UNDERSTANDING STUDENTS ATTITUDE TOWARDS THE USE OF COMPUTERS IN LEARNING SCIENTIFIC CONCEPTS

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ABSTRACT: The developments of Information and Communication Technology (ICT) has made education and learning move towards technology-based instruction instead of directed, teacher-centered instruction. It is no longer news that computers today are the main instructional support to the learning and teaching process. As a human, there is an adaptation process of this new development and its implications as well that has to be considered. This research paper examined the attitude of students towards computers for learning and achievement in scientific concepts. Gender difference in attitude towards the use of computer in learning was also examined. A cross-sectional survey design and convenient sampling techniques was carried out among students in north-east Nigeria. Questions were administered to 117 undergraduate students. Data collected were analyzed with SPSS version 20. Findings from this study showed that though students have a negative attitude toward the use of computers for learning scientific concepts, if teachers are trained and favourably disposed, then one does not need to envisage much trouble in getting the students to use computers for learning and achievement in scientific concepts. The findings also revealed a statistically significant difference in attitude between male and female students toward the use of computers in learning scientific concepts.
KEYWORDS: teacher-centered instruction, student-centered instruction, computer, technology, scientific concept, learning.

1. INTRODUCTION

ICT instruments today are utilized in all circles of human undertaking subsequently assuming huge roles in countries' advancement ([SG05]). The quick development of the utilization of ICT apparatuses has achieved a progressive change in each feature of human life ([Kam02]). Without question, the world is turning into an information society and unequivocally depending on the utilization of ICT as a method for correspondence and executing business ([SS01]). The fate of each economy and its residents' thriving are in this way, unequivocally connected with the utilization of ICT in each part of life ([And10]). Developed and developing countries have understood that ICT instruments use for instruction effectively affect people and social orders which has until now inspired nations to present ICT at all degrees of training. Nations have contributed so a lot and will keep on putting fundamentally in ICT instruments, such as software, hardware and even 'peopleware'. Most nations have developed approaches on ICT to empower mass support of students in Personal Computer (PC) instruction. This technological development positively has consequences for how individuals realize, what individuals know and where individuals get information and data ([NSF18]), which has prompted a change in outlook from educator-centered instruction to child-centered instruction. This move has made the job, activities, frames of mind, and impressions of students towards the utilization of PCs for learning and accomplishment in logical ideas become increasingly significant concern for in-depth analysis. PCs currently update instrument not only for training, but for social, and financial life standard as well ([I+04]). PCs are currently utilized for word processing capacities, illustrations, customized guidance for critical thinking, spreadsheets, databases, systems administration, and broadcast communications for the present high innovation advancements as intelligent to training. What's more, PCs have separated the roles of students and instructors by application of instruction for understanding and meaningful learning for all students. PC has changed the method of gaining from teacher-based instruction to child-centered instruction leading to multiple intelligence atmospheres to the educational cycle ([Gra01]).
The utilization of PC in training along these lines is unprecedented in recent times and it cut across all levels of education particularly at the tertiary level. Higher learning establishments are progressively situating themselves to the utilization of PCs as a method for conveying topic substance ([SS01]). Higher institutions today have created on-line and mixed learning models to complement face-to-face education to widen their extent of conveying instruction to their students. Learning using the PC framework in this manner has been held onto as one

of the most strong intends to guaranteeing fast socio-economic progress. Studies have, however, built up a connection among attitude (frame of mind) and learning. Without a doubt, the investigation of students' frames of mind toward the utilization of PCs for learning is basic, particularly in a developing nation like Nigeria. This paper, therefore, seeks to investigate students' disposition to the utilization of PC for learning and accomplishment in logical ideas. The paper is separated into four areas. Section one is the introduction, section two covers review of work on attitudes of students to the use of PCs in learning logical ideas (scientific concepts), section three examined students' perception of the utilization of PCs for scientific concepts and section four are conclusion and recommendations respectively.

1.1 Study Objectives

The general goal of this paper is to dissect students' mentalities towards the utilization of PC in learning scientific concepts. In particular, the investigation expect to:

i. find out the view of students towards PC use in learning

ii. ascertain the perceived usefulness of PC in learning scientific concepts

iii. find out gender distinction in the utilization of PC in learning scientific concepts.

1.2 Research Questions

The following research questions guided the research.

i. What are students' discernment to the utilization of PC in learning?

ii. How regularly do students use PC in learning scientific concepts?

iii. Whether the utilization of PC has helped students comprehend logical ideas superior to different techniques for learning

1.3 Hypothesis

- Ho1: There will be a significant positive relationship between students' attitudes and the use of computers for learning scientific concept.
- Ho2: There will be significant differences between male and female students' attitudes towards the use of computers in learning scientific concepts.

2. REVIEW OF LITERATURE

Various authors have characterized the concept of *attitude* in apparently various manners. Aiken ([Aik18]) presents that attitude is an educated inclination to act emphatically or contrarily towards specific items, circumstances, ideas or people. Kassin ([Kas08]) considers attitude to be an enduring conviction that incline somebody to act in a constructive, adverse, or irresolute route to someone else, object, or thought. This conviction impacts how the individual gets things done and the result of his/her activities. This implies attitude influences individuals in all that they do and it reflects what their identity is, subsequently attitude is a determinant of one's conduct ([Yus06]). Psychologists consider attitude to be a combination of affective, cognitive, and behavioural components ([MH10], [Lia02]). The cognitive part of attitude has to do with what the individual thinks or accepts about an item (object) while the affective component is the sentiments or feelings of the individual related to the object. The propensity of such an individual to act with a specific goal in mind to the object is viewed as the behavioural component of attitude ([MH10]; [Lia02]). It is understood that individuals' frames of mind toward others, items or circumstances can be good, troublesome or irresolute. Along these lines, students' attitudes toward computer education could be positive, negative or undecided.

The importance of attitude for learning how to utilize PC is particularly appreciated by DeYoung and Spence ([DS04]); Saade and Galloway ([SG05]). Bringing attitude to the use of PCs, we can infer that attitude is somebody's general assessment or sentiments of support or against computer technologies and explicit PC related exercises. Students with inspirational frames of mind toward ICT education have been found to perform superior to those with negative mentalities toward the subject ([N+04]). In a study conducted by Garland and Noyes ([GN05]), it was found that confidence correlates positively with computer attitude. Gao ([Gao05]) has additionally seen that apparent helpfulness of PC has emphatically corresponded with students' attitudes toward it. The investigation uncovered those students who saw computer education to be superfluous were not decidedly inclined toward the subject. It was revealed that PC uneasiness likewise impacted the frames of mind of students toward computer education ([Gao05]).

There are mix perceptions of gender differences in attitude toward computer education and use. While a few research concurred that there are gender differences in students' frames of mind toward computer education and use, others are yet to locate a critical distinction between the gender groups ([I+04]). Clariana and Schultz ([CS93]) opined that young men's attitudes toward computer education were commonly more positive than those of young ladies. Critical contrasts favouring boys as far as

attitudes toward new communication technology, degree of PC use and self-saw PC experience were found in different studies ([HG01]; [SK01]; [MF02]; [Bro05]). A study carried out by Liaw ([Lia02]) implied to evaluate students' view of PCs and different innovations additionally discovered gender differences. The investigation uncovered that male students had a positive view of PCs and the web advances than female students. Kaino ([Kai08]) however, utilized subjective and quantitative procedures to break down gender differences in frames of mind toward computer education in Bostwana Junior Secondary Schools. The examination saw that most students (both males and females) discovered PC valuable; the young men appreciated picking up utilizing PCs with less or no nervousness than young ladies, which propose that young men, by and large, have uplifting mentality towards learning with the use of ICT than young ladies. Nevertheless, a few investigations have not discovered critical contrasts in frames of mind of male and female students toward computer education. For example, Adenuga *et al.* ([AOA11]) didn't discover huge contrasts in gender groups' attitude toward ICT education. Their examination uncovered that both males and females demonstrated a negative frame of mind towards ICT education. Wong and Hanafi ([WH07]) were not able to build up any noteworthy distinction in the dispositions of young men and young ladies toward ICT education. Their investigation found that young men and young ladies have the same sort of frame of mind towards ICT education. Different investigations talked about hitherto shows that proof of gender differences in students' dispositions toward computer education and use has not been indisputable. This situation necessitated the conduct of this study to broaden the discussion on students' attitudes towards computers for learning and the achievement of scientific concepts.

A significant learning hypothesis proposes that the learning procedure comprises a connection between previous information and new information and as a result, students' insight is vital for further learning. Studies at all levels of education to know students' in-depth knowledge about fundamental scientific concepts have demonstrated that students who didn't get an agreeable understanding of scientific concepts were as a result of traditional teaching methods of learning ([Hal08]). Such a traditional teaching method requires students to sit passively and does not in any way engage students actively in learning ([M+05]). In such a traditional teacher-centered classroom, students just tune in, while the instructor gives out facts and characterizes significant thoughts. Students' interest is regularly restricted to lifting their hands to respond to questions ([Mui04]). This technique, when utilized in teaching science implies students may comprehend the subject – however just at an 'information level' that includes retaining ideas without accomplishing inside and out comprehension. Likewise, profoundly teacher-centered teaching techniques may adversely influence the students' conviction about science, driving such students to see science learning as a basic aggregation of actualities, and science as uninteresting ([Kib02]; [KNW04]). These instructive methodologies may then impact students' frames of mind, subjective improvement, and accomplishment in science training ([CTK06]). Along these lines, science instructors may need to consider alternative teaching approaches, particularly for troublesome and conceptual science ideas. It is presently obvious that powerful learning can be accomplished by utilizing more student-focused methodologies and especially those that utilize current information and communication technologies. ICT can help encourage information development in the classroom and guide student exercises, leaving educators the chance to cooperate with fewer students and to analyze challenges ([W+04]). Whitworth and Berson ([WB18]) concurred that innovation-based learning can help build up students' basic decision making and critical thinking aptitudes, information handling abilities, and relational abilities. In student-centered classrooms, the utilization of PCs can assist students with collaborating, utilize basic deduction and discover alternate answers for issues. There have been premium communicated in science instruction change as of late, which stresses the requirement for incorporating PC advancements into learning and educating ([WB18]).

A study carried out by Haluk ([Hal08]) opined that the application of computer-simulated experiments (CSE) together with a critical thinking approach positively affects students' logical accomplishment, science process abilities, and disposition toward logical ideas at the secondary school level. Haluk ([Hal08]) results demonstrated that there is altogether more noteworthy accomplishment in logical ideas through PC re-enacted tests, and that the utilization of incorporated video media additionally improves students' accomplishment and disposition to science-arranged issues. CSE presents various degrees of data with a specific goal in mind, for example, microcomputer-based research facility, pH meters, or chemical indicators, which impacted students' comprehension of corrosive, base, and pH ideas ([Hal08]). Late investigates have indicated that computerized molecular modeling improves tenth-grade students' spatial capacity to see new ideas and accomplishments about structure and bonding ([Hal08]). Likewise, PC liveliness together with an

applied change approach uncovered that students presently comprehend that electrons don't go through fluid arrangements while utilizing synthetic responses at the sub-atomic level ([Hal08]). These PC helped-programs show that students can imagine what's going on at the atomic level. This likewise applies for more complex systems, for example, ion formation and solution chemistry where activities in a hypermedia situation empower students to envision that liquefying is unique in relation to dissolving, how particles are shaped, and how hydration happens ([Hal08]). It is a decent improvement that students can cooperate with ideas when utilizing PCs. For instance, interactive simulations using modeling and simulation packages for teaching chemical equilibrium have helped students to retain certainties as opposed to attempting to explain chemical equilibrium and solve chemical equilibrium problems with a general more grounded attempts made at theoretical understanding and coherent thinking. Stieff and Wilensky ([SW03]) did an investigation on connected chemistry-incorporating interactive simulations into the chemistry classroom. Their examination saw that PC guidance-drove-programming is relevant to an assortment of learning undertakings including generally troublesome subjects like understanding chemical formulas and mole related issues. They reasoned that utilizing a PC instructional exercise program as an enhancement to the classroom brings about altogether higher accomplishment at the information, understanding, and application levels ([SW03]).

Wolfram ([Wol18]) proposed A New Kind of Science (NKS). It is a novel utilization of ICT explicitly in learning and clarifying logical ideas. NKS comprise of more than 800 programs that spread huge measure of computational capacities and ideas. The programs are very short and clear, utilizing the many programming ideal models accessible in Mathematica. The innovation excited a science instructor of more than 25 years and has roused him with the end goal that he built up a profound feeling of curiosity to become familiar with NKS and potentially figure out how to carry it to the consideration of his partners and students that are being prepared as educators ([Wol18]). Jegede ([Jeg05]) led an examination to analyze the disposition of students to the utilization of PCs and NKS for learning science among 50 purposively chose Obafemi Awolowo University, Ile-Ife students dependent on the foundation of having any fundamental science as their region of specialization. Selwyn-Soh Information Technology Attitude Scale (SSITAS) was utilized to dissect and approve information gathered. The investigation indicated that about a portion of the students have decent frames of mind to PC use ([Jeg05]). This is very promising as this gives trust later on the utilization of PCs in the classroom. In another related investigation completed by Aladejana ([Ala07]), various research strategies were utilized including survey, notes dependent on perception, dialog, and meeting remarks to look at the frames of mind of educators to the utilization of PC in instructing science. 106 purposively chose science instructors from 25 schools were picked by stratified irregular choice utilizing the standard of government or private possession. The discoveries show that 20% out of 106 respondents are reluctant to utilize a PC as a result of harming it, 10% would prefer to keep away from work that includes a PC, 8% concurred that they are not in charge when utilizing a PC, 24% are troubled about utilizing a PC, 2% would possibly utilize a PC when it is totally important, 18% abstain from coming into contact with PCs in their work, 16% waver to utilize a PC inspired by a paranoid fear of committing errors, and 14% said PCs make them feel awkward. Nonetheless, 9% said utilizing a PC doesn't unnerve them at all and that they utilize one consistently for their work, 3% said they don't feel uneasy about utilizing it ([Ala07]).

3. METHODOLOGY

3.1 Study design

This research focussed on the mentalities of university and polytechnic students in the north-eastern part of Nigeria to the utilization of PC in learning logical ideas, and whether there is a noteworthy distinction in frame of mind among male and female students towards the topic. A survey design was employed to achieve the set objectives.

3.2 Population and Sample

Students from four universities and three polytechnics in north-east Nigeria were relied on for information thus; they comprised the populace for this examination. The students were stratified into male and female and a simple random sampling technique was utilized for the activity. An aggregate of 117 students which is comprised of 54 male students and 63 female students spread the populace size.

3.3 Study instrument

Data for this research were assembled through a poll structured utilizing Google Form. The survey comprised of two areas. Section 'A' concerned students bio-data (gender, age, religion, and

institution) while Section 'B' dealt with students' dispositions towards the utilization of PC in learning scientific concepts. The research utilizes Selwyn-Soh Information Technology Attitude Scale (SSITAS) to decide attitudes of students in northeastern Nigeria towards PC use in learning. SSITAS is an institutionalized survey that has five sub-scales for estimating attitude. The poll managed comprised of 15 items with 3 items estimating every one of the five sub-scales. The response pattern is similar to Likert type ([Soh98]) question like "My first experience using computer was with apprehension. That is, anxiety or fear that something bad or unpleasant may happen" were asked and participants were expected to either tick strongly disagree, disagree, indifferent, agree, and strongly agree. This was used to measure attitudes among students towards the use of computers in learning. The subscales of this instrument are:

i. *Affective component*: this instrument decides the summed up enthusiastic response of students to the utilization of PC for learning. It gets to the uneasiness or dread that something awful or unsavoury will happen when utilizing PC, which makes students hesitant and conceivably lose enthusiasm for the utilization of PC for learning.
ii. *Perceived usefulness factor*: this instrument signifies the view of students concerning whether PC enhances work execution. This evaluates whether students see PC as for the most part accommodating, beneficial, inventive, and intriguing in connection to their learning logical idea.
iii. *Perceived behaviour component*: the instrument decides the routine conduct in the recurrence of the utilization of PC to discover solution or get familiar with consistently task/issue.
iv. *Perceived control component*: this instrument helps to decide students' apparent capacity to control the PC and gives a sign on the degree of trust in dealing with and utilizing the PC. It surveys viable utilization of programs to learn tasks/issues identified with their course of study.
v. *Defense component*: the instrument decides students' protective mentality against the utilization of PC. It surveys excuses students give for not utilizing PCs to learn.

The instrument was validated through peer review and its reliability was determined after a pilot-testing. Cronbach alpha correlation was used to calculate reliability co-efficient which was .75 with .69 test-retest of six months.

3.4 Data Collection and Analysis

The researchers utilized convenient sampling procedures, which mean students who were accessible and prepared within the sampled institutions and belong to faculties relevant to the study were used. Due permission was sought from the institutions' authorities after which the google form link (URL) for the questionnaires was distributed to the study participant. SPSS version 20 was used for analysis. Descriptive statistics like frequency counts and percentages were used to answer research questions while inferential statistics called independent t-test was used to test the formulated hypothesis at a significant level of .05.

4. RESULTS AND DISCUSSION

The results of this study are presented in tables. Table 1 shows ages and gender distribution among students in north-east Nigeria.

Table 1: Ages and Gender distribution of respondents

Age	**Total**	**Percentage (%)**
18-23	76	65.0
24-29	25	21.4
30-35	14	12.0
36-41	2	1.7
Total	117	100
Gender	**Total**	**Percentage (%)**
Male	54	46.15
Female	63	53.85
Total	117	100

The result from Table 1 showed that the majority of respondents were female constituting 53.85% while male respondents constitute 46.15%. This implies that more female students sampled for this study filled and submitted their questionnaire than their male counterparts. Age distribution among population size showed more respondents are between ages 18 and 23 with a percentage of over half of the total population. This implies that the majority of our respondents are in the era where computers and other ICT tools have replaced the manual method of accomplishing tasks either in business, entertainment, banking or education sector. Table 2 sought to ascertain hypothesis one which says there will be a significant positive relationship between students' attitudes and the use of computers in learning scientific concept.

Table 2: Showing the Mean, Standard Deviation and inter-variable correlation

Variables	Mean	SD.	1	2	3	4	5	6	7	8	9	10
1. **Age**	1.50	.77	1									
2. **Religion**	1.55	.49	-.15	1								
3. **Gender**	1.49	.50	-.16	-.59**	1							
4. **Affection component**	-	-	.01	-.13	.21*	1						
5. **Perceived usefulness**	-	-	-.10	-.06	.17	.26**	1					
6. **Perceived behaviour**	-	-	.13	-.05	.05	-.10	.49**	1				
7. **Perceived control**	-	-	.18**	-.09	-.12	.02	-.04	.03	1			
8. **Defence**	-	-	-.14	-.01	-.00	.19	.20*	-.03	.17	1		
9. **Attitude**	-	-	.07	-.13	.06	.36**	.63**	-.54**	.60**	.50**	1	
10. **Computer literacy**	-	-	.32**	-.13	-.23*	-.44**	-.34**	.06	.12	-.09	-.16	1

Note: ** Correlation is significant at 0.01 levels (2-tailed)
*Correlation is significant at 0.05 levels (1-tailed). N = 117

Table 3: Summary of Independent T-test showing gender differences in attitude towards the use of computer in scientific concept

Variable	Mean	SD	T	Df	F	P-Value
Gender: Male	1.57	.49	2.55	115	2.80	.012
Female	1.34	.47	2.56			

Note: **p<.01, *p<.05, N=117

The result in table 2 showed that attitude has no significant relationship with the use of computers in learning scientific concepts [r(115)=-.09, $p > .01$]. This implies that students have a negative attitude towards the use of computers in learning scientific concepts probably because of the complexity involved. This means that hypothesis one is hereby rejected.

Table 3 is a summary of the independent t-test used to analyze hypothesis two which says there will be significant differences between male and female students' attitudes towards the use of computers in learning scientific concepts.

As shown in Table 3, there is a statistical significance difference between male and female students attitude towards the use of computers for learning scientific concept, with male mean score (M= 1.57, SD=.49) compared to female with mean score (M=1.34, SD=.47) Male students showing more positive attitude than female students towards the use of computers in learning scientific concept. With t(115)=2.55, P<.05, it, therefore, means that hypotheses that say that there will be a significant statistical difference in attitude between male and female students towards the use of computers for learning scientific concept is hereby confirmed.

4.1 Implications

From this study, we can deduce the following as attitudes students display towards the use of computers in learning.

1. *Fear:* Students most occasions flee from the utilization of PC for the dread of harming it. They consider PC to be a delicate instrument that if not deliberately took care of will get harmed.
2. *Lack of Exposure*: The level of exposure of students decides to what degree he/she will need to utilize the PC for learning. Students who are acquainted with PC right off the bat in life will, in general, create enthusiasm for the utilization of PC for learning. Those from remote zones who likely are interacting with PCs for the first time have a negative attitude towards the utilization of PCs.
3. Lack of Confidence: Some students need certainty about the utilization of this innovation. They think that it's hard to attempt new logical ideas (scientific concepts) with PC for the dread of not committing errors.
4. Proper guide and mentoring: Students appear to create a negative attitude to the utilization of PC for learning logical ideas when he/she has no legitimate

guide/coaching on strategies/steps to follow in accomplishing these ideas.

5. Teacher's mentality to the utilization of PC: Negative frame of mind of educators to the utilization of PC for encouraging students has in a manner considered the disposition of students to the utilization of PC for learning science.

5. CONCLUSION

The study has revealed insight into students' attitudes towards the utilization of PC in learning logical ideas. Discoveries uncovered that the attitude of most students to utilizing PCs in learning science is poor. The utilization of PCs in learning science has been seen to make learning more meaningful and encourages active student participation. There is in any case, an extremely poor degree of certainty (among participants of this study) in dealing with PCs for this kind of learning. Students who should be at the cutting edge of this creative thought are either hesitant to utilize a PC because of harming it and would prefer to abstain from utilizing it. Some are anxious about utilizing a PC. They will possibly utilize a PC when it is completely important; consequently, abstain from coming contact with PCs in learning logical ideas. Others falter to utilize a PC inspired by a paranoid fear of committing errors and said PCs make them feel awkward. Clearly, the five scale Likert type instrument used to assess students' mentality to the utilization of PCs in learning logical ideas as investigated in this exploration paper has demonstrated that if PC assets are accessible and instructors are trained and favourably disposed; at that point, one doesn't visualize a lot of issue in getting the students to utilize PCs in learning scientific concepts.

6. RECOMMENDATIONS

Base on the discoveries made in this paper, proper suggestions that will help change students attitudes to the utilization of PCs in learning logical idea are recorded as pursues:

i. Teachers ought to be prepared to assist students to be favourably disposed to the utilization of PCs for learning logical ideas.

ii. Students ought to be edified and their certainty worked on to realize PCs will not in the slightest bit divert them from their examinations. Rather, it will be an instructional material to enhance their learning abilities.

iii. Efforts should then be made by ICT educators to relieve the dread and apprehensiveness of students to utilize a PC. They ought to be urged to feel good in utilizing PCs and ought to be guided on how to use ICT apparatuses in learning science.

iv. It will be significant for the government to have an approach that tries to deal with issues, for example, class size, preparing of educators in ICT for instructing and the incorporation of ICT-coordinated exercises into the educational program.

v. State Ministries of Education through their Local Inspectors of Education (LIE) should screen the usage of computer education programs in Nigerian secondary schools. This will fabricate trust in students moving to higher institutions to study science-related courses.

vi. Parents, NGOs, industrial sector, ICT delivering organizations, all employers of labour, and the international community must not leave the activity of making schools ICT-incorporation to the government, but instead, all hands must be on deck to guarantee this technological change.

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