgr | progesterone receptor status |
|  | Er | estrogen receptor status |
|  |  |  |
| Staging | patientid |  |
|  | Stage | stage of tumor |
|  |  |  |
| Treatment | patientid |  |
|  | Surgery | surgery regime received |
|  | Radiotherapy | radiotherapy received |

There are a number of methods that can be used to transform data variables into forms that are usable by data mining algorithms. The Weka data-mining tool was used for the preparation of the breast cancer datasets for mining.

The PCA data reduction method (prcomp( ) function) in R statistical program was used to reduce the dataset. PCA is a statistical method routinely used to analyze interrelationships within a large set of data, revealing common underlying factors or components. PCA examines the correlations between the original data values and condenses the information contained within objects into smaller group of components with minimal loss of information.

According to Thongkham et al. (2007), stratified 10-fold cross-validation is a common validation method used to minimize bias and variance associated with random sampling of the training and test datasets. Also, it is a common method for data selection in machine learning related to medical and biological research. The stratified 10-fold cross-validation process was used in this study in evaluating and validating the predictive model. The process consists of four steps as follow (Thongkam et al. 2007):

1. Divide the dataset into a set of subclasses.
2. Assign a new sequence number to each set of subclasses.
3. Randomly partition the subclass into 10 subsets or folds.
4. Combine each fold of each subclass into a single fold.

The Weka data mining tools support automatic splitting of a data set into training and test sets using either a straight percentage splits or through k-fold cross validation.

**Results**

This section discusses analysis of the breast cancer dataset by various methods.

Analysis was begun by performing logistic regression on the complete 10-year survival dataset. The *summary( )* function was used and *length* on the *alivestatus* factor to determine the number of rows for each outcome, as well as the total number of patients as

shown in table 2.

***Table 2.*** *Total Number of Patients*

|  |
| --- |
| Total Number of Rows in the Dataset |
| 0 Number of live patients 11,714  1 Number of dead patients 3,480 |
| Total number of patients 15,194 |

The number of patients alive after 10 years (row 0) is more than three times the number of patients that have died (row 1). To create a logistic regression model, glm( ) function is called, which provides a model that is an equation to predict whether a patient will survive 10 years. To evaluate the predictive ability of the model, we used the predict( ) function to predict the probability of outcome for all cases in the dataset. The classification result of the logistic regression was 12,080 (11,301 + 779) correct predictions (true positive and true negative), and 3,114 (2,697 + 417) incorrect predictions, resulting in the overall accuracy of 79.5% (12,080/15,194). The precision was 80.7% (11,301/13,998). The recall was 96.4% (11,301/(11,301+417)).

Logistics Regression with Holdout: We repeated the logistic regression approach using the holdout method that contained lesser dataset to evaluate the model; the result was 1,482 (816 + 666) correct predictions (true positive and true negative), and 604 (392 +212) incorrect predictions, resulting in the overall accuracy of 71% (1,482/2,086). The precision was 67.5% (816/(816+392)). The recall was 79.4% (816/(816+212)).

Decision Tree Algorithm: The Weka’s J48 decision tree learner, based on C4.5 decision tree algorithm was used with default parameter setting to build a decision tree model for a 10-year survival dataset. The function was called J48 and is already implemented in RWeka. The precision for the model is 79.9% (2,485/(2,485+631)). The decision tree model was evaluated using the 10-fold cross-validation.

The multilayer perceptron learner algorithm in Weka with default parameter settings was modified such that it could serve as a Neural Network. The hidden layers parameter was set to one hidden layer with five nodes to build the artificial neural network model for a 10-year survival dataset. The function is called multilayerPerceptron and is already implemented in RWeka. The model was evaluated using 10-fold cross-validation and the original train.full\_1 dataset was used to build the model. The results was 72.94% accuracy in classification. The correct prediction was 4926/(4926+1827), which was 72.94% and incorrect prediction was 1827/(4926+1827), which was 27.1%. The kappa statistics was 0.523.

The next modeling approach was a support vector machine (SVM). The SVM algorithm implemented in Weka is called SMO (sequential minimal optimization). A significant factor in the SVM model-building process is parameter adjustment. The SVM model was generated using RWeka’s built-in function, SMO( ). Ten-fold cross validation of the SVM model was performed and the model was evaluated using the 200-instance test set.

The SVM model accuracy result on the full dataset was 68.4%, the correct prediction was 4620/(4620+2133), and incorrect prediction was 2133/(4620+2133), which was 31.6%. The kappa statistics was 0.3683 and the ROC area was 0.684.

We applied boosting to the breast cancer dataset using J48 decision tree as our model-building algorithm. To implement AdaBoost.M1, we called the AdaBoostM1( ) function and set the classifier algorithm parameter (W) to “J48” using Weka\_control( ). We evaluated the model by performing 10-fold cross-validation; the boosted model is then evaluated on the small test set. The boosting model accuracy result on the full dataset was 69.5%, the correct prediction was 4694/(4694+2059) and incorrect prediction was 2059/(4694+2059), which was 30.5%. The kappa statistics was 0.3902 and the ROC area was 0.759. The boosting model accuracy result on the 200\_test data was 73%. We applied bagging to the breast cancer dataset using the J48 decision tree. The bagging( ) function in Weka was called and set the classifier algorithm parameter (W) to “J48”. The model was evaluated by performing 10-fold cross-validation, the bagged model was evaluated on the small test set (200 instances).

The bagging model accuracy result on the full dataset was 68.84%, the correct prediction was 4649/(4649+2104), which was 68.84% and incorrect prediction was 2104/(4649+2104), which was 31.16%.

The RandomForest model was built using Weka’s RandomForest ( ) function, which is based on the same concept as the original Random Forest algorithm developed by Breiman (Breiman, 2001). Like boosting and bagging, the Random Forest model was created using the Weka’s RandomForest( ) classifier and evaluated the model by performing 10-fold cross-validation. Using Weka\_control() function, the RandomForest( ) function created 1,000 trees by setting the parameter I to 1000.

The Random Forest model accuracy result on the full dataset was 75%, the correct prediction was 5064/(5064+1689), which was 74.99% and incorrect prediction was 1689/(5064+1689), which was 20.01%.

The summary of the prediction results of the data mining and statistical learning algorithms are shown in Table 3. The SVM classifier is the only algorithm that did not improve when applied to the independent dataset with 200 records. The rest of the algorithms showed slight improvement when applied to the independent dataset.

***Table 3.*** *Prediction Results of the Algorithms*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type | Overall Accuracy – Full Dataset | Overall Accuracy – 200 Independent dataset | Precision – full dataset | Precision – 200 Independent dataset |
| Logistics Regression | 71% | 72.5% | 67.5% | 68.3% |
| Decision Tree – J48 | 70.17% | 71.5% | 71.7% | 74.2% |
| ANN MultilayerPerceptron( ) function | 72.94% | 73.04% | 74% | 74.7% |
| Support Vector Machine (SVM) using Weka’s Sequential Minimal Optimization (SMO) | 68.414% | 66.5% | 69.7% | 69.4% |
| Boosting- AdaBoostM1 | 69.5% | 73% | 70.2% | 71.7% |
| Bagging - Weka’s Bagging( ) function | 68.84% | 72% | 67.3% | 71.6% |
| Random Forest - Weka’s RandomForest function | 75% | 76.6% | 72% | 73.1% |

**Discussion**

The prediction of cancer survivability has been a major issue in medicine and biology. In this study, we have explored six different statistical and machine learning methods for generating predictive models for datasets with either binary or continuous response variables. It is critical that one does not apply classification or regression methods to datasets without having confidence that the methods are indeed suitable for data.

For the binary outcome survival status dataset, we generated six models from diverse statistical learning and data mining techniques. This was useful because it gave us a choice of models and indicated which model is superior by assessing the accuracy and precision. From the accuracy perspective, the best model is RandomForest (75.0%). We did, however, express concern about cost of predicting patients to survive 10 years but who actually die (False–Negative). If this is more important than overall accuracy or precision, our best model is produced by bagging (26.5% error) and the worst is the decision tree (33.3% error). The second best error rate for false-positive is Random Forest (30% error). Clearly there is much to think about even after we have generated the models, from this study, we can say the result of each model depends on the quality of the biological dataset, the size of the dataset and the representation of the dataset.

**Conclusion**

Medical institutions looking to undertake a data mining approach to solve biological problems could be well-served by including statistical learning and data mining processes in their analytical and intervention efforts. Computer scientists, medical researchers and statisticians need to look at their own biological data availability for variables that might potentially link to prediction of cancer survivability. The selection of variables in this study was based on computational biology and bioinformatics literatures, breast cancer dataset available and domain knowledge of the researcher.

Data preparation (data quality) could be the difference between a successful machine learning project and a failure and takes between 60 – 80% of the whole data mining or machine learning effort or process (Witten & Frank, 2005).

Findings indicate that none of the data mining and statistical learning algorithms applied to the breast cancer dataset outperformed the others in such a way that it could be declared the optimal algorithm. Additionally, none of the algorithm performed poorly as to be eliminated from future prediction model in breast cancer survivability tasks.

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Enhancing Quality Education in Nigerian Unity Schools Through Effective Supervision in a Changing Environment

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Abstract

It is the desire for the Federal Ministry of Education to improve the quality of teaching and learning in the Unity Schools. Supervision (internal and external) is an important component for quality education. This paper discussed the strategies for enhancing effective supervision, such as good leaders occupying principal position, effective communication and improved curriculum. It also stated the problem associated with effective supervision in achieving quality, which includes inadequate provision of infrastructure (buildings, learning and teaching materials), irregular training and re-training for staff and students, supervisors finding fault in the supervisee, partial or non implementation of proffered solutions by the government. The paper equally highlighted the usefulness of supervision and also made suggestions on how supervision could be improved to enhance quality education in a changing environment.

**Keywords:** Education, Supervision, Nigeria

**Introduction**

The second tier of education (secondary) is very important for the survival and progress of any nation in a changing environment like Nigeria, because it is an ingredient for the formulation of national policies which when implemented, will enhance growth and development.

In order to stamp out cultism, examination malpractice, bullying, fagging, stealing, sexual abuses, and other vices in our educational system, secondary education in Nigeria is expected to conform with the global reform agenda in terms of effective supervision which will bring about quality in our educational system. In unity schools, the workforce is made up of management staff, teaching and no-teaching staff and non-governmental organization, such as the P.T.A and the Old Boys Associations. Unity schools Old Boys Association is presently engaging government at all levels and the private sector on constructive, positive advocacy, actions and initiations geared towards revamping educational statements across our public schools. Input by these categories must be qualitative so that the process yield positive output. Supervision is a mechanism used for achieving quality in effective management and control of education.

It is the modern concept, which aims improvement of teaching and learning in a changing environment.

**What is Supervision?**

According to Nwagwu N. A., Ijeoma M. E. and Nwagwu C. C. (2004), supervision could be regarded as a concept with emphases on the improvement of instruction. These instruction could be policies, principles, rules and regulation. It is characterized by totally over seeing and evaluating all aspect of teaching and learning and physical facilities. According to Nnabua P. O. M, Okorie N. E., Agabi G. O. and Igwe L. E. W. (2004), supervision can be viewed as;

“All efforts of designated school officials directed toward providing leadership to teachers and other educational workers in the achievement of instruction. Involve the stimulation of professional growth and development of teachers, the selection and revision of educational objectives, materials of instructions and method of teaching, and the evaluation of instruction”.

The effectiveness of supervision will enhance leadership styles of both teachers and students, greater staff cooperation in terms of inter personal relationship, staff development, achievement of organization goals, resource procurement, greater participations of non-governmental organizations and appraisal.

Supervision is very essential in any formal organization for which secondary schools is one. Lack of effective supervision will mean that most task cannot be accomplished and organizational goals cannot be achieved, because it is expected that all the units that make up the components must be functional.

**Quality Education**

Generally the word quality in the views of Babalola J. B., Akpa S. O., Hauwa I. and Ayeni A. O. (2008) could be used to mean fitness for purpose. Thus it examines how efficient and effective the following are: administration teaching/learning and research in Education System. Quality in Education cuts across measurement and extent of conformity to set standards, formulation of policy as well as implementation of educational processes, curriculum content coverage, teaching/learning process, students and teachers performance evaluation and so on.

This goes to support Okorie N. C. and Ememe O. N. (2008) who are of the view that to achieve quality education, there is the need to put into use Total Quality Management as a complete management system that sees the Organization (School) in its totality or completeness with the aim of infusing the tradition of on-going organizational improvement. Quality education is very essential in Unity Schools as it is the determining factor of the extent learning has actually occurred in the learner. Babalola and etal (2008) relates quality in Education to factors, such as properly planned curriculum, strong and well articulated national goals, well stated assessment procedure and instruments, effective utilization of assessment outcomes as well as quality of students enrolled.

Quality Education can also be said to measure how good and efficient the teachers are, how adequate and accessible the physical facilities and teaching aids needed for effective teaching/learning are, as well as how the graduates are solving challenges in the field of work

Ebong J. M. and Afangideh S. T. (2009) equally contributed that quality could mean a standard against which performance and actions is measured. This means quality in Secondary Education in the Unity Schools has an all important role to play in terms of conformity to standard, effective teaching/learning process, that is, involving supervision, parents and client in quality process.

According to Babalola J. B., Akpa G. O., Ayeni A. O. and Adedeji S. O. (2007), quality in Education really means a multidimensional concept transferring every action which goes into making the process of education possible. They further maintained that quality education pervades all elements of the activities and programmes undertaken in the course of educating, and total benefits of educational activities to both the individual learner and the society at large. Babalola and etal (2007) contributed by stating that the following essential elements (inputs and processes) enhance quality in education.

1. The involvement of the society in programme development, acceptance and ownership.
2. Policy must be democratically formulated and articulated, adapted to suit local conditions.
3. The decentralization of management frame works, power and initiatives moved to the grass root level and enabling empowerment and autonomy for operations down the line.
4. The teaching force should be qualitatively, adequately educated/trained and professionally prepared.
5. The curriculum must be responsive to needs and aspiration of the individual and society, comprehensive in coverage and suitable to changing needs, time and conditions.
6. The infrastructure should be qualitative, aesthetic and equally adequate, should equally be learners and teachers friendly. Classroom, workrooms, recreational facilities, toilet and first aid facilities should be adequate.

Babalola J. B. and etal (2007) maintained that quality outcomes in =education can only be achieved through effective supervision of inputs and processes in the education industry such as Unity Schools.

Thus quality education in Unity Schools as applicable to all other sectors of education can only be achieved as supervisors effectively supervise all inputs and processes in Unity Schools ensuring accountability, full effective and efficient utilization of educational systems and services. This relates to the missions, contexts and declared objectives of the National Policy on education, focusing on the learner, the teacher, the teaching/learning process and output or outcomes measured in terms of knowledge, skills, attitudes which includes relevant and appropriate skills or tools to evaluate them.

**Strategies of Enhancing Effective Supervision**

One reason for the establishment of Federal Government Colleges in Nigeria is to encourage unity among different ethnic groups, religion, cultural backgrounds and economic, social and political aspect. It is important to note that for effective supervision to be achieved, the following strategies must be adapted.

1. Good leaders should take principal position. According to Hoy E. W. and Miskel G. C. (2008).

*“Leadership should be defined broadly as a social process in which a member(s) of a group or organization influence the interpretation of internal and external events, the choice of goals or desired outcomes, organization of work activities, individual motivation and abilities, power relations and share orientations*

The principals should be able to provide a good working environment were there will be a good relationship between staff and authority and between staff and students. This inform the reason why there is a School Base Management Committee (SBMC), which is the higher body responsible for taking decision and guiding the principals to take informed decision.

1. Supervision must involve effective communication: If communication is effective, it will allow for inter-personal relationship among staff and students. Recently, the Ministry of Education set up a Visitation/Assessment Committee for the Federal Unity Colleges, to assess the state of infrastructure, level of compliance with ministerial directive on the renovation of infrastructure in the colleges, laboratories and special rooms. They are to assess the adequacy and conduciveness of the learning environment, assess the availability of teaching and non teaching staff in terms of lighting of number vis-à-vis the various subject areas, assess level of coverage of curriculum, assess and analyze the academic performances of students in WAEC, NECO and NABTEB in the last 5 years as well as internal examinations. They are equally to study the leadership style of the principal officers of the college with a view to determining the level of rapport between the leadership and other members of the school community on one hand and with the host community on the other hand etc. The committee met with all teaching and non teaching staff to proffer solution on how the performance in the education can be enhanced.
2. For supervision to be enhanced, the curriculum must be improved as to meets the challenges of the society. According to Nnabuo and et al (2004), curriculum is all the learning experiences provided in the school for learners. The supervisor/principal is expected to assist teachers to achieve educational goals, by recommending training and retraining of staff in unity schools. Today there is the ICT centres in all unity schools in Nigeria, where teachers are trained on the use of computers, workshop and seminars, are organized by the World Bank through step-B, capacity training by NDDC and the involvement of leadership training for prefects and teachers in Unity Schools by the PTA. One of the recommendation of the Visitation/Assessment Committee is that supervision in school should be enhanced as to improve teaching and produce good result in the external examination.

**Problems Associated with Effective Supervision in Achieving Quality**

Despite several policies and innovation introduced by the government in order to improve the educational system through effective supervision, the problems are endless and are in recurring decimal. These among others include,

1. Inadequate provision of infrastructure such as building, learning and teaching materials.
2. Irregular training and retraining exercises in Unity Schools today has also affected proper supervision. Most teachers after employment have not attended any training either in form of seminar or workshops. This has greatly affected supervision adversely.
3. Must supervisors uses “fault finding method” in their supervision process. This has been a major problem in unity schools.
4. Yearly, supervisors proffers solutions bedeviling the unity schools, which are partially implemented and at other times zero implementation.
5. Most supervisors do not have professional training. They are transferred from other Federal Ministries/Parastatals to the Inspectorate Division. This has greatly affected quality education in the unity schools, since their input do not make maximum impact in education.

**Usefulness of Supervision in Unity Schools**

The national policy on education stated in clear terms, that government will continue to run good and well staffed inspectorate services for all levels of education so that quality will not be compromised. Supervision is thus useful because;

1. Effective supervision of Unity Schools by the inspectorate division and the federal ministry of education regularly will enhance quality education.
2. The advice given by the inspectorate division and the ministry is adhered to by the teaching and non-teaching staff. This has improve the quality of the teaching and learning process in unity schools.
3. Effective supervision serves as a check in Unity Schools between the management staff and the ministry on one hand and between principal and the staff on the other.
4. When there is effective supervision, good teachers and students are easily identified and bad eggs are flushed out of the system or are encouraged to improve.
5. Effective supervision is two ways traffic and it assist teachers, students and management to work hand-in-hand in making sure that goals are achieved.
6. Effective supervision have made government to have proper estimate on the provision of infrastructure, manpower and instructional materials. The principals defend their budget, base on felt needs of the unity schools every year.
7. Adequate supervision have given rise to high level of morals. Non Governmental Organizations moves round all the 104 unity schools, teaching students and teachers good morals.
8. Due to effective supervision, there is improvement of the result in internal and external examination

**Conclusion**

Quality education is a veritable tool for economic and national development. Hence there is the need for stakeholders to be involved in taking adequate steps to ensure that quality education is achieved through effective supervision. Supervision is needed to achieve quality education through effective supervision. It is expected that supervisors should show high level of commitment despite the challenges associated with supervision, so that teaching and learning would produce the desired change in the students, teachers as well as the society.

**Suggestions**

The following suggestions are made.

1. For quality to be achieved in Unity Schools in terms of effective supervision, teaching and non teaching staff, inspectorate division, should be given in-service training (with or without pay). Even students (prefects) should be given leadership training by paramilitary organization to prepare them for effective supervision of other students.
2. To make supervisors show interest in supervision, government should provide incentive or good working conditions that will make them give their best.
3. Government and non governmental organization should continually provide infrastructure in Unity School for effective teaching and learning, so that supervision will be easier.
4. Government should continually provide enough personnel who are professionals in the field of education to carry out supervisory role, rather than employing non professionals who have little or no knowledge about supervision.
5. Supervisor should be motivated to read current journals and be ICT friendly to abreast themselves with relevant research work in all aspect of education.
6. All stakeholders should be involved in affecting supervision positively in unity schools to achieve organizational goals.

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Changes in the Structure of Educational System in

the Function of Millennium Tendencies

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Abstract

Education in future implies a reconstruction in the education system. This practically means implementation of reform of the entire educational system and development of conception of the permanent education accorded with social needs and changes. The presented work here is an integral part of a broader set up and realized preliminary project on „Redefinition of Education Structure of Republic of Serbia“ forwarded to the Ministry of Education of the Republic of Serbia in 2010. The preliminary project guided by Ph.D. Miroslav Kuкa and Ph.D. Vuкosava Zivкovićwas realized in the team work and in coordination of work of the central and regional working groups in Serbia and the surrounding countries having 80 collaborators in total working on the project. Model of our structure of the education system extends the period of compulsory education up to 10 years of age(till the first grade of high school which is the same for all regarding the curriculum) and is based on differentiation of the education levels (from preschool to high school) in cycles, which, on their part, are defined by aims and tasks. Short-term, middle-term and long-term aims have been clearly defined and concise division of competence and the follow-up methods of successfulness of its implementation has been made within the proposal of our model.

**Keywords:** Education system, redefinition, education structure, modifications and reform

**Introduction**

A learning process can be concisely described as the process of the confrontation of a motivated or unmotivated individual with certain obstacles which represent a difficulty for achieving his objectives (or educational objectives) and fulfilling his motives. In order to overcome those obstacles and eliminate the difficulties, the individual takes investigative steps (or they are often being recommended) until he overcomes the obstacle with those steps, that is, until he eliminates the difficulty towards the objective. The pressures aimed at modifications that would get the educational process in the position in which it would suit better the new needs are increasing with time. Pedagogical practice confirmed many times that some modifications not only don’t lead towards the improvement of success within the education, but also become the source of regression in this area (advocating the so-called general socio-trend directions with the tendency of incorporating them into the educational process as well). Our project with its conceptual approach, the reform within the structure of the education system, implies the strategy of modifications “from the bottom up”, that is, the strategy in which the local initiatives of higher education institutions (faculties, institutes, vocational schools…) come to expression. This approach would suit the thesis which believes that less successful strategies of improving the educational process are the ones that operate from higher levels, where the politics is being created, and which are characteristic to rely on consultants that influence externally and have no connection with educational practice except intuitive assumptions.

**In which category would our redefinition of the education system structure be classified?**

Depending on the principle of modifications (reforms), we can speak of four types of possible changes in the existing pedagogical practice: adaptive, external, regulatory and structural. Our reform in this general setting refers to the structural type of modification, which is aimed towards changes in the organizational structure of the education system, but it doesn’t affect the realization of the educational process. Primarily, the structural systemic modifications are directed to economy, rationality, educational liberalization and acquisition of specific knowledge. Essentially, education is, with our structure, directed to results, that is, to defined knowledge, skills, attitudes and values that students should have after finishing a certain education cycle. Our modifications within the already existing structure can be categorized under the model of the so-called controlled expansion. This approach to reforms is the most appropriate for education systems which don’t need radical changes, but the interventions of limited proportions – alterations, repairs, modifications, that is, the implementation of new details into the existing system, i.e. structure. Modifications of this kind have a character of conceptual modernization aimed towards better achievements of students in school. In the educational process, the main attention should be paid to knowledge structure, to the development of one idea from another, and to what age level can given algorithm (with its structural concretization) be applied. The structure is what enables to sort out and classify unfamiliar impressions and in that way what is learnt gets meaning and through meaning it initiates other motivators in the educational process. What should be emphasized in our approach is the idea that every content of teaching can be taught effectively at any level of student’s development, provided that the given ideas and principles are adapted didactically in order for the student to use them. Our starting point in these evaluations, which differ from structural conceptions from 30 - 40 years ago, starts from the point that the development of a child is mostly conditioned by social factors. How far will a child get in the intellectual development and when we ourselves can influence the same, primarily depends on the cultural surrounding, that is, on the impact of the environment. The development of consciousness of every individual, including children aged 7 – 18 years (our sample within the redefined structure of the education system), has had such a cognitive leap in the last 30 years (perception, reasoning, anticipation, the critical thinking process, the time consistency of attitudes, interests…), that everything that was true in perceptive age gradations of the children at the given age once, has now moved for at least one generation up. Many social psychologists that analyse the mental and manual skills of the children of different age and compare them with earlier similar studies share this view. Hence, in our system of education structure we start with perceptively cognitive and psycho-motor, manual skills of the children at the given age, with aims and tasks that have been placed upon them as well as with the relevance of the process of rationalization and economy of the educational process. Specifically our education structure, the model of controlled liberal education – is oriented towards a child, supports active teaching concretized on the example of the differentiated cycles at given educational levels, as well as the redefined curriculum according to it.

**Socio-Educational Rationale For The Implemenation Of Our Education Structure**

The model of our structure of the education system is based on the differentiation of the educational levels (from pre-school to high school) on cycles, which are determined by the defined aims and tasks for each specific age. Those aims are defined within the reform of the existing education itself which is directed to curriculum and its transfer to education directed to outcomes, that is, defined knowledge, skills, attitudes and values that students should acquire after finishing a certain education cycle. One of the main outcomes of our structure, which is in this segment primarily sociologically determined, is the extension of the period of compulsory education from 8 i.e. 9 years, to 10 years (V cycles) which is in accordance with European and other international tendencies in education. In most countries of the world education begins at the age of 6 or 7 years, and in some countries even earlier. The duration of the compulsory education varies, but in most cases is 9 years and it is finished at the age of 15 – 16 years. From the objectives set within the pre-school education (stands for 0 grade, i.e. I cycle), the same transforms from the current playgrounds into a program defined socio-educational environment. The responsibilities of the educator increase with regard to the demands that are being requested from him. Terminological dichotomy, as in our country so in the world, about defining the notion of primary education *(primary education, elementary education, l´énseignement primaire élémentaire)* in the period from year 1992 – 1996 is defined by means of the new version of the International Standard Classification of Education. According to the new version of the classification of education, primary education includes the first level of education (ISCED level 1)that is the first cycle of basic education. This level generally lasts from 5 – 7 years of regular schooling that includes all levels of education. The second level of education (secondary education)has two levels: the first level or the second cycle of basic education (ISCED level 2) and the second level or the third cycle (ISCED level 3). Unlike the concept of basic education, compulsory education is more easily defined and regardless of the structure of the education system in certain countries, it *(compulsory education, schulpficht, obligatoire, objazatel´noe, etc.)* represents schooling that is obligatory by law for children of certain age. Compulsory education by its essence and purpose makes the basis for the formal structure of the education system. What is in common for almost all countries is the fact that compulsory education is of general education character. Its duration differs and depends on a school system and prerequisites for mass education. In most countries, besides primary education, compulsory education also includes the first level of secondary education, which is the conception of our structure as well (V cycle). In our conception of education structure, the grade repetition is abolished and replaced with the form of moving students to a higher grade with obligatory re-attendance of subjects that are not acquired properly in terms of knowledge (at least 50% of the anticipated number of classes for that subject at the year level). Starting from III – V cycle (with the transition from class to subject teaching) the student can transfer four or less subjects from one grade to the next. In case that at the end of a school year a student has more than four negative grades, the categorization of subjects is conducted for the level of compulsory education (basic subjects → compulsory subjects). If a student is being moved more than three times during compulsory education, therefore almost every grade, he limits his education in that way to the level of compulsory education (to the end of V cycle). At the end of III cycle, the check of the acquired knowledge is introduced, by means of the test of general knowledge as well as the check of potential advancement within intellectual abilities as compared to the enrolment period. Through these data and information on typifying students’ personalities → completed by a class master as well as an educator at the end of I cycle, a new formation of the groups (classes) of given grades is conducted, within the already familiar educational environment (school). This is, in addition to monitoring the rate of acquired knowledge, skills and character traits, a way for the children to be directly exposed to the challenges of social adaptability within the partially familiar social environment, which is also a good preparation for the next redefining of groups that follows in high school and is predominantly determined by the unfamiliar social environment. The first grade of high school is obligatory for everyone and regardless of the type of school has the same curriculum. This structure initiates the idea that through the controlled liberalization of the educational process, the same enhances and develops the interest of children for education even after a cycle of compulsory education.

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Competency Strategies in Alleviating Poverty for Sustainable Development in the Teaching and Learning of

Home Economics Education

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Abstract

This study looked at poverty scenario in Edo State and how Home Economics graduate from the universities can use their competency to alleviate poverty for sustainable development. A self developed questionnaire of 4 point instrument was used for data collection from150 respondents from 25 shops in 2 zones i .e commercial and residential areas in Edo State. The data collected was subjected to frequency distribution count and percentage rating analysis. The findings shows that majority of the home economics graduate from our universities exhibited low competencies of less than 15.0% in business management feasibility, business risk management, business finance management, and creativity ability in alleviating poverty in their chosen business ventures: the reasons being that they were all involved in buying and selling cake items for baking, interior decoration items, provision and toiletries among others. Findings further revealed that all the studied respondents were highly constrained by lack of competency strategies; solutions were thus proffered and established for sustainable development.

**Keywords**: Poverty, Home Economics, Competency, Sustainable development and Graduates

**Introduction**

Wide spread poverty and hunger is an enduring problem affecting an estimated 800 million people worldwide and it is a factor responsible for at least five million deaths each year. in the developing countries (UNICEF, 2002). The focus of Home Economics Education is to equip individuals with relevant knowledge, skills and attitudes for work in chosen occupations and career opportunities. This type of education also emphasizes that after training, the trainee would be self employed and reliant thus producing goods and services as entrepreneurs for the benefits of the society. In 2004, the Federal Government of Nigeria in its national policy on education equivocally spelt out the broad aims and objectives of Home Economics Education under vocational and technical education to include “To give training and impact the necessary skills leading to the production of craftsmen, fashion designer, interior decorator, event planners and other skilled personnel who will be enterprising and self reliant.” Osuala (2001), also advocated for greater emphasises on vocational Education (Home Economics Education) which has as its goal the “preparation of the learner for entry into employment and advancement in his chosen career, meeting the manpower needs of the society, increasing the option available to students and adults and also to enable learners to wisely select a career. Obasigie and Orumwense (2009) opined that when the human and natural resources of a nation are not sufficiently developed, poverty becomes the order of the day and the economic scene will be eluded with various problems to the extent that policy makers, practitioners and general public will appear to be in a state of confusion. Poverty is not just lack of income or employment but also total deprivation of essentials hence it is defined as a state of non fulfillment of minimum requirement of food, shelter and clothing, which are the component forms of economic, social and psychological deprivations. It is against this background that this article seeks to identify the competencies of Home Economics graduates in poverty alleviation, in Edo State with a view to proffering suggestions that could create sustainable development.

**Purpose Of Study**

The major purpose of this study is to investigate the entrepreneurship competence by Home Economics graduate in alleviating poverty in Edo State. Specifically the study will determine Home Economics Education competencies in learners with regards to:

* Competencies on business feasibility
* Business risk management
* Business finance management
* Competencies in creativity in business ventures

**Methodology**

The design of the study is a survey research on the investigation of how Home Economics Education can alleviate poverty in a depressed economy like Edo State. According to Kerlinger (2004), survey research is a useful tool employed by researchers when they are interested in the opinions and attitudes of people as well as the relationship of there attitudes to the respondents overt behavior.

**Population** – The area of the study was Edo State in Nigeria. The population was made up of university graduates of Home Economics Education in the area of study. The entire population was studied. The respondents were all self employed in 25 identified small scale enterprises zoned into two areas i.e. residential and commercial zones. The residential zone is made up of small scale businesses located in GRA and its environs and the commercial zone covers shops around the ever busy Ring Road i.e Mission Road, Oba market road, Ekenhuan road and New Benin market.

**Sample And Sampling Technique** – A self developed questionnaire was used for data collection, it was validated by Home Economists expert before being used for data collection. A total of 300 samples were identified for the study and 75 small scale enterprises were randomly selected from each zone giving a total of 150 shops. The data collected using a 4 – point instrument of 7 items rating scale of highly possessed, fairly possessed and not possessed was developed based on the specific purposes of the study. The instruments were then subjected to percentage analysis.

**Data Analysis Technique** – In analyzing the data obtain from the study, frequency distribution and percentage rating were computed for each item on statements on competencies on business feasibility, risk management, financial management and creativity in the business venture of university graduates of Home Economics Education in Edo State Nigeria. A percentage of 15% and above for the 4- point rating was accepted as possessed while percentage scores less than 15% for any item was considered as not possessed for further clarification.

***TABLE 1:*** *Statement on competencies on business feasibility study of*

*Home Economics graduates from university.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Competencies** | **Frequency** | **Percentage (%)** | **Remarks** |
| 1. Location of business site | 30 | 20.0 | Highly Possessed |
| 2. Identifying potential buyers | 28 | 18.6 | Highly Possessed |
| 3. Location of raw materials for business | 13 | 8.7 | Not possessed |
| 4. Identification of business competitors | 19 | 12.7 | Not possessed |
| 5. Identification of business personnel | 10 | 6.7 | Not possessed |
| 6. Locating favorable business environment | 25 | 16.6 | Fairly Possessed |
| 7. Identification of viable business venture | 25 | 16.6 | Fairly Possessed |
| Total | 150 | 100 |  |

*Source: Researcher’s Fieldwork, 2011*

**Discussion on findings** - **table 1**

Statement on competencies on business feasibility possessed by university graduates of Home Economics Education shows that out of the 7 item identified, four(4) were rated as adequate competencies as their percentage was above 15.0%, while three (3) were rated as not adequate, as their percentage rate falls below 15%. This goes to show that some of the graduates do not possess the required business competencies in regards to feasibility study needed in their related career choice. This finding supports the work of Osuala (2001) that greater emphasis on vocational education will enable the learner to advance in his chosen career.

***Table 2:*** *Statement on competencies on risk management by university graduates of home Economics*

|  |  |  |  |
| --- | --- | --- | --- |
| **Risk management** | **Frequency** | **Percentage (%)** | **Remarks** |
| 1. Coping with technological challenges | 24 | 16 | Fairly Possessed |
| 2. Management of mechanical and electrical breakdowns | 30 | 20.0 | Highly Possessed |
| 3. Coping with government inconsistent policies relating to small scale business sector | 10 | 7.0 | Not Possessed |
| 4. Identification of quality control strategies | 16 | 11 | Not possessed |
| 5. Coping with death of business partners | 20 | 13 | Not Possessed |
| 6. Coping with price fluctuations in the market | 25 | 17 | Fairly Possessed |
| 7. Identification of product seasonality | 24 | 16 | Fairly Possessed |
| Total | 150 | 100 |  |

*Source: Researcher’s Fieldwork, 2011*

Discussion of findings on table 2

The statement aimed at identifying competencies in business risk management of university graduates of Home Economics Education shows that the respondents exhibits adequate competencies in four (4) out of the 7 items identified while the other three items lacks competencies in coping with business risk management. This is in line with the work of Obasigie and Orunmwese (2009) which says the economic scene in Nigeria is eluded with various problems to the extent that policy makers and the general public often appears to be in a state of confusion.

***Table 3:*** *Statement on the financial management of university graduates of Home Economics Education*

|  |  |  |  |
| --- | --- | --- | --- |
| **Competencies** | **Frequency** | **Percentage (%)** | **Remarks** |
| 1. Identification of business capital (direct or indirect source) | 45 | 30.0 | Highly Possessed |
| 2. Projection of profit margin | 18 | 12.0 | Not possessed |
| 3. Book - keeping and Accounting | 10 | 7.0 | Not possessed |
| 4. Determination of depreciation of equipment and structures | 12 | 8.0 | Not possessed |
| 5. Product – price fixing | 10 | 7.0 | Not possessed |
| 6. Sourcing for loan | 43 | 28 | Highly Possessed |
| 7. Registration of business site | 12 | 8.0 | Not possessed |
| Total | 150 | 100 |  |

*Source: Researcher’s Fieldwork, 2011*

Discussion of findings on table 3

The statement on financial management of university graduates of Home Economics Education shows that out of the 7 items identified, only 2 items possessed the competencies for financial management while the remaining 5 lacks the adequate competencies in financial management. This goes to show that if graduate of Home Economics Education are not given adequate assistance in terms of finance, they may not be able to cope in running successful business venture.

***Table 4:*** *Statement on creativity competencies of university graduates of*

*Home Economics Education in business management*

|  |  |  |  |
| --- | --- | --- | --- |
| **Competencies** | **Frequency** | **Percentage (%)** | **Remarks** |
| 1. Advertisement and marketing | 20 | 13.0 | Not Possessed |
| 2. Satisfying customers needs | 31 | 21.0 | Highly Possessed |
| 3. Coping with staff welfare obligation | 15 | 10.0 | Not Possessed |
| 4. Identification of staff dispute | 16 | 11.0 | Not Possessed |
| 5. Identification of alternative raw materials (improvisation) | 18 | 12.0 | Not Possessed |
| 6. Organization of return on resources | 10 | 7.0 | Not Possessed |
| 7. Mobile shops | 40 | 26.0 | Highly Possessed |
| Total | 150 | 100 |  |

*Source: Researcher’s Fieldwork, 2011*

Discussion on findings on table 4

The findings on creativity competencies of university graduates of Home Economics Education shows that majority of the respondents do not possess business management competencies while only 2 of the items shows creativity ability. This implies that vocational education program in our universities probably produce graduate who are not sufficiently skilled in their fields of study as they are deficient in creativity, innovation, risk taking and profit making activities which are dispensable to managerial ventures.

In all the statistical analysis, it can be deduced that there is an increasing predominantly white collar jobs (civil service) economy which is becoming highly saturated thus generating unemployment and underutilization of Nigeria’s human and natural resources. The work of Ukwe (2007) is line with these findings when he declared that the culture of post independent Nigeria consciously created by the ruling class has been responsible for the level of domestic developmental stagnation in various vocations, characterized by the greed and insatiable crave for the national cake, thus disregarding resourcefulness and dignity of labour.

**Recommendations**

Based on the above findings and if the goals of Home Economics Education are to be achieved in alleviating poverty, the following recommendations are proffered –

1. The students industrial work scheme (SIWES) should be properly implemented and enforced. Big industries and other small scale enterprise should be put in place, along with the required infrastructural facilities that will enhance practical learning activities in the learner.
2. The objectives of vocational education has spelt out by the federal government should be established in our universities so that the students interest will be aroused.
3. Home Economics Education should be seen as Education for the coordinated and articulated minds and not Education for the underprivileged, maladjusted, the physically challenged among others.
4. Vocational programmes in the university especially Home Economics Education should be reviewed to focus on entrepreneurship, creativity, resourcefulness and managerial skills.
5. Soft loans should always be given to Home Economics student on graduation by banks and the government to enable them to establish small – scale enterprise to promote sustainable development in developing nations and poverty alleviation programs established by government for graduate of vocational Education should be earnestly sustained for technological advancement.
6. Poverty alleviation programs such as National Directorate of Employment (NDE) and Lift Above Poverty Organization (LAPO) established by government for graduate of vocational education should be earnestly pursued and implemented for sustainable technological development.

**Conclusion**

This study has identified various competencies possessed by Home Economics graduates from the Nigerian universities in relation to their ability to alleviate poverty in the Nigerian economy. The level of possession of the needed competencies in alleviating poverty was considered low and inadequate for the purpose of self – reliance, as this is based on the fact that majority of the graduates studied where involved in the same type of business venture such as buying and selling cake items for baking, interior decoration items, children’s clothing, provisions and toiletries among others in the same business location. This type of business on the long run is not sufficient in alleviating poverty in a depressed economy. Credence is therefore called for sustainable vocationalization of Home Economics curriculum to ensure that university graduates in the discipline are fully equipped to be a job creator rather than a job seeker thus disregarding the crave for white collar jobs and the national cake.

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Colonialism and Education: English Language Education in Sri Lanka

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Abstract

The English Language was introduced to Sri Lanka by the British colonial rulers at the beginning of the 19th century. Since then the existence of the people of Sri Lanka changed significantly together with the values and attitudes towards life. Independence gained in the 20th century did not have a speedy recovery on the damages done to the thinking patterns of the people; making the languages people used as a wedge. The much debated ‘Sinhala Only’ policy in 1952 paved the way for the Sinhala educated mass to come to the administrative strata of the country in the post colonial times. Yet, English was not dethroned; it enjoyed the prestige it used to have. The intension of this paper is to discuss the efforts taken to remove the colonial mind set from the people of Sri Lanka while opening doors for globalization through English Language education. The variety of English called Sri Lankan English emerged clandestinely; even the users of this variety of English were unaware of its existence. The new found identity can be the stepping stone in placing English language at its right place, and acquiring the skills and knowledge necessary to compete with the global standards.

**Keywords**: Colonialism, post colonialism, policy, globalization, Sri Lankan English

**Introduction**

Sri Lanka shares the same mind-set with other nations that were once colonized by the European monarchs. Colonization left an indelible mark in the history of a nation that was once self- sufficient and rich with arts and crafts to induce higher order thinking. Colonialism, according to the Oxford Dictionary of Politics is the policy and practice of a strong power extending its control territorially over a weaker nation of people. It is connected with exploiting the resources of the country in captivity for the betterment of the sovereignty; in the case of Sri Lanka it was for the British sovereignty. Inevitably, it is associated with ‘Imperialism’ the practice of which one state extends its power and dominion by territorial acquisition and gaining political and economic control (Phillipson, 1992). ) Sri Lanka was a British Colony from 1802 to 1948. Prior to this, the coastal area of the then ‘Ceylon’ was under the Portuguese and Dutch for approximately 3oo years. This duration was long enough to make an impact on the minds of the people to be obliging and dependant on a nation which exhibited supremacy over every aspect of life; social, cultural, economic, and political- wise. Undoubtedly it created linguistic diversity adding English Language to already existing Tamil and Sinhala languages. These two languages were well established in Sri Lanka. Knowledge was disseminated to the affluent Sinhala youth by the monks in temple schools. During this colonial period, in 1832 Colebrooke Commission appointed to look into socio political matters in this country, recommended wide spreading English Language as the commission has observed the education given by the monks was substandard. That was mainly because Colebrooke was led by one sided objective and did not possess the ability to understand Sinhala language. During the tenure of Governor Sir Robert Wilmot Horton the educational reforms recommended by the Colebrooke Commission were implemented promoting education in English Language at the same time introducing vernacular education with the hope of it being a precursor to learn English (Coperehewa). In this system of education vocational or technical skills were not encouraged since the polity needed men of understanding English to carry on their commands and the missionaries’ necessity to convert people to Christianity. Missionary education, however, opened the doors of education to locals irrespective of cast and gender.

The colonial pattern changed with the change of politics in 1930. The house of Parliament was elected with locals gaining more control and the Ministry of Education was under control of the elected members to the Parliament. The educated elite of the Sinhala and Tamil communities received their higher education in England and were influenced by the free thinking enjoyed by the erudite class. This eventually paved the way to educational reforms with major policy decisions such as making Sinhala the Official Language in Sri Lanka. This was seen as a mark of separation of the educated Tamils from being entered into the positions in the government (Canagarajah, 2005). However, education was made free throughout the island, education was given in the vernacular in Tamil language in the North and East and in Sinhala language in all other parts in Sri Lanka, with facilities to learn in Tamil if the student population was high in the school. This policy popularly referred to as the Sinhala Only policy, aroused nationality feelings among the Tamil speaking community. Yet, the English educated minority enjoyed the higher ranks in administration. Although education was rendered free, the status of English Teaching was poor in most of the schools due to the lack of teachers of English language. There was a substandard type of English taught in schools and the failure rate at the examinations was high. With the introduction of open economy in the late 1970s the demand for English was much greater and the outlook into the wider world was remarkable. There was an effort by the Sri Lankan English educated to decolonize the language from its owners; the native speakers, in that, poetry and language teaching material were based on local themes. Thus the variety called Sri Lankan English emerged; it is now seeking international identity. English Langue teaching is encouraged by the present government; the year 2009 was declared as the year of English and IT in Sri Lanka. The policy is behind this was to open this language once consecrated to a wealthy minority to be accessible by all. The problems created by the ‘Sinhala Only’ policy were rectified by designating Tamil langue an official language by the 1978 constitution of the Democratic Socialist Republic of Sri Lanka (Chapter IV of the constitution). Globalization demands more exposure to the shrinking world and to not to be marginalized, Sri Lanka needs to be conversant in a language that the majority understands. Sri Lankans are encouraged to speak ‘English our way’ which is a timely need to drive away the fear psychosis out of the peasants who are from the underprivileged mass. It is with a new paradigm shift that Sri Lanka can do justice to the variety called Sri Lankan English and teach encourage teaching English to the mass.

**Education under the British colonial rule**

Scholars agree that the problems of language in education have their roots in the 19th century. Before the colonial time education was limited to a small elite. The educated monks and Brahmins taught the upper class privileged few to read and write. Buddhist monks taught the Sinhalese and the Brahmins taught the Tamil Vellala children (Cooperehewa, 2011). Technical education passed from father to son and they each learnt their craft to serve the king and to earn their living. Cast system prevailed but it was not as strong as can be seen in India because Buddhism was widespread and equality was practiced to a certain extent.

It was the British rulers that seriously thought of educating the locals to fill the posts in civil service. However the capacity of the locals to hold responsible positions were underestimated for the sake of preserving the sovereignty of the regime and for easy control over the colonized. Canagarajah observes that ‘English education was not only teaching English language, but also adopting the medium, modes of instruction, curriculum, and teaching material from the British public schools. Clearly there was no need analysis done before setting the curriculum, it was planned totally on the whims and fancies of the rulers, and the rulers’ intentions were totally different from that of the ruled. This was the reason for the dearth of English Language teachers in a later period; teachers were not aware of the reasons why they were teaching English, other than being paid and securing a higher position in society. However, education was open to all irrespective of cast. Women were admitted to schools for education. Those who studied in the English medium in the government controlled schools ended up being Christians or the Christians were provided with English education and offered posts in the government. Although not popular, the traditional system of education continued.

Language was always a problem for the administrators and the need to educate locals to serve as translators was desirable. The missionaries contributed to this need by spreading religion together with the language. This was not sufficient as the rulers and the missionaries debated what kind of English should be taught in schools. It is under this backdrop the British Colonial Office sent a Mission to probe into the administrative, economic, and educational and social institutions in Sri Lanka. The recommendations were mainly on administrative and judicial reforms, but language policy gained special importance. This was the commission comprised of W.M.G. Colebrooke and C. H. Cameron. The commission was led by Colebrooke. The report of this commission, in the report ‘Administration of the Government of Ceylon’ (dated 24 December 1831), recommended the language of administration, judicial, and commerce should be English (Coperehewa, 2011). Vernacular languages further declined from their prestige but were extensively used by the masses.

In this context Sri Lanka shares the experiences of other nations: India, Africa and the Caribbeans, the rulers imposing the language of education on the affluent few to make them feel the guardians of the language among the vernacular educated many. However, the younger generation of this class who were educated in the west brought home the ideals of a changing world mainly ideals as such as liberalism and Marxism. Yet they were not spared of the colonized mind-set. Their dress, food and religion were that of the colonizers. The ideals they spread through the country caught the minds of the vernacular educated intellectuals who always had the passion to free the country from the foreign dominance.

**English Language in the post colonial Sri Lanka**

Sri Lanka gained independence from the foreign rule in 1948. As stated in the Wikipedia online encyclopedia; “by the end of the 19th century, a new educated social class which transcended the divisions of race and cast was emerging as a result of British attempts to nurture a range of professionals for the Ceylon Civil Services and for the legal, educational, and medical professions” (Wikipeadia). There after education was let in the hands of the local politicians. There were the anti colonial ideas to consider, some elites’ perspective of turning the country to serve the purposes of Europeans, the humanitarian principle of education for all ideal, and many more. However, education was compulsory for all, but various types of schools prevailed. In some schools the medium of instruction was English and in some others it was either Sinhala or Tamil. In the first few years of independence there were debates on which language to be used as the official language. The new found freedom impressed many to come back to the freedom of thought that the nation was enjoying for more than 2000 year before being captured.

In 1945 Dr. C.W.W. Kannangara initiated the free education system and a policy was established in all schools to teach either in the Sinhala/Tamil media. This was an opening for all to have access to education free of charge from kindergarten to University. The chasm between the social classes, imbalanced distribution of employment opportunities, access to information from the outside world were all remedied in a few years lapse. The key to all these opportunities are enclosed in education. The new generation educated in the Central schools were counted among the university academia, government sector organizations, and other careers once restricted to European and English educated few. This was facilitated by the government policy of making Sinhala the official language in 1956. Controversies were brought forward by the Tamil scholars fearing that they would lose grounds in holding higher ranking positions in the government sector. Indeed there were troubles unforeseen at that time, which ended in losing lives to war lasting for 28 years.

The status of teaching and learning English remained poor, without much encouragement from the government and much detested outlook towards the English educated locals. Even with the adverse attitude towards the English language and manners and customs, English hailed to be the language of the higher education, of the courts, and of the flourishing private enterprises. It was the prestigious social status that the English educated few enjoyed that made the common mass envied them and/or idolized them. It was this gap that had to be abridged to look to true and peaceful living, right education, proper employment, and the development of the country. The use of three main languages in Sri Lanka is encouraged by the 1978 constitution of Sri Lanka, with amendments in 1987, making Tamil and Sinhala both as official languages. (Chapter 4 Language -the Constitution of Sri Lanka).

**Globalization and the place of English Language**

The need to bring the English language down from its pedestal and to make it available to common mass has been identified as a need of the time. The language policies changing from the 1978 constitution of the Republic of Sri Lanka and the amendments made to it in the 1987 eased the severity of opposition to the existing policy, making Tamil language an official language in the island. English serves as a link language. Amidst all the efforts to preserve language and culture in many minority communities, English language is extending to all parts of the world, gradually spreading language imperialism (Phillipson, 1992). The word means integration and development (according to the Oxford Dictionary), but the it is the development of the English Language when it is used by the people of many nations giving it a local flavor, but can be understood by many. The assimilation of a foreign language by any other nation makes that language superior and it paves the way to language imperialism. David Crystal and Robert Phillipson both agree that it was the British Empire once ruled most parts of the globe and now it is the English empire that dominates the globe (Carpenter, 2007). A good example for this is the establishment of the British Council in 1933 which reached Sri Lanka in 1948. It marks the smooth transfer of power from politics to cultural ensnarement which the colonized could not get over, The British Council was established with the intention of the British Establishment to ‘spread and strengthen influence through the development of cultural relations’ **(**the British Council website). Awareness of what is taking place around world has opened the minds of Scholarly Sri Lankans to identify and give recognition to the variety of English called Sri Lankan English. In the ‘Dictionary of Sri Lankan English’ Michael Meyler brings to notice certain words, phrases, and pronunciation that were passing around the English speaking Sri Lankans, unnoticed of the existence of these idiosyncrasies. Many English language speakers, speaking English as their first language or mother tongue, claiming that that they were not aware of these differences as many of them were ignorant of the rules or the words in use as long as they were understood in the context. English teachers in Sri Lanka are educated in the vernacular and learn English from another local teacher who makes the same differences to the language; therefore the teachers pass on the Sri Lankan variety of English to their students. For a language which has been part of the culture and identity of a country for nearly 210 years, English occupies a peculiar position in Sri Lankan society. It is only now, in the 21st century that at least some users of English are prepared to say they speak or use Sri Lankan English. “For generations, people have believed and declared that they speak British English or the Queen’s English; and these terms are used interchangeably. In keeping with this belief, some Sri Lankans still look to the BBC as the arbiter of correct usage of English for Sri Lanka. In a post colonial society such as ours, this is supreme example of linguistic servitude."(Gunasekera, 2005).

A language has to be written for it to be recognized. Speaking a language is not sufficient to bring it to the state of acceptance by the scholars. Any language will not be accepted until the form of communication, the words and expressions are documented. Within the Sri Lankan context the idea of Sri Lankan English is much discussed and debated. ‘A Dictionary of Sri Lankan English’ a dictionary composed by Michael Meyler has approximately 2,500 examples which describe the English as used in Sri Lanka. This is documentary evidence to the emergence of a new language that can be internationalized in the future to be learned and/or studied by the scholars. However Meyler himself suggests in the introduction to the book that this book is a descriptive work collecting and stating the language in Sir Lanka as it is. He does not intend to make judgments over whether the word is correct or and “error”, but just leave it in the hands of the reader to make the judgment. Professor Ryhana Raheem writing the forward to the book states that it is ‘an important contribution to the development of English in this country’.

The people who use English as their first language and whose generations have learned in the English Medium schools in the colonial times have identified and encouraged the use of Sri Lankan English. It is intriguing to note that the Dictionary of Sri Lankan English is compiled by a British national, a teacher at the British Council Sri Lanka. These writings and the encouragement by the government to popularize English to be in the hands of many with the slogan English Our Way has roused controversial view points. The politicians view of using the language change as panacea to the all ills: cultural, economic, educational and many other, in the country and the reality of the need that is felt by all is to make new advancements in learning, researching, and developing an easy communication method with the world. At the same time some scholars who have mastered the language are opposed to the proliferation of the notion Sri Lankan English as they call it all as substandard and erroneous language used by the many people out of the Colombo metropolis and a variety that was once laughed at. However, the craving to learn English by common man is Sri Lanka is evident in the success of any English teaching programme that is offered to the public for money, by the fact that it makes a profit for the provider of the course. Yet people are not decisive whether they are taught Sri Lankan English or the British or American English. The government offers English Language education to all school children from grade one to the Advanced level classes. The government encourages speaking in English, the reason is that people are reluctant to use the language for the fear of being laughed if they try and make errors in the language. Yet, speakers of the English in Sri Lanka make errors, at times; they are disregarded as long as they could be understood. Steps are taken by the government to encourage English language usage in Sri Lanka. The Policy at the moment is to make Sri Lanka a trilingual country enhancing social harmony and cooperate living in a multi cultural nation state.

There are opposite views to establishing and popularizing Sri Lankan English by some scholars on the grounds that “given the opportunity topick up the standard form or expression (that is internationally recognized), the average speaker/writer gives up what has been practiced or used as a result of ignorance or lack of exposure and improves on the newly suggested form or expression” (Fonseka, 2003). Further, “for courtesy’s sake protest only silently when academic guests talk in ceremonial terms about a concept called Sri Lankan English, and …”, he goes on to say that Sri Lankan English is imposed on the Sri Lankans unwelcomed, at least by some. There is a controversial line of reasoning where to draw the line between the errors and substantial Sri Lankan English, but at least to some extent even the owners of the language, the native speakers cannot find a solution to the predicament. The unequivocal truth however, is that learning English and using it in a profitable way to achieve targets and goals is still an illusion for many people in Sri Lanka.

It is this gap that has to be filled and it is the focus of attention of the policy makers and the academia that can solve efficiently and effectively only if both work together. Inevitably what is left from the colonial past is the slavish desire to be educated in the English medium that paid excessively in the form of economic well being and upward mobility in the social ladder. Today it is the understanding of the importance of a second language or a link language to express opinion and share knowledge and information. This is done without being subservient to the nations that own the English language, liberating from the moral obligations to speak a definitive language immaculate in the hands of another user. With the assistance of the political leaders to popularize English, the academia is left to solve the problem as to what should be taught in the classes; whether it could be Sinhala and Tamil literature or literature translations, or literature pertaining to England, or language to cater to the private sector entrepreneurs, or language to peace building with the concerned nationalities. These are the questions with which the educators are left with to find answers for, no matter what variety of English the student and the teacher use. The teacher or the instructor of English him/herself is not competent to teach in English catering to many fold needs of the learner, the need to train the teachers and the instructors become the fore most need of the hour. A planned methodology to decide the outcomes and the standards achieved is in the hands of the course planner. Although concepts such as language imperialism and colonization of the mind are creeping into the reasoning minds of the educated, it is inexorable in the minds of the common and sundry to find the most effective means of comfortable living. English with its utilitarian value does not escape as a means of social well being. Therefore there is a rupture in the protective wall of the nationalists’ movements to exercise Sinhala only or Tamil only policies, that globalization has crept in and settled with the assurance of establishing regional power at its zenith. In the backdrop of this state of affairs, steps are taken to utilize all available diplomatic assistance to fill the gap between the English educated minority and the vernacular educated majority to share equal opportunities among the general public. Utilizing the grants offered to develop English Language skills the syllabi to teach English is set by the locals who have competency in English Language skills. The teaching materials are authentic and relevant to the learner’s experience. This is a new development shattering the shackles of dependency morality. This gives the course providers a sense of achievement and a conscience of greatness. Paradigms are shifting, learning, unlearning and relearning are taking place. While the policy makers are engaged in transforming the mind set new developments in the discipline are to be anticipated. Professor M. Wickramasinghe suggests to ‘establish English Faculties that offer diversified, but inclusive programmes of study that are scholarly and cutting-edge, professionalized and need based (Wickramasinghe, 2008).

**Conclusion**

English Language has been in the hands of the people of Sri Lanka for centuries that it has changed in to a form of a language partly Sri Lankan and partly global. With the change of the colonial administration the minds of the people who used English changed and it made them see the reality of the language they spoke genuinely and sincerely, and the existing differences affixed to the language they used. There was a time people could not decide which language to use for the purposes of education commerce and entertainment, but one fact was observed in the course of time that English has come to stay at home in Sri Lanka. It has become the responsibility of the administration and the academia to offer the best kind of English language to the people who need it to accomplish their targets in relation to personal development and the development of the state. Leaving behind the separatist and nationalist short sighted outlook to life smitten by a war for nearly thirty years, Sri Lanka can look forward to accept Sri Lankan English that encourages cooperation. Encouraging research on English language and linguistic studies, translations and translation studies, English Language Teaching and ELT studies is a need of the hour that has to be given serious thought.

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Effect of Self–Regulated Learning Strategies on Secondary School Students’ Performance in Home Economics Education

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Abstract

This study investigated if using self-regulated learning strategies could promote students learning performance in Home Economics. A quasi-experimental design was used to examine the effectiveness of a teaching intervention in achieving the goals of learning using experiment group (N = 51) and control group (N = 54). A pre-test was administered to both groups to determine their entry characteristic; a standardized aptitude test was also administered to both groups to determine their intelligent quotient(I.Q). At the end of the treatment which lasted for eight weeks, a post-test was given to both groups, to determine the effect of treatment. All hypotheses were tested at 0.05 level of significance. The study revealed that the experimental group scored significantly higher on measures reflecting self-regulated learning process in their learning experience than the control group, (Mean= 28.80 experimental) (Mean = 26.52 control). There was no significant difference in performance in academic ability of student with low and high IQ exposed to self-regulated learning ( P = .336). The study revealed that there was a significant effect of treatment (method) on students' achievement in Home Economics, with no significant difference in the performance of students; The study thus recommended among others that teachers should encourage the use of self-regulated learning method by student in studying Home Economics with better achievement.

**Keywords**: Self-regulated learning, Academic performance, Home Economics, learning strategies, and Secondary school Students

**Introduction**

In this era of technological advancement, what is important in teaching is to teach students how to learn. There is a great deal of concern that teachers and schools are failing to help children acquire the knowledge, skills and dispositions that are crucial for life outside the school. The challenge faced is how to make learning in schools more authentic, more useful and more contextualized for students so that they are equipped to solve problems that confront them in and beyond schools. Current psychologist of education tend to focused on intrinsic motivation and autonomous learning in order to achieve this sort of outcome (Pintrich, 1999; Cheng, 2001).

A considerable number of studies have been conducted in education especially outside Nigeria, which demonstrate that self-regulated learning can enhance students academic achievement and facilitate learning (Lins & Chen, 1995, Pintrich 1999, Zimmerman 1986). Such studies have been reported in mathematics and physical education, where self-regulated learning strategy is used in improving students’ performance.

Results of such previous researchers have shown that there are interactions between self-regulated learning and performance. The concept of self-regulated learning implies a teaching strategy that enables individuals develop their own goal directed learning processes. It does not only promote individual learning but also provide opportunities for students to actively engage in the learning processes such as goal setting, self monitoring, self-evaluating, self- reinforcement and resource management.

Piaget and Vygotsky (cited in Chen, 1996) mentioned that an important goal of teaching should be to lead the students to active participation so that they can actively explore and think, and construct their own know1edge self-regulated learning is therefore an important strategy that enable individual to use skill and knowledge construction process. This has arguably become an essential competence in an ever changing society. By constructing new skills and knowledge, Self-regulation can be defined as sustaining and activating one's own cognition, behaviour and motivation (Karoly, 1993).

Self-regulated learning is an integrated learning process whereby learners control their own motivation, cognition and behaviour. It includes two sub-processes, motivational beliefs and strategy use and can be seen as the integration of "will" and "skill". "Will" refers to the learner's goals, values and expectations or (motivational orientation). "Skill" refers to the learner's use of different strategies of cognition, meta-cognition and resource management (Garcia 1995). Self regulation includes the provision of physical and mental preparation and physical presentation.

Self-regulated learning is an innovate approach to promote a sense of belonging and it provides students with a role in decision- making and offers a supportive approach to learning. Conversely, the traditional approach tends to be prescriptive with teachers emphasizing skills in the learning processes rather than the individual's development. This study is meant to investigate the effects of using self-regulated learning strategies on Junior Secondary School students' performance in Home Economics education. The present study will examine self-regulated learning through the process of goal setting, self-monitoring, self-evaluation, and self-reinforcement.

Educational reform is necessary in the Educational sector as many problems abound in this area. Tsujino (1991) argued that it is necessary to reconstruct institutions from their school centred educational focus to a lifelong learning system focus and from an academic achievement-conscious society to a learning society. In developing lifelong learning system, there are several fundamental requirements when considering the school's role, they are to;

* foster the individual’s ability to meet life-long learning needs through self-instruction;
* consider individually adapted educations;
* improve educational curricular in terms of their flexibility and diversity; and
* pursue the concept of an open-minded school collaborating with the society around it.

Current Psychologists of education however focus on intrinsic motivation and autonomous learning to be able to solve these educational problems. Self-regulated learning has presently become an essential tool in proffering solutions to educational problems in this our ever changing society as it is able to help students develop, self-direct learning processes as well as provide opportunities for student to actively involve themselves in learning process conversely, traditional learning tends to dominate the learning processes and emphasis movement to performance rather than understanding and problem solving. This teacher-centered approach appears to limit students' access to autonomous learning.

From the perspective of contemporary education, Tsujino (1991) stated that "institutionalization of values" and "modernized poverty" have contributed to a lack of desire for autonomy of learning and poor ability in problem solving. By institutionalization of values he meant that the values of education and the institutions aiming to fulfill these values were confused; in modernized poverty he saw a state of mental parsimony.

The fact is that the concept of education and life long education has been over flogged but then, life-long education and the learning society had emerged. In Nigeria, the responsibility of education is placed on schools. To be concrete education needs to focus more on informal education, with links not just to school but also to the family, community, individual persons and social customs of the society, all of which can influence individual's development.

Currently, a number of psychologists of education have suggested that the learner should be actively involved in the process of learning, instead of engaging in passive learning as it is in the traditional method of learning. (Chen, 2002; Pintrich, 2000; Zimmerman and Martinez-Pon, 1986).

In the domain of Home Economics Education, Uko-Aviomoh and Nwabah, (2005) investigated the implementation of home economics instructional methods in secondary schools in Nigeria. The result shows that instructional methods used by teachers and their teaching techniques are ineffective as perceived by students. This study established the reasons for poor performance and dissatisfaction of students in Home Economics classes.

Curriculum reforms in Home Economics education therefore is needed to strengthen the teachers by constantly educating them on the importance of accommodating the change in teaching methods. Infact, teachers should be able to adjust in their teaching methods attitude and evaluation in order to decrease student's sense of failure and increase student self-confidence and motivation to learn.

Thus the main concern of Home Economics education is to help individuals live a purposeful and satisfying life through wise use and management of their human and available material resources. It then becomes necessary to strengthen the attention given to this area by providing the students opportunities of improving self, through life-long education (self-regulated learning strategies).

Zimmerman (1989: 1990) stated that self-regulated learning has three main characteristics. Firstly, the learners' internal motivation will be aroused. Secondly, the learners· will get involved meta- cognitively in the task. Thirdly, the learners will actively take measures to construct their own learning models. Bandura (1986, 1991) emphasized the self-efficacy expectation as it relates to the influence of behavioural motivation. He purposes that using goal setting, self-evaluation, and self-reinforcement builds and maintains a behavioral motivation. These processes are the basis of self-regulated learning mechanisms. Karoly (1993) had undertaken an extensive review of the self-regulation mechanisms underlying cognitive and somatic based learning in therapy and performance. Self-regulation appears to be the stable element attempting to guide behaviour along a specific path to a directed aim or goal. Pintrich (1995) indicated that self-regulated learners would be able to attempt to control their behaviour, motivation, and cognition and identify achievable goals. Schunk (1996) argued that the self-regulated learning process involves motivation (self-instruction, attribution, achievement motivation, and task value) and cognition activities (meta-cognition, self-monitoring, and self-evaluation).

Social cognitive researchers have focused on self-regulated learning and its related processes, including self-reinforcement (Bandura and Kupers, 1964), self-efficacy (Bandura, 1982), goal setting (Tubbs, 1986), self-evaluation (Bandura and Cervone, 1983) and self-instruction (Schunk, 1986). They have developed an integrated theoretical model, which can be used to explain the individual self-regulated learning process. Gracia (1995) indicated that self-regulated learning comprises the learner's will and skill. Will refers to the learner's motivational orientation of goal, value, and expectation. Skill refers to the learner using different cognitive, meta- cognitive, and resource management strategies.

Bandura (1986) pointed out that self-regulated learning involves three sub-processes: self-observation or self-monitoring, self-judgment, and self-reaction, all of which interact with each other. Self-observation emphasizes self-recording and the standard to be attained as evidence of progress. Self-judgment refers to the way in which individuals compare their current performance with the goal; it can be affected by the evaluation criterion, the characteristics and importance of the goal, and attribution. Self-reaction focuses on personal and environment as being supportive of their self-esteem.

According to the above theories, self-regulated learning is a Learning process, which occurs when individuals attempt to adjust the characteristics of their own behaviour, motivation, and cognition to best suit their own learning. It is most important that both control and goal setting come from within the student and are not externally imposed. As identified, self-regulated learning refers to individual's spontaneous and self-directed learning.

Self-regulated Learning Theories

Zimmerman (1989) and Schunk (1996) have integrated many theories of learning into four major theories: operant conditioning, cognitive development, social-cognitive, and information processing theory. This section describes the main features or the self-regulated learning related to these four theories.

***Table 1:*** *summary of self-regulated Learning Theories*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Characteristics** | **Operant Conditioning** | **Cognitive Development** | **Social Cognitive** | **Information processing** |
| Key to learning | Reinforcement | Self-regulation | Modeling and Observation | Mental processing |
| Regulating process | Self-monitoring  Self-instruction  Self-reinforcement | Observation emulation  self-control  self-regulation | Self-observation self-judgment self-reaction | Select organize rehearsal map |

*Source: Schunk and Zimmerman, 2003*

Table 1 provides a summary of these major learning theories applied to self-regulated learning. It shows Behaviourism, Cognitive Development, Social Cognitive, and Information processing perspectives on the self-regulated learning processes. Firstly, psychologists emphasize that individuals decide their internal self- regulated behaviour link with the external stimuli of the environment.

In other words, the behaviour that occurs depends on its consequences. The function of reinforcem.ent is to strengthen the discriminative stimuli for the regulated individual's behaviours. Furthermore, self-reactiveness depends upon self-recording to understand self-reflection. The main regulating processes are self- monitoring, self-instruction, and self-reinforcement. Column one shows how operant conditioning theory focuses on the use of the processes of self-monitoring, self-instruction, and self-reinforcement for setting - up and modifying tile learning behaviour. It reflects the behaviourist perspective; however behavioural responses are confined to the provision of external cues, and tend to be dependent and passive.

Secondly, in column two, the cognitive development focuses on learners exerting control over their thoughts, feelings, and actions. The main regulating processes involve observation (acquiring knowledge of the skill to be learned), emulation (using these skills), self-control (internalizing these skills) and self-regulation (using them adaptively).

Thirdly, column three shows how a social cognitive perspective expands the meaning of self-regulated learning. It points out how learners draw on internal regulation related to learning motivation and cognition. In other words, social cognition theory emphasizes the interactive effects of individuals, behaviour, and environment. Factors relevant to the individual include the goal, self-efficacy, meta- cognition, strategy knowledge, sense of value, and emotion. Behaviour implies self-monitoring, self-judgement, and self-reaction.

Environmental factors refer to the characteristics or classrooms or teaching, and academic performance. These three dimensions of self-regulated learning systems go beyond operant conditioning theory's perspective, which emphasizes the behaviourist aspect, instead of the cognition strategies. The main regulated processes are self-observation, self-judgment, and-self-reaction.

Finally m column four, information-processing theory, uses metacognition to explain self-regulated learning and indicates that the learner recognizes the learning strategy and how to use it. The main regulating processes are selecting and organizing information, rehearsing new knowledge alongside existing information in working memory and employed these learning strategies.

Volition also plays an important role in self-regulated, Kuhl (1984) emphasized that the use or a learning strategy alone is insufficient for achieving the goal in learning processes, and. there is a need to incorporate action control for achieving goal in learning processes, and there is a need to incorporate action control for achieving goal realization.

Action control involves two types of processes including pre-decision processes and post-decision processes. The former refers to the cognitive activity related to decision making and goal setting (motivation), the latter refers to when the goal setting has been developed and the processing activity has become important for implementing the goal. Pintrich (1999) argued that time and environment management, peer collaborative learning, and resources management are important in self-regulated learning strategies. The way in which teachers actually operationalise self-regulated learning in practice will depend on what cognitive theories are working within.

**Statement Of Problem**

Teachers have explored different teaching methods and strategies such as collaborative learning, the use of verbal cues and feedback, yet low performance in Home Economics education is still on the increase, and teachers in general like to stick to convention, and give little or no attention to innovations (Zhou 1994). Students are more focused on examination success and put little emphasis on the learning culture, that will equipped them to solve problems that are likely to confront them in and out of school.

Therefore, the problem of this study is whether self-regulated learning actually improves on students’ performance so that they become more autonomous and motivated in their learning. Whether this is obtainable through changing teaching methods to incorporate performance expectancy as self-regulated learning, in this wise this study becomes relevant.

**Research Questions**

The following research questions were raised to guide this study.

1. Does self-regulated learning improve performance in Home Economics?
2. Is there a difference in performance in the academic ability of students with low and high intelligent quotient exposed to self- regulated learning?

**Hypotheses**

The following hypotheses were formulated

1. There is no significant difference in performance of students who are exposed to self-regulated learning and those who were not.
2. There is no significant difference in performance in academic ability of students with high and low intelligent quotient exposed to self-regulated learning.

**Purpose of The Study**

The main purpose of this study is to determine if self- regulated learning can be inculcated in secondary school students and its effect on their academic performance in Home Economics.

Specifically, the study will determine:

* If the use of self-regulated learning strategy improve on students' performance.

**Significance of The Study**

In Nigeria, very few attempts have been made to develop the understanding in the area of self-regulated learning for Home Economics Education. The findings of this study will help students to better achieve the goals of Home Economics Education by increasing their disposition to the acquisition of skills which in turn would lead to their becoming life-long learners. It will also facilitate the development of self-regulated learning for achievement. The findings of this study will also improve on teachers' perception of this teaching method. Teachers will be able to adjust their teaching methods, attitudes and evaluation in order to decrease students sense of failure and frustration and increase students self confidence, motivation to learn. The findings will also serve as baseline information for future studies in this area.

The study covers the effect or self –regulated learning strategies on secondary school students' performance in Home Economics.

The study is restricted to all Junior Secondary School Year 3 students of two different public schools (Mixed) in Oredo Local Government Area, the largest in Edo State.

**Methodology**

**Design of The Study**

The research design adopted in this study is quasi-experimental design. The study made use of 2x2 non-randomized pre-test, post-test control groups. It is a quasi-experimental study because an intact class was used. This design can establish a cause and effect relationship between two variables.

The design is represented and illustrated in Fig.1

|  |  |  |  |
| --- | --- | --- | --- |
|  | Pre-test | Treatment | Post-test |
| Experimental Group | 01 | x | 02 |
| Control group | 02 |  | 02 |

*Fig 1: Design of study.*

Where 01 and 02 represent the pre-test and post test respectively, X is the treatment. The two groups were both pre-tested and post tested. Only the experimental group was exposed to treatment.

**Research Population**

The population of the study consists of all junior secondary school year three (JSS III) students offering Home Economics as a subject in Oredo Local Government Area of Edo-State. A total of 39 Government Schools offer Home Economics in Oredo Local Government Area with a student’s population of 786.

**Sample and Sampling Technique**

The sample size for this study was 95 students. In sampling the two schools, multistage sampling technique was adopted. The first stage implied stratifying schools offering Home Economics in Oredo to two groups. Second stage involved selecting purposively those who met the criteria set. The criteria set was that these schools would have enrolled student in JSSCE for at least three years. This was to ensure that they were not new schools. One intact class each was selected randomly from the schools sampled. Balloting was used to determine which school served as the control and the other experimental. Two schools were chosen, to avoid biases in an experimental study.

***Table 2:*** *List of Selected Schools.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S/N | Name of school | School Type | Form | Research Purpose | Number of Students |
| 1 | Ihogbe Junior Secondary School Benin City | Mixed Boys/Girls | JSS 3. | Control | 54 |
| 2 | Ogbe Junior Secondary School Benin City. | Mixed Boys/Girls | JSS 3 | Experimental | 51 |

**Research Instrument**

The instruments used for the study were the Pre-test and Post- test Achievement test, standardized Aptitude test, Treatment packages were also developed.

The Aptitude test was used to measure the intelligent quotient of the students, this is to determine if there is any relationship between intelligent quotient and performance. The achievement test was used to measure the students acquired knowledge that enhanced their performance. A total of 60 questions developed by the researcher was used for both the pre-test and post-test (achievement test).

Validity is the extent to which an instrument measures what it claims to measure. To determine the content validity of the instrument, the instruments were given to three experts; the research supervisor, measurement and evaluation expert and another expert in Home Economics, all from the Faculty of Education, University of Benin. Their comments, corrections and contributions, made on the test items were effected before the production of the final copies of the instruments.

To determine the reliability of the instrument, the test re-test reliability co-efficient was determined for the achievement test. This item was pilot-tested in another mixed secondary school in Oredo Local Government Area that is not involved in the study but part of the population. This was done by administering the test lo twenty students and re-administered to the same students after two weeks. The data collected were analysed using Pearson's r formulae and a coefficient of reliability of 0.73 was obtained.

The pre-test and post test items, the Aptitude test were administered to the students. This instruments; pre-test and posttest item and the aptitude test were collected on the spot.

**Method of Data Analysis**

The responses to the items were transformed into scores and analyzed using mean standard deviation. The null hypotheses formulated were analyzed using the t-test to determine the significance levels of difference between the academic achievements of students taught under self-regulated learning model, and those not taught. All statistical analysis was tested at 0.05 level of significance.

**Result Presentation and Discussion**

**Hypothesis One**

There was no significant difference in performance of students exposed to self-regulated learning strategies and those who do not.

***Table 3:*** *t-test on Students Performance due to Self-Regulated Learning*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | --- | ----- | -\_.- ---- | - | -- --. | -\_.\_ .. \_.\_ .. \_- |  |
| Group | N | Mean | Standard  Deviation | t | | P-value sig.  (2 tailed) | |
| Without  Self-Regulated Learning | 54 | 26.52 | 5.68 |  | |  | |
| With Self-Regulated  Learning | 51 | 28.80 | 5.61  , | -2.072 | | .041 | |

*α= .05, p <.05*

Table 3 shows a t value of -2.072 and a P value of .041. Testing at an alpha level of .05, the P value is less than the alpha level, so the null hypothesis which stated that "there is no significant difference in performance of students expose to self-regulated learning strategies and those who were not exposed to self regulated learning is rejected. There is a significant difference in performance of those who use self-regulated learning and those who did not use it.The mean scores for those who used self-regulated learning is 28.80 and those who do not is 26.52. Those who use self-regulated learning had higher mean score. Self- regulated learning increased achievement in Home Economics.

**Hypothesis Two**

There was no significant difference in performance in academic ability of students with low and high intelligent quotient exposed to self-regulated learning.

***Table 4:*** *t-test of performance of students exposed to self-regulated*

*learning by Intellectual ability*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Intellectual Ability | N | Mean | Standard Deviation | t | P-Value sig.  (2 tailed) |
| Low | 29 | 28.14 | 5.99 |  |  |
| High | 22 | 29.68 | 5.08 | -.972 | .336 |

*= .05, P < .05*

Table 4 shows a t-value of -.972 and a P-value of .336. Testing at an alpha level of .05, the P-value is greater than the alpha level, so the null hypothesis, which states that there is no significant difference in performance in academic ability of students with low and high intelligent quotient exposed to self-regulated learning is retained. There is no significant difference in performance in academic ability of students with low and high intelligent quotient.

**Discussion**

The result shows that there is significant improvement in Home Economics achievement of the students in the experimental group after the intervention of self-regulated learning strategies. This supports Zimmerman's theory that says that when students are given opportunities to self-regulated and explicitly taught of self-regulated learning strategies, academic achievement is more, likely to be positively affected. Similarly this finding also confirms the result of the studies of Bandura and Schunk (1981) done with the use of the theory of self-regulated learning.

The result also reveals that both the slow and active learners can also regulate their performance through the use of self-regulated learning strategies. The null hypothesis two of this study was retained, indicating that self-regulated learning is effective for low and high intelligent ability. This implies that when students are taught to focus attention on the processes and strategies that help them acquire knowledge, and skills, they tend to engage in activities, they believe can enhance learning such as goal setting, self monitoring, self- evaluation and re-enforcement. This further indicates that students remembers and learn more when given the opportunity to use strategies that enhance conceptual understanding.

**Conclusion**

This study adds to the evidence that self-regulated learning in Home Economic has immediate benefits for students. The result of the present study supports using of self regulated learning to enhance students learning. Self-regulated learning implies two critical processes; motivational belief and learning strategies. The process of using self-regulated learning should focus more on goal setting, goal setting plays an important role in the cognition process whereby if individuals are not able to consciously evaluate self, monitor, then their goal setting may not be helpful.

Finally, in using self-regulated learning strategies, effective class management and collaborative learning should be taken into account. Teaching and learning is a complex process in which teachers should take the responsibility for enabling students to learn. If students’ needs do not influence their knowledge, cognition and intellectual experience, learning will be limited. Self-regulated learning supports students to be involved in their learning processes. It improves students to be involved in their learning processes. It improves students learning desire and helps to achieve self-development through the success that results. Conversely, the traditional instruction emphasizes imitation or memorizing rather than understanding and problem solving. The teacher centered approach limits student access to autonomous learning; therefore self-regulated learning should be used by all.

**Recommendations**

The intent of this study was to promote a focus on teaching pedagogy in Home Economics by examining the effect of self-regulated learning strategies on secondary school students performance. This study is just a small step towards developing effective teaching/learning strategy in Home Economic classes. It is therefore recommended that self-regulated learning should receive more attention in schools; its theoretical and educational relevance should not be underestimated. As a theory it presents linkages of the different components of learning, it's practical value stresses the importance of personal efforts, self-direction and personal responsibility or learner to their own behavior.

There is the need for continuing the use of self-regulated learning strategy instruction as an intervention to help the slow learners. In this way, more students will benefit in terms of academic achievement.

It is recommended that teachers use self-regulated learning instruments on their students, so that the traditional perceptions that some students just cannot learn will be changed. Teachers should see learning as a process, they should make and encourage students to learning as a process, they should make and encourage students to use self-regulated learning and also make students benefit from peer collaborative or team work in the classroom.

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Analysis of the Frequency of Academic Staff and Students` Use of Information and Communication Technology (ICT)

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Abstract

The paper analyze the frequency of academic staff and students use of information and communication technology {Ict} in Katsina State College of Education, it explore the ability of staff and students in computer application 114academic staff and 1995 students were engaged in the study. A survey research design was used; the data collected was analyzed using percentage to present the responses. 4 point Likert-scale was used, while a mean of 2.50 was adopted to determine the higher and lower participation in the use of ICT and ability in computer application. The finding show that the use of ICT in the College is high [m=2.78 higher than m=2.50]. The study also indicated that the academic staff are more competent in the use of wide range of computer applications than students [m=3.08and 2.56 respectively] the study reveals that the staff and students actually engaged in the use of ICT almost on a daily basis for both school learning and individual use. The researchers therefore recommend that this study should be carried out in all the tertiary institutions in Nigeria to clarify the uncertainty of the frequency of ICT use in Nigeria schools.

**Keywords**: Information, Communication, Technology, Frequency, Competency

**Introduction**

There is a growing trend towards the adoption of electronic learning as a frame work for enhancing quality delivery of education is the quest to achieve educational development. This effort result to the integration of information and communication technology (ICT) in education. According to Udie and Ekpang in Babalola et al., (2008) the use of ICT has created opportunity for collaborative learning among group of students, in which students take responsibility for their own learning and which students work with others on complex, extended real world-like problem.

UNESCO (2003) stipulated that ICT constitutes new tools in the hands of teachers. Teachers are key forces in tapping ICT facilitated learning opportunities. yet many lack the knowledge, skills and attitudes to effectively use ICT as tools to enhance learning Farrel and Wachelz (2003) affirm that the limited use of technology for teaching was not only wdue to lack of facilities but also due to teachers knowledge skills, beliefs and expertise, teachers need more training not only in computer literacy but also coherent strategies are needed to enable teachers fully integrate ICT as pedagogical tools even in the classroom. Inspite of the integration of ICT in teaching and learning and the exclusive inclusive of these (ICT) technology into educational activities run by schools across the world national center for educational statistics (2000) affirm that there is dramatic growth in the availability of technology in schools, there is still a great deal of evidence that teachers do not use technology as expected.

In Nigeria, the governments have invested a lot to support the integration of ICT in teaching and learning in the schools. But what is still lacking is adequate monitoring and evaluation of such government investment. Keegwe (2007) is of the opinion that investment in ICT should be followed with continues evaluation in terms of how such technology is used. Technology is important, but what is more important is how it can be used to enhance the quality of teaching and learning expected.

**Statement of the Problem**

The integration of ICT in education is to ensure effectiveness and efficiency in teaching and learning. Imisson and Tayor (2001) opined that ICT is an increasingly powerful means to enhance one ability to think, to learn, to communicate and to use ones brain creatively and logically, however, a number of challenges has been observed to be responsible for the failure of the scheme, accordion to Federal Ministry of Education (FME) 2001 cited in Badamasi (2010) Nigeria is experiencing a sever shortage of ICT skills and personnel necessary for taking advantage of the new Emerging technologies in the knowledge society. More so, there is a growing uncertainty of academic staff and student’s ability and competency in the use of ICT in Nigeria tertiary institutions inspite of its availability in the schools.

**Purpose of the Study**

This study is design to examine the frequency of academic staff and students participation in the use of ICT in Katsina state College of Education Nigeria, based on the fact that the facilities are available to some extent but how well the facilities are use becomes the focus of the study. The study will also determine the ability of academic staff and students in computer appreciation. Finally the study will explore and relate the ability of the both groups under study to be able to identify the group with a high ability in computer applications.

**Research Questions**

Specifically, this study attempts to answer the following research questions:

1. How often do academic staff and students use ICT?
2. What type of computer applications are academic staff and students able to use?
3. Are there any differences in academic staff and students’ ability in computer appreciation?

**Research Design and Procedure**

A survey research design was employed for the study. The population is made up of 216 academic staff from the 5 schools (education, art and social science, science, languages and vocational and technical education) of the college and a total of 4583 students across NCE 1 and NCE 3 of the college. In all 120 academic staff across the five schools and 2100 students across the three levels within the five schools were sampled for the study. The mode of sampling is what Nworgu (1995) calls “purposive or judgemental sampling”. Purposive or judgmental sampling involves the use of specific elements which satisfy some predetermined criteria (Nwikina, 2010). Hence the representativeness of such samples was assumed in this study.

**Instrument for data Collection**

The instrument for data collection was a structured questionnaire developed by the researcher. It was validated by experts from the department of educational foundation of the college. A4 point Likert –type scale was adopted for the option and used for the study. the options are :-almost every day (A)=4, A few times each week (B)=3, a few time each month (C)=2, and never (D)=1, for items in research question 1, while the options for research questions 2 and 3 are:- I do this my self (A)=4, I seek assistance of some one when doing this (B)=3, I have knowledge of this but can’t do it (C)=2, I can start this but can’t get what I went (D)=1.

**Method of data Collection**

The instrument used was a questionnaire administered to 120 academic staff and 2100 students within the college. It took a week to administer the questionnaire to the staff as the researcher move from office to office; the collection was also in same manner. While the students’ questionnaire was given to them at their lecture venues and was retrieved immediately it was completed. However, not all the questionnaires could be retrieved. A total of 2109 questionnaires were returned out of which academic staff returned 114 out of the sampled 120 and 1995 students questionnaire was also collected back out of 2100 students that was sampled. This 2109 questionnaire collected was used for data analysis.

**Results**

Research Question 1: How often do academic staff and students use ICT?

***Table 1:*** *Academic staff and students’ frequency of ICT use.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **ICT Frequency Of Use** | **Valid Percent** | | | | **M** |
| 4 | 3 | 2 | 1 |  |
| 1. | Computer for word processing (i.e. MS word) | 16.22 | 40.11 | 24.23 | 19.44 | 2.53 |
| 2. | Spreadsheet to software (such as ms excel or lotus develop budget, statistics, organize C.A and calculate C.G.P.A or analyze scientific data) | 4.03 | 17.92 | 43.30 | 35.75 | 1.90 |
| 3. | Computer to create and use presentation packages e.g. ms-power points. | 0.38 | 1.42 | 2.94 | 95.26 | 1.07 |
| 4. | Any computer based instructional software or courseware for teaching and leaning. | 20.44 | 29.02 | 12.32 | 38.22 | 2.32 |
| 5. | Reference and research tools on the internet or installed in computer such as electronic encyclopedia atlas, Qur’an, bible e.t.c. | 86.30 | 3.79 | 5.64 | 4.27 | 3.72 |
| 6. | The internet to lookup information about people, places, things or ideas and to catch the latest news. | 90.66 | 3.32 | 4.65 | 1.37 | 3.83 |
| 7. | The internet for sending and receiving documents, messages, through email. | 66.95 | 15.17 | 3.85 | 14.03 | 3.35 |
| 8. | The internet to download leaning/research materials such as articles and journals. | 49.26 | 19.49 | 23.76 | 7.49 | 3.11 |
| 9. | The internet to download soft ware like educational software as well as multimedia items such as music and videos. | 42.30 | 17.92 | 20.06 | 19.72 | 2.83 |
| 10. | GSM phones to make and receive calls, send text message, conference cell e.t.c. | 100 | - | - | - | 4.0 |
| 11. | Computer games and simulations for teaching and learning. | 6.31 | 31.86 | 13.80 | 48.03 | 1.96 |

*Mean of Frequency of use =2.78*

*Response Scale: 4 =almost every day*

*3 =a few times each week*

*2= a few times each month*

*1= never*

The above findings revealed that ICT has gained ground in Katsina State College of Education inspite of the fact that it was not a long time since it was introduced and the facilities provided. Going by the mean of frequency of usage (m=2.78 higher than 2.50) the use ICT among staff and students has been impressive. The activities that staff and students usually do almost every day are using reference and research tools on the internet to install in computer such as electronic encyclopedia, atlases, Bible, Qur’an etc (m=3.72), surfing the internet to lookup information about people, places, things or ideas and to catch the latest news (m=3.83),using the internet for sending and reviewing documents, messages through email (m=3.35), using the internet to download learning/research materials such as articles and journals (m=3.11), using the internet to download software like educational software as well as multimedia items such as music and videos (m=2.83), GSM phones to make and receive call etc.(m=4.0), computer for word processing MS Word (m=2.53) and any computer based instructional software for teaching (m=2.92). The activities that are less frequently practiced (i.e. a few time each month or never) are computer games and simulation for teaching and learning (m=1.96), using the computer to create and use presentation packages e.g. MS-power points (m=1.07) and spreadsheet software such as MS Excel or Lotus to develop a budget, statistics, organize C.A, and calculate CGPA or analyze scientific data (m=1.90).

**Research Question 2 and 3**

(2) What type of computer application are staff and students able to use?

(3) Are there any differences in academic staff and student’s ability in computer appreciation?

***Table 2:*** *Staff ICT Ability*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Types of Computer Applications**  **used by staff** | | **Valid Percentages (%)** | | | | **Mean**  **(m)** | **Remark** |
|  | | 4 3 | | 2 | 1 |  |  |
| 1 | Surf the internet | 71.93 | 12.28 | 8.77 | 7.02 | 3.49 | Good |
| 2 | Copy a file from a flash drive/CD-ROM | 13.16 | 13.163 | 22.81 | 50.89 | 1.89 | Poor |
| 3 | Scroll up and down a document | 100 |  |  |  | 4.0 | Good |
| 4 | Create/ edit a document | 69.30 | 21.93 | 1.75 | 7.02 | 3.54 | Good |
| 5 | Open a file | 64.91 | 21.93 | 7.02 | 6.14 | 3.46 | Good |
| 6 | Install, update and scan the computer for virus. | 14.04 | 22.81 | 21.05 | 42.10 | 2.08 | Poor |
| 7 | Save a computer document or file. | 67.54 | 19.30 | 7.89 | 5.27 | 3.49 | Good |
| 8 | Print a computer document or file. | 75.44 | 12.28 | 3.51 | 8.77 | 3.54 | Good |
| 9 | Delete a document or file | 85.96 | 1.75 | 9.65 | 2.63 | 3.71 | Good |
| 10 | Copy or download files from the internet | 28.42 | 10.53 | 8.77 | 7.89 | 3.48 | Good |
| 11 | Attach a file on an email | 74.56 | 12.29 | 7.89 | 5.26 | 3.56 | Good |
| 12 | Create a computer graphic (e.g. logo) | 10.53 | 5.26 | 8.77 | 75.44 | 1.51 | Poor |
| 13 | Create a presentation using power point | 5.26 | 12.28 | 50.88 | 31.58 | 1.91 | Poor |
| 14 | Start and play computer game | 54.39 | 23.68 | 15.79 | 6.14 | 3.26 | Good |
| 15 | Download music/videos and pictures from the internet. | 64.04 | 15.78 | 10.53 | 9.65 | 3.34 | Good |

*Academic staff ICT ability mean=3:08*

*Response scale: (4)= I do this myself, (3)=I seek assistance of someone when doing this, (2)=I have knowledge of this but can’t do it, (1) I can start this but can’t get what I want.*

The findings, as shown in table 2 have shown that most academic staff have the ability to operate a wide range of the computer applications (m=3.08), surf the internet (m=3.49), scroll up and down a document(m=40), create/edit a document (m=3.54), open a file (m=3.46), save a computer document or file(m=3.49), print a computer document or file (m=3.54), delete a document or file (m=3.71), copy or download files from the internet (m=3.48), attach a file to an email(m=3.56), start and play a computer games(m=3.26), download music, videos, pictures from the internet (m=3.34). However, the ability of academic staff is poor in some of these computer applications e.g. copy a file from flash drive (m=1.89), create a computer graphic e.g. logo (m=1.51), create a presentation using power point (m=1.91) and install, update and scan the computer for virus (m=2.08). These four applications require the staff to undergo more training especially in advance computer skills in order to improve.

***Table 3:*** *Students ICT ability*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S/n** | **Students items** | **Valid Percentages (%)** | | | | **Mean**  **(m)** | **Remark** |
|  | | 4 | 3 | 2 | 1 |  |  |
| 1. | Surf the internet | 60.45 | 20.25 | 16.59 | 2.71 | 3.38 | Good |
| 2. | Copy a file from a flash drive | 35.69 | 10.18 | 15.19 | 38.94 | 2.43 | Poor |
| 3. | Scroll up and down a document | 70.93 | 17.69 | 9.02 | 2.36 | 3.57 | Good |
| 4. | Create/edit a document | 21.25 | 24.71 | 28.97 | 25.07 | 2.42 | Poor |
| 5. | Open a file | 52.93 | 15.24 | 15.09 | 16.74 | 3.44 |  |
| 6. | Install, update and scan the computer for virus | 11.83 | 1.60 | 75.24 | 11.33 | 2.14 | Poor |
| 7. | Save a computer document or file | 40.25 | 41.70 | 6.12 | 11.93 | 3.10 | Good |
| 8. | Print a computer document or file | 52.28 | 30.28 | 10.63 | 6.81 | 3.28 | Good |
| 9. | Delete computer document or file | 50.23 | 20.20 | 15.14 | 14.43 | 3.06 | Good |
| 10. | Copy or download file from the internet | 2.11 | 75.09 | 20.15 | 2.65 | 2.77 | Good |
| 11. | Attach a file on an email | 5.11 | 4.92 | 80.30 | 9.67 | 2.05 | Poor |
| 12. | Create a computer graphic (e.g. logo) | 1.41 | 4.51 | 8.47 | 85.61 | 1.22 | Poor |
| 13. | Create a presentation (using power print) | 1.75 | 0.40 | 96.84 | 1.01 | 2.03 | Poor |
| 14. | Start and play a computer game | 75.24 | 10.28 | 9.37 | 5.11 | 3.56 | Good |
| 15. | Download music/videos and pictures from the internet | 15.14 | 70.63 | 5.76 | 8.47 | 2.92 | Good |

*Mean of Students ICT Ability = 2.56*

The data in Table 3 above indicates that the students’ ability in computer appreciation is good (m=2.56, higher than 2.50). The activities students do better include: surfing the internet (m=3.38), scrolling up and down a document (m=3.57), opening a file (m=3.44), saving a computer document or file (m=3.10), printing computer document or file (m=3.28), deleting computer document or file (m=3.06), copying or downloading a document or file from the internet (m=2.77), starting and playing a computer game (m=3.56), downloading music, videos and pictures from the internet (m=2.92). While the applications with poor abilities include:- copying a file from a flash drive (m=2.43), creating and editing a document (m=2.42), installing, updating and scanning the computer for viruses (m=2.14), creating a computer graphic e.g. logo (m=1.22), creating a presentation using power point (m=2.03), and attaching a file to an email (m=2.05). These applications have challenges because the students need training and retraining to be able to use all these applications effectively.

**Discussion**

The findings of this work reveals that staff and students of the college are using ICT on a frequent basis (m=2.78 higher than 2.50) as shown in table 1, though there are challenges especially in the use of spreadsheet software (m=1.90), creating and using presentation packages such as Power point (m=1.07), computer games and simulation for teaching and learning (m=1.96). Table 2&3 shows that the staff ability in computer application is high (m=3.08) and students ability is also rated high (m=2.56), using the adopted mean of 2.50. There is great ability in computer appreciation in the college. The mean also shows that the staff are of high ability in computers appreciation than students with means of 3.08 and 2.56 respectively.

**Educational Implications and Suggestions**

Technology has been integrated in the learning activities of the college but it is not clear, if it has yielded any impact in building of knowledge. Marwan (2008) suggested that the focus of ICT integration should be directed towards achieving the effective attainment of knowledge through technology. That is, teachers should be aware that efforts need to be made to ensure that teaching using ICT can provide better learning outcomes than that of the conventional teaching. This study indicates high ability in computer appreciation among staff than students. This could be trace to one basic fact that almost all the staff used in this study have computers of their own while on the part of the students a very large number depend on the school computers. This is a fact that also determines how fast students can improve on their abilities. Therefore, the introduction of a policy that will ensure that all students in all the tertiary institutions own computers should be encouraged. Finally, the researcher recommends that similar study should be carried out in other tertiary institutions across the nation; this will show the frequency with which ICT has been integrated in our school system in Nigeria.

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Handling Perishable Food Stuff for Quality Assurance and its Effect on Quality and Price a Study of Yanlemo Market,

Kumbotso L.G.A of Kano State

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Abstract

The purpose of this research work is to find out how perishable food stuffs are handled in Yanlemo market and its effect on quality and price of commodity. Questionnaires were administered to 50 randomly sampled traders about handling of perishable stuff during transportation, cleanliness, display, storage, how it affects quality and price and the problems associated with the its handling. The study revealed that there is little or no knowledge on proper handling since 75% of the respondents are within the range of non formal to O’level of education. More than 75% displayed their items outside shops which attract dust, air, sunlight, flies and other climatic conditions. While they realized that quality of their item is the main factor that stimulate customers and that poor handling depreciate the value of the item, 40% of the respondents suggested that for effective quality assurance in the business of perishable items cooperative efforts of 40% and Government role of 30% should be involved.

**Keywords:** Food, Quality assurance, Yanlemo Market, Kano State

**Introduction**

Health is wealth and pre-requisite for development. Nutrition is a process of receiving food necessary for growth and healthy, food is an edible substance that nourishes the body, and after its digestion and absorption it support life and promote growth. Food is classified into: carbohydrates, proteins, fats and oil, vitamins, mineral salts, and water.

According to Thareja (2007), “Quality assurance refers to the planned and systematic activities implemented in a quality system so that quality requirement for a product or services will be fulfilled through systematic measurement comparison with a standard monitoring of processes and associated feedback loop that confers error prevention for survey to identify strength and weakness, monitoring, competition, standard compliance and evaluation. It also involves documentation, use of technical infrastructure, time to time checking, audit trail, research information from others with experience then share effective policy and competition.”

Reilly (2003) stated that carbohydrates supply energy and obtained in cereals, tubers, etc, protein is responsible for promoting growth, body building, assist in repair body tissues, transmission of hereditary characteristics, produces enzymes and antibodies, obtained from meat, fish, milk and so on, while fats and oil supply heat and energy present in groundnut oil, olive oil, palm oil etc, vitamins and mineral salts for carrying out various body process and protection against diseases found in fruits, vegetables, seed, nuts, and so on.

Perishable food composed high moisture thus make them prone to deteriorate almost immediately unless properly handled. Example fish, meat, sea foods, fruits as banana, pawpaw, mango, pineapple, etc. vegetable as spinach cabbage, lettuce, etc. all these require accurate temperature, controlled humidity, air circulation and sanitary storage space, failure to this, can lead to deterioration or eventual loss.

Hobbs & Roberts (2009) defined “Food handling as a process of regarded as open food operations with appropriate care and attention, it involve personal hygiene, cleaning methods, clean containers, pre-packed grocery, sales, temperature and storage. Perishable food perpetuate poor handling in three stages:- production stage, poor agricultural practices, like irrigation with stagnant and contaminated water, farm pest and diseases, dirty tools free and extensive rearing, unsanitary slaughtering places etc. These favour spread of harmful bacteria and worms. The marketing stage that denote poor transportation exposure to sunlight, use of unventilated containers etc. Which attract flies, bacteria, fungi, etc. and preparation state. According to Reilly (2003) “most nutritive values of perishable food are loss through bad choice, bad methods of cooking over steeping, during cleaning, destroy gravies and storage at ambient temperature.

Poorly handled food especially perishable items are deficient to some nutritive values or harbour pathogenic bacteria and render it harmful even if it is acceptable to the eye. For instance exposure to sunlight destroyed Vitamin C, A and reduced Vitamin D. Over steeping destroyed Vitamin A, C, Niacin and folic acid. Exposure to dust and flies caused infection, food borne diseases, as vomiting diarrhea, etc. and free rearing system could lead to infection as typhoid fever, tape worm, etc. These encouraged this study to find out the activities carried out in market that could affect perishable food stuff for the purpose of enlightening traders on how best to handle perishable food for proper health and National development.

**Objectives of the Study**

The objectives of this study are as follows:-

* To find out how perishable food stuff are handled by retailers and marketers.
* To identify the effects of handling perishable food on its quality.
* To identify the relationship between handling of perishable food and their price.
* To determine the best methods of producing quality assurance in business of perishable food.

**Research Questions**

* How perishable are foods transported from producers to marketers?
* What methods do marketers use to clean perishable food?
* In which places do marketers store their unfinished perishable food stuff?
* Where and how do marketers display their perishable food stuff for sale?
* What could be the problems associated with buying and selling of perishable food items?
* What stimulate customers during purchase of perishable item?
* Can the problem associated to the business interfere with the price of perishable items?
* What factors determine the price of perishable item?
* What opinion do marketers have that can improve the quality assurance of perishable item business?
* What effort can individual marketers offer that will boost the marketing of perishable food item?

**Hypothesis**

1. Ho: There is no significant difference between handling of perishable item and its quality.
2. Ho: There is no significant difference between quality of perishable item and its price.

**Methodology**

The research designed was descriptive survey.

**Area of the Study**

The study area was Yanlemo market located at Maikalwa Quarters of Zaria Road Kano. It is quite a popular place for the wholesale of fruits like oranges, bananas, watermelon etc. Other consumable commodities are also available. The commodities are brought to the market for sale from other places by local producers.

**Population and Sampling Procedures**

The target population were marketers of perishable food business transactions in Yanlemo market in which 50 people were sampled randomly, the return is 100% because the researcher used oral interview.

**Instrumentation**

The data was collected by the use of a set questionnaire captioned QAHPF, consisted of 15 questions of choice the appropriate answer among the options provided.

**Validity and reliability of instrument:**

The questionnaire was screened and vetted by a Senior Lecturer in the Faculty of Education of the Ahmadu Bello University Zaria.

**Result: General Profile of the Sampled Respondents**

Out of the 50 sampled respondents 31 (62%) were within the age range of 30 – 40 years, 13 (26%) within 20-29 years, and 6 (12%) above 40 years and none under 20 years. While 24 (48%) received secondary education, 14 (28%) primary education 12% non-formal Education 6 (12%) tertiary education and no graduate. 56 (92%) are male and 4 (8%) are female respondents.

***Table 1:*** *Means of Transporting Perishable Item to the Market*

|  |  |  |
| --- | --- | --- |
| **Responses** | **Frequency** | **Percentage** |
| On motorcycle | 20 | 40 |
| On pick up and trucks | 19 | 38 |
| On animals | 0 | 0 |
| In vans | 2 | 4 |
| On cars | 9 | 18 |
| **Total N = 50** | **-** | **100** |

***Table 2:*** *Methods of Cleaning Perishable Items*

|  |  |  |
| --- | --- | --- |
| **Responses** | **Frequency** | **Percentage** |
| Soaked in large containers | 10 | 20 |
| Wash directly with tap water | 0 | 0 |
| Not cleaned at all | 30 | 60 |
| Use of detergent and other chemicals | 10 | 20 |
| **Total N = 50** | **-** | **100** |

***Table 3:*** *Methods of storing perishable food*

|  |  |  |
| --- | --- | --- |
| **Responses** | **Frequency** | **Percentage** |
| Parked in bag and kept open | 23 | 46 |
| Parked and kept open | 8 | 16 |
| Use of natural substances | 4 | 8 |
| Thatched in open place | 5 | 10 |
| In stores | 5 | 10 |
| Use of artificial substances | - | - |
| Rentage in marketers store | - | - |
| Refrigerator | 5 | 10 |
| **Total N = 50** |  | **100** |

*Table 4: How they displayed perishable food for sale*

|  |  |  |
| --- | --- | --- |
| **Responses** | **Frequency** | **Percentage** |
| Shops | 3 | 6 |
| Hawking | 6 | 12 |
| Outside shop | 26 | 52 |
| Under thatched roof | 15 | 30 |
| **Total N = 50** |  | **100** |

***Table 5:*** *Problems associated to handling business of perishable item*

|  |  |  |
| --- | --- | --- |
| **Responses** | **Frequency** | **Percentage** |
| Attack by bird, insects and rodents | 15 | 30 |
| Storage facilities | 12 | 24 |
| Transportation | 11 | 22 |
| Weather problem | 12 | 24 |
| **Total N = 50** |  | **100** |

***Table 6:*** *Factors that stimulate customers*

|  |  |  |
| --- | --- | --- |
| **Responses** | **Frequency** | **Percentage** |
| Neatness: personal hygiene, equipment and place. | 15 | 30 |
| Discount prices | 11 | 22 |
| Quality of the item | 19 | 38 |
| Advertisement | 5 | 10 |
| **Total N = 50** |  | **100** |

***Table 7:*** *Factors that depreciate the value of perishable item*

|  |  |  |
| --- | --- | --- |
| **Responses** | **Frequency** | **Percentage** |
| Discoloration/faded | 15 | 30 |
| Wilted | 10 | 20 |
| Odour | 15 | 30 |
| Dryness | 10 | 20 |
| **Total N = 50** |  | **100** |

***Table 8:*** *The treatments to the spoilt perishable food*

|  |  |  |
| --- | --- | --- |
| **Responses** | **Frequency** | **Percentage** |
| Sell at cheap price | 20 | 40 |
| Throw away | 15 | 30 |
| Give out to children and beggars | 10 | 20 |
| Used at home | 5 | 10 |
| **Total N = 50** |  | **100** |

***Table 9:*** *Factors to improved quality assurance in perishable food business.*

|  |  |  |
| --- | --- | --- |
| **Responses** | **Frequency** | **Percentage** |
| Government assistance | 15 | 30 |
| Cooperative society | 20 | 40 |
| Non-governmental organizations | 5 | 10 |
| Personal hygiene | 10 | 20 |
| **Total N = 50** |  | **100** |

***Table 10:*** *Individual efforts for boosting perishable item business*

|  |  |  |
| --- | --- | --- |
| **Responses** | **Frequency** | **Percentage** |
| Personal hygiene | 15 | 30 |
| Cleanliness of market place | 6 | 12 |
| Cleanliness of the item | 20 | 40 |
| Use of uniform, gloves, and so on | 8 | 16 |
| **Total N = 50** |  | **100** |

**Discussion**

The data obtained show various handling activities that affect the quality and price of perishable food stuff. Table 1: revealed that 40% of the perishable food traders transported with motorcycle and pick-ups in the absence of vans which exposed the items to dust, air, sunlight, rain or even pressure by the human activities because it is observed that people laid on the main food stuff on the pick ups and trucks, therefore 70% of the data collected revealed poor transportation of perishable item.

The cleaning of perishable food is also not encouraging because 60% of respondents stated that they do not clean their items at all and those that clean them soaked them. Reilly (2009) stated that over soaking destroy most nutrient content. 20% used detergent to clean oranges which is also hazardous to health.

Table 3 showed the absence of good storage facilities while table 4 revealed the process of displaying perishable item for sale of which more than 90% of are done in the open, outside shops. Based on this, there are various problems associated with handling of perishable food since the percentages of responses are within the same range of percentile that is 22 – 30%. Table 6 and 7 indicated the significant relationship between handling of perishables and its quality and prices because the respondents indicated that 38% of customers considered quality of item and 30% considered the hygiene 22% discount. While table 8 revealed that due to poor handling 60% stuff got spoilt and lost.

Finally, traders viewed that quality assurance in perishable food business can be achieved through government support, cooperative societies and personal efforts in terms of personal cleanliness as well as that of the perishable items.

**Conclusion**

Quality assurance has a great effect on any business be it production or services especially in terms of handling perishable food item due to their fragile nature so as to minimize the rate of deterioration, avoid infection and disease and provide quality self reliance and National development among the citizenry.

**Recommendations**

* Training of youth and adults on the handling of perishable food stuff should be supported especially through apprentice programme.
* Extension services should be organized in order to impart knowledge of handling food for nutrients conservation.
* Media should increase effort on handling food and nutritional education.
* Private and non governmental organizations should be involved nutritional education and food handling.
* Food safes should be maintained by green grocers to avoid insects perching on perishable food.

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Schools’ Records: A Deficiency Analysis of English

Language Exercises in Public Schools

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Abstract

This paper examines students’ records of English language exercises in public schools in Rivers State, Nigeria. Students’ record shows classroom practices or interaction between teachers and students as it relates to the implementation of the national policy on education. Students and teachers in public secondary school constitute the population of this study. Data for the study was got through content analysis of 30 English language notes from 30 students in five secondary schools in Rivers State. Structured interview was also used to elicit data from 15 English language teachers and 72 students in public secondary schools to corroborate the students’ record. Simple frequency and percentage are used for data analysis. Based on the findings, the paper reveals amongst others that students’ lacks as a result of the quality of language instruction is majorly responsible for students’ proneness to examination malpractices and mass failure in English language in NECO and WAEC. The paper recommends the provision of an optimal learning environment for language learning as well as the use of a good supervisory technique to ensure instructional quality in language arts in public schools in Rivers State.

**Keywords**: Schools Record, Students Record, Language Instruction, Corrective Feedback, English Language Note Book

**Introduction**

Whereas children unconsciously acquire language especially the language they are exposed to, students of second language must consciously study the necessary skills required for communication in a target language. The essence of language teaching in second language acquisition is for communicative competence.

In Nigeria, English language as a subject is studied to improve the communicative competence of the students who hitherto must have acquired and gained a fair mastery of their mother tongue. The study of English language as a major subject is tied to the fact that English language is the official language in Nigeria. Considering the importance of language in all human activities, it is imperative to empirically study the quality of language instruction in Nigerian schools.

The purpose of this study is to examine students’ record of English language exercises as an evidence of pedagogical contact with English language teachers in the classroom. The significance of this study lies in the instructional quality of the contact between the students and their English language teachers in the classroom. The examination of students’ record is important as it reveals teachers performance or implementation of the curriculum. Teachers’ performance in the classroom serves as input which manifest in students knowledge and usage of the target language. Students manifest teachers input as output in their performance in examination. Mass failure in English language in national examination like WAEC (West African Examination Council) and NECO (National Examination Council) is an indicator of the quality of language instruction in public schools in Nigeria.

The quality of language instruction in schools has bearings on students’ behaviour during examination. It accounts for students’ proneness to examination malpractices in Nigeria. This paper aims to provide answers to the following research questions.

What does students’ record of language exercises show about the quality of language instruction in public schools in Rivers State?

1. What factors are responsible for the quality of language instruction shown in students’ record of English language exercises in public secondary schools in Rivers State?
2. What is the implication of the quality shown by the students’ record?

To provide answers to these questions, the paper is divided into five parts. Part one is the introduction. Part two provides a conceptual framework for the study. Part three contains research methodology. Part four discusses findings and part five has summary and recommendations.

**Conceptual Background**

In school administration, record keeping is very crucial. Some major records in the school are diary, teachers’ grade book, cumulative record folder (CRF), transcript or report card, log book, attendance register, admission register, visitors’ book and punishment book.

Apart from these, there is the exercise book used by students to record subject taught in the classroom. The exercise book records the instruction taught in the class. In the secondary school, most students have different exercise book for different subjects.

Ogidi (2008, p.9) provides the following reasons for record keeping in the school system. Record keeping:

1. provides details of students’ progress towards the attainment of stated educational objectives, aims and goals,
2. shows the academic achievement of the students,
3. provides a track record of a child’s behaviour and work problems,
4. helps in educational planning,
5. provides a working tool for teachers and parents to assess students activities in the school,
6. serves as a diagnosis tool for the discovery of academic flaws which require remediation,
7. contains information about the schools’ administrators,
8. enables students to obtain information about their schools’ work for employment or further studies.

**Students’ record and English Language Exercises**

Students’ records show academic activities in school. Students use exercise books to note salient points of every lesson presented by teachers in school. The English language exercise book records the content as well as the exercises used for evaluation for every lesson presented by the English language teacher.

Usually, the English exercise book has the following information: subject, date, title of lesson and content of lesson. In addition to these, there are exercises for evaluation ‘classwork’ in the exercise book. More exercises based on the lesson may be given as homework or assignment. Some schools use different note for homework. There is also the workbook which provides more exercises as a kind of drill to reinforce students’ competence in the skills taught. The English language note is meant to contain corrective feedback by teachers. By feedback, the teacher makes comment by evaluating what has been written by the students.

The essence of corrective feedback is to treat errors in the work submitted by the students. Errors in the students exercise may be semantic or lexical, syntactic errors or pronunciation errors (Spada and Lightbown, 2002, p.128).The students are to respond to the teachers’ remark by attending to the teachers’ comment. The teacher is also to comment on the students’ corrected exercise.

**English Language Instruction in Schools**

English language instruction in schools is centered majorly on the four language skill: listening, speaking, reading and writing. These language skills are acquired through the arrangement of language instruction through the following linguistic components: syntax (sentence structure), phonology (sound system), lexicon (vocabulary), semantics (meaning) and pragmatics (usage) (Mitsutomi, 2005, p.1). These are presented through the following lessons:

1. comprehension (reading and listening)
2. speech (oral English)
3. language structure (syntactic rules)
4. vocabulary Building (semantics)
5. composition (writing)
6. mechanics (punctuation rules)
7. literature (Junior secondary).

The scheme of work for language instruction provides a topic on these areas of study at least once in two weeks. Otherwise, there is an aspect of these areas to be covered weekly.

The importance of the aforementioned areas in the development of basic language skills are discussed hereafter.

Comprehension in language instruction is done as either listening or reading comprehension. This aspect of language instruction builds on all the language skills. While listening comprehension emphasizes students comprehension to passages read to them, reading comprehension is based on what students comprehend from what they have read. Idogo (2011, pp.3-4) defines reading comprehension from three perspectives. They are listed below.

1. Reading comprehension is the end product of a reading programme that aims at getting students to grasp the meaning of words.
2. Reading comprehension is a constructive process that involves the drawing of inferences based on an interaction between the readers’ prior knowledge and information from the text.
3. Reading comprehension is the process of constructing meaning through the dynamic interaction among the reader, the text and the context of the reading situation.

Speech in language instruction encompasses the study of vowels, consonants and stress. The essence of speech in language instruction is to improve the pronunciation skills of the students. Burns and Seidlhofer (2002, p.211) consider speech from a broad view of speaking and note that learning speaking involves developing subtle and detailed knowledge about why, how and when to communicate, and complex skills for producing and managing interaction.

Language structure is another aspect of language instruction. It avails students with skills in syntax. The students are made to understand the rules of grammar through language instruction.

Understanding the meaning of words in English language is undertaken in lessons on vocabulary building. This aspect of language instruction increases students’ knowledge and grasp of words as well as usage. Vocabulary building lessons are focused deliberate learning of words. This form of learning is seen to be effective than incidental learning of vocabulary (Nation and Meara, 2002, p.41). Focused deliberate learning of words is in consonance with the noticing hypothesis which explains that students are more likely to learn when they consciously notice the words presented to them through deliberate vocabulary learning (Schmidt, 1990, p.130).

Composition is also an aspect of language instruction. Through composition, students are taught on how to express themselves in oral presentation or writing. They are made to understand the framework of composing sentences to express their views and opinions.

Mechanics is a part of language instruction. Through mechanics, students know when, where and how to use punctuation.

In junior secondary, Literature-in-English is also a part of language instruction. The essence is to improve students’ knowledge of words especially when words are used figuratively.

**Data Analysis**

Lantern English, English Project, Intensive English and Oxford English are some English textbooks used in secondary schools in Nigeria. For this study, English textbooks would serve as a guide as there is no uniform scheme of work. The content of Intensive English and English Project would serve as a guide.

In Intensive English, a total of 135 lessons for a school year can be formed from comprehension (20), language structure (20), speech (20), composition (35), vocabulary (20) and mechanics (20). For English Project, a total of 160 lessons can be formed from speech (20), reading comprehension (20), vocabulary building (25), listening comprehension (20), grammar (20), skills (25) and writing (30).

Using these two textbooks as course books to be covered in a school year, the sample of students’ record of language exercises can be evaluated thus:

**Data Presentation**

***Table 1:*** *Content Analysis from Students’ Records of English Language Exercises in 2011/2012 School Year.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/No** | **School/Class** | **Term** | **CM** | **SP** | | **LS** | | **VB** | | **CP** | | **MC** | | **LIT** | | **ASS** | | **TOTAL** | | **FB** | |
| 1 | Sample1  JS1 | 1st | 4 | 2 | | 5 | | 3 | | 3 | | - | | - | | 1 | | 18 | | 4 | |
| 2nd | 4 | 1 | | 2 | | 3 | | - | | - | | - | | - | | 10 | | 7 | |
| 3rd | 1 | 1 | | 2 | | - | | - | | 1 | | - | | 3 | | 08 | | 3 | |
| Total | 9 | 4 | | 9 | | 6 | | 3 | | 1 | | - | | 4 | | 36 | | 14 | |
| 2 | Sample 2  JS1 | 1st | 2 | 3 | | 1 | | 1 | | 3 | | 1 | | - | | - | | 11 | | 2 | |
| 2nd | 1 | - | | 4 | | 2 | | - | | 1 | | - | | 1 | | 09 | | 4 | |
| 3rd | - | - | | 3 | | 1 | | - | | - | | - | | 1 | | 05 | | 2 | |
| Total | 03 | 03 | | 08 | | 04 | | 03 | | 02 | | - | | 02 | | 25 | | 08 | |
| 3 | Sample 3  JS1 | 1st | - | - | | 4 | | - | | - | | 1 | | 2 | | - | | 07 | | - | |
| 2nd | - | - | | 6 | | 2 | | - | | - | | 1 | | 2 | | 11 | | 3 | |
| 3rd | 1 | - | | - | | - | | 5 | | - | | - | | 1 | | 07 | | 1 | |
| Total | 01 | - | | 10 | | 2 | | 5 | | 1 | | 3 | | 3 | | 25 | | 4 | |
| 4 | Sample 4  JS2 | 1st | 1 | 7 | | 3 | | 1 | | - | | 1 | | 2 | | - | | 15 | | 4 | |
| 2nd | 2 | 8 | | 3 | | 2 | | 2 | | 1 | | - | | 2 | | 20 | | 3 | |
| 3rd | 1 | - | | 4 | | 1 | | 5 | | 1 | | - | | 1 | | 12 | | 3 | |
| Total | 04 | 15 | | 10 | | 04 | | 07 | | 03 | | 02 | | 03 | | 47 | | 10 | |
| 5 | Sample 5  JS2 | 1st | 4 | 4 | | 5 | | 1 | | 2 | | - | | 1 | | 3 | | 20 | | 7 | |
| 2nd | 2 | 5 | | 2 | | 1 | | - | | - | | 1 | | 1 | | 12 | | 2 | |
| 3rd | - | - | | 4 | | 1 | | - | | - | | - | | - | | 05 | | 1 | |
| Total | 06 | 09 | | 11 | | 03 | | 02 | | - | | 02 | | 04 | | 37 | | 10 | |
| 6 | Sample 6  JS2 | 1st | 1 | 9 | | 1 | | 2 | | - | | - | | 1 | | 2 | | 16 | | 2 | |
| 2nd | - | - | | 11 | | - | | 2 | | - | | - | | 3 | | 16 | | 2 | |
| 3rd | 3 | - | | - | | - | | 1 | | - | | 7 | | 3 | | 14 | | - | |
| Total | 04 | 09 | | 12 | | 02 | | 03 | | - | | 08 | | 08 | | 46 | | 04 | |
| 7 | Sample 7  JS3 | 1st | 1 | 3 | | 3 | | 2 | | 1 | | - | | 2 | | 5 | | 17 | | 7 | |
| 2nd | 2 | - | | 2 | | 2 | | - | | - | | 3 | | 1 | | 10 | | 4 | |
| 3rd | 2 | - | | 1 | | 1 | | - | | - | | 6 | | 4 | | 14 | | 1 | |
| Total | 05 | 03 | | 06 | | 05 | | 01 | | - | | 11 | | 10 | | 41 | | 12 | |
| 8 | Sample 8  SS1 | 1st | - | 3 | | 5 | | 1 | | - | | - | | - | | 3 | | 12 | | 6 | |
| 2nd | - | 4 | | 9 | | 2 | | - | | - | | - | | 4 | | 19 | | 4 | |
| 3rd | - | 2 | | 6 | | - | | - | | - | | - | | 1 | | 09 | | 4 | |
| Total | - | 09 | | 20 | | 03 | | - | | - | | - | | 08 | | 40 | | 14 | |
| 9 | Sample 9  SS11 | 1st | - | 3 | | 2 | | - | | 1 | | - | | - | | - | | 06 | | - | |
| 2nd | - | - | | - | | - | | - | | - | | - | | - | | - | | - | |
| 3rd | 1 | 2 | | 6 | | - | | 1 | | - | | - | | 2 | | 11 | | - | |
| Total | 01 | 05 | | 08 | | - | | 02 | | - | | - | | 02 | | 17 | | - | |
| **Sum of Exercises** | | | **33** | **57** | **94** | | **29** | | **26** | | **07** | | **26** | | **44** | | **316** | | **76** | |

*Foot Notes*

*CM – Comprehension VB - Vocabulary Building LS - Language Structure*

*CP - Composition MC – Mechanics ASS - Assignment*

*SP – Speech LIT – Literature FB - Corrective Feedback*

*The use of ‘-’ means nothing or no record found. The ‘-’ on this table implies the aspects of language instruction not provided in the period shown on the table.*

***Table 2:*** *Coverage of English Textbook for School Year 2011/12*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Samples | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Mean |
| No. of Lessons Recorded | 36 | 25 | 25 | 47 | 37 | 46 | 41 | 40 | 17 | 34.9 |
| Coverage of Course book Intensive English | 26.7% | 18.5% | 18.5% | 34.8% | 27.4% | 34.1% | 30.4% | 29.6% | 12.6% | 25.8% |
| Coverage of Course book English Project | 22.5% | 15.6% | 15.6% | 29.4% | 23.1% | 28.8% | 25.6% | 25% | 10.6% | 20.6% |

***Table 3:*** *Corrective Feedback Given in Response to Students’ Exercises Recorded*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Samples | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Mean |
| No. of Lessons Recorded | 36 | 25 | 25 | 47 | 37 | 46 | 41 | 40 | 17 | 34.9 |
| No. 0f Corrective Feedback Given | 14 | 08 | 04 | 10 | 10 | 04 | 12 | 14 | - | 8.4 |
| Percentage of Corrective Feedback Given | 38.9% | 32% | 16% | 21.3% | 27.0% | 8.6% | 29.3% | 35% | 0% | 23.2% |

The data shown reveals that the language instruction students are exposed to in the school year shown is short of what is required to boost their communicative competence. Language instruction serves as input in second language acquisition. Sun (2008, p.1) notes that input is one of the most important elements in the process of second language learning.

Teachers’ response to students work is about 23.2%. This implies that certain errors in the students’ record would go uncorrected. This means that the wrong hypothesis of the students would be unchecked. Students’ responses to the structured interview corroborate the fact that the students do not get the required attention.In a particular school as shown on table 1, students did not receive corrective feedback for a whole term. Students interviewed from that school attest to the fact that they never received corrective feedback.

Certain factors account for the poor performance of teachers and students, Akwanya (n. d., pp.1-2) laments that the low performance of Nigerian students can be attributed to factors such as low investment in education, poor training of teachers, non-availability of teaching aids, poor teaching methods, lack of commitment among the teachers, explosion in student population.

Of a truth, these factors affect the quality of language instruction. Take for instance explosion in intake or admission of students is tantamount to over crowded classrooms. A teacher cannot provide corrective feedback to an over crowded class. Students’ responses to the structured interview show that some classes have more than one hundred students. This is against the teacher student ratio of 1: 40 (National Policy on Education, 2004, p.22). An English teacher who teaches five classes where each class is more than one hundred cannot provide corrective feedback.

Consequently, this scenario leads to poorly delivered language lessons. This ultimately would mean students low confidence in their language skills. Hence, they resort to examination malpractices. Moreover, poorly delivered language lessons would result to failure. Ijaiya(2001, p.295) explains that failure ‘suggests that there is a dissonance between what the teachers teach and the needs of the learners.’

Every year, public schools churn out educated illiterates. To be precise, these students come out of with learning disabilities. They cannot read, write or speak English Language. In a situation where these students do not get remedial language instruction, they become language disabled. Being language disabled, they become handicapped in communication.

On the contrary, English language instruction in Nigerian schools is supposed to be for communicative competence. Where this is achieved, students in and from Nigerian schools through quality language instruction would be enabled to use English language fluently, accurately and elegantly (Olaofe, 2002, p.36). This is important because apart from using English language for academic purpose, students are supposed to use language for such developmental purposes like improved socio-economic development, increased employment opportunities, poverty alleviation, self actualization, scientific and technological growth(Olaofe, 2002, p.36). These are not possible with the poor language instruction shown in the students’ record of language exercises in public schools in Rivers State. There is need for remediation through the adoption of the recommendations listed hereafter.

**Conclusion and Recommendation**

1. Government should provide an optimal learning environment for language instruction in schools.
2. English lessons should be presented everyday of the school week for a fair coverage of the scheme of work. A class should not be more than 40 students. This would make corrective feedback possible.
3. There should be quality control in language teaching through the provision of a uniform scheme of work.
4. A good supervisory technique should be adopted to ensure that the scheme of work is fairly covered.
5. Language teachers should be trained on the use of an eclectic approach in teaching.
6. Remedial language instruction should be planned and put in place in secondary schools to remediate the lacks of students as a result of poor language instruction provided over the years.

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Girl-Child Education: A Challenge for Sustainable

Development in Nigeria

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Abstract

Girl-child education is crucial for sustainable development. When you educate the woman, you educate a nation. Children look up more to their mothers as role models than to their fathers and it is true that women have primary influence on their children. Therefore, uneducated women are likely to bring up poorly mannered or uneducated children. Communities that do not give adequate attention to educate the girl-child are usually characterized with mass illiterates, ill equipped to deal with life situations around them as their knowledge will be very limited thereby working against sustainable development. It is, an established fact that behind every successful man, there is a woman who should also have some attained level of education. This paper therefore sees the girl-child education very important for attaining sustainable development. The paper begins with an introductory highlight, the concepts of the girl-child, and education were briefly discussed, the importance/benefit of girl-child education were examined. The challenges and strategies for improvement were forwarded and conclusion given.

**Keywords:** Education, Sustainable development, Nigeria

**Introduction**

Tremendous efforts and huge sums of money have been and continue to be spent to ensure that development takes place in all parts of the world. It was assured and expect that as societies develop, every living person will experience better living standards where necessities of live such as education, health and health care, employment as well as infra-structural provisions of water, light, roads and transportation, housing to mention a few would all improve in quantity and quality and be accessible by all and sundry as proves of development.

It is evident that past approaches to development have not equally benefited all members of the societies, though with claims that we are living in a post modern era, yet economic and social problems are yet to get solution. This has led to new approaches to development that are people oriented tagged as “Sustainable Human Development (SHD)”. The Sustainable Human Development approach emphasizes the participation of all segments of the population claiming that the eradication of the imbalance between sexes with respect to education, economy, cultures to mention but a few are pre-condition for achieving long lasting and sustainable development (Gender Training Manual 1999).

In spite of the fact that improvement and ordering of access to education has been a major goal of African Government since in the 1960s, the history of educational provision to date is a catalogue of enduring inequality between boys and girls and men and women. Again, though educational opportunities have indeed greatly expanded for all children in Nigeria, there is still an under-representation of females in schools, showing a disparity in educational access and achievement widened to the growing disadvantages of females (Gender Training Manual 1999).

Nigeria is a signatory to many international conventions aimed at bringing the gender imbalance in education, yet the girl-child lags conspicuously behind. The 1984 Universal Development of Human rights states that “every person has a right to education”. Article seven (7) of (UNICEF 1995) and the right of the child also states “every child (male or female) is entitled to receive free and compulsory basic education and equal opportunity for higher education based on individual ability.”

In 1990, the world Conferences on Education for All (EFA) held in Jomtien, Thailand, declared among others, that every person shall be able to benefit from educational opportunities designed to meet their basic learning. Despite the concerted efforts at national and international levels to bring about gender equality between boys and girls in many areas and particularly in education, in equality still persist world wide. ( Mamma in Eze 2011) captures the fate of the girl child, “it is a well know fact that many parents in Africa give preferential treatment to boys especially in matters concerning education.” It is really sad that up till now in some societies, girls are still made to live in their shadows, denied education and other rights, and socially exploited. What is more disturbing, is that even the passage of the child rights act into law in 2003 by Law makers in Nigeria on the issue of the girl child education has not been fully addressed. The child rights law seeks to facilitate the realization and protection of the rights of all children in the country regardless of their tribe, gender, and parents’ status. However, there is a continue national gender disparity in basic education enrollment, retention and completion against the girl child. Available statistics revealed that we have about 10 million children in Nigeria, and 60 percent are girls who are presently not in school(Jackson in Walwana 2009).

**Conceptualization**

**The Girl- Child:**

The girl-child is a female human being from birth to 18 years of age. Ponte (2006) sees, girl children as socially constructed category around female persons between 0 and 18 years. It is the age before one becomes young adult. This period covers the stages of nursery or early child hood (0-5years), primary (6-12years), and secondary school (12-18years). During these stages, the young child (girl-child) is completely under the care of the adult who may be her parents or guardians and older one around. During this period, the girl-child’s character and personality is built and developed and as well influenced by those around her as she is much dependant on others, those on whom she models her behavior, through observation, repetition and imitation. Afforma (2009) states, “she is able to build her physical, mental, social, spiritual and emotional developments start and progress to get to the peak at the young adult stage”.

**Education**

Education is the process of providing information to an inexperienced person to help him/her develop physically, socially, emotionally, spiritually, politically and economically. It is a process of acquiring a adequate and appropriate knowledge, skills, attitude and value to be able to function optimally as a citizen. It is a means of preserving, transmitting and improving the culture of the society as it seeks to develop the innate inner capacity of man. Infact it is a means through which the young acquires knowledge and realizes their potentialities and uses them for self actualization. Ocho (2005) buttressed that it is a process through which individuals are made functional members of their society. Education attempts to guide young people through experiences that will maximally develop each one to do better than he other wise would or could, those desirable things that he will do any way.” By Educating an individual we attempt to give he/she some desirable knowledge, understanding, skills, interest, attitudes and critical thinking. The individual develops some understanding about deeper things in life, and the complex human relationship. As an individual in the society, he/she has to think critically about various issues of life and take decisions about them being free from bias and prejudices, superstition and blind beliefs.

Reynolds in Shaw (1937) summarized education into four components: the power to do, the power to know, the power to think and the power to feel. To crown it all, education is a vehicle for social mobility.

If education, however, is to be afforded by series of experiences, these experiences must be organized in some way to contribute to development. The girl-child however, should be considered along side with her opposite sex counterpart in the acquisition of desirable skills, knowledge, attitudes and understanding (education) which are all geared towards sustainable development.

**The Importance/Benefit of the Girl-Child Education in Nigeria**

True education is well defined as the harmonious development of all the faculties’, a full adequate preparation for life now and in the future. It is in the early years in the home and in the formal school work that the mind develops, a pattern of living is established, and character is formed.

It has often been observed that in the past African cultural settings, the girl child is being associated and attached to the kitchen rather than going to school. In fact, education for the girl child was almost a taboo and if the girl child went to school, the best and highest level she could reach was primary or junior level. Parents then felt that given the girl child opportunity to go to school was waste of resources but rather prepares her for marriage as the most profitable venture because of the expected bridal price.

Nkwantabisa (2012) categorized the importance of the girl child education into the following.

**Mentally**

* Education trains up the girl-child’s mind, ending up in equipping the individual with knowledge which can be applied to situations to achieve better results.For example, they acquire knowledge in their human rights.
* It builds up self confidence and self esteem in the girl.
* It improves her managerial abilities, she acquires good leadership skills.
* It broadens the girl child out look in terms of marriage, child up bringing, home keeping and relationships in the society.

Mubezi in Walwana (2009) buttressed, “ Girls are mothers of tomorrow’s generation (Nation), so they need to be educated in order to make good and productive future generation.

**Physically**

The individual obtains skilled man power, it enriches the individual to equip her with better standards and builds her up to become an asset in terms of human resource and technological development. Education improves the girl child condition of living and her self worth.

**Socially**

Education empowers the girl child to be self reliant in national development, she gets better job placements into various industries and places of work which helps her to earn proper and good remunerations. Education also enables the girl-child to contribute to innovation and creativity in various fields of endeavors that stems up the economic growth of the nation as a result of improve quality of the nation’s human resource which will assist in future education of the nation at all levels resulting in curbing unemployment and underemployment in the mist of available resources in the nation. Others are the ability to play women’s natural responsibilities better, as well as to attain higher developments when given positions of other responsibilities. The girl child becomes good stewards in the home, marriage, and work places. She gets to improve her income, health, well being of other individuals and thus takes care of the planet. Unuemu (2012) sums it as “life without education is meaningless.”

**Challenges to Girl-child Education in Nigeria**

Gender equality and women empowerment are the major challenges facing the United Nations and the world today. It is against this background that (UNESCO 2005) emphasizes that men and women should be equally valued by society regardless of their differences or roles they play. In other words, it means men and women should be full partners every where they find themselves. This view was agreed upon at the Beijing conference of 1995, where most countries registered their commitment to work more hard towards gender equality in all ramifications. Inspite of the above commitments, Africa in general and Nigeria in particular still face a lot of challenges in respect to the girl-child education. Some of these challenges are:

**Male Preference**

Male preference to female is widely practice in Nigeria that robs the girl child of her rights to equal education. Ezeliora (2010) states, the male child is perceived as an asset, highly treasured in the family name.

The female child is treated with disregard because she will be married out to another family, and if given education, she will in the future develop another man’s home at the detriment of her biological home therefore seen as waste of resources. This practice is the beginning of the age long exclusion of females from the social mainstreaming. They are marginalized and regarded as second class citizens, incapable of developing their God’s given potentials as they are considered inferior and low intelligent incapable of making good and rational decisions for themselves and others and therefore they are not expected to perform well in school.

**Poverty**

Poverty in a family discourages parents from educating their female children, rather some of the affected girls go on the streets hawking in order to generate income to alleviate the family’s financial problems. The resultant effect on some of these girls is prostitution, unwanted pregnancy, abortion and untimely death.

**Traditional Practices, Religious Beliefs and their Effects on the Girl-Child**

There are so many traditional practices that are detrimental to the girl-child. Some parents feel proud with such practices because they think they are respecting their tradition, not minding the gravity of the harm they bring upon their female children, which affects them throughout their life period.

**Perpetual Ignorance and Misconception**

Many females do not go to school because of ignorance on the part of the parents who are not exposed. They live in the remotest areas and have no idea and access to western education. On the other hand, some parents have wrong concept about sending their female children to school on the basis that, girls who go to school will not keep good matrimonial homes. The society look upon females who go to school as prostitutes, expensive to be maintained, proud and in the long run they may not have husbands to settle down in their own homes (Kasin – Oghiantor, 2005). Many men believed that education is not good for wives because they have mixed up with men in school and she must have gotten boyfriends. Such misconceptions make it difficult for uneducated parents to send their female children to school and the vicious cycle continues.

**Lack of Government Commitment and Political Will**

The government is characterized by non-commitment and non-challant attitude to the girl child education. Nigerian government is known to be laudable in making and formulating policies, but when it comes to implementation, they end up in grave yards . In fact, government behaves as the saying that goes, “things are easier said than done.”

**Strategies for Improving the Girl-Child Education in Nigeria**

There have been several discussions about inequality between males and females even before the 20th century. The 21st century definitely stands out as a watershed for the global transformation in the education of gender relations between the sexes. This could be seen in a number of international actions in defense of gender equality starting with 1945 UN Charter on the principles of equity to the 1995 Fourth World Conference on Women (Beijing)adopted as the Beijing Declaration and Platform for action. At the African Regional level, there have been quite notable events which support the movement for equality. These include Novakchot 1997, Rabat 1979, Lusaka 1999, Arusha 1984 and Abuja 1989. There are also Declarations and action plans adopted, including the Ouagadougou Declaration on education of girls in 1993, the Kampala action plan on women and peace 1993 adopted by the OAU Council of Ministers in 1994, the Dakar-Ngor declaration on population, family and sustainable development 1992 to mention a few, are all geared towards the elimination of inequality between male and female. Thus the right to receive an equal education has been a fundamental part of many human rights documents since the second World War.

However, the age-long inequality on the girl-child education could be improved by complying strictly on these and other strategies that may not be included in this write up.

* A declaration of firm and vigorous commitment to equality of opportunities in education as well as implementation of some.
* The annual celebration of children’s day of every 27th May of the year be intensified to create more awareness for the rights of the child, especially the girl-child.
* Encouragement for girls such as creating opportunities and improving their access, attention and performance via scholarships and protective laws and legislations, policies of positive discrimination like minimum quotas and special measures to attract girls to vocational training programmes.
* Massive public enlightenment campaigns on the importance of girl-child education, including relaxation of cultural taboos and constraints, social and medical complications that may accompany early marriages, sexual intercourse, pregnancy and child birth.
* Encouragement of and recruitment of female teachers to act as role models, especially in the highly islamized communities where female teachers are lacking.
* Improved opportunities for career progression for all females
* Improved socio-personal relevance of the curriculum to appropriately and opportunity respond to the needs of the girl and the female folk in general.
* Provision for second chance education through adult education short courses or distance learning.
* Improvement in pedagogic skills by ensuring that teaching and learning materials such as audio-visual aids depict girls in active roles and women in non-traditional roles or jobs while in the classroom interaction, assigning particular duties to boys and others to girls be discouraged. Choose some adventure stories where girls and women are central characters. Speakers/counselors in non-traditional areas should be invited to come and talk to pupils. Teachers must also ensure that sanctions against misbehaviours are not sex-stereo typed.
* Intervention legislations made by government should go beyond mere pronounce policy statement, rather to create and embark on initiatives which are automatically translated into sustainable and realistic behavior change.
* Equip teachers with relevant skills and information to influence and transform the thinking on the girl-child education in the society by their position as one of the agents of socialization. Gender sensitization training be incorporated in formal education curriculum and also establishment of departments of gender and women studies in tertiary education. Feminization of courses should be discouraged.

**Conclusion**

Education is the backbone of every societal development, however, the importance of girl-child education to sustainable development cannot be over-emphasized. Despite the continued efforts of governments, individuals, groups and organizations to bring about world understanding and commitment to the increase access and participation as a necessary and indispensible condition for over all societal development, women still occupy very low scores in the educational indices of access, participation as well as performance due to lond age factors and as such, Nigeria and most African countries, women are under represented at all levels of educational system. Therefore the challenges that surround the girl-child in the area of education, calls for radical functional strategies amongst them, a committed government to move the course of the girl-child education from paper to practice.

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Instructional Variables and Students’ Acquisition of Employable Skills in Vocational Education in Nigerian Technical Colleges

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Abstract

This paper focuses on teacher quality, teaching methods, and access to training materials on students’ acquisition of employable skills in vocational technical subjects, for self employment in Akwa Ibom State. Three questions and three hypotheses were formulated and tested in the study. The population of the study comprised senior technical II students in the six technical colleges in the state. The population size was 240. A random sampling technique was used to obtain a sample size of 120 students for the study. A 28 - item structured questionnaire titled, Students’ Acquisition of Employable Skills Questionnaire (SAESQ) with a four-point rating response options were used for data collection. Mean, Pearson Product Moment Correlation (PPMC) and Regressional analysis were used for data analysis. The results indicated that there was significant relationship between teacher quality and students’ acquisition of employable skills. The findings also revealed that there was significant relationship between teaching methods and students’ skill acquisition. This paper therefore calls for the provision of modern workshop equipment and employment of qualified and experienced teachers for effective teaching/training of students in order to achieve the objectives of vocational and technical education in Akwa Ibom State.

**Keywords:**Instructional Variable, Students, Vocational education, Nigeria, Employment

**Introduction**

The ultimate aim of Vocational Technical Education (VTE) training is for the acquisition of knowledge, attitude and marketable skills for sustainable development. The training of Vocational Technical Education students is based on the production of skillful individuals who are proficient in production of goods and services that are not only relevant to themselves but to the society. The acquisition of a life-long or employable skills calls for effective and efficient teaching methods and the utilization of improved and standard instructional facilities, equipment, machines, tools and infrastructure, to ensure the production of desired quality of Vocational Technical graduates with enterprising skills. Udoutin (2001) asserted that tools, equipment and technical facilities utilized in laboratories and technical workshops constitute the learning environment for skill acquisition. The utilization of instructional materials and other facilities as well as the teacher quality play important role in the acquisition of employable skills by students.

The imparting of skills to students/learners requires tools, equipment, machines, workshop and effective utilization of these facilities. In learning employable skills, equipped workshop are required and competent/experienced teachers to train the students to acquire skills. According to Adewoyin (1991) human behaviour in the learning of skills are connected to theories associated with stimuli, reinforcement’s response. These theories are very relevant to learning and conditioning behaviour required in skill and habit formation in Vocational Education (VTE).

The acquisition of entrepreneurial skills for self employment is a major factor in the design of Vocational Technical Education Programme (World Bank, 2000) because high quality skills requires appropriate training equipment and tools, adequate supply of training materials and practice by learner. Other requirements include training manuals and qualified teachers with experiences. However, such categories of workers are also in high demand in the labour market, but could be suitably motivated for part time instruction in technical and vocational colleges (Johnson and Adams, 2004).

Industries are demanding for highly skilled labour in view of increasing sophisticated technology. To meet up with these challenges, the students must be trained and developed to acquire the new and improved technical skills and knowledge to meet the demand of modern industries. For this reason, institutions require well equipped workshops to produce the right caliber of people, skilled enough and are self reliant. A teacher of vocational and technical subject must not only teach, but must use methods that will enhance students’ acquisition and sustenance of knowledge, skills and self-concept formation as well as interest. Olaitan, Nwachukwu, Igbo, Onyemachi and Ekong, (1999), Ogwo and Oranu (2006), recommended field activity-based instructional methods for instructional delivery. Also project method was recommended by Nsa (2002) as a teaching method which helps students develop originality of work in them.

Akpan (1998) indicated that there was significant correlation between vocational education and employability and that vocational education has a significant influence on self-reliance as a result of training. This implies that vocational technical education is capable of providing trainees with functional and desirable competencies or professional skills preferred by industries and employers of labour. Olaitan, Nwachukwu, Igbo, Onyemachi and Ekong (1999) pointed out that vocational technical education is education for work. The emphasis in vocational education is on skill acquisition as specified in Nigeria’s Educational reforms which intentions are to ensure value re-orientation, self-reliance, poverty eradication, job creation and wealth generation (Obioma, 2007).

The emphasis on skill acquisition is due to the high rate of unemployment among graduates, high rate of crimes due to untrained youths in advancing technology and challenging economy. Vocational technical education is knowledge, skill and technology driven. It empowers students with employable skills and job creation potentials leading to poverty reduction. The acquisition of employable skills empowers the students with competence to practice, create, develop and establish agricultural farms and business ventures (Imandojemu, 2001 and Ukut & Udofia, 2001). The skill acquisition by students can only be achieved where the training institutions are adequately funded, equipped with adequate facilities and have competent and experienced teachers that adopt effective and efficient instructional methods. This would facilitate and improve students’ skills acquisition as asserted by Bassey and Inyang (2001) who observed that there was relationship between instructional materials and students’ skill development. The results of Bassey and Inyang’s study on skill development efforts of male and female students in business studies, showed that boys tend to have higher level skill development and performance than girls in technical education related subjects.

**Statement of the Problem**

Vocational education emphasizes skill acquisition for employability. In this regards, the major factor in the design of Technical Education programmes comprises the acquisition of entrepreneurial skills for self employment (World Bank, 2000). This calls for the necessity of acquiring high quality skills through appropriate training with adequate facilities and technically enriched environment. In learning employability skills, equipped workshops, competent and experienced technical teachers are needed complements to train the students for Mastery of job requirements and sequence to tasks operations. Despite this signal, such categories of competent technical personnels and teachers that are in high demand in the industrial sector are not easily found in the school settings. Johnson and Adams (2004) contended that the services of these level of technical experts could be obtained by suitably motivating them for part-time instructions in technical colleges.

In most technical colleges, courses are taught theoretically without the use of modern machines, equipment, tools and other instructional inputs. This makes it difficult for the students to develop the right habit for carrying out a particular job. Nwachuku (2006) noted that vocational and technical education must establish appropriate work habits in order to enable students to be productive on their chosen field. The inability of technical teachers to use adequate instructional techniques does not enhance students’ acquisition of skills and development of self-concept as well as interest, (Ogwo and Oranu, 2006). Nsa (2002) equally had pointed out that the lack of using project method alongside other strategies as teaching methods does not encourage or help students to develop originality of work. The lack of imparting practical skills to students portends that:

1. the teachers are not master of their trade areas and are unable to improve/adapt new knowledge and technologies
2. lack of equipment/workshops
3. the students are ill-prepared to meet future employment challenges.

This above negates the fact that the Technical/Vocational Education which ought to have empowered the students with competence to excel, create, develop workshops, farms and business ventures have rather created unemployment and poverty, Ukut & Udofia, (2001), Imandojemu (2001). It is against this background that this study was aimed at determining the correlate of teacher quality, teaching methods, workshop equipment, training materials and students’ acquisition of skills in vocational technical subjects, so as to recommend the way forward to ameliorate the problems posed.

**Purpose of the Study**

The study was purposed to determine the influence of teacher quality, teaching methods, workshop equipment and training materials on students’ acquisition of employable skills in Vocational Technical subjects in Technical Colleges in Akwa Ibom State. Specifically the study sought to:

1. determine the influence of teacher/students relationship on students’ acquisition of employable skills in electrical installation works.
2. determine the relationship between teaching methods and students acquisition of employable skills in rabbitery and poultry production.
3. determine the relationship between training materials and students’ acquisition of employable skills in electrical installation works.

**Methodology**

The study adopted a correlational survey design. The design was used, since the researchers sought the opinion of large number of people about the event. The study was conducted in six Technical Colleges in Akwa Ibom State. Akwa Ibom State is in the South-South Zone of Nigeria. The state is blessed with God given natural resources and has rich cultural heritage. These features attract investors and tourist to the state. The occupation of the people include farming, fishing, trading and majority of the people are civil servants, but if properly trained in vocational skills, they could be readily employed in the industries in the state and else where.

The population of the study comprised all senior technical two students in Science and Technical subjects. The population size was 240. A simple random sampling technique was employed. The sample size of 120 was drawn from the population to participate in the study.

**Instrument**

A 28 item structured questionnaire title students acquisition of employable skills questionnaire (SAESQ) was constructed by the researchers. A four-point scale response option was used for data collection. A bench mark or cut off point of 2.50 and above was fixed for the acceptance in the mean rating for each response.The instrument was given to three experts in test and measurement and a lecturer in Vocational Education Department, all in the Faculty of Education, University of Uyo for validation. The corrections were incorporated to ensure that it measures the intended attributes.

The researchers administered the instrument by face to face contact and the data obtained were splited into two (even and odd numbers). The two different sets of data were used to compute for reliability correlation coefficient (r) using Kuder Richardson (KR-21). The Kuder Richardson formula was used to determine to what extent the items measured the same characteristics. This was done by determining individual item score rather than examining part or total scores (as in the split half, method) the reliability index yielded .88.

**Data Analysis**

The data collected were analyzed on the basis of research questions and hypotheses. Mean was used to answer all the research questions while PPMC and Regressional analysis were used in testing hypotheses.

**Research Question 1**

What is the influence of teacher/student relationship on students’ acquisition of employable skills in electrical installation works? The answer to this question is presented in table 1 and 2.

***Table 1:*** *Mean rating for teaching/students’ relationship on students’ acquisition of employable skills. N = 120*

|  |  |  |  |
| --- | --- | --- | --- |
| **S/N** | **Items on Teacher/Students Factor** | **A**  **X** | **D**  **X** |
| 1. | Skills to design learning experiences that inspire/interest students | 2.85 \* | 0.38 |
| 2. | A lot of enthusiasm in both cognitive and psycho-productive development of students | 2.88 \* | 0.39 |
| 3. | A caring attitude towards students | 2.73 \* | 0.36 |
| 4. | A thorough understanding of the students problems | 2.83 \* | 0.39 |
| 5. | A great deal of involvement of students in lesson planning | 2.65 \* | 0.27 |
| 6. | Takes students aptitude into consideration in instructional delivery | 2.74 \* | 0.38 |

*Note \* the cut off point for acceptance of mean rating is 2.50 and above.*

The result from Table 1 indicates that all the items met the cut off point of 2.50 and above. This implies that all the items are teacher qualities which could help the teacher for effective instructional delivery for students’ acquisition of employable skills.

***Table 2:*** *Mean rating on students’ acquisition of employable skills.*

*N = 120*

|  |  |  |  |
| --- | --- | --- | --- |
| **S/N** | **Items on Students’ Skills Acquisition** | **A**  **X** | **D**  **X** |
| 7. | The teaching methods used encourage skill acquisition in rabbitary | 2.62 | 0.80 |
| 8. | Egg candling facilitate skill acquisition | 1.68 | 0.60 |
|  | **Availability of materials for learning facilitates acquisition of skills in:** |  |  |
| 9. | Conduit wiring | 2.61 | 0.38 |
| 10. | Cable jointing | 2.50 | 0.44 |
| 11. | Diagnosis of diseased birds | 2.55 | 0.37 |

The result in Table 2 shows that 4 out of 5 items met the cut off point of 2.50 and above mean rating. The result revealed that the accepted teaching methods have relate with students’ acquisition of employable skills.

**Research Question 2**

What is the influence of teaching methods on students’ acquisition of employable skills in rabbiting and poultry production? The answer to this question is shown in table 3.

***Table 3:*** *Mean rating of teaching methods on students’ acquisition of employable skills.*

*N = 120*

|  |  |  |  |
| --- | --- | --- | --- |
| **S/N** | **Items on Teaching Methods** | **A**  **X** | **D**  **X** |
| 13. | Feeding of day old chicks | 2.57 | 0.85 |
| 14. | Heating the brooder house | 2.61 | 0.43 |
| 15. | Feeding rabbits with herbage | 2.54 | 0.46 |
| 16. | Accurate reading of Avometer | 2.56 | 0.44 |
| 17. | Effective use of Drilling Machine | 2.58 | 0.43 |
| 18. | Effective use of Battery Charger | 2.65 | 0.43 |

The result in Table 3, shows that all the items had a mean rating of 2.50 and above. This reveals that workshop equipment enhances or facilitates students’ acquisition of skills.

**Research Question 3**

What is the influence of training materials on students’ acquisition of employable skills. The data for answering research question 3 is shown in table 4.

***Table 4:*** *Mean rating of training material on students’ acquisition of employable skills.*

*N = 120*

|  |  |  |  |
| --- | --- | --- | --- |
| **S/N** | **Items on Availability of Training Materials** | **A**  **X** | **D**  **X** |
| 19. | Enhances students’ understanding of the lesson | 2.58 | 0.50 |
| 20. | It facilitates effective planning and learning | 2.54 | 0.47 |
| 21. | It makes learning more meaningful | 2.61 | 0.44 |
| 22. | It helps to increase students/learners productivity | 2.50 | 0.44 |
| 23. | It makes learners more dutiful and conscientious in the daily activities | 1.06 | 1.15 |
| 24. | It enhances students skills acquisition | 2.59 | 0.27 |

The results from Table 4 indicates that five items except one met the cut off point of 2.50 and above. This therefore shows that training materials influence students’ acquisition of skills.

**Hypothesis One**

There is no significant relationship between teacher quality and students’ acquisition of employable skills in electrical installation works.

***Table 5:*** *Pearson Product Moment Correlation (PPMC) for Teacher Quality and*

*Students’ employable skills acquisition*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **X**  **Y** | **X2**  **Y2** | **XY** | **df** | **rcal** | **rcrit** | **Decision** |
| Teacher Quality  (X) | 120 | 176 | 5220 |  |  |  |  |  |
|  |  |  |  | 4304 | 118 | 0.93 | 0.195 | \* |
| Students’ Acquisition of Skills  (Y) | 120 | 142 | 4096 |  |  |  |  |  |

*\* Significant @ rcal = 0.93, rcrit = 0.195, df = 118 and .05*

The result from Table 5 shows that rcal of 0.93 is greater than rcrit value of 0.195 at df of 118 and .05 level of significance. The Hypothesis one was rejected, on the basis of the result. The result reveals that there is significant relationship between teacher quality and students’ acquisition of employable skills.

**Hypothesis Two**

There is no significant relationship between teaching methods and students’ acquisition of employable skills in rabbitary and poultry production.

***Table 6:*** *PPMC Analysis for teaching methods and students’ acquisition of skills.*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **X**  **Y** | **X2**  **Y2** | **XY** | **df** | **rcal** | **rcrit** | **Decision** |
| Teaching methods  (X) | 120 | 266 | 11930 |  |  |  |  |  |
|  |  |  |  | 11760 | 118 | 0.99 | 0.195 | \* |
| Students’ Skills Acquisition  (Y) | 120 | 262 | 11644 |  |  |  |  |  |

*\* Significant @ rcal = 0.99, rcrit = 0.195, df = 118 and .05*

The results in Table 6 reveals that the rcal value of 0.99 is greater than rcrit value of 0.195 at df of 118 and 0.05 level of significance. Null Hypothesis two was rejected, since rcal was higher than rcrit. The result therefore shows that there is significant relationship between teaching methods and students’ acquisition of employable skills.

**Hypothesis Three**

There is no significant relationship between training materials on students’ acquisition of employable skills in electrical installation works.

***Table 7:*** *Regressional analysis for training materials on students’ skills acquisition*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **X**  **Y** | **X2**  **Y2** | **XY** | **df** | **rcal** | **rcrit** | **Decision** |
| Training Materials  (X) | 120 | 176 | 8356 |  |  |  |  |  |
|  |  |  |  | 7310 | 118 | 0.95 | 0.195 | \* |
| Students’ Skills Acquisition  (Y) | 120 | 167 | 7027 |  |  |  |  |  |

*\* Significant @ rcal = 0.95, rcrit = 0.195, df = 118 and .05*

The results in Table 7 indicates that the rcal value of 0.95 is greater than rcrit value of 0.195 at df of 118 and .05 level of significance. Null Hypothesis 3 was rejected on the basis of the result. The result reveals that there is significant relationship between teacher quality and training materials and that these factors influence students’ acquisition of employable skills in electrical installation works.

**Discussion of Findings**

On the issue of teacher quality on students’ acquisition of employable skills, Hart and Teeter (2002), National research council (2001) and Reichardt (2001) reported that teachers require professional skills, abilities, competence, years of experience, thorough understanding of the subject matter and effective involvement of the students in the instructional delivery. The finding in Hypothesis one is in line with Chih-Yang et al (2007) who reported that the quality of the teacher is an indicator of students acquisition of skills or achievement of Vocational Education.

With respect to the teaching methods on students’ acquisition of employable skills, Ibe (1994) reported that human potentials are developed with the use of practical-orientated method for manipulation of workshop tools, equipment. The finding in null hypothesis 2 is in with Ibe (1994) and in support of the adoption of practical oriented method as well as complementary methods recommended for the teaching of technical related subjects to enhance students acquisition of employable skills as prescribed by (Ali, 1988; Ekong, 1999; Nsa, 2002 and Ogwo and Oranu, 2006).

On the instructional materials and students’ acquisition of employable skills, the finding is in support of Udoutin (2001) who reported that the utilization of tools and equipment in teaching/learning enhance students skill development and that students practical skills enable them to earn a living. Instructional materials utilization enhances students understanding, learning effectiveness, influences learner attitude, stimulates learning and increase learners productivity.

**Conclusion and Recommendations**

The availability of technical equipment, tools machines and other technical facilities as well as effective utilization of these facilities in teaching/training of students in technical colleges equipps them with employable skills. The instructional materials when effectively utilized in instructional delivery concretize the concepts and students skills acquisition.

The findings of the study showed that there were relationships between the teacher quality, teaching methods, workshop equipment, instructional materials and the employable skills acquired by students.

From the findings of the study on teacher quality, teaching methods, workshop equipment, training materials and students acquisition of employable skills in electrical installation works in technical colleges the following recommendation were drawn:

1. Modern technical equipment, tools, machines and instructional materials should be made available by the state government to the technical colleges workshops to enhance the training of students for the acquisition of employable skills and for self-reliance.
2. All stakeholders in education, industry and Non Government Organizations (NGOs) should jointly fund and train/develop the students for the acquisition of employable skills to meet the demand of industry and the sophisticated technology in this technological era.
3. The teachers should be effectively re-trained by the government for enhanced skill and professional knowledge, competency and professional growth to facilitate increased productivity.
4. Well qualified and experienced teachers should be employed for the teaching/training of students in technical colleges to ensure that the students are adequately trained and motivated to acquire the expected skills for their employability and self reliance.

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Ethical Considerations in Software & Information Systems Engineering: The Case of a Local Hospital in

Adamawa State of Nigeria

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Abstract

For more than a decade now, Nigeria has been witnessing a continuous improvement and boom in the application of Information and Communications Technology in all the vital sectors of her economy. There is an increasing dependency on computer programs for critical infrastructures, business processes and operations. This boom is not abating, and is resulting in a corresponding increase in the number of companies and individuals who join an increasing population of software engineers, enterprise application developers and programmers. But regrettably, the boom has given rise to a host of ethical issues. The ability to make sound ethical judgement and decision is becoming very important as “half-baked” software developers produce critical software that are supposed to run critical business functions and operations. To compound this problem the few technical schools or colleges that produce the very needed programmers and web designers do not have a clue that there is something negative creeping in from another angle; they do not have qualified or versed instructors to arm their graduates with the basic foundation knowledge in software professional ethics which is needed to effectively practise the art of software engineering in the society at large.This paper investigates the state of software engineering ethics in the face of Nigeria’s upwelling Information and Communications Technology and intention to produce and use locally designed and implemented software. The paper calls attention to the nonchalance, dispassion and mass negligence attendant to this issue. It further highlights and calls for adherence to sound ethics at all levels of software production in the Nigerian society at large. The paper uses a case-study and scenario to illustrate how to start doing so.

**Keywords:** Software Engineering, Ethics, Nigeria, Information and Communications Technology, “half-baked”

**Introduction**

Of late, owing to the huge influence and effect that software engineering is having in the lives of the modern work force in the Nigerian society, it has become very important to seriously start considering how to integrate Information and Communications Technology and human values in such a way that this enabling technology will indeed protect the improvement and enhancement of societal values.

There is a growing need to start thinking how to produce and implement software to achieve a semblance of orderliness instead of the “jungle” of participants which is presently out there right now. There has to a concerted effort to bring in some guiding principles and code of ethics. Such effort will express a consensus of the profession on ethical issues and judgement. Codes of ethics usually express this consensus, and will serve as a means of training and educating the general Nigerian public about the ethical norms and values of the software engineering endeavour and profession.

It is worth noting that a practicing software engineer who builds application systems to solve business and societal needs constantly interacts with the social process during the design, construction and implementation of his/her software; he/she constantly interacts with eventual users of his/her proposed software, customers, project sponsors, systems project managers, supervisors and other society-wide stakeholders. The ethical problems that a typical software engineer faces therefore involve the following: the placement of his/her part-deliverables or final deliverables (end product(s)), the development process and methodology used to create such part-deliverables and final product, the human interactions in the development of the product. With all this the software engineer indirectly or directly constantly interacts and interfaces with the society and the environment at large.

Dodig-Crnkovic et.al (2010) summarises the surround Ethics Contexts that should drive the conduct of practising software engineers. This summary is depicted in Figure 1 below:



***Figure 1:*** *Contexts of Professional Ethics.*

According to (Moor 1985), Computer Ethics should be defined as the analysis of the nature and social impact of computer technology and the formulation and justification of policies for the ethical use of such technology.

(Gotterbarn, 1999) in his write-ups opined that software engineers are meant to know and follow laid down basic principles so that they are equipped to instinctively make ethical decisions. He advised that citizens should make it their duty to be accustomed with it. Such code should be derived with respect to the public, client and employer, product, management, profession, colleagues and self.

(Gotterbarn, 1999) further reiterates that software engineers should be concerned with both the interests of the clients or employers and the public and try to align them. In other words, when they are in the process of designing a product, they should take into consideration the effects of the end product and potential misuses. Also, they need to ensure that the product they are designing meets the highest possible standards and that all the professional judgments they make are honest and independent. He went on to advise that software engineers need to be fair and supportive of their colleagues and condone and promote an ethical approach to their profession.

Furthermore, concerning adequate training and grounding of practising computer and software engineers, Dodig-Crnkovic et.al (2010) argue that training and education in professionalism and Ethics should be a compulsory part of Software Engineering curricula as many important engineering decisions are based on both engineering and ethical principles. They advise that the common ethical concerns specific to Software Engineering and Computer Science must include the following according to the [IEEE Computer Society. Computing curricula 2001. http://www.computer.org/education/cc2001, 2001.]:

* Social context of Computing
* Methods and tools of analysis of ethical argument
* Professional and ethical responsibilities
* Risks and liabilities of safety-critical systems
* Intellectual property
* Privacy and civil liberties
* Social implications of the Internet
* Computer crime
* Philosophical foundations of Ethics

With the level and severity of the ethical issues prevalent in the Information and Communications Technology in Nigeria, this paper will draw directly from the approved and adopted Code of Ethics by both the ACM and the IEEE–Computer Society.

It should be noted that Software Engineering has proven to be a complex and demanding field as its practitioners interact to build vital technology solutions in form of applications and software which ordinary citizens use to perform their day to day tasks. Therefore it is not difficult to see that there exist ethical issues which may arise in the practice of software engineering. Recognizing the current state of engineering ethics in Nigeria’s fast improving Information and Communications technology gives software engineers an edge to the resolution of existing ethical issues. This is to ensure that performance is adequate and the quality/security of the software developed is viable and acceptable. As a result, all ethical issues should be pointed out and evaluated to improve performance at all times.

Subsequent sections of this paper explores some ethical considerations and provides possible solutions to the current state of software engineering ethics in Nigeria’s fast improving Information and Communications Technology.

On a daily basis, individuals working in the software development environment encounter a number of ethical issues as they develop and work on deliverables. These ethical issues are known to hinder the progress of activities being undertaken. The software developers design and implement software that drive technologies such as aircraft systems, telecommunication systems, transport systems, accounting and banking systems, enterprise systems and many more.

As noted earlier, Nigeria is one of the countries benefiting from this growth of technology through the involvement of software development. These systems or technologies are expected to perform efficiently and adequately. Ethical considerations are usually derived from dilemmas faced in the working environment. Some of them include (but are by no means limited to):

* How much safety should be included in the schedule?
* What capabilities will be included in the proposed software/technology?
* Should we make this technology general or specific?
* How much test code should be written?
* What type of exhaustive testing should be carried out?
* Have the people anticipated the proposed software or technology?
* If so, what are their intentions and proposed uses of the technology?
* What are the perceived negative and positive uses of the technology?
* What is the benefits/dis-benefits of using the proposed software and to whom?
* etc.

To obtain a correct answer to the above questions opens a vicious battle between right and wrong for individuals working in the software development environment. It is in situations like these that the software engineering code of ethics can be of great importance as it can provide practical guidelines that could be applied.

**The Impact of Ethical Problems In Nigeria’s Fast Growing Information and Communications Technology**

In the rapidly growing and reforming software engineering environment in Nigeria, ethical issues are increasingly arising. The unpredictable growth of ICT in Nigeria and the use of its technologies have had major impacts on the society. This has brought about ethical questions for software organizations and software engineers in the country. These ethical questions and problems are rising on a drastic level and if left unattended to will greatly affect the society in various negative ways.

Some of the ethical issues affecting ICT in Nigeria and the world as a whole include:

* Invasion of individual and corporate privacy
* Intellectual property rights
* Individual and societal rights
* Values preservation
* Accountability for the consequences arising from the use of ICT.
* Encryption
* Trust

For example in Nigeria, during the recent issue of the removal of fuel subsidy early this year in 2012, hackers invaded the privacy of government officials. The hackers leaked information on these individuals on a known social network called twitter. Although many citizens of the country were of the opinion that this was a right move by the hackers, in the real sense of the matter it was an invasion of privacy and was a punishable crime. Regarding this example a question that may arise as to what ethical responsibility will the supplier of the software used in the hacking process bear? This is one of the many software ethical issues facing the country.

**Addressing Ethical Problems In The Software Engineering**

Ethical problems come about on a daily basis in software engineering development practices and software use in Nigeria. It has now become vital to address these ethical issues. The most effective way to start tackling these ethical problems is the use of the Software engineering code of ethics.

The software engineering Code of Ethics by both the ACM and the IEEE–Computer Society stipulates various guidelines on how software developers are required to handle issues that may arise in the software development environment but does not show how these guidelines can be applied. Addressing ethical problems in the software development environment may be difficult but made easy to understand with the use of case studies as they provide concrete examples and how the code of ethics can be applied. For the case study used as illustration, the paper will therefore draw upon and base its analysis on:

\*Software Engineering Code of Ethics and Professional Practice (Version 5.2) as developed and recommended by the ACM/IEEE-CS Joint Task Force on Software Engineering Ethics and Professional Practices and jointly approved by the ACM and the IEEE-CS as the standard for practicing and teaching software engineering.

The case study presented will illustrate how ethical problems emerge and how to use the above software code of ethics to tackle these problems bearing in mind the following decision making guidelines abstracted from *A Practitioner's Guide to Ethical Decision Making* by Holly Forester-Miller and Thomas Davis. These guidelines include (Forester-Miller and Davis, 1996):

* Identify the problem.
* Apply the Code of Ethics.
* Determine the nature and dimensions of the dilemma.
* Generate potential courses of action.
* Consider the potential consequences of all options, choose a course of action.
* Evaluate the selected course of action.
* Implement the course of action.

**Illustration of a Dilemma Faced in the Software Development Environment of a Local Nigerian Hospital**

To address the possible solutions to the ethical problems faced in software engineering in Nigeria, software developers are encouraged to make use of the code of ethics. The following case study is a realistic situation and scenario encountered by a set of graduating students of the Software Engineering Department at the School of Information Technology and Communications, American University of Nigeria during their Senior Design Projects with Local Businesses in the Adamawa State of Nigeria. The case study will be used to illustrate and describe some software ethical issues in the area of study and sector.

**Case Study: Peace Medical Hospital – Yola Adamawa State, Nigeria.**

Peace Medical Hospital is a growing hospital situated in Adamawa State, Nigeria. It makes use of a manual pharmacy information system which is currently reaching overload. The specifications developed for a PC-based information system involves Rachel who is the Vice President, Records & Automation and George who is the Chief Pharmacist. The system is developed by consultants who are hired by George while Rachael tests the procedures. Installation & Training discovers problems. Helen is the consultant in charge of installation & training. Ann is a skeptical nurse cross-checking computer outputs. It was then discovered that there were dosage problems from data entry errors. It was also discovered that there were billing issues. Some patients were over billed due to the data entry errors. Helen says “We should go back to old system during cleanup”; George replies “Is old system less risky?”, “How do we ensure cleanup will get it right”. Helen replies “I’m just a consultant. You handle this” George is at a cross road and could be at the risk of losing his job.

The code of ethics helps to integrate ethics into daily software engineering practices. “*Public - Software engineers shall act consistently with the public interest*”.

Therefore, decisions that would be made have to be made for the benefit of the patients in the hospital before any other individual present. [Looking at the Principles and Guidelines in the Addendum,]: According to Clause 1.04, George is required to disclose the problems of the system to the appropriate persons or authorities in this case Rachael. From Clause 2.07, Rachael is required to identify, document, and report issues which affected the patients, of which she is aware to the affected patients. She will inform the patient that was being over billed and given an overdose regardless of its consequences. The following steps are to be taken.

*Results chain*

* Add patient safety outcome, patient stakeholder representative
* Rework-business-workflows initiative, including safety checks; add clerical-staff stakeholder

*Patient Win-Win*

* Patient representative: safety criteria; parallel-operation phase-in
* Clerical staff: prototype GUI, including safety-check support

*Business Case****:*** Includes added safety costs and benefits

*Risk Management:* Assess warehouse package safety, effects of workflow changes.

*Concurrent Engineering*

* Concurrently address business workflows, GUI prototypes, COTS alternatives, feature prioritization, cost/schedule/benefits analysis, other risks

*Monitoring and Control*: Use Balanced Scorecard to track progress with respect to plans; apply corrective actions as necessary

*Change as Opportunity:* Look for emerging COTS pharmacy-related fulfillment systems

These steps taken fulfill Clauses 3.09, 3.11.Options have been chosen to correct issues that arose in the hospital through the use of code of ethics. This shows that the code of ethics serves as a form of guide to software engineers when they are faced with ethical problems in the software development environment.

**Conclusion**

The major aim of this paper has been to provide ethical considerations to help Nigerian software engineers and practitioners to learn ethical values from scenarios. As seen in the paper, case studies would be a productive way of getting software developers and programmers acquainted with ethical values.

This paper achieved this by using a scenario where graduating seniors in software engineering at the Software Engineering Department, School of Information Technology & Communications used the ACM/IEEE Software Engineering Code of Ethics and Professional Practice when faced with ethical dilemmas. As pointed out by (Gotterbarn, 1999), these ethics are important because they develop the skill and habit of thinking rationally about ethical issues, and in that way prepare software professionals for the challenges of their profession.

Several times, software developers are faced with ethical problems and it affects their delivery and may actualize the dangers that are being avoided. The use of the software engineering code of ethics does not only help the software engineer become more professional but makes the software development environment more efficient. Its effective use will improve the attitude towards ethical considerations in software engineering and also greatly benefit the growth of Information and Communications Technology in Nigeria.

Software engineers have increasing power to do public harm or good. Therefore clearly pointing out the dilemmas software engineers face in a working software environment will help to improve software performance, safety and quality.

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Quality Assessment of Rain Water Around a Cement

Factory in Benue State, Nigeria

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Abstract

This study was aimed at determining the physico-chemical properties of rainwater collected from a cement factory and its environment. Four (4) locations labeled A, B, C and D were sampled and analysed. The result of the rainwater analysed indicated that locations A, B, C and D had temperature values of 22.3, 21.7, 23.5, and 21.8oC respectively, Turbidity; (0.15, 0.18, 0.20 and 0.13 NTU), pH: (6.5, 6.4, 6.1, and 6.7), Hardness as CaCO3: (40.00, 40.00, 40.00 and 40.33 mg/L), NO3- : (36.77, 38.63, 32.40, and 30.20mg/L) respectively, while the microbiological assay showed no presence of e. coli. CO2 values were 24.00, 21.00, 22.67, and 24.33 mg/L for A, B, C and D respectively, Ca2+: (21.33, 22.00, 120.33 and 19.67mg/L), SO42- : (10.67, 8.67, 32.67 and 12.67 mg/L) respectively for A, B, C and D. The pH values showed that rainwater from all the locations were slightly acidic particularly location C. Overall, the water was found fit for drinking though with a relative high amount of Nitrates in samples A and B and a high CO2 content especially in locations D, A and C. These results are indications that the area could experience acid rain under extreme conditions.

**Keywords:** Cement, Rainwater, Pollution, Quality, Benue State

**Introduction**

People have specific water quality requirements for drinking water, recreation, agriculture and industry, although the specific water quality requirements vary by sector. Degradation of water quality erodes the availability of water for humans and ecosystems, increasing financial costs for human users, and decreasing species diversity and abundance of resident communities. These changes in environmental quality can be associated with changes in water quality parameters such as sediment load, nutrient concentrations, temperature, dissolved oxygen levels, and pH. Developments in science and technology have brought improved standard of living, but have also unwittingly introduced some pollution into our environment. Substances are regarded as pollutants if they are present in concentration toxic to man, animals or plants, have an odour or in some other ways that irritate our senses (Wooven, 1974).The addition of excessive levels of naturally occurring or synthetic compounds, such as oil and grease, pesticides, mercury and other trace metals, and non-metallic toxins (e.g., PAHs, and PCBs) can harm wildlife and people that depend on these aquatic resources.

Poor water quality can be the result of natural processes but is more often associated with human activities and is closely linked to industrial development. Although substances that can be harmful to life can have natural or human-made sources, the contribution of some human-produced chemicals to the natural environment far overshadows natural sources.

Water contaminated with cement is highly alkaline and can cause severe pollution (Environment Agency, 2011) To mitigate these problems, large urban centres began developing sewage networks and water treatment facilities. These facilities continue to be installed and expanded to accommodate increases in human population. However, the rapid growth in some urban areas, particularly in Asia and Latin America, has outpaced the ability of some governments to develop and maintain treatment facilities (FWR, 2004).

Since the 1940s, the development and production of synthetic chemicals used in industry and agriculture has had profound effects on water quality worldwide. Eutrophication of surface waters from human and agricultural wastes, and nitrification of groundwater from agricultural practices, have affected large parts of the world. Acidification of surface waters by air pollution is a relatively recent phenomenon and can threaten aquatic life and the long range transport of airborne pollutants is also a significant source of water quality degradation in some areas of the world. Further, urbanization, population growth, and increased rates of consumption have led to increased resource extraction (e.g., mining and forestry), material processing (e.g., smelting, pulp and paper mills, assembly plants), and demands for energy (hydro-electrical impoundments and generating stations). The building of impoundments along watercourses for hydroelectric power generation and water storage, while playing an important role in meeting human needs for water, can significantly alter water quality. Many researchers including Evans, Coombes, and Dunstan (2006), Yasunori and Akira (1981), Nicole and Mason (2001) and Susumu, Shunsuke and Masaaki (2001) have considered the effect of acid rain on human health. These acid pollutants can be deposited in a dry form through dust. Pollutant that contributes to acid rain may be carried hundreds of miles before being deposited on the earth. Because of this, it is sometimes difficult to determine the specific sources of these acid rain pollutants (Dinrifo et al, 2010).

Climate change, the evolution of new waterborne pathogens, and the development and use of new chemicals for industrial, agricultural, household, medical, and personal use have raised concern as they have the potential to alter both the availability and the quality of water (IPCC, 1995; WHO, 2003; Kolpin *et al*., 2002). All of these activities have costs in terms of water quality and the health and integrity of aquatic ecosystems (Meybeck, 2004).

Mining activities account for consequences such as sedimentation, eutrophication, thermal pollution, dissolved Oxygen, acidification, trace metals contamination, salinization and non-metallic toxins (Carr and Neary, 2006). Acid rain is formed through a complex process of chemical reaction involving air pollution (Kemp, 1971). Acid rain has recently become a serious environmental problem in many industrialized countries including Japan, in Europe and in the northeast areas of the United States and Canada (Adachi, *et al* 1990). Beside farming and horticultural activities, the quality of rainwater has the potential to affect aquaculture (Adewolu *et al* 2009). We know that all life is dependent on water and that water exists in nature in many forms - clouds, rain, snow, ice, and fog; however, strictly speaking, chemically pure water does not exist for any appreciable length of time in nature. Even while falling as rain, water picks up small amounts of gases, ions, dust, and particulate matter from the atmosphere. Then, as it flows over or through the surface layers of the earth, it dissolves and carries with it some of almost everything it touches, including that which is dumped into it by man. This necessitates the constant probe into the environment, pollution factors and effects so as to stem the tide of pollution. This study is meant to analyse the chemical constituents of rain water obtained from a site polluted by activities of mining of limestone and subsequent production and transportation of cement products.

**Study Area**

The study area, Gboko is found in Benue state, North Central Nigeria. Situated on longitude 9oE and latitude 7.0oN and 7.50oN, Gboko is a densely populated area inhabited dominantly by average-life dwellers. The factory under study releases production dust into the atmosphere alongside the vehicular traffic activities within and around the factory premises.

**Materials And Methods**

Rain water samples were collected from four locations around the cement factory and labeled A, B, C and D. Locations A, B and D were sited in settlements around the factory while location C was sited within the factory premises. Care was taken to ensure that no accidental contaminations occurred during sampling and that samples were a representative of the water to be examined. Rainwater samples were collected in clean plastic containers by placing the container on a raised platform in an open environment in other to ensure that the water had no contact with any object before getting into the container. Some of the sample parameters were immediately analyzed and the remaining samples were stored in a refrigerator for further analysis.

**Analysis**

Physical analyses of the samples were carried out by physical observation of the appearance, colour, taste, odour and turbidity. These were determined by the use of sensory evaluation panel as adopted by Edema, Omemu, and Fapetu (2001). The samples for chemical analyses were refrigerated and analyzed within 24hours. All plastics and glass wares utilized were prewashed with detergent water solution, rinsed with tap water and soaked for 48 hours in 50% HNO3, then rinsed thoroughly with distilled-deionised water. They were then air dried in a dust free environment.. Chemical analyses were done according to AOAC (2004) and Food and Agricultural Organization FAO (1997.

All containers for bacteriological analysis in addition to previous treatment, were sterilized in an autoclave at 121oC for 15minutes. Microbiological analyses were carried out using the multiple tube technique as described by Uzuegbu and Eke (2001).

All chemical and microbiological analyses were done in triplicates.

**Results/Discussion**

**Temperature**

The temperatures of the sample collected from the four locations of A, B, C and D were found to be 22.3oC, 21.7oC, 23.5oC and 21.8oC respectively. This falls well within the WHO standard of between 20 - 32oC

**PH**

In water, a small number of water (H2O) molecules dissociate and form hydrogen (H+) and hydroxyl (OH-) ions. If the relative proportion of the hydrogen ions is greater than the hydroxyl ions, then the water is defined as being acidic. Natural acidity in rainwater is caused by the dissolution of atmospheric carbon dioxide (CO2)(Carr and Neary, 2006). The PH values of locations A and D with average values of 6.5 and 6.7 respectively, fall within the WHO even though they show a slight acidity while the samples analysed in location B and C show a marked increase in the acidity of the rain water with values of 6.4 and 6.1 respectively.

**Turbidity**

Turbidity refers to water clarity. The greater the amount of suspended solids in the water, the murkier it appears, and the higher the measured turbidity. Higher turbidity

levels are often associated with higher levels of disease-causing microorganisms such as viruses,

parasites and some bacteria and dissolved chemicals. (Dinrifo et al, 2010). The turbidity values of 0.15NTU 0.18NTU, 0.20NTU, and 0.13NTU represent locations A, B, C, and D respectively. This shows that all the samples fall within the WHO range.

**Hardness as CaCO3.**

Natural sources of hardness principally are limestones which are dissolved by percolating rainwater made acidic by dissolved carbon dioxide. Industrial sources include discharges from operating and abandoned mines. When water containing bicarbonate or “temporary” hardness is heated, carbon dioxide is driven off, converting the bicarbonate into carbonates which precipitate to form the hard scale found in cooking utensils, pipes, hot water tanks, and boilers. This scale reduces the capacity of pipes to carry water and does not

transmit heat well (Shelton, T. B. et al, 2005)The average hardness of the samples were 40mg/L, 40mg/L, 40mg/L, and 41mg/L respectively for locations A, B, C and D. This indicates that the water samples are soft and fall below the WHO requirement of 100-250mg/L The water samples result show that the water would require little soap to form lather and hence is good for washing. Also the lifespan of household equipment, such as aluminium pots, will be protected from scaling (Oni, Ajaga and Ipav, 2010).

**Salinity and Conductance**

Salinity is an indication of the concentration of dissolved salts in a body of water. The ions responsible for salinity include the major cations (calcium, Ca2+; magnesium, Mg2+; sodium, Na+; and potassium, K+) and the major anions (carbonates, CO32- and HCO32-; sulphate, SO42-; and chloride, Cl-) (Carr and Neary, 2006). The level of salinity in aquatic systems is important to aquatic plants and animals as species can survive only within certain salinity ranges (Friedl *et al*., 2004). Although some species are well-adapted to surviving in saline environments, growth and reproduction of many species can be hindered by increases in salinity.

Specific conductance, or conductivity, measures how well the water conducts an electrical current, a property that is proportional to the concentration of ions in solution. Conductivity is often used as a surrogate of salinity measurements and is considerably higher in saline systems than in non-saline systems. (Dodds, 2002). The salinity and conductivity of a system will tend to change depending on the recharge of the system: during wet periods, salinity and conductivity will decline as the concentration of salts becomes more dilute, whereas dry periods will lead to increased salinity and conductivity values (Carr and Neary, 2006). Municipal, agricultural, and industrial discharges can contribute ions to receiving waters or can contain substances that are poor conductors (organic compounds) changing the conductivity of the receiving waters. Thus, specific conductance can also be used to detect pollution sources (Stoddard *et al*., 1999). Global average concentrations of the four major cations (calcium, magnesium, sodium, and potassium) and the four major anions (bicarbonate, carbonate, sulphate, and chloride) in surface water tend to approach patterns in which calcium concentrations dominate the cations and bicarbonate and/or carbonate concentrations dominate the anions (Wetzel, 2001).

Chlorides with sodium cations have a detectable salty taste, but if combined with the cation calcium or manganese, the salty taste might not be apparent even up to higher level of chloride as high as 1000mg/l. Increased level of chlorides in water increase its corrosivity and hence an increase in the levels of metal in the water. WHO (2004, 3rd Edn) does not provide a health based guideline figure for chloride, but notes that there may be a detectable taste above 250 mg/l.Note that some users in dry-land, arid and semi-arid areas in particular, sometimes drink much higher levels than 250 mg/l. The acceptability will depend very much on what level the person is used to drinking. From the analyses of these ions, locations A, B, C and D had values that fall within the WHO standard, hence making it fit for drinking and other house hold activities.

**Nitrate & Nitrite**

Nitrate and Nitrite occur naturally as ions as parts of Nitrogen Cycle. Concentrations of nitrate and nitrite can also be high in water as a result of contamination from agricultural run-off (fertilisers), run off from refuse dumps, and contamination of water with human and animal wastes. The main risk from nitrate and nitrites is methaemoglobinaemia or ‘blue-baby’ syndrome, to which babies under 0.5-1 year are more prone(OXFAM Technical Brief). The consequences of eutrophication as a result of nitrates for humans are bad taste and odour in public water supplies, production of cyanobacterial toxins that can threaten animal and human health, infilling or clogging of irrigation canals with aquatic weeds, loss of recreation use due to slime, weed infestations and noxious odours, and economic losses due to the disappearance of species targeted in commercial and sport fisheries (Ongley, 1996). In addition, nitrate in drinking water has been linked to human health problems such as methaemoglobinaemia (blue-baby syndrome) (Boatman *et al*., 1999), stomach cancer and negative reproductive outcomes (Carr and Neary, 2006). High nitrate concentrations have also been linked to lower productivity in livestock (Carr and Neary, 2006). The average values of Nitrate as NO3- for locations A, B, C and D are 36.77mg/L, 38.63mg/L, 32.4mg/L and 30.20mg/L respectively. All these fall within the standard of 11mg/l as N (50 mg/l as NO3-) as recommended by World Health Organization (WHO) (WHO, 2004, 3rd Edn).

**Carbon IV oxide**

Natural acidity in rainwater is caused by the dissolution of atmospheric carbon dioxide (CO2) (Carr and Neary, 2006). CO2 is a colourless, odourless and poisonous gas which can be produced as a result of the mining of the CaCO3 and the production of cement. The amounts of CO2 noticed could also be due to heavy vehicular activities in and around the factory premises. Excessive amounts of this gas can cause asphyxia a condition that can lead to death. The CO2 levels were relatively high though tolerable at 24.00mg/L, 21.00mg/L, 22.67mg/L, and 24.33mg/L respectively for A, B, C and D as compared to the WHO standard of 6-60mg/L. It appears higher levels of CO2 could have been noticed if the samples were taken at the onset of the rainy season.

**Bacteriological analysis**

Water can be infected with a variety of pathogens especially Surface and ground water. indicator organisms are typically used to detect the presence of faecal contaminants in the water resource (Carr and Neary, 2006). In particular, either total coliforms or faecal coliforms (a subset of total coliforms) are measured as indicators of pathogenic microbes. However, testing for *Escherichia coli* (*E. coli*) alone is becoming more prominent as *E. coli* indicates the presence of only faecal contaminants, while total or faecal coliform tests may give positive results for non-faecal, naturally occurring bacterial species (Hill, 2003). Any food or water sample in which this group of bacteria is found, is to be suspected of having come intocontact with domestic sewage, animal manure, or with soil or plant materials. It follows that such a water supply may contain pathogenic (disease causing) bacteria and viruses that cause such serious human illnesses as typhoid fever, dysentery, hepatitis, etc. These water samples from all locations indicate no presence of coliform hence does not contain pathogens and can be used for drinking.

**Conclusion**

The contaminant levels of the water samples collected indicate that temperature, Odour, Turbidity, Ph, bacteriological parameters, nitrate (NO3-) levels, calcium (Ca2+), Mg2+, Cl-, SO42-, hardness as CaCO3, all fall within the WHO standard. Even though this is so, high values were noticed in hardness as CaCO3 and Nitrates (NO3-). It is worthy of note that since the study was carried out after series of rainfall of up to three months, it can be safely deduced that the incessant rainfall had washed the atmosphere of the accumulated CO2, hence the level of CO2 is tolerable.

**Recommendations**

1. Similar Work should be done on same locations at the beginning of the first rain to determine the level of contaminants released into the environment.
2. People should be advised not drink the waters from the first and early rains so as to allow for the dust and contaminants to be washed thoroughly.
3. Alternative sources of drinking water should be made available to the people living in the industrial area so as to enhance good health.
4. Consistent analyses should be carried out on the water and environment to safeguard the health of the people.
5. Frequent health awareness Programmes should be carried out in order to educate the people living in these areas on basic hygiene and general steps to enhancing good health.
6. Air pollution control measures should be taken to enhance a pollution free environment.
7. The excessive release of Carbon II oxide (CO) and Carbon IV oxide (CO2) should be stopped to avoid greenhouse effect and subsequent health hazards accompanying it.

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***Table 1:*** *levels of some physical parameters in rainwater samples around a cement factory in Benue state*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Location A | Location B | Location C | Location D | WHO Standard |
| Temperature (oC) | 22.3 | 21.7 | 23.5 | 21.8 | 20-32 |
| Taste | Ts | Ts | Ts | Ts | Tasteless |
| Odour | Os | Os | Os | Os | Odourless |
| Turbidity (NTU) | 0.15 | 0.18 | 0.20 | 0.13 | 5 |
| Colour | Cs | Cs | Cs | Cs | Colourless |
| pH | 6.5 | 6.4 | 6.1 | 6.7 | 6.5-8.5 |

Key:

Ts = tasteless

Cs = colourless

Os = odourless

***Table 2:*** *levels of some Microbiological parameters in rainwater samples around a cement factory in Benue state.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Pararmeter | Location A | Location B | Location C | Location D | WHO standard |
| Coliform count (CFU/mL) | 0 | 0 | 0 | 0 | 0 |
| *Escherichia coli (*CFU/mL) | 0 | 0 | 0 | 0 | 0 |
| Yeast/ Moulds (CFU/mL) | 0 | 0 | 0 | 0 | 0 |

***Table 3:*** *levels of some chemical parameters in rainwater samples around a cement factory in Benue State.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Location A | | | Location B | | | Location C | | | Location D | | | WHO standard |
|  | 1st | 2nd | 3rd | 1st | 2nd | 3rd | 1st | 2nd | 3rd | 1st | 2nd | 3rd |  |
| Hardness as CaCO3 (mg/L) | 40.00 | 40.00 | 40.00 | 0.00 | 40.00 | 40.00 | 40.00 | 40.00 | 40.00 | 41.00 | 40.00 | 40.00 | 100-250 |
| Calcium (Ca2+) (mg/L) | 20.00 | 22.00 | 22.00 | 20.00 | 21.00 | 25.00 | 120.00 | 120.00 | 121.00 | 20.00 | 18.00 | 21.00 | 20-200 |
| Magnesium (Mg2+) (mg/L) | 20.00 | 20.00 | 22.00 | 20.00 | 20.00 | 20.00 | 40.00 | 40.00 | 41.00 | 20.00 | 20.00 | 22.00 | 80-100 |
| Chloride (mg/L) | 11.90 | 11.70 | 11.90 | 13.80 | 13.90 | 13.60 | 11.90 | 12.00 | 12.20 | 11.80 | 12.00 | 11.90 | 250 |
| Sulphate (SO42-) (mg/L) | 10.00 | 11.00 | 11.00 | 8.00 | 8.00 | 10.00 | 32.00 | 32.00 | 34.00 | 10.00 | 12.00 | 16.00 | 500 |
| NO3-  (mg/L) | 36.80 | 36.80 | 36.70 | 38.60 | 38.50 | 38.80 | 32.40 | 32.40 | 32.40 | 30.20 | 30.40 | 30.00 | 50 |
| CO2 (mg/L) | 24.00 | 24.00 | 24.00 | 21.00 | 21.00 | 21.00 | 22.00 | 23.00 | 23.00 | 24.00 | 25.00 | 24.00 | 6-60 |

*Synthesis, characterization*

N’dama Cattle Conservation: The Potential Roles Of

Artificial Insemination and the National Policy

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Abstract

Regular access to genetically superior bulls from an open nucleus breeding system is an impetus for N’Dama cattle utilization and conservation. However, shortage in the number of bulls that could be distributed to the farmers for subsequent breeding remains a challenge in some countries of West Africa. In this regard, the potential benefit of artificial insemination (AI) and the roles of national policy was assessed. The open nucleus breeding scheme of International Trypanotolerance Center (ITC) in the Gambia was used as a case study and the research questions were answered with literature review, focus group discussion, and Likert-scale questionnaire. Introduction of AI into the breeding scheme of N’Dama cattle can create higher selection intensity and promote a wider dissemination of genetic gain made at the nucleus. With improved AI techniques, a better use of improved N’Dama bulls can be achieved. Notwithstanding, there are concerns about low pregnancy rate, quality of the semen, inadequate knowledge of AI technicians, and the regular availability of quality bulls. For the Gambian national policy, the environmental component is the most relevant for conservation of N’Dama cattle. This can be buttressed with more flexibility and a clearer communication of the objectives through workshops and local media.

**Keywords**: N’Dama, breeding, conservation, artificial insemination, policy

**Introduction**

The characteristic resistance of N’dama cattle to parasitic infection such as trypanosomiasis and also the ability of this breed to tolerate low quality feed when compared to the Zebu breed are among the factors for its preference by the small-scale farmers (Mattioli, Pandey, Murray, & Fitzpatrick, 2000).

However, to sustain the unique characteristics of N’Dama cattle, there is a need to adequately breed, conserve and prevent this breed from further dilution of its genetic traits. The first initiative in this direction started in the mid-1990s with the establishment of an open nucleus breeding scheme (ONBS) in the Gambia (Dempfle & Jaitner, 2000). Unfortunately, the scheme is suffering a setback from the collapse of multipliers’ association and then the reduced number of nucleus animals that could be disseminated to the farmers.

According toKahi & Rewe (2008) and van Arendonk (2011) whoindependently gave overview of reproductive technology in the developing countries, artificial insemination (AI) can be considered for animal breeding purposes. However, none of these studies mentioned the factors that need to be considered for the adoption of AI. In this regard, this exploratory research is aimed at identifying the factors which determine the possibility of using AI in disseminating genetically proven N’Dama bulls as a complement to the system which involves transfer of live animals. Also the extent to which the existing Gambian agricultural policies can be used to stimulate conservation of N’Dama breed of cattle was investigated.

The underline framework for this research as depicted in Figure 1 is based on the hypothesis that a wider dissemination and continuous access of the farmers to genetically improved bulls through AI will encourage better utilization of N’Dama cattle. On the other hand, a better utilization of genetic resources such as semen can enhance sustainable conservation of an animal (Notter, 2004).



***Figure 1:*** *A Schematic Description of the Research Framework*

The research questions were based on the main objectives of PROGEBE (Regional Project on Sustainable Management of Endemic Ruminant Livestock in West Africa) which include how to sustainably utilize and conserve the biodiversity of endemic ruminant livestock in physical and institutional environments. Also, the outcome of this research is important for breeding decisions in the programme of ITC (the institution with the responsibility of N’Dama cattle genetic improvement in West Africa). The answers to policy related questions are intended to provide empirical evidence for the current conservation activities and to generate information for future making decisions.

Methods and Procedure

The state of use of artificial insemination in Africa and the activities that are related to breeding and conservation of N’Dama cattle was assessed through information sources such as scientific articles, magazines, conference proceedings, reports, and publications of relevant organizations. The collated information also served as a basis for the design of questionnaire and focus group discussion interview guide (Rubin & Babbie, 2009; Wong, 2008). Meanwhile, the breeding scheme of ITC in the Gambia was used as a case study.

**Questionnaire**

With the aim of evaluating the beliefs and intentions of the respondents concerning the adoption of AI, the questionnaire was designed based on the theory of planned behaviour (Hardeman et al., 2002). The questions were answered on a 5-point Likert-type scale (Likert, 1932) although some questions were negatively phrased in order to ensure variations in responses. Overall, the questions were grouped into major six constructs: knowledge(A), perceived susceptibility(B), perceived severity(C), perceived barriers(D), attitudes towards behaviour(E), and cues to action(F). In this regard, construct ‘A’ evaluates the knowledge of the respondents on AI; ‘B’ examines what the respondents perceived as the technical effects of using AI; ‘C’ measures the extreme cases that should be considered in the use of AI; ‘D’ tests the opinions of the respondents on what could be the constraints to using AI; ‘E’ contains questions on the prerequisites that will make AI appealing to farmers; ‘F’ evaluates the financial, technical and institutional factors that could influence the choice of using AI.

Meanwhile, each construct on the average has 6 questions which evaluates the essential factors to be considered with regard to the adoption of AI in a typical N’Dama cattle breeding scheme. The questionnaire in an English language was pre-tested with potential respondents who were randomly chosen from the targeted population (Nicolaos, 2003). The feedbacks obtained from those participants were thereafter used to improve the final copy of the questionnaire.

**Focus Group Discussion**

In order to directly assess the opinions of farmers who are the main custodians of N’Dama cattle, three separate focus group discussions were held at Keneba, Niamina and Nianija intervention sites of ITC, the Gambia. In selecting the participating farmers, due attentions were given to societal issues such as age, gender and level of education. Also during the discussions, group dynamics, motivation and curiosity were ensured in order to generate enough responses from the participants. The discussion/interview guide which has similar number of constructs like the questionnaire focused on AI and then the Gambian national policy. The discussions were conducted in the local languages (Fula, Madinka, and Wallof) of the participants while the note taking was done simultaneously by the researcher and a livestock assistant.

**Analysis of the Questionnaire and Discussion Transcripts**

The responses to 5-point Likert-type questionnaire were coded as 1 = “I strongly disagree”; 2 = I disagree”; 3 = “neutral” 4 = “I agree”; 5 = “I strongly agree” and analysed on a stepwise basis with a Statistical Package for Social Sciences (IBM-SPSS® version 19.0). Variations among the stakeholders (apart from the illiterate farmers) in the N’Dama cattle management was evaluated across demographic variables such as age, gender, religion, highest level of education attained, type of profession, and experience level by using frequency counting and proportions.

The independence of the questions (variables) in each construct was determined through a crosstabulation and Pearson’s Chi-squared test. Meanwhile the internal consistence of each construct was measured using a reliability analysis (Gardner, 1995; Gliem & Gliem, 2003). In this case, the decision to either retain or drop a variable in a construct was based on the value of Cronbach’s Alpha coefficient (de Vaus, 2002; Floyd, 2009); any dropped variable was however found to be redundant. Furthermore, since it is unlikely for a single question in each construct to fully represent a theoretical concept of the subject matter, the scores of the questions in a construct (i.e. a total score per construct) were obtained (Spector, 1992). This step averages out the measurement errors (Nunnally & Bernstein, 1994). Further analysis was based on total score per construct of each respondent.

The number of components needed to explain the independence of the evaluated constructs was determined with the Principal Component Analysis (PCA). A careful examination of the underlying assumptions for appropriateness of the PCA such as sample size (107 in this case), ratio of sample size (number of respondents) to constructs = 107:6; presence of at least 2 correlations with values >0.3 in the correlation matrix of the variables; measure of sampling adequacy (0.651>minimum 0.50), and Bartlett’s test of sphericity (p<0.05) were all satisfactory. To ensure that variance of the loadings within each component is maximized, Varimax was set as the rotation option while the latent root condition for number of components to be retained was based on Eigenvalue-one criterion (Tabachnick & Fidell, 2001). In any case, a component is considered significant if its Eigenvalue is greater than 1.

Based on the component plot of PCA for the constructs, 3 components were distinguishable. Therefore the constructs were regrouped into three main factors i.e. ‘perceived susceptibility’, ‘stimulating factors’ and ‘limiting factors’. The degrees to which the respondents agree, remain neutral or disagree with the retained questions in each construct were reported.

The transcripts from focus group discussions similarly written as the constructs used in the questionnaire were first reviewed and later analysed by content analysis method (Weber, 1990). To concisely express all the relevant statements, emphasis was given to the patterns and trend of the identified common keywords. Aggregation of the respondents’ statement on the basis of relevance to the research questions was done by placing them side by side. The summary of the discussions are presented in the result section.

**Results**

Potential Factors Influencing the Use of AI for Disseminating N’Dama Bulls

The respondents classified as stakeholders in this research and sorted according to their demographic variables are as shown in Table 1 below. These stakeholders (apart from the illiterate farmers) were older than 18 years of age and of which a total of 95.1% have at least had a basic secondary school education. Meanwhile, there was a narrow variation in terms of religion and gender. This set of information on the distribution of stakeholders is important for making decisions on the possibility of using AI. In addition, any policy process on the conservation of N’Dama cattle should needs to consider this observed variation in the distribution of stakeholders.

***Table 1:*** *Demographic Information of N’Dama Stakeholders*

|  |  |  |  |
| --- | --- | --- | --- |
| Variables | Categories | Frequency counts | Valid  Percent %) |
| Stakeholders’ groups | N’dama Cattle Owners | 46 | 42.6 |
| Agricultural Officers | 25 | 23.1 |
| Livestock Technicians | 10 | 9.3 |
| Veterinarians | 9 | 8.3 |
| Scientists | 10 | 9.3 |
| Policymakers | 8 | 7.4 |
| Age | 0-18 | 0 | 0 |
| 19-50 | 65 | 60.7 |
| >50 | 42 | 39.3 |
| Gender | Man | 92 | 92.9 |
| Woman | 7 | 7.1 |
| Religion | Islam | 100 | 92.6 |
| Christianity | 4 | 3.7 |
| Other | 2 | 1.9 |
| Number of years in practice | 0-10 | 34 | 31.8 |
| 11-20 | 22 | 20.6 |
| >20 | 51 | 47.7 |
| Highest level of education attained | Non-formal Education | 5 | 4.8 |
| Basic Education (grades 1-9) | 10 | 9.6 |
| Senior Secondary Level | 31 | 29.8 |
| University Level | 33 | 31.7 |
| Others (college, technical schools) | 25 | 24.0 |

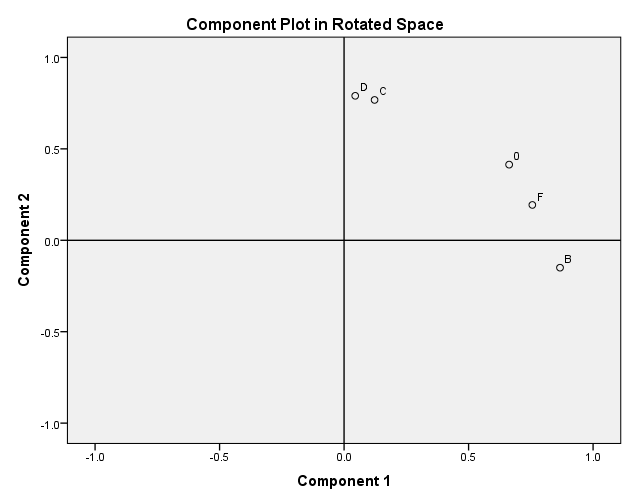
As also shown in Table 2, the first glance into the constructs tested in this survey indicates that the construct ‘attitudes toward behaviour’(E) has the highest significant correlations (p<0.01) with the other constructs. In other words, this is the construct which is mostly related to the other ones and therefore needs to be given a high consideration in deciding on the factors that influence the adoption of AI for disseminating genetically improved bulls. Also, it means that the tested variables in the other constructs are highly dependent on the variables grouped in construct ‘E’. Meanwhile, the construct ‘Perceived susceptibility’(B) and ‘Perceived barriers’(D) were negatively correlated but not statistically significant.

***Table 2:*** *Inter-item Correlation Matrix of the Constructs*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Questionnaire constructs | | | | | | |
|  | A | B | C | D | E | F |
| A | 1.00 |  |  |  |  |  |
| B | 0.385\*\* | 1.00 |  |  |  |  |
| C | 0.077 | 0.086 | 1.00 |  |  |  |
| D | 0.203\* | - 0.026 | 0.293\*\* | 1.00 |  |  |
| E | 0.387\*\* | 0.399\*\* | 0.368\*\* | 0.210\* | 1.00 |  |
| F | 0.306\*\* | 0.449\*\* | 0.050 | 0.115 | 0.283\*\* | 1.00 |

*\*\* Correlation is significant at the 0.01 level (2-tailed); \* Correlation is significant at the 0.05 level (2-tailed).*

By using the Principal Component Analysis (PCA) as a statistical data summarising method, the construct ‘A’ was dropped off after the first iteration because of its low communality. After the second iteration of the procedure, only 3 components (B, C+D, and E+F) as shown in Figure 2 were identified. In other words, these 3 components represent the independence of the constructs that were tested in this survey. Taking clues from the component plot, an overall summary was done by grouping the variables (questions) in the evaluated construct into three distinguishable factors namely: (1) Potential Effects (**B** = *perceived susceptibility*); (2) Stimulating Factors (**E**= *attitudes toward behaviour* +**F**= *cues to action*) and (3) Limiting Factors (**C**= *perceived severity* + **D**= *perceived barriers*)’.

****

**E**

***Figure 2:*** *Component Plot of the Constructs*

Therefore as summarised in Table 3A, the 6 potential effects that the use of AI can generate were identified. More than 50% of the total respondents agreed that AI can result in conservation of N’dama cattle breed, increased offspring per animal, higher selection intensity, and better gene flow at different levels of ONBS. However, the response did not differ considerably with regard to whether the use of AI can enhance genetic diversity given a phenomenon like inbreeding depression.

On a further note, more than an average number of the respondents perceived high financial requirement, complex logistical operations, and quality of the semen as factors that will limit the use of AI for disseminating N’Dama cattle bulls. Technically, the low pregnancy rate, inadequate expertise of AI technicians, farmers’ inadequate knowledge of detecting animals in heat and in keeping breeding records were further identified as limiting factors for adopting AI as a reproductive technology in a typical setting like that of ITC, the Gambia. Interestingly, nearly half (46.2%) of the respondents did not consider the extensive method of N’Dama husbandry as a potential factor that can hinder the use of AI.

Concerning the factors that can stimulate the use of AI in a purebreeding scheme, more than 65% of the respondents agreed that a clear breeding objective, involvement of breeders’ organizations, and use of incentives in a form of price subsidy are essential requirements. Similarly, establishment of AI camps at community levels, availability of financial and technical support, animal genetic resources (AnGR) related policies were identified. Meanwhile none of the respondents disagrees with the notion that educational campaign is a priority in stimulating the use of AI for an N’Dama purebreeding system.

***Table 3A:*** *Potential Effects of Adopting AI for Disseminating N’Dama Bulls*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **A. Potential Effects** | Agree (%) | Neutral (%) | Disagree (%) | N | S.E.M. |
| Conservation of N’dama cattle breed  High selection intensity | 77.4  58.5 | 11.3  17.0 | 11.3  25.4 | 106  107 | 0.066  0.079 |
| Improved exchange of semen at different levels of ONBS | 50.0 | 12.3 | 37.7 | 106 | 0.055 |
| Improved gene flow in a pure breeding system  Increased offspring per animal | 69.8  69.8 | 17.0  5.7 | 13.2  20.8 | 105  106 | 0.078  0.059 |
| Maintenance of genetic diversity | 41.5 | 12.3 | 46.2 | 106 | 0.083 |

***Table 3B:*** *Summary of the Stimulating Factors Influencing the Adoption of AI*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| B. Stimulating Factors | Agree (%) | Neutral (%) | Disagree (%) | N | S.E.M. |
| Animal genetic resources (AnGR) related policies | 81.9 | 10.5 | 7.6 | 105 | 0.057 |
| Capacity building of extension agents and technicians  Clear national breeding objective | 86.7  77.1 | 5.7  15.2 | 7.6  7.6 | 105  105 | 0.055  0.059 |
| Educational campaigns | 91.4 | 8.6 | - | 105 | 0.027 |
| Establishment of AI camps at community levels | 84.6 | 12.5 | 2.9 | 104 | 0.045 |
| Financial and technical support | 87.2 | 7.3 | 3.7 | 107 | 0.044 |
| Highly functioning breeding organizations | 74.5 | 11.8 | 13.7 | 102 | 0.071 |
| Introduction of AI into the existing ONBS  Involvement of breeders’ organizations | 70.1  78.6 | 22.4  8.7 | 7.5  12.6 | 107  103 | 0.060  0.068 |
| Public funding by the government, NGOs, etc. | 64.4 | 15.4 | 20.2 | 104 | 0.079 |
| Use of incentives in a form of price subsidy | 59.0 | 15.2 | 25.7 | 105 | 0.084 |
| ***Table 3C:*** *Summary of the Limiting Factors Influencing the Adoption of AI* | | | |  | |
| C. Limiting Factors | Agree (%) | Neutral (%) | Disagree (%) | N | S.E.M. |
| Complex logistical operations | 69.8 | 17.0 | 13.2 | 106 | 0.093 |
| Farmer’s inability to detect heat period  Farmers’ inadequate knowledge of keeping breeding records  High amount of initial capital | 50.0  85.0 | 12.3  7.5 | 37.7  7.5  20.8 | 106  107  106 | 0.121  0.092  0.108 |
| 73.6 | 5.7 |
| Inadequate knowledge of the AI technicians | 57.5 | 17.0 | 25.5 | 106 | 0.117 |
| Low pregnancy rate | 55.7 | 25.5 | 18.9 | 106 | 0.098 |
| Quality of the semen | 58.5 | 17.0 | 25.4 | 106 | 0.106 |
| Restriction to periurban areas only | 24.0 | 13.5 | 62.5 | 104 | 0.083 |

*\*\*N is the total number of responses for each variable; S.E.M. is the error associated with the summary hereby presented.*

Possibility of AI in an Open Nucleus Breeding System (ONBS): Farmers’ Perspective

The focus group discussion held with farmers in the Gambia further proved that a relatively large proportion (>80%) of these custodians of animals keep N’dama cattle for both economic and cultural purposes. In addition, the N’Dama cattle farmers indicated that this breed is highly adaptive to the local environment when compared to other familiar breeds such as Gobra and Macha (Gobra x N’Dama).

Concerning the knowledge of these farmers on the possibility of using AI for disseminating the bulls from the nucleus breeding scheme, 80% of this group indicated that they have not had such a practical opportunity to use AI. However they were aware of this reproductive technology through documentary, reading of books and learning from the experience of their neighbouring Senegalese farmers. A very few farmer who were beneficiaries of the F1 programme (crossbreeding of N’Dama cattle with Holstein Friesian and New Jersey) in 1999/2000 also narrated their experiences. The farmers realized that with AI, calving interval could be shortened and there is an added advantage of having calves at any time of the year. Also, wider dissemination of semen from a proven bull, twin-calf birth, access to genetically superior bulls are some of the benefits that will make AI beneficial to the farmers. However, the often required activities such as confinement of animals for oestrous synchronization and the difficulty which would be encountered in providing supplementary feed are the likely barriers. Other limiting factors include low success rate of insemination and lack of post-insemination supervision by the government officials.

Further thoughts beyond those limitations mentioned above, the farmers indicated a higher preference for the semen from genetically proven N’Dama bulls to the exotic breeds on the premise that exotic breed cannot tolerate the local climatic and veterinary conditions.

Impacts of Existing National Policies

The interviewed farmers indicated a good knowledge of the need to conserve their indigenous breeds of animals including the N’Dama breed of cattle. In this regard, their conservation practice often includes a good monitoring of their herds of cattle in order to prevent indiscriminate crossbreeding with other neighbouring breeds. Based on a general consensus, the farmers revealed that they were not aware of any Gambian national or agricultural policy which specifically addresses the issue of N’Dama cattle conservation. However, the farmers through the awareness of environmental policy always protect the forest zones by avoiding tree felling, bush burning or any other activity that could lead to destruction of the natural habitats where endemic animals are raised. Nevertheless, dissatisfaction was expressed by the farmers concerning unfairness in policy making process (for instance, side-lining of the farmers) and inadequate compensation for compliance to government initiatives like tax payment. The farmers expressed willingness to learn more about national agricultural policies of the Gambia and how it relates to conservation of animal genetic resources through mediums such as workshops, printed materials, radio programmes and local leaders.

**Conclusion**

Interestingly, the possibility of disseminating genetically improved N’dama bulls with AI in order to support sustainable use and conservation of the breed can be considered feasible given some stimulating factors such as educational campaigns, capacity building of extension agents, and availability of subsidy on insemination price. However from a theoretical point of view and specifically with respect to avoidance of an inbreeding depression, the small base population of N’Dama cattle at ITC station and in the Gambia as a whole are additional limiting factors to the use of AI. Furthermore, the existing technical capacity and infrastructural facilities at ITC are not enough to guarantee a successful application of AI.

As a first-hand option in solving the challenge of limited bulls that can be disseminated to the farmers for further breeding activities, it is recommended that the nucleus station herd should be increased. Also as an alternative to the phenotypic selection currently being used, a marker assisted selection (MAS) can be additionally evaluated and adopted. With the MAS, the bulls can be tested and selected at a relatively young age and therefore be ready for an onward dissemination to the eagerly waiting farmers.

The importance of a national policy for breeding and conservation of endemic animals like N’Dama cattle cannot be overemphasized. The effects of such policies can be about the protection of natural habitats where endemic animals are reared. To encourage a better compliance to policies, the farmers desired that more flexibility and their own involvement be considered in policy making process. Furthermore, the policies need to be clearly communicated to them through workshops and local leaders. The use of day-to-day activities and circumstances are also recommended in this perspective. Specifically for the Gambia, taking clues from the way through which the environmental policies in this country are presently implemented will be an effective step in ensuring an effective implementation of other closely related national policies.

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**Student Variables and Senior Secondary Students’ Achievement in Mathematics in Rivers State, Nigeria**

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***Abstract***

*This research study focused on the relationship between the student variable and their achievement in mathematics at the senior secondary school level in Rivers State, Nigeria. The ex-post facto research design was adopted for this study, since already conducted mathematics test scores of the students were retrieved and used for the analysis. Furthermore, data were elicited through the student variable and students’ achievement in mathematics questionnaire (SVAMQ). This questionnaire consisted of five sections and was administered to the students. A population of 10,120 students were involved in the study out of which 4510 were chosen for the sample using the Yarrow Yamen’s formula. The data were analyzed using the Z-test statistic, means and simple percentage. The findings were that to a high extent students’ attitude towards mathematics, their perceptions of the importance of mathematics and their self-concept influenced their achievement in mathematics. Based on these findings, recommendations were made.*

***Keywords****: Student variables, mathematics achievement, attitude, self-concept, perceptions*

**Introduction**

This research study focused on the student factor and students’ achievement in mathematics at the senior secondary school level of Rivers State, Nigeria. There is a widespread interest in improving the levels of mathematics achievement in schools. Apart from the economic benefits that it is argued this would bring, by better preparing young people for the numeracy demands of modern workplaces and raising the overall skill levels of the workplace, there are also social benefits tied to improving access for larger numbers of young people to post-school education and training opportunities and laying stronger foundations to skills for life-long learning.

This interest in raising levels of achievement has led to a focus on identifying the range of factors that shape achievement as well as understanding how these factors operate to limit and enhance the achievement of different groups of students. Such major factor to be considered in this study is the student factor. In our research context, the student factor means the attitude, perceptions and self-concept of the students towards mathematics as a subject in the senior secondary school.

However, the Third International Mathematics and Science Study (TIMSS) represents the most comprehensive international comparism of students’ achievement, yet recorded. The TIMSS assessment was conducted to study the effects of different factors on students’ achievement, including instructional activities, classroom environment, home background and possessions, students confidence in mathematics and science ability, and students’ attitudes towards mathematics and science. Kiamanesh (2005) observed that the preliminary investigations of the TIMSS data in Iran indicated that there is a positive relationship between students’ achievement in mathematics and science and home background variables such as parents level of education, number of books at home and possession of dictionary and study desk. Furthermore, the study showed that the science achievement score of Iranian students who benefited from high confidence in science ability was much higher than that of those who had medium or low confidence in science ability (Kiamanesh and Kherich, 2001).

Arguing further, Papanastasiou (2002) asserted that students’ attitude towards an academic subject is a crucial role not only in learning but in maintaining a continued interest in the subject. Stodalsky, Sack and Glasner (1991) had earlier mentioned that students develop ideas, feelings and attitudes about school subjects over time and from a variety of sources. They argued that positive attitude to school and education is a necessary component for high educational aspirations. Research evidence shows that if an important person encourages somebody to behave in a certain way, he or she will accept it. The influence of an important person is so strong that even the individual may change his or her attitude in agreement with that of the important person (Berkowitz, 1986). Does an aggregate of these views connote the fact that the student factor plays a centre-stage role in the achievement of students especially in mathematics? What is the problem of low achievement in mathematics at the senior secondary school level?

**The Problem**

Odubina (2001) posited that mathematics is the pivot around which the whole essence of living revolves and the basis for scientific and technological take-off. Yet, Ahiakwo (2006) found that the performance of various levels of students has decelerated over the years with that of Nigerian children quite remarkable. Furthermore, the chief Examiners Report of results of our public examinations (WAEC, 2001-2009) had shown markedly a decline in the percentage of passes in mathematics. There is a perceived risk that the percentage of failures in secondary schools and in universities is greater in scientific matters than in others. Earlier, Ibebuike (1986) noted that many students, even as far back as their primary school time, do not take interest in mathematics to a meaningful degree and this has led to a continuous general poor performance in the subject. Does that suggest a high or low likely relationship between the student factor and their achievement in mathematics at the senior secondary school II level in Rivers State, Nigeria?

**Theoretical Background**

The term student variable, in relation to this study is a concept demanding utmost attention. It includes students’ attitudes towards mathematics students’ perceptions of the importance of mathematics and students’ self-concept and achievement in mathematics. Psychologists define attitude as any strong belief or feeling or any approval or disapproval towards people and situations. We have favourable or unfavourable attitudes towards people, politics and academic subjects etc. We favour the things we think are good and helpful and oppose the things we think are bad and harmful (Kagan, 1984). The students’ attitude towards an academic subject is a crucial factor in learning and achievement in that subject. Whether a student views herself or himself as a strong or weak person in a specific subject may be an important factor in her or his academic achievement. Among the major findings of TIMSS 1999 was that students generally had positive attitudes towards mathematics and science, although less so in countries where science is taught as separate subjects at the eighth grade (Mullis et al, 2000).

Many studies have examined students’ thinking about school and their attitude towards mathematics (Vanayan, White and Tepper, 1977 cited in Papanastatiou, 2002). Instruction in school settings provides one important and regularly experienced context in which ideas and perceptions about subject matters as well as other cognitive and affective outcomes can be shaped.

The next concept in this framework is students’ perceptions of the importance of mathematics. By perceptions, we mean hard work, good luck and natural talent towards mathematics. Researchers recommend that students’ perceptions of themselves play an important role in their level of personal aspirations and in their self-expectations (Lynch, Campbell, 2001). Researchers (Frize, Francis and Hanus, 1983; Weiner, 1985) have shown that attributions influence students’ achievement and they often attribute their outcomes to variables like hard work, good luck and natural talent. Although students may attribute their failure or success to the afore-mentioned variables, the efforts that they make in order to learn science at school or do home work at home probably have an effect on their achievement.

Another concept involved in the student factor is the self-concept of the student. By self-concept, we mean what the student thinks mathematics is to him – whether mathematics is not one of his strength or thinks he would like mathematics if it were not difficult and his belief that mathematics is more difficult for him than for many of his classmates. Franken (1994) stated that there is a great deal of research which shows that self concept is perhaps the basis for all motivated behaviour. He argued that it is the self-concept that gives rise to possible selves, and it is possible selves that create the motivation for behaviour. Hamachek (1995) asserted that self-concept and school achievement are related. Research had shown a close relationship between academic self-concept and academic achievement (Russel-Bowie, Yeung and Mcleney, 1999). House (1993) had earlier observed that students; self-appraisals of their overall academic ability were significantly related to grade performance in their science courses. The major issue here is the direction of relationship i.e. does self-concept produce achievement or does achievement produce self-concept? However, Marsh (1988) found support for both self-concept affecting achievement and achievement affecting self-concept. Marsh (1990) further suggested that the effect of prior academic self-concept on subsequent achievement is likely to be substantial and it is interesting that findings may vary depending on how academic achievement is inferred. Many investigations recommend the improvement of a students’ academic self-concept as a basic educational outcome (Koutsouls and Campbell, 2001).

The next concept in this framework is students’ achievement in mathematics. The concept of achievement in mathematics denotes the performance in tests and examinations conducted by the mathematics teacher. However, the Third International Mathematics and Science Study (TIMSS, 2002) measured the achievement of students at different grade levels in various countries around the world. In conjunction with the achievement portion of the study, a video study of mathematics teachers in Germany, Japan and the United States of America was also conducted. Peterson (2005) found that by video taping many randomly selected eight grade teaching episodes in each of these countries, the researchers were able to capture and describe the type of teaching that typically took place in each of these countries.

Earlier empirical studies conducted included Fredman (1976) and Legette (1979). Fredman (1976), in his study on the relationship between self-concept and academic achievement used 190 fifth and sixth grade males enrolled within a white middle to upper middle class school district in Pennsylvania. Three research groups were formed consisting of 66 males classified as aggressive – disruptive, 53 males classified as withdrawn – inactive, and 71 males classified as appropriate within the classroom. The Piers-Harris self-concept scale and the Fredman-Willowdale school concept scale were administered. He observed that there was a significant and positive relationship between IQ and school self-concept (p.05), but the relationship between IQ and generalized self-concept was not significant.

Similarly, Legette (1979) in an earlier study tried to find out if self-concept influences achievement. She used 3734 students in the seventh, ninth and eleventh grades. She used the Pearson Product Moment Correlation Coefficient to compute the correlation between subjects’ self-concept score and their achievement and came out with the result that there is a relationship between self-concept and achievement.

In the same vein, studies like Tymns (2001) and Benlow (2002) have found that attitude of students towards mathematics has impacted student achievement. Basic theories of learning encapsulated in this study include David Ausubel and Robert Gagne. An examination of the above literatures revealed that students’ attitude, perceptions and self-concept had relationships with achievement in mathematics.

However, these studies were conducted in foreign lands quite alienated from the Nigerian environment. This study intends to find out to what extent student attitudes, perceptions and self-concept influence their achievement in mathematics with a special focus in Nigeria and Rivers State in particular. Hence, this study is poised to investigate empirically the student factor and achievement in mathematics with a view to filling the gap in literature and contribute to requisite knowledge.

**The Method**

The ex-post facto research design was adopted for this study because it seeks to investigate an existing phenomenon regarding students’ achievement in mathematics. The population of the study consisted of 10,120 senior secondary II students in Rivers State, Nigeria. However, the sample size of 4510 for the study was selected by using the Yarrow Yamen’s formula. The research instrument is the student factor and students’ achievement in mathematics questionnaire (STAMQ), divided into five sections. To elicit data from the respondents, the instrument was constructed using the following scale:

1. Very High Extent (VHE) = 4
2. High Extent (HE) = 3
3. Low Extent (LE) = 2
4. Very Low Extent (VLE) = 1

The respondents were free to indicate (√) in the column against each of the items as it applied to them. A decision cut off point of 2.50 was adopted. Any item or component in which the respondents have a mean score of 2.50 and above was regarded as “a high extent” while a mean score below 2.50 was regarded as a low extent.

Descriptive and inferential statistics were adopted for this study. In the descriptive statistics, means , variance (δ)2 and standard deviations (δ) were computed and tables constructed. Deductions made from results on these tables formed the answers to the research questions (1-3). To test the hypothesis (1-3), the Z-test statistic was applied to compare the means of the various variables and those of achievement in mathematics. The 0.05 level of significance was adopted with the degree of freedom as df = N1 + N2 – 2.

***Table 1:*** *Distribution of Population of 10,120 senior secondary II students in Rivers State, Nigeria*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S/N | Local Govt. Area | No. of Schools | Population of students (SS2) | Sample of students (SS2) |
| 1 | Abua/Odual | 11 | 440 | 209 |
| 2 | Ahoada-East | 12 | 480 | 218 |
| 3 | Ahoada-West | 13 | 520 | 226 |
| 4 | Akuku-Toru | 8 | 320 | 177 |
| 5 | Andoni | 10 | 400 | 200 |
| 6 | Asari-Toru | 8 | 320 | 177 |
| 7 | Bonny | 13 | 520 | 226 |
| 8 | Degema | 12 | 480 | 218 |
| 9 | Eleme | 6 | 240 | 150 |
| 10 | Emohua | 19 | 760 | 262 |
| 11 | Etche | 19 | 760 | 262 |
| 12 | Gokana | 12 | 480 | 218 |
| 13 | Ikwerre | 13 | 520 | 226 |
| 14 | Khana | 22 | 880 | 275 |
| 15 | Obio/Akpor | 16 | 640 | 246 |
| 16 | Ogu/Bolo | 3 | 120 | 92 |
| 17 | Okrika | 6 | 240 | 150 |
| 18 | Omuma | 3 | 120 | 92 |
| 19 | Ogb/Egbema/Ndoni | 15 | 600 | 240 |
| 20 | Opobo/Nkoro | 3 | 120 | 92 |
| 21 | Oyibgo | 4 | 160 | 114 |
| 22 | Port Harcourt | 15 | 600 | 240 |
| 23 | Tai | 10 | 400 | 200 |
|  | Total | 253 | 10,120 | 4,510 |

**Results and Discussion**

**Research Question 1:**

To what extent do students’ attitude towards mathematics relate to their achievement in mathematics?

***Table 2:*** *Analysis of the opinions of students on their attitude towards mathematics*

*and achievement in mathematics*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **Question Items** | **VHE**  **(4)** | **HE**  **(3)** | **LE**  **(2)** | **VLE**  **(1)** | **Total** | **Mean** | **Percentage rating (%)** |
| 1 | To what extent do you like studying mathematics? | 958  (3832) | 1184  (3552) | 1533  (3066) | 835  (835) | 4510  (11,285) | 2.50 | 62.56 |
| 2 | To what extent do you hate mathematics? | 992  (3968) | 755  (2265) | 1579  (3158) | 1184  (1184) | 4510  (10575) | 2.35 | 58.75 |
| 3 | To what extent do you think that mathematics is an easy subject? | 1049  (4196) | 970  (2910) | 1984  (3968) | 507  (507) | 4510  (1581) | 2.57 | 64.25 |
| 4 | To what extent do you think that mathematics is a difficult subject? | 1094  (4376) | 1049  (3147) | 1961  (3922) | 406  (406) | 4510  (11851) | 2.63 | 65.75 |
| 5 | To what extent do you think mathematics is important to every one’s life? | 970  (3880) | 1094  (3282) | 1872  (3744) | 574  (574) | 4510  (11480) | 2.55 | 63.75 |
| 6 | To what extent do you think mathematics is boring? | 767  (3068) | 902  (2706) | 2368  (4736) | 473  (473) | 4510  (10983) | 2.44 | 61.00 |
| 7 | To what extent do you feel uncomfortable during the mathematics class? | 925  (3700) | 1071  (3213) | 1804  (3608 | 710  (710) | 4510  (11231) | 2.49 | 62.25 |
| 8 | To what extent do you dislike mathematics because of the teacher? | 1105  (4420) | 1409  (4227) | 1003  (2006) | 993  (993) | 4510  (11646) | 2.58 | 64.50 |
| 9 | To what extent do you think mathematics is not necessary to life? | 846  (3384) | 902  (2706) | 1736  (3472) | 1026  (1026) | 4510\(10588) | 2.35 | 58.75 |
| 10 | To what extent do you dislike any subject with calculations and numbers? | 1049  (4196) | 1364  (4092) | 1691  (3382) | 406  (406) | 4510  (12,076) | 2.68 | 67.00 |
| 11 | To what extent do you fear mathematics? | 1217  (4868) | 1026  (3078) | 1578  (3156) | 689  (689) | 4510  (11791) | 2.61 | 65.20 |
| 12 | To what extent do you appreciate subjects with calculations and numbers? | 902  (3608) | 1015  (3045) | 1748  (3496) | 845  (845) | 4510  (10994) | 2.44 | 61.00 |
|  | **Group Mean Rating  =** | | | | | | **2.52** | **63.00** |

Table 2 above, revealed that the summary result of the total opinion of students on the relationship between students’ attitude and their achievement in mathematics was 2.52 indicating a percentage of 63.0. However, the decision rule says that the mean of the scale used is 2.50, making any score above 2.50 to show “a high extent” students attitude towards mathematics is related to their achievement in mathematics. It also indicates that any score below 2.50 means to “a low extent” student’s attitude towards mathematics is related to their achievement in mathematics. Therefore the score 2.52 above shows that to “a high extent” students’ attitude towards mathematics is related to their achievement in mathematics.

**Research Question 2**

To what extent do students’ perceptions of the importance of mathematics relate to their achievement in mathematics?

***Table 3:*** *Analysis of the opinions of students on the perceptions of the importance*

*of mathematics and achievement in mathematics.*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **Question Items** | **VHE**  **(4)** | **HE**  **(3)** | **LE**  **(2)** | **VLE**  **(1)** | **Total** | **Mean** | **Percentage rating (%)** |
| 1 | To what extent do you perceive mathematics is worth studying? | 973  (3892) | 1180  (3540) | 1540  (3080) | 813  (813) | 4510  (11,325) | 2.51 | 62.75 |
| 2 | To what extent do you perceive mathematics is not worth learning? | 850  (3400) | 680  (2040) | 1683  (2366) | 2297  (2297) | 4510  (10103) | 2.25 | 58.25 |
| 3 | To what extent do you perceive mathematics is an easy subject? | 830  (3320) | 660  (1980) | 1698  (3396) | 1322  (1322) | 4510  (10,018) | 2.22 | 55.50 |
| 4 | To what extent do you perceive mathematics is a difficult subject? | 1990  (4360) | 1053  (3159) | 1960  (3920) | 407  (407) | 4510  (10840) | 2.43 | 60.75 |
| 5 | To what extent do you perceive mathematics is important to everyday life? | 1098  (4392) | 1160  (3480) | 1420  (2840) | 432  (432) | 4510  (11144) | 2.47 | 61.75 |
| 6 | To what extent do you perceive that mathematics is boring? | 820  (3280) | 968  (2904) | 2360  (4720) | 362  (362) | 4510  (10266) | 2.27 | 56.92 |
| 7 | To what extent do you perceive discomfort during mathematics classes? | 826  (3204) | 934  (2802) | 1921  (3842) | 729  (729) | 4510  (10577) | 2.34 | 58.5 |
| 8 | To what extent do you perceive that mathematics is not to be liked because of the teacher? | 1100  (4400) | 1400  (4200) | 1017  (2034) | 993  (993) | 4510  (10634) | 2.35 | 58.75 |
| 9 | To what extent do you perceive that mathematics is not necessary to life? | 760  (3040) | 810  (2130) | 1260  (2520) | 1680  (1680) | 4510  (9670) | 2.14 | 53.50 |
| 10 | To what extent do you perceive that any subject with calculations and numbers should be disliked? | 1068  (4272) | 1343  (4029) | 1703  (3406) | 396  (396) | 4510  (12103) | 2.68 | 67.00 |
| 11 | To what extent do you perceive that mathematics is to be feared? | 1208  (4832) | 1120  (3360) | 1563  (3126) | 619  (619) | 4510  (11937) | 2.64 | 66.00 |
| 12 | To what extent do you perceive that subjects with calculations and numbers should be appreciated? | 960  (3840) | 1042  (3126) | 1801  (3602) | 707  (707) | 4510  (11275) | 2.50 | 62.50 |
|  | **Group Mean Rating  =** | | | | | | **2.40** | **60.00** |

Table 3 above, revealed that the summary result of the total opinion of students on the relationship between students’ perceptions of the importance of mathematics and their achievement in mathematics was 2.40 indicating a percentage of 60.00. However, the decision rule says that the mean of the scale used is 2.50, making any score above 2.50 to show “a high extent” students’ perceptions of the importance of mathematics is related to their achievement in mathematics. It also indicates that any score below 2.50 means to “a low extent” student’s perceptions of the importance of mathematics is related to their achievement in mathematics. Therefore, the score 2.40 above shows that to “a low extent” students’ perceptions of the importance of mathematics is related to their achievement in mathematics.

**Research Question 3**

To what extent do students’ self-concept relate to their achievement in mathematics?

***Table 4:*** *Analysis of the opinion of students on their self-concept and achievement in mathematics*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **Question Items** | **VHE**  **(4)** | **HE**  **(3)** | **LE**  **(2)** | **VLE**  **(1)** | **Total** | **Mean** | **Percentage rating (%)** |
| 1 | To what extent do you think you are talented in mathematics? | 395  (1580) | 620  (1860) | 2650  (5300) | 845  (845) | 4510  (9585) | 2.13 | 53.25 |
| 2 | To what extent do you think mathematics is more difficult for you than your classmates? | 958  ((3832) | 1409  (4227) | 1623  (3246) | 520  (520) | 4510  (11825) | 2.62 | 65.50 |
| 3 | To what extent do you think mathematics is not one of your strength? | 1039  (4148) | 958  (2874) | 1860  (3720) | 655  (655) | 4510  (11397) | 2.53 | 63.25 |
| 4 | To what extent do you think you would love mathematics if it were not difficult? | 1184  (4736) | 1432  (4296) | 1669  3338) | 225  (225) | 4510  (12595) | 2.79 | 69.75 |
| 5 | To what extent do you think mathematics is for science students? | 1015  4060) | 1071  (3213) | 1714  (3428) | 710  (710) | 4510  (1141) | 2.53 | 63.25 |
| 6 | To what extent do you think no body likes mathematics in your family? | 823  (3292) | 868  (2604) | 1691  (3382) | 128  (1128) | 4510  (10406) | 2.31 | 57.75 |
| 7 | To what extent do you think you have passed mathematics examinations? | 980  (3920) | 936  (2808) | 1691  (3382) | 902  (902) | 4510  (11012) | 2.44 | 61.00 |
| 8 | To what extent does your set of beliefs encourage you to study mathematics? | 958  (3832) | 1364  (4092) | 1691  (3382) | 497  (497) | 4510  (11803) | 2.62 | 65.50 |
| 9 | To what extent do your feelings about mathematics encourage you to study mathematics? | 969  (3876) | 1049  (3147) | 1748  (3496) | 744  (744) | 4510  (11203) | 2.50 | 62.50 |
| 10 | to what extent do your ego and strength encourage you to study mathematics? | 733  (2932) | 1409  (4227) | (2932) | 902  (902) | 4510  (12561) | 2.79 | 69.75 |
| 11 | To what extent does your self appraisal overall academic ability influence your achievement in mathematics? | 1128  (4512) | 1488  (4464) | 1691  (3382) | 203  (203) | 4510  (12561) | 2.79 | 69.75 |
| 12 | To what extent does your high confidence in mathematics influence your achievement in mathematics? | 1015  (4060) | 1082  (3246) | 1635  (32270) | 778  (778) | 4510  (11354) | 2.52 | 63.00 |
|  | **Group Mean Rating  =** | | | | | | **2.52** | **63.00** |

Table 4 revealed that the summary result of the total opinion of students on the relationship between self-concept and achievement in mathematics was 2.52 indicating a percentage of 63.00. Furthermore, the decision rule says that the mean of the scale used is 2.50, making any score above 2.50 to show “a high extent” students’ self-concept is related to their achievement in mathematics. It also indicates that any score below 2.50 means to “a low extent” students’ self-concept towards mathematics is related to their achievement in mathematics. Therefore, the score above showed that to “a high extent” students’ self-concept towards mathematics is related to their achievement in mathematics.

**Hypothesis Testing**

**Hypothesis 1**

Ho1: There is no significant relationship between students’ attitude towards mathematics and their achievement in mathematics.

***Table 5:*** *Z-ratio test of significant relationship between students’ attitude towards mathematics*

*and their achievement in mathematics.*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** |  | **sd** | **N** | **df** | **P** | **S. Error** | **Z-cat** | **Z-crit** | **Decision** |
| Students’ attitude | 62.83 | 3.43 | 4510 | 9,018 | 0.05 | 0.051 | 38.17 | Z>1.96  or  Z<-1.96 | Reject Ho1 |
| Students’ achievement in mathematics | 54.09 | 14.79 | 4510 | 0.228 |

The result on table 5 showed that the calculated value of Z is 38.17, which is greater than the critical value of 1.96 at the degree of freedom 9,018 at the 0.05 level of significance. Since the calculated Z-value is greater than the critical value, the null hypothesis that there is no significant relationship between students’ attitude towards mathematics and their achievement in mathematics is rejected. Hence, there is a significant relationship between students’ attitude towards mathematics and their achievement in mathematics

**Hypothesis 2**

Ho2: There is no significant relationship between students’ perceptions of the importance of mathematics and their achievement in mathematics.

***Table 6 :*** *Z-ratio test of significant relationship between students’ perceptions of the importance*

*of mathematics and their achievement in mathematics.*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** |  | **sd** | **N** | **df** | **P** | **S. Error** | **Z-cat** | **Z-crit** | **Decision** |
| Students’ perceptions | 60.00 | 3.21 | 4510 | 9,018 | 0.05 | 0.048 | 25.60 | Z>1.96  or  Z<-1.96 | Reject Ho2 |
| Students’ achievement in mathematics | 54.09 | 14.79 | 4510 | 0.228 |

The result on table 6 showed that the calculated value of Z is 25.60 which is greater than the critical value of 1.96 at the degree of freedom 9,018 at the 0.05 level of significance. Since the calculated Z-value is greater than the critical value, the null hypothesis that there is no significant relationship between students’ perceptions of the importance of mathematics and their achievement in mathematics is rejected. Hence, there is a significant relationship between students’ perceptions of the importance of mathematics and their achievement in mathematics

**Hypothesis 3**

Ho3: There is no significant relationship between students’ self-concept and their achievement in mathematics.

***Table 7 :*** *Z-ratio test of significant relationship between students’ self-concept*

*and their achievement in mathematics.*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** |  | **sd** | **N** | **df** | **P** | **S. Error** | **Z-cat** | **Z-crit** | **Decision** |
| Students’ self-concept | 62.83 | 4.93 | 4510 | 9,018 | 0.05 | 0.073 | 38.16 | Z>1.96  or  Z<-1.96 | Reject Ho3 |
| Students’ achievement in mathematics | 54.09 | 14.79 | 4510 | 0.228 |

The result on table 7 showed that the calculated value Z is 38.16 which is greater than the critical value of 1.96 at the degree of freedom 9,018 at the 0.05 level of significance. Since the calculated Z-value is greater than the critical value of 1.96, the null hypothesis that there is no significant relationship between students’ self-concept and their achievement in mathematics is rejected. Hence, there is a significant relationship between students’ self-concept and their achievement in mathematics.

**Conclusion**

From the analyses of data and the discussion of findings, the following conclusions were made:

1. There is a significant relationship between students’ attitude towards mathematics and their achievement in mathematics at the senior secondary II level in Rivers State, Nigeria
2. There is a significant relationship between student’ perceptions of the importance of mathematics and their achievement in mathematics at the senior secondary II level in Rivers State, Nigeria
3. There is a significant relationship between students’ self-concept and their achievement in mathematics at the senior secondary II level in Rivers State, Nigeria.

**Recommendations**

Considering the findings and discussions of this study, the following recommendations were made:

1. In order to eliminate or minimize poor performance in mathematics at public examinations, the researcher recommended that students should be made to attend seminars and workshops on attitudinal change towards mathematics.
2. That the search light of blame on poor performance in mathematics should be re-focused on areas such as students’ perceptions of the importance of mathematics, even at the primary school level
3. The prolonged students’ self-concept on mathematics which are negative could be eliminated by guidance and counseling tutors at school
4. That the pedagogical training given to teachers of mathematics at the secondary school level should be re-emphasized before mathematics teachers are employed to teach.
5. Since, the problem of this study was the poor performance of students in mathematics at the senior secondary school level in Rivers State, parents should not blame governments, teachers of mathematics and WAEC alone, but look inside at home by helping students adjust the negative concepts and perceptions towards mathematics as a subject.

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