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FOSTERING AN ALTERNATIVE AND MANUAL SKILLS IN INFORMATION AND COMMUNICATIO TECHNOLOGY (ICT) VIA MATHEMATICS CURRICULUM

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Abstract

The paper was trying to examine alternative and manual skills which Mathematics as a core subject could give the stakeholders in view of the inaccessible gadgets of the Information and Communication Technology (ICT) in the 21st century. It examined some topics in the secondary school mathematics curriculum that have gone into extinction by different public examination bodies, and which they could have been used to sustain the tempo of ICT in the education set-up. Study made use of three research questions on some of the identified topics to enhance students' knowledge of ICT, and solicited for the cognizance of these topics to enhance ICT knowledge among the stakeholders due to the nature of ICT gadgets that might not be at the disposal of the current teeming population and the prevailing economic situation of the environment of the learners at present.

Introduction

The acronym ICT means Information and Communication Technology which has turned entire world into small community where easy flow of information is feasible without stress provided the available gadget to sustain the system is available. According to Gusen and Olarinoye (2006) Information and Communication Technology is the combination of computer and telecommunication system. It is a communicative, interactive, delivery mechanism and a powerful educational system, recognized globally as the bedrock for national survival and development in a rapidly changing global environment. Going by this analysis ICT plays a crucial role in providing succour to different education problems which could surface in form of political, economical, cultural suitability, and magnitude of change in institutions of learning. It is characterized by its high speed, accuracy, storage facilities, cost effectiveness, absence of monotony, efficiency, user-friendly, conveniences and problem-solving. However, these efficiencies are often constrained by different factors especially in a developing country like Nigeria which in most cases experiences electrical power outage to sustain the system, unfriendly climatic situation, training facilities and work habits (attitudes) just to mention a few. On the other hand, it should be understood that technology itself is an offshoot of science which express thing in universal, practical and acceptable norm. According to Abidemi (2008), it could be manual which makes use of hand and hand-tools or mechanized which makes use of the machines in the evolution of things for human consumption as the case of computer system in the Information and Communication Technology. Apart from that science on the other hand is a language of technology with mathematics as its tool of understanding. This implies that the sustenance of science and technology in which Information and Communication Technology belong to depends largely on the comprehensive knowledge of mathematics to keep the tempo of its understanding, and that is why the subject is made one of the core subjects for the students to pass at least up to the secondary school levels and as prerequisite to some courses at the higher institution of learning. Infact the subject was structured to encompass various topics to advance students' knowledge towards solving their immediate environmental problems as well as knowing fully what transpired in other environment other than theirs. Some of the topics referred-to include bearings, equivalence relation, longitude and latitude just to mention few in information. In the communication it is disheartened to observe the extinction of set theory and equivalence relation, while constructions and loci for the improvement of technology have disappeared, particularly when one observed the question pattern of the public examination bodies in the 80s relatively to the present set-up. This among others have been source of concern to full integration of Information and Communication Technology(ICT) in its manual stage as compared to the mechanized one which has been constrained by the identified factors earlier raised, and comparatively to the nation status of developing one. Meanwhile, this study tries to examine various ways by which some topics in mathematics could be used to advance students' knowledge in the ICT at best manually ahead of leaving the threshold of constraints of the mechanized one for now.

Statement of the problem

The study examined the alternative knowledge acquisition and application of Information and Communication Technology (ICT) in some extinct mathematics topics at the secondary school level. Specifically, it took cognizance of the role of the manual technology which these topics could lend to students' knowledge of ICT in view of the prevailing constraints of modern technology for which global ICT resides, and provides alternative skills for the understanding of the cardinal points of ICT as Information, Communication and Technology respectively.

Research Questions

RQ_1: In what manner could longitude and latitude in mathematics be used to improve students' knowledge of Information in ICT?

RQ_2: In what capacity could set theory and equivalence relation in mathematics be used to improve students' knowledge of Communication in ICT?

RQ_3: In what direction could construction and loci in mathematics be used to enhance students' knowledge of Technology in ICT?

Methodology

Research Design

As a positioned paper which tried to examine the alternative knowledge acquisition and application of Information and Communication Technology (ICT) in some extinct mathematics topics at the secondary school level a descriptive research design was chosen.

Population

The population to the study included all the stakeholders of the nation education system that inclined to be ICT compliance but constrained by the inaccessible modern ICT gadgets, at present, to practice the modern technology know-how.

RQ_1: In what manner could longitude and latitude in mathematics be used to improve students' knowledge of Information in ICT?

(1) Longitude and latitude in mathematics as Information in ICT

The above-stated topic in Mathematics was most conspicuous especially in the 80s in the set-up of the public examination at the ordinary level to an extent that its full understanding was a passport, at least, to success in the mathematics examination. Apart from that the topic was very vital to an extent that it enriches students' knowledge of timeframe between ones country or the other, though its aspect is also domicile in Geography which is not a core subject like Mathematics at the secondary school level. For instance, the knowledge of Longitude and latitude makes students to appreciate the clear shape of the entire universe as not in absolute circle rather it is spherical. This is information!

Similarly, the topic provides students or stakeholders the information of time difference between one environment and the other that lies on the globe as 8.00am in Nigeria cannot be the same 8.00am in the United State of America, simultaneously. What makes students not to realize the information posture of this topic in mathematics is partly due to its teaching to pass examination from the mathematics teachers without adequate practicability, and to the extinction of the topic in the public examination that could gear students to go extra mile to understand it. Even if one wants to be ICT compliance one needs to be integrated on the information of those who started the global ICT via proper information of their environment, and not just total importation of technology that one lacks information of the terrain in which it works. According to Gusen and Olarinoye (2006), ICT started in Britain Education in the 70s with several committees(Fullan and Elliot), establishment of agencies and massive in-service training among others, its impact was not felt in Nigerian Educational System until 2001 as exemplified in the mission and vision statements, and strategies. The focus could be regarded as truncated when one looks at the total importation of the technology at the detriment which each school subject like mathematics could offer. The other way by which this topic provides information to the stakeholders is the time-degree consciousness on the globe which stipulates every 4 minutes to be 1^0 degree on the globe as 360^0 makes a revolution and 24 hours make one day. The knowledge acquisition provides by the topic is very crucial information to the students and it could assist to understand more of the nature and scope of the modern ICT as one needs information ahead of understanding the nitty-gritty of the circumstances under which certain gadgets are used if at all no constraint poses stumbling block. Furthermore, the knowledge of space exploration though theoretically resides in Geography at the secondary level yet its computation and knowledge where exact and certain country lies on the globe as information could be best illustrated to the students through the concept of Latitude, an aspect of the entire topic of Longitude and latitude in mathematics. What else information could be strange to

students if this is properly harnessed? This is a rhetorical question to this great audience as could be observed in a practical example of the topic below:

Example:

Made and used British computer at 7.00pm was imported to Nigeria for internet browsing but with inscription that maximum efficiency is guaranteed in the morning time at any other place of use other than Britain which is diametrically opposite on equator with longitude of 180^0 and differ in time by 6hours to Nigeria. At what exact time should this computer be put into use in Nigeria where power is not predictable for the day to ensure maximum efficiency as stated?

Solution:

One observes that information has been provided on the use of the computer with maximum efficiency at the disposal of customer in Nigeria to follow timeframe use.

Since the computer works at 7.00pm in Britain which differs from Nigeria by 180^0, now time for 1^0 longitude is 6x60/180 = 2minutes

This implies that customer in Nigeria could ensure maximum efficiency of the system by observing 2 minutes before or after the use in Britain and still maintain efficiency. Meanwhile, a Nigerian could use the system at 2 minutes before or after 1.00am daily and ensure maximum efficiency. This is practical information to enhance ICT, and the knowledge is found in the topic 'Longitude and latitude' in mathematics. Using this practical example by the mathematics teacher instead of teaching to pass only and coupled with the non-extinction of the topic on the other hand provides enabling information towards skill acquisition and application to modern ICT.

RQ$_2$: In what capacity could set theory and equivalence relation in mathematics be used to improve students' knowledge of Communication in ICT?

(2) Set theory and equivalence relation in mathematics as Communication in ICT

The role language in the communication cannot be overemphasized as it gives the direction to which the action takes place. While science itself is a language which could be demystified through mathematics which in turn makes use of diverse symbols and equations to solve everyday problem in compliance with the contemporary development that ICT emphasized, set theory and equivalence relation as topics provide communicative skills for the learners in terms of relationship or otherwise. In most the classroom teaching of set theory, specifically sub-topics much emphasize is placed on the use parameters at the detriment of real-life situation to acquaint students with communicative skills. For example in the analysis of concept of intersection and union of two sets that are often display through Venn diagram reflect a communicative skills that enhanced the basic tenet of communication being emphasized in the ICT if properly harnessed by the mathematics teachers. The under-mentioned example would show the direction of thought of the study.

Example: Display through Venn diagram the intersection and union of two sets two sets A = {1,2,3,4} and B = {3}.

It is obvious the question is letters and numbers but to demonstrate the communicative skill to the learners each set should be taken as a whole entity that comprises of different attribute like saying set A is man with eyes, nose, tribal mark and ear while set B is a woman with the same tribal mark as found in A.

With the aid of Venn diagram the intersection of A and B is as shown below, and it refers to the common features of the two entities, represented by A ∩ B = {3}

Venn Diagram
$A \cap B$
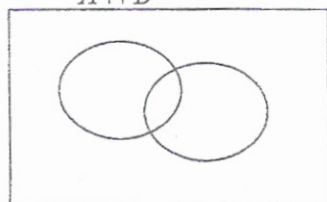
On the other hand the Venn diagram of all the attributes which the concept of union emphasized display the list of all the attributes in the two entities, and it is denoted by A U B = {1,2,3,4} and represented on Venn diagram as

A U B
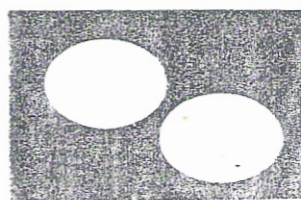
In the concept of equivalence relation as it displays communicative skills to the learners, one needs to understand that relation is equivalence if it satisfies reflective, symmetric and transitive. These are communications in the topic as it will be examined in this manner. For whenever a new baby is born his name as at the point of birth is 'Baby' but later he is given a definite name, say John. As he grows up to understand things around him he is cautioned in most cases by calling John! That name and he has reflective attributes and used simultaneously to communicate him, and yet not full equivalence in terms of external attributes other than his personal name.

Assuming John has a sister, either younger or older called Mary, then communication could be that John is a younger or elder brother to Mary as situation applies, and so the relation is said to be symmetric, since John's attribute could be found Mary through common domain of the same parent. This relation is also applicable to Mary, but not yet equivalent relation unless the third condition is fulfilled, and this is also communication in real sense of it.

In a situation where Mary has another younger brother called James, one could establish a communicative skill among the trio by saying John is brother to Mary who is a sister to James who is thereafter a younger brother to John in the family which describe the entire communication as equivalence relation. So, as soon as any these children are found good or bad there is communicative precedence to attest to their equivalence as relation. When this communication is well structured for the learners to understand and apply to manual ICT that lay foundation to global ICT could be appreciated, instead of virtual algebraic explanation in the classroom.

RQ$_3$: In what direction could construction and loci in mathematics be used to enhance students' knowledge of Technology in ICT?

(3) 'Construction and loci' in mathematics as Technology in ICT

In modern world technology occupies the higher position and this is feasible through the level science in which mathematics is the language. Construction in mathematics play dual role to the learners in the sense that it helps to develop the psychomotor of learners on on hand and prepare for the society the like mind of engineers to advance the course c technology. The most dishearten aspect of thi topic is the neglect of the topic in the recer public examination that could spur th stakeholders to put adequate consideration in it teaching and learning. The worst is the tota omission of the advanced aspect of the topi called 'loci' that most mathematics teacher tend to run away from either due to inadequat knowledge of it or otherwise, but they do nc realize the multiplier effect on the natio: technology. The moment learners understan the principle of construction and loci i mathematics such learners are bound to develo his psychomotor adequately, and at the sam time increases the crops of engineers i different areas to advance technology.

Example:
Construct triangle ABC with side AB=10cm angles CAB=45^0 and ABC=75^0, and henc determine the:
(i) Angle ACB, (ii) locus(l$_1$) of a poin equidistant from points A and B, (iii) locus (l$_2$ of a point equidistant from lines AB and BC (iv) locus (l$_3$) of a point equidistant from poin A,B and C, (v) magnitudes P$_1$P$_2$, P$_2$P$_3$, and P$_1$P if the points of intersections of (l$_1$ and l$_2$), (l and l$_3$) and (l$_1$and l$_3$) are P$_1$, P$_2$ and P respectively,(vi) the radii which locus(l$_3$ formed from P$_1$, P$_2$ and P$_3$ respectively.

When this type of question is raised in the mathematics classroom it is expected that the objectives to be drawn include the developmen of psychomotor domain but real practical aspec of it is to enable the students turn thi construction to real life situation. This is mos lacking in the course of teaching the topic fo two reasons. It is either the mathematic teachers do not understand the basic principle o 'loci', on one hand or that fostering the manua technology that could aid the global ICT is no understood by the stakeholders concerned. Mos of the Mathematics teachers do tailored the solution to providing cognitive aspect at the detriment of psychomotor that enhanced the technology itself. Although the solution to the question is as presented in figure 1 below yet i has not provided a meaningful solution until i adaptable to solve the problem of the society fo which the Technology is known for.

Figure 1

Figure 1

[C] ∠ACB = 60°
[N] |P₁P₂| = 5·4cm,
|P₂P₃| = 4·5 cm, |P₁P₃| = 4·9 cm

[M] r₁ = 0·9 cm
r₂ = 5·8cm
r₃ = 5·9 cm

Conclusion

It should be emphasized that school is established in order to solve the problem for the society, but nowadays it seem as if the school itself continues to create more problem for the larger society by not teaching the stakeholders the manual technology that each school subject is expected to deliver. The developed nations worldwide looked inward to invent the contemporary technology, and build into their school curriculum but in terms of the developing nation like Nigeria the global ICT which could have been a blessed innovation has considerably been constrained by the economics(purchase and maintenance of computers, training and educational value of personnel, and non-availability of ready-to-use computer programmes), physical(electrical powers, climatic conditions and training facilities, gender role among others), and hence the need to foster an alternative and manual skills in Information and Communication Technology (ICT) via Mathematics Curriculum so that nation will not be stagnated till the next century when others might have gone beyond the matching point.

Recommendations

There is no doubt that ICT is very important in the contemporary society because lack of it put the nation education is at a cross road. Meanwhile, ICT is feasible only if the major constraints identified are adequately rectified or better still not to be cut out of the global ICT development there is a need to look inward to what the school subject like Mathematics could offer the society, and apply them accordingly. The era of the school not taking cognizance of its proper functions should be adequately addressed so that the society's problem will be adequately be given the right solution and not create a multiplier effect of the problem created any longer.

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