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Teaching of STEM Subjects in Africa: Perspectives of Gender, Difficult Topics, School Ownership and Recommendation of CTCA

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ABSTRACT

The new senior secondary computer studies curriculum for multilingual West African schools came into use in 2015. Since the beginning of its application, there have been few reported studies on the difficulty level of the content as perceived by students, gender equity, and school ownership. The study had two main purposes–to find out (a) the topics in the new computer studies curriculum that secondary school students perceive to be difficult; (b) if gender, and school ownership impact students' perception of the difficulty of the computer studies topics. Participants were 1,501 computer studies students from nine public and 12 private senior secondary schools in Nigeria and Ghana. About 51% of the respondents were females. Three-quarters of the schools are in urban areas, the rest are in rural locations. Rich qualitative data on the sources of difficulty (unique for this study) are reported. Slight gender differences and marked rural/urban differences were found. Recommendations were made for improving the teaching and learning of computer studies in African schools with the use of Culturo-Techno-Contextual Approach (CTCA).

Keywords: *Computer Studies, Gender, Teaching, Topic Difficulty, School Ownership*

1.0 INTRODUCTION

All across the world, girls and women are still much more likely to never get into a classroom than men and boys despite all efforts and the tremendous progress that was made over the past few decades. Gender inequality in education is still a key issue so let's take a closer look. To support countries in their efforts to fulfil and live up to their promise that by 2030 they will have closed the gender gap, the UNESCO Institute for Statistics (UIS) is disaggregating all sex-related indicators to the highest possible extent (Sugimoto, et al., 2019).

Since the advent of information communication technology to the national secondary school curriculum in 1987, the subject is still limited to some secondary schools in Nigeria. Though some private schools have introduced computer studies into their school system, the number of schools that offered ICT cannot be compared to the number of students in the school because some considered the subject to be irrelevant which results in negative attitude towards the subject, some student consider to be topics to be difficult and no study has been carried out to delve into concepts that learners consider to be difficult in ICT. Examination conducted from the inception of West Africa Examination Council till 2014 statistics showed there was no enrolment for computer studies in Nigeria. An analysis obtained from a state in Nigeria WAEC results, computer studies as a subject was qualified for analysis in 2016 with about 3000 number of candidates.

From previous study, an obstacle to the low performance of students in secondary schools in Nigeria has been a great debate in the issues of education and which causes has been narrowed into several views by researchers as poor study habit of students

Ayodele 2013, School environment Adesoji 2008, teachers competencies Akiri 2009, parents economic status Osonwa 2013 and educational funding Ugwulashi 2012 without considering the perceived difficulty in the concepts of computer studies been taught in secondary school. The significance for ICT education literacy has made it imperative that increased attention be given to the study of computer/ICT education at all level of education especially in secondary schools in Africa. Many schools lack standardized computer laboratory and instructional materials required for learning of computer studies and majority of those that has these facilities are not fully utilized.

The application of the knowledge of information communication technology is important in all fields of science. It teaches students graphical design, problem solving and logical reasoning skills which are valuable to their career beyond the classroom. Further, information communication technology will arouse student's interest in technology helping them become technology innovators, build skills and also enable them to design technical solutions to problems in science, mathematics and other subjects. It is increasingly recognised by researchers, governments and educators around the world that ICT presents many opportunities for teaching and learning in education. The inadequacy of ICT facilities in the classroom is disadvantageous for students because without access to this, they are deprived of opportunities to acquire some of the digital skills and attributes they need to overcome the digital divide and become full participants in an increasingly ICT mediated globalised world (UNESCO, 2008).

In most secondary schools' students are not being taught computer like they take other science subject which they considered important, it is not compulsory for some students why few that offered it only have computer studies lesson once in a week and they are also shortage of computer teachers. Students find some concepts in computer difficult and boring sometimes due to lack of practical and misunderstanding of some concepts. Information communications technology (ICT) is a transformational tool that stresses the role of unified communications and the integration of telecommunications, computers, middleware and also software, storage and audio-visual systems, which makes users to create, access, store, transmit, and manipulate information. Information and Communication Technology (ICT) in education is the mode of education that use information and communications technology to support, enhance, and optimise the delivery of information. Worldwide research has shown that ICT can lead to an improved student learning and better teaching methods. The influence of ICT in the world has affected the education sector. ICT has also impacted the effectiveness of teaching-learning process and research in the institutions across the globe.

However, one of the reasons why computer studies/ICT teachers are in short supply is that when teachers with computer/ICT qualification are employed, they prefer to teach mathematics and other subjects rather than computer/ICT subject. Most of these computer teachers have been exposed only to the theoretical aspect of their program with little or no attention was paid to the practical aspect of their program during their years of training (Aghadino, 2014).

This study helps to identify the difficult concepts in computer studies and also reasons for the difficulty: The consistent poor achievement of African senior secondary school students in computer studies has been of concern to the stakeholders, computer teachers, curriculum planners and government. This low registration and lack of interests of students well as low achievement in computer examinations can be traced students' difficulty in task demanding scientific explanation in some topics perceived to be difficult in computer studies during examinations.

With the above mentioned this world of ICT in Africa will likely collapse, therefore we must do the needful to ensure failures are totally eradicated in the computer science education/ICT for maximum benefits to the continent of Africa and the world at large. One primary goal of education is the promotion of meaning learning. There are numerous blocks

to the attainment of these objectives. One of such barriers is the manner of delivery of the curriculum. Any effort to improve how the curriculum is delivered is a welcome addition to improving the quality of education (Okebukola, 2019). It is on this basis that the researcher deems it necessary to conduct a study on the topic's students perceived to be difficult in computer students and the reason for the difficulties. Computer studies/ Information communication technology for the purpose of this study the two terms are considered to mean the same thing as it was introduced into the curriculum as computer studies before it was changed to information communication technology.

1.1 What is Perception of Difficulties?

Perception has to do with a way a man is been able to process output received and express their thought and actions towards it. Perception is awareness of the elements of environment through physical sensation color perception. Thus, perception is not just what one sees with the eyes it is a much more complex process by which an individual selectively take in the stimuli in his context, cognitively organises the input information in a specific design and then bring out the information to make an assessment about what is going on in one's context. Perception is a subjective procedure; therefore, different individuals may perceive the same location a power to see what is not evident to the average mind," perception implies quick and often sympathetic discernment (as of shades of feeling (Gbeleyi, 2019).

One of the enduring findings in the science education literature is the strong link between students' performance and the ecocultural context of delivering science (Aparicio, Bacao, & Oliveira,2016; Banner, 2016; Okebukola and Jegede, 1990; Sugimoto, M., & Swain, 2016). Cultural context is a panoply of vistas, broad ranging from sociological (Jacobs & Hanrahan, 2016), political (Scheitle, 2018), ethnic (Fiske, 2017; Lips, 2016; Roth 2019), religious (Radhakrishnan, 2019; Thomas, 2016) to gender (Cobert, 2016; Parsons, Bulls, Freeman, Butler, & Atwater, 2018) and several other individual and group-denominated characteristics. In Africa, as early as the 1840s when European missionaries included nature study in the curriculum of schools, the goal was to teach science to pupils from largely Eurocentric contexts. Examples of flora and fauna, though available within the precinct of the village classroom were of species in the colonising country. For pupils in the hot tropics, it was a world of imagination of the polar bear and the fir of the tundra. Meaningful learning was impeded, love for science was not kindled, the ranks of future scientists thinned, and the girls had a dim enthusiasm for science. This was over a century-and-half ago. What has changed?

Since most colonised African countries wrestled independence in the early 1960s, efforts of the nationalists steered in the direction of making the teaching of science more culturally relevant. The milestones in these efforts included revision of science policies, curriculum reform, new models of science teacher education and better resourcing of schools. In anglophone Africa, from the 1960s to the 1990s, government and the missionaries were the key actors on the stage of science education. In francophone Africa, French influence lasted longer and it is still strong till today. The missionaries provided a mix of education which had religion and secular subjects, including science in the curriculum. In government schools, subjects offered were essentially to provide some of literacy not beyond the level of producing clerks and administrative assistants. After independence and with greater national control, both missionary and government schools were strengthened to produce secondary and postsecondary education of respectable quality (Okebukola, 2020). While science was given visibility in this arrangement, teaching within the cultural context of learners remained compromised. The situation has only marginally changed even in the second decade of the 21st century.

It is helpful at this stage to make a distinction between rote and meaningful learning since these are central to topic difficulty. Rote learning is shallow learning

which is based on memorisation (cramming) and repetition with little or no effort to integrate new knowledge with existing concepts in the cognitive structure (Grove & Bretz, 2012). What is learned under rote is easily forgotten and hardly applied to new situations. Meaningful learning on the other hand is not based on memorisation and repetition but on linking prior knowledge with new, incoming information. What is learned is long lasting and can be easily applied to new situations. There is a deliberate effort to link new knowledge with higher order concepts in the cognitive structure. In the extensive study entitled "Attaining meaning learning of ecology and genetics through the concept mapping heuristic" Okebukola (1990) confirmed that meaningful learning involves understanding how all the pieces of an entire concept fit together. The knowledge gained through meaningful learning can be applied to new learning situations. This type of learning stays with students for a long time (for life). Meaningful learning is active, constructive, and most importantly, it allows students to be fully engaged in the learning process. The spectrum of easiness to difficult falls along the rote learning and meaningful learning polar axes.

1.2 The New Computer Studies Curriculum

We selected the computer studies curriculum for study for several reasons. Globally computers are used every day and everywhere because it has help to solve problems in our day-to-day activities, and has become a standard for so many professions and it has relevance in all professions ranging from education, medicine, banking and finance among others. In reality, the academic session in the Higher Learning Institution continued with the new norm and online learning has been implemented to ensure smooth process of teaching and learning and the subject to accomplished this is computer studies in the post-secondary level (Musa & Kamis 2021).

Recent research has shown that 90% of job opportunities require basic computer skills such as data processing and good use of the Microsoft office suite. As we evolve and technology keeps improving hence to make our work easier and fit into the workforce there's a need for computer education in all schools. The major areas considered in the entire syllabus include: Computer fundamentals and evolution; Computer hardware; Computer Software; Basic Computer Operations; Computer Applications; Machine Language; Logic gates; Binary Number; Managing Computer files; Developing Problem-solving skills; Information and Communication Technology; and Computer ethics and human issues.

The objectives of the syllabus are to test candidates' understanding, knowledge and acquisition of basic concepts of computer and its operations; manipulative, computational and problem-solving skills; application of software packages; operation of computer – related simple devices; on-line skills and their applications; safe attitudes and good practices on effective use of computer; potential for higher studies in computer related areas.

For most of the countries, there are sub-regional examination bodies which provide syllabuses for the subjects and to which schools draw their curriculum. There is also a national curriculum which draws largely from the provisions of the examination syllabuses. Since the delivery systems at the secondary level is mainly examination focused, this slant is inevitable. The most expansive sub-regional examination board in Africa is the West African Examinations Council (WAEC). It was established in 1952 and it examines over two million candidates annually from Ghana, the Gambia, Liberia, Nigeria and Sierra Leone at the end of senior secondary education. In 2015, it approved new curricula for most of the subjects including computer studies. It is this new computer studies curriculum that this study sought to investigate levels of difficulty of the topics as perceived by students. The curriculum has been in operation for four years at the time the study was conducted in 2019.

1.3 What is CTCA?

In seeking a way out, the intense study of teaching techniques that have dominated the science education literature brought to our

attention that culture and context play significant roles in student learning, and most of this literature has failed to realise such. The one-size-fits-all model has not been significantly convincing to bolster students' performance consistently; hence, a wake-up call to culturally immerse and contextually situate the way science is being taught. This is the footing assumption of the culturo- techno-contextual approach (CTCA) experimented with within this study. If these science concepts are tackled via linkage with indigenous knowledge and cultural practices, the chances are bright that the 'genie of poor performance in STEM will be thrown progressively back into the bottle' (Okebukola 2015, 2020).

The culturo- techno-contextual approach is a method invented to teach science, developed in 2015 after over 40 years of exploration with different methods in African settings to find a solution to the issues that inhibit the meaningful learning of science (Okebukola 2020). The approach is a conglomerate that derives its potential from three frameworks- (a) cultural environs with which learners are staying; (b) technology to which teachers and learners are using; and (c) locational context which plays a strong role and case studies for computer studies lessons.

1.4 Purpose of the Study

This study had two main purposes – find out (a) the topics in the new computer studies curriculum that secondary school students perceive to be difficult; and (b) determine if gender, school ownership impact students' perception of difficulty of the computer studies topics. The questions which the study sought answers to were:

1. What topics in the new computer studies curriculum do students find difficult to learn?
2. Are there statistically significant differences on students' (a) gender in (b) urban and rural schools; in their perception of difficulty of computer studies concepts?

2.0 METHODOLOGY

A mixed method design was adopted for the study. To achieve this, two instruments were developed: Difficult Concepts in Computer Studies Questionnaire (DCCSQ) and Difficult Concepts in Computer Studies Interview Guide (DCCSIG). Two West African countries, Ghana and Nigeria were selected for the study. This is because both countries used the same WAEC computer studies syllabus which serves as a common goal for the study to be able to identify the concepts that learners perceived to be difficult. Participants in this study were 1,501 students offering computer studies from nine public and 12 private senior secondary schools in Nigeria and Ghana. About 52% of the respondents were males. Three quarters of the schools are in urban areas, the rest being rural located, to establish the difficult concepts perceived in ICT students from senior secondary school 1 (SS1) to senior secondary 3 (SS3) participated in the study.

The instruments used for data collection consists of the following:

1. Difficult Concept Computer Studies Questionnaire (DCCSQ)
2. Will there be any statistically significant difference in reasons for the perception of difficulty of computer studies of students in public and private schools?

The difficult concept in computer studies questionnaire (DCCSQ) was used to collect quantitative data for the study. It had five sections, section A which contained the demographic data of the respondents and also introduced the instrument to the respondent and also the purpose of the questionnaire. Section B consist of the difficult concepts contained in the curriculum for computer studies concepts using a three-point rating scale of very difficult, moderately difficult and not difficult after validation exercise. The difficult concepts in computer studies interview guide (DCCSIG) were the instrument used to elicit responses from the respondent comprises of public and private school. The instrument contained only three basic questions; List three concepts you consider most difficult to learn in computer studies? Please explain why you find each of these

concepts difficult to learn. Please suggest ways by which understanding of these concepts can be made easy for computer studies students. These questions were considered valid and appropriate after several practice sessions among the researchers. Nine of the participants were interviewed through phone call while five of them were interviewed face to face. In each case it took an average of six minutes complete a session. Interviews were conducted with students as follow-up to help fill in gaps and more clarifications from questionnaires already administered. This was done soon after the questionnaires had been administered and the difficult concepts had been selected. The oral interviews were documented in form of audio clips.

3.0 DATA ANALYSIS AND FINDINGS

Data generated from the questionnaires were analysed using IBM-SPSS Version 23. After the initial raw analysis of the three-point scale of difficult, moderately difficult and not difficult, a mean rank analysis was done to establish the ranking of the difficult concepts, the data coding process involves each scaled to be scored as not difficult 1, moderately difficult 2 and very difficult 3 which answered the first research question (see table 1). Non-parametric tool of chi-square was applied on the cross-tabulated data to provide answers to the other research questions. The mean rank method (Okebukola, 1986; 1987) was used to answer the main research question of the study. This involves a two step-process. The first step was the summing up of the difficult score of each topic for the respondent dividing by the number of respondents to get the mean difficulty score and the second step involves ranking the mean topic difficulty score in order from the 1st (most difficult of the 19th concepts) to the 19th (least difficult concepts) as perceived by computer studies student in the sample.

Our results on research question 1 which sought to find out the topics in ICT curriculum that students find difficult to learn are reported in table 1, flowcharting (mean difficulty score 2.12) was perceived as the most difficult concept in senior school in ICT, followed by Algorithm (2.07), these concepts are been taught together in senior secondary school. Problem solving skills ranked the third most difficult concept in senior secondary school (2.00) and problem development cycle (1.96) ranked the fourth respectively.

Research Question 1: What concepts do senior secondary school students perceive as difficult in computer studies?

TABLE I
Mean Rank Analysis on Difficult Concepts in ICT (N-1501)

S/N	Topics	Mean score	Rank
1	Flowcharting	2.12	1st
2	Algorithm	2.07	2nd
3	Problem solving skills	2.00	3rd
4	Program development cycle	1.96	4th
5	Machine language	1.91	5th
6	Computer Ethics and human issues	1.84	6th
7	Logic circuit	1.82	7th
8	Computer fundamentals and evolution	1.81	8th
9	Networking	1.77	9th
10	Arithmetic logic unit	1.74	10th
11	Managing computer files	1.73	11th
12	BASIC programming	1.65	12th
13	Computer applications	1.55	13th
14	Booting	1.53	14th
15	Telecommunication	1.53	14th
16	Basic computer operations	1.49	16th
17	Binary numbers	1.45	17th
18	Operating system	1.44	18th
19	Components of a computer system	1.35	19th

Research question 2: Will there be any statistically significant difference in reasons for the perception of difficulty of computer studies of students in public and private schools?

TABLE II
Perception of Difficulty of Computer Studies of Students in Public and Private Schools

		PUBLIC		PRIVATE		
S/N	Statement	Yes	No	Yes	No	Chi- square
1	Computer studies is not interesting enough	79.7	20.3	72.7	27.3	7.29*
2	We don't have computer laboratory	67.0	33.0	92.0	8.0	86.95*
3	There is little or no practical work	50.4	49.6	72.6	27.4	52.14*
4	Teacher not helpful or friendly	79.2	20.8	86.9	13.1	10.23*
5	The syllabus is too wide	71.7	28.3	61.5	38.5	12.45*
6	I do not have required textbooks to study	47.6	52.4	49.5	50.5	0.38
7	Computer studies contents are not easily understood.	57.4	42.6	60.3	39.7	0.89
8	I do not have access to computer & internet to support my learning after school like my friends.	67.2	32.8	41.2	58.8	72.14*
9	My teacher don't explain some topics with adequate examples.	71.6	28.4	82.0	18.0	14.91*
10	If the topics can be taught with videos, I would have little or no difficulty.	71.9	28.1	73.4	26.6	0.30

The second research question is on the reasons of perceived difficulty in some concepts in computer studies by African students. The findings reported in table 4 showed the students confirmed that the perceived difficulties of some concepts to the subject teacher not being helpful and friendly with over 70% acceptance from student in public and private schools. While over 60% claimed that the syllabus is too wide and over 50% claimed that the contents are not easily understood.

Also, majority of the student from public and private school claimed that computer studies is not interesting enough with over 75% acceptance while 92% of the respondents attending private school agreed that they have computer laboratories compared to 67% from public schools. Over 80% of the students claimed that their teacher does not explain with adequate examples and does not respond to our questions this is in line with the response of one of the respondents who reported that

Amina (pseudo name) "When we ask our teacher, he will promise to get back to us but he won't answer until the class is over and the examples given are sometimes confusing."

The observed reasons for perceived difficulty of student in private and public schools in computer studies were largely statistically significant ($p > .05$).

Research question 2b: Is there any gender difference in the most perceived difficult concepts in computer studies?

TABLE III
Crosstabulation of Perception of Difficulty of Computer Studies Concepts by Male and Female Students

				Male		Female		
S/N	Difficult Topics	Mean	Rank	Not Difficult	Difficult	Not Difficult	Difficult	Chi square
1.	Flowcharting	2.12	1st	28.4	71.6	19.4	80.6	24.13*
2.	Algorithm	2.07	2nd	28.0	72.0	23.2	76.8	7.20
3.	Developing problem solving skills	2.00	3rd	38.2	61.8	22.6	77.4	58.91*
4.	Program development cycle	1.96	4th	31.5	68.5	27.3	72.7	3.73
5.	Machine language	1.91	5th	35.5	64.5	34.3	65.4	7.81
6.	Computer ethics and human issues	1.84	6th	43.1	56.9	32.9	67.1	15.57*
7.	Logic circuit	1.82	7th	37.7	62.3	40.3	59.3	13.89
8.	Computer fundamentals and evolution	1.81	8th	47.9	52.1	30.6	69.4	40.18*
9.	Networking	1.77	9th	41.9	58.1	45.7	54.0	15.08
10.	Arithmetic logic unit	1.74	10th	47.1	52.9	44.3	55.7	11.08
11.	Managing computer files	1.73	11th	50.2	49.8	38.1	61.9	28.93*
12.	BASIC programming	1.65	12th	46.2	53.8	53.0	46.8	10.80
13.	Computer applications	1.55	13th	60.7	39.3	56.2	43.8	18.20*
14.	Booting	1.52	14th	59.3	40.2	58.7	40.3	9.84
15.	Telecommunications	1.53	15th	58.8	41.2	60.7	39.3	7.84
16.	Basic computer operations	1.49	16th	62.6	37.4	58.4	41.6	14.80*
17.	Binary numbers	1.45	17th	64.2	35.8	70.2	29.8	14.04
18.	Operating system	1.44	18th	66.3	33.7	64.9	35.1	3.41
19.	Components of a computer system	1.35	19th	73.7	26.3	71.1	28.9	1.80

The results confirmed that of the 19 topics, only eight showed gender differences. These are flowcharting, developing problem solving skills; computer ethics and human issues; Computer fundamentals and evolution; managing computer files, Computer applications and Basic computer operations. And flowcharting remains the most difficult concepts for female students (80.6%), algorithm is perceived as most difficult by the male students (72.0%).

4.0 DISCUSSION OF RESULTS

This study investigated concepts in the computer studies/ICT curriculum that are perceived difficult by African students. The top ten topics in order of perceived difficulty were found to be flowchart; algorithm; problem solving skills; problem development cycle; machine language; computer ethics and human issues; logic gates; computer evolutions; networking and arithmetic logic units. From the study components of a computer system was the least difficult; this is because the concepts have been taught right from primary school to junior school with little modification in the content. Gauging by student who had graduated from university that claimed to have studied computer science with in ability to code due to poor performance and adequate knowledge in flowchart and algorithm, this is as a result of inability to understand the concepts which leads to skills

deficit, emphasis should not only be laid on learners having credits in five subjects including mathematics and English language but also in ICT to build their programming skills, innovations as well as inventions.

Moreover, Tam (2020) evaluates a local ICT training workshop in Hong Kong with 411 female students in junior secondary school, this study provides empirical evidence supporting the effectiveness of a STEM education program for promoting student development and alleviating gender stereotyping in ICT. The results showed that an inquiry-based model of learning, which focuses on students' problem-solving skills and analytical ability, significantly enhanced ICT self-efficacy and reduced perceived difficulties in using ICT. Moreover, ICT-related gender stereotyping was associated with both ICT self-efficacy and perceived difficulties in using ICT, indicating that gender stereotyping in ICT can be reduced by granting more ICT learning opportunities to female students. And regardless of society or time era, gender has universal traits, according to (Bahri, 2021).

Also, Nix & Perez-Felkner, (2019) in their study to examine a relationship between mathematics ability beliefs and STEM degrees? Fields such as physics, engineering, mathematics, and computer science (PEMC) are thought to require talent or brilliance. This relationship varied more strongly based on gender than race/ethnicity. Notably, Black women show higher gains in predicted probability to declare a mathematics-intensive major as compared to all other women, given their mathematics difficulty orientations. This study's findings show that both gender and racial/ethnic identities may influence the relationship between mathematics difficulty orientation and postsecondary STEM outcomes.

The computer studies curriculum in secondary schools expects learners to be able to state the functions of an algorithm, develop an algorithm that can be easily executed, write out an algorithm for problem-solving, what each flowcharting symbol stands for and how to draw a flowchart for a giving problem. Consideration of gender and context of the students is crucial in decision-making in this age and time. Yuan, et al., (2022) in their study on mobility plays a crucial role in constructing gender. In line with the changes in education around the world as we move towards the 21st century, education based on Information and Communication Technology (ICT) demand for increased levels of competency of teachers today (Mahzan, 2021). The study found that the bodily practice of cycling allows women to exercise agency by permitting them to express and improve their skills, which further enables them to reconsider gender identities and challenge traditional gender dualism. However, the agency depended on context. The study contributes to understanding the intersection of cycling mobility and gender through an embodied and situational agency.

5.0 SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Despite the stated reasons for difficulties in the subject, findings in the study reveals that some students find a specific aspect of the topic to be easy and consider some to be difficult because of a lack of practical and inability to relate it to what they are used to. Suggestion from an Ayomide read that;

Our teacher should explain in simple language that we can understand and also do practical class so we can know how to use them and how we can apply it to our daily activities. It's always difficult writing out the procedure involve especially if we don't really understand the problem but I don't have any problem with algorithm.

Algorithms and flowcharts in computer studies are concepts perceived difficult by senior secondary students. There is a need to make these concepts less difficult so as to improve student performance. Trained secondary school teachers are not only facilitated but encouraged to use technologically integrated teaching strategies for teaching and also relate it to learner's cultural backgrounds and what they can see in the environment.

This paper highlights difficult concepts faced by secondary school students across Africa in ICT, and suggestions were given for improvement in the subject. To progress the

value of teaching-learning in the subject, there is much need to engage in activities such as intensive ICT skills training to students and teachers increase in ICT equipment and applications in schools, and emergence of innovation centres. Even with such improvements, there is still enormous work to be done in Africa's education system to ensure that as the third decade of the 20th century begins and, in the march, to attain the goals of the African Union Agenda 2063, there is a heightened need for professionals in ICT-related disciplines. By 2063, it is intended by the leaders in government of the 54 African countries that the huge natural resources of the continent will be better sustainably harnessed to deliver the "Africa We Want" (AU, 2018).

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