

Computer Attitude, Ownership and Use as Predictors of Computer Literacy of Science Teachers in Nigeria

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Abstract: This study investigated the effect of computer attitude, ownership and use on the computer literacy of science teachers in Nigeria. One hundred and twenty (120) science teachers drawn from the four political divisions of Ogun State, Nigeria were used for the study. Two valid and reliable instruments namely Computer Attitude, Ownership and Use Scale (CAOUS) and Computer Literacy Self Assessment Scale (CLSAS) were used to collect the needed data. Percentages, standard deviation and multiple regression statistics were employed for data analyses. The findings revealed that the science teachers have positive attitude towards computer. Also, a little above half of the science teachers had personal computers and not all the teachers used computers frequently. Finally, computer attitude, ownership and frequency of use jointly predicted the science teachers' computer literacy with the influence of computer ownership being the highest when considered individually. Suggestions based on these outcomes were presented in this paper.

Key words: Computer attitude, Literacy, Science Teachers

INTRODUCTION

Background to the Problem

That computer technology has gained prominence in most parts of the world is no longer debatable. In the industrial and consumer societies of the world, micro-chip technology is rapidly becoming all-pervasive; wherever one looks, one finds more and more examples of its application (Yushau, 2006). According to Blease (1986), micro technology is something, one uses, it is a tool for achieving ones objectives more quickly, more cheaply or more efficiently. It even facilitates things, which, ten years ago, would have been considered age, would have been considered impossible.

Moreover, advances in computer technology have caught the attention of many educators and researchers. Computer based instructional applications are considered an effective alternative to traditional teaching methods (Larkin, 2003; Leigh, 1996). Today in numerous educational and training sessions, interactive computer programmes are used to teach young students and adults computer literacy skills.

In the light of the above, Yushau submits that computers have been used in education for more than four decades, and they have been "unconditionally" accepted as an integral part of educational system. The foregoing underlines the call of Jay (1981) for personal education in computer technology, and promoting computer literacy for both learners and instructors, especially in the sciences within educational institutions. Actually, the increase in computer use is rapid and has also generated new challenges. Perhaps more than other fields, science teaching is thought to have benefited and established a stronger intrinsic link with the development of computers in recent times. However,

Kadijevick (2002) has identified four issues as critical to proper and effective use of computer technologies in the classrooms. Top among them is computer attitude, followed by software selection, a proper utilization direction, and web – based professional development teachers.

Similarly, in his meta-analysis of the factors that are instrumental in promoting the use of computer aided learning, Griffin (1988) found that teacher attitude towards computer is an important factor related to the teacher's role towards the effective use of computers in education. According to Yushau (2006), indeed, previous correlation studies have long forecasted that the use of computers in education would very much depend on how reel teachers integrate the stated factors in everyday activities. Therefore, the question of teacher attitude towards computers is central to any successful use of computers in education (Yuen & Ma, 2001).

Studies have also, shown that computer anxiety, lack of confidence, and lack of enjoyment influence both the acceptance of computers and their use as a teaching and learning tool (Gressard & Loyd, 1986; Woodrow, 1991). The need to therefore disabuse the minds of teachers from such fears and replace these misconceptions with confidence building measures is ever more paramount. In this regard, computer ownership and computer experience are two very important and interrelated factors that can help in mitigating fear and anxiety about computers from the minds of teachers and help to develop their confidence with computer ownership, the teacher is able to have total access and freedom to experiment with the use of a computer has the machine or tool that it is (Yushau, 2006). With ownership, there comes the reciprocal relationship of computer experience that provides the technical – know – how and the intellectual ability to manipulate and discover the pedagogical power of the

machine. The importance of these two facts has been echoed and reiterated in many studies that encapsulate the argument about the effectiveness of computer use in teaching. Loyd and Gressad (1984: 67) puts it more succinctly:

It is becoming increasingly evident that familiarity with computers and the ability to use them effectively will be of critical importance to success in many different fields. Computer experience is therefore gaining wide recognition as crucial component of educational process.

The background provided so far, - underscores the need for personal education in computer technology and the need to promote computer literacy for both learners and instructors within educational institutions in Nigeria. However, there has been little information related to science teachers' level of literacy in basic computer operations and the extent to which variables such as computer attitude, ownership of computer and frequency of use of computers either jointly or individually predict the science teachers' literacy in basic operations in computer. It becomes crucial to provide information along this line in order to be able to make recommendations that will promote computer literacy among science teachers in Nigeria. This certainly will encourage the use of computer – aided teaching strategies in science classrooms in Nigeria.

This study therefore seeks to examine the science teachers' computer attitude, ownership and frequency of computer use as predictors of the science teachers' literacy in basic computer operations. In other words, the extents to which the variables jointly and individually predict the teachers' computer literacy are determined.

Research Questions

Specifically, this study provided answers to the following research questions:

- 1) What is the pattern of the computer attitude, ownership, frequency of use and literacy in basic operations of science teachers in Nigeria?
- 2) To what extent do the computer attitude, ownership and frequency of use jointly predict the literacy of the science teachers in basic operations in computers?
- 3) What is the relative contribution of computer attitude, ownership and frequency of use to the prediction of the science teachers' literacy in basic operations in computers?

METHODOLOGY

Design

This study employed *ex post – facto* or causal – comparative research design in carrying out the study. Here, there is no manipulation of variables but seeks to establish cause – effect relationship based on existing observations.

Sample and Sampling Technique

The sample for this study consists of one hundred and twenty (120) science teachers. Thirty (30) science teachers were randomly drawn from each of the four political divisions of Ogun State, Nigeria namely, Ijebu, Remo, Yewa and Egba divisions. Each of the teachers selected teaches at least a science subjects in any of the senior secondary school classes.

Instruments

Two instruments were constructed and used by the researcher in collecting data for this study. The two instruments are (a) Computer Attitude, Ownership and Use Scale (CAOUS) and (b) Computer Literacy Self Assessment Scale (CLSAS).

(a) Computer Attitude, Ownership and Use Scale (CAOUS)

This scale was used to collect needed data on computer attitude, ownership and frequency of computer use from the science teachers. CAOUS has three sections. Section I elicited information on the computer attitude of the science teachers. This section has four (4) sub-scales: (a) computer anxiety, (b) computer confidence, (c) computer liking and (d) computer usefulness.

The science teachers were required to indicate their level of agreement or disagreement with the statements listed. Strongly Agree attracted 4 points, Agree, Disagree and Strongly Disagree attracted 3, 2, and 1 respectively.

The section II elicited information from the science teachers on whether they own computer or not and section III asks for the frequency of computer use by the teachers.

The validity of the items was ensured through rational logical analysis of the experts in questionnaire construction. A reliability index of 0.76 was established through test – retest method of two weeks interval for the instrument.

(b) Computer Literacy Self Assessment Scale (CLSAS)

This instrument is used for collecting data on the level of computer literacy of the science teachers under study. The instrument is divided into two sections. Section I asks for the background variables such as sex, class, taught science etc. section II has a list of the common software and the science teachers were asked to rate themselves on their level of competence in handling the operations on the levels of Very Good (5 points), Good (4 points), Average (3 points), Poor (2 points) and Very Poor (1 point). The computer operations included are file management, word processing, spreadsheet, presentation and internet applications.

The validity of this instrument was ensured through thorough scrutiny by some computer experts while 0.73 was established as the reliability index of the instrument through test – retest method of two weeks interval.

Data Analysis

The data analysis employed in this study involved descriptive statistics such as simple frequencies, percentages and standard deviation while multiple regression was used as inferential statistics.

RESULTS AND DISCUSSION

Research Question 1: What is the pattern of the computer attitude, ownership, frequency of use and literacy in basic operations of science teachers in Nigeria?

(i) Computer Attitude of Science Teachers in Nigeria

It is worth noting that a participant that answered all the questions has a maximum of 20 and minimum of 5 for each subscale for the computer attitude scale. Participants with attitude score of 12 and above in each subscale are considered to have positive attitude. Therefore, in general, the results of this study suggest that the science teachers in Nigeria have positive attitude toward computers (Table 1).

This result implies that the science teachers generally display favourable dispositions toward computers possibly based on their past experiences with computer. This agrees with the definition of Dusick (1998) which states that attitude is an evaluative disposition related to past behaviour intentions. Therefore, the positive attitude of the science teachers

could be attributed to the science teachers' past behaviours or experiences. However, the outcome of this study is consistent with the results of other similar studies carried with teachers outside Nigeria (Yuen & Ma, 2001; Robb, 1996).

(ii) Computer Ownership

This table above reveals the pattern of ownership of computer among science teachers in Nigeria. The table shows that 54.20% of the teachers have personal computers while 45.80% do not have. According to Woodrow (1991), computer ownership is a confidence building factor that has the ability to help in mitigating fear and anxiety about computers. Also, with computer ownership, the teacher is guaranteed total access and freedom to experiment with the use of a computer as the machine tool that it is (Varank, 2006).

(iii) Frequency of Computer Use

Table 3 shows that only 20% of the science teachers use the computer everyday and majority (35%) of the teachers use the computer a few times, a week. Use of computer, according to Loyd & Gressard (1994) is related to familiarity with computer and the ability to use item effectively.

(iv) Literacy in Basic Operations of Computer

The science teacher has a maximum of 5 and a minimum of 1 for each computer operation of the self assessment computer literacy scale. Teachers with literacy score of 3 and above are considered to have performed above average on that computer operation. On table 4, it is obvious that the mean performances of

Table 1: Summary of the means and standard deviation of computer attitude subscales for the science teachers.

	N	Minimum	Maximum	Mean	Std. Deviation
Computer anxiety	120	13.00	18.00	15.30	1.10
Computer consideration	120	13.00	16.00	14.80	0.82
Computer liking	120	14.00	17.00	14.95	0.74
Computer usefulness	120	13.00	18.00	15.05	1.25

Table 2: Computer Ownership by Nigerian Science Teachers

	Frequency	Percent	Valid percent	Cumulative percent
No computer	55	45.10	45.80	45.80
Has computer	65	53.30	54.20	100.00
Total	120	98.40	100.00	

Table 3: Frequency of Computer Use by Science Teachers in Nigeria

	Frequency	Valid percent	Cumulative percent
Not at all	12	10.00	10.00
A few times a year	12	10.00	20.00
A few times a month	30	25.00	45.00
A few times a week	42	35.00	80.00
Everyday	24	20.00	100.00
Total	120	100.00	

Table 4: Science Teachers' Literacy in Basic Operations of Computers

	N	Minimum	Maximum	Mean	Std. Deviation
File management	120	1.00	5.00	3.41	1.16
Word processing	120	1.00	5.00	3.28	1.15
Spread sheet	120	1.00	5.00	3.17	0.94
Power point	120	1.00	5.00	3.16	0.80
Internet	120	1.00	5.00	3.29	0.82

the science teachers in all the computer operations are above average. This implies that the teachers are averagely literate in basic computer operations. This somehow links computer literacy with computer use and ownership (Keller, 1995) of the science teachers.

Research Question 2: To what extent do the computer attitude, ownership and frequently of use jointly predict the literacy of the science teachers in basic operation in computer?

Table 5 shows that the three variables of science teachers' computer attitude, ownership and frequency of use, when taken together yielded a Multiple Regression Coefficient (R) of 0.378, a Multiple R Square of 0.143 and Adjusted R Square of 0.121. The interpretation of this is that 14.3% of the variance in the teachers' computer literacy can be explained by the combined influence of the three variables. The table also shows that analysis of variance for the multiple regression data produced on F – ration of 6.453 which is significant at the 0.05 level. This indicates that the effectiveness of the predictor variables in predicting science teachers' computer literacy could not have occurred by chance.

The fact that computer attitude, ownership and experience effectively predicted the teachers' computer literacy is not surprising because literature has indicated a strong relationship between computer attitude and familiarity with computer and computer skills (Kay, 1993; Keller, 1995).

Research Question 3: What is the relative contribution of computer attitude, ownership and frequency of use to the science teachers' computer literacy?

On table 6 above, the beta weights provide an indication of relative effects (contributions) of each of the predictor variables on the prediction of the science teachers' computer literacy, when other variables are controlled. The value t – ratio associated with the teachers' computer attitude and ownership are not significant at the 0.05 level but that of computer use is significant.

It is also observable from the table that science

teachers' computer ownership has the greatest contribution, followed by frequency of computer use which is followed by computer attitude.

This revelation confirms the importance of computer ownership, frequency of computer ownership, frequency of computer use and the teaches' attitude towards computers as indicated by the studies of Loyd and Loyd (1985) and Pope-Davies & Twing (1991) that there is a strong relationship between computer attitude, experience, software familiarity and computer skills.

CONCLUSION AND RECOMMENDATIONS

This study has investigated the computer attitude ownership, use and computer literacy among science teachers in Nigeria. The findings are:

1. the science teachers in Nigeria have positive attitude toward computers, although some of them are yet to be using computers as frequently as expected. It was also found out that only a little above half of the science teachers have personal computers. Interestingly, the teachers were found to be a bit above average in literacy in basic operations in computer.
2. the combination of computer attitude, ownership and frequency of use effectively predicted the computer literacy of the science teachers.
3. computer ownership of the science teachers has the greatest influence on their computer literacy. This is followed by frequency of computer use which is followed by computer attitude.

Generally, the result of this study suggests that the science teachers in Nigeria need to be shown the essence of owning their personal computers. These should also be a concerted effort to enlighten and

Table 5: Using computer attitude, ownership and frequency of use to predict the literacy of the science teachers in basic operations in computer

Multiple R = 0.378 Multiple R Square = 0.143 Adjusted R Square = 0.121 Standard Error = 4.1754					
Analysis of Variance (ANOVA)					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	223.583	3	74.528	6.453	.000
Residual	1339.617	116	11.548		
Total	1563.200	119			

Table 6: Relative contributions of the predictor variables to the prediction of computer literacy of science teachers in Nigeria

Model	Unstandardized Coefficient		Standardized Coefficient	t	Sig.
	β	Std. Error	Beta		
Constant	11.031	11.147	-	.990	.324
Computer attitude	2.139E – 02	.196	0.012	.109	.913
Computer ownership	2.697	.800	0.372	3.372	.001
Freq. of computer use	-5.073E – 02	.261	-0.017	-.194	.846

develop confidence of the science teachers on the need for regular use of computer which in turn will improve their attitude toward computer. This can be achieved by organizing periodic trainings or workshops for science teachers.

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