

AGE, GENDER, TEACHING EXPERIENCE, ACADEMIC QUALIFICATION, ACCESS TO COMPUTER AND COMPUTER EXPERIENCE AS CORRELATES OF COMPUTER SELF EFFICACY OF NIGERIAN SECONDARY SCHOOL TEACHERS

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Abstract

This correlation study sought to determine the factors that could predict the computer self-efficacy of public secondary school teachers. The factors investigated are age, gender, teaching experience, academic qualification, access to computer and computer experience. With a sample of 733 secondary school teachers who responded to a computer self-efficacy questionnaire, it was ascertained that gender, academic qualification, access to computer and computer experience could predict computer self-efficacy. The implication of this for teacher training was discussed and recommendations made.

Introduction

Computer self efficacy, described as a belief in one's capability to use the computer, has been recognized as an important factor in assisting teachers to integrate computer technology into their teaching and learning process. As the use of computers at all levels of education have increased, researchers have become interested in links between beliefs about personal ability to perform computer tasks and subsequent learning about, and use of, computers. When applied to teachers using ICT for educational purposes, self-efficacy would appear to be an important indicator of whether an individual will teach with computers at a later stage. Ropp (1999) notes that there is research to show that while many teachers have positive attitudes to the use of educational technologies, they do not necessarily believe in their own ability to use technology in a classroom with students.

Delcourt and Kinzie (1993) reported that learning about computers is aided by high levels of self-efficacy and a positive attitude.

Ertmer, Addison, Lane, Ross and Wood (1999) suggested that teachers with higher computer self efficacy are likely to be more enthusiastic to use technology in their classrooms than those with lower self efficacy. Teachers' beliefs in their computer proficiency determine whether or not they will use computers in their teaching and learning process. For the goals of computer literacy and education to be accomplished in any country, for its children to acquire computer skills, it is necessary that teachers be trained and after training integrate computers into teaching and learning processes.

According to Kirschner and Davis (2003), teachers need to be trained to implement computer education; they will also need to become proficient in basic computer operations, basic applications of software like word processing, database, spreadsheets, graphic software and so forth, and the integration of computers in teaching. For such training and integration to be effective, the computer self-efficacy of teachers comes into consideration.

Computer self efficacy is based on beliefs about what a person can accomplish with the skills and knowledge they already possess; therefore, for them to adequately impart these skills to children, they necessarily must have a good computer self efficacy. However, a close study of computer self efficacy has revealed that it may be dependent on an individual's demographic factors, which implies that the level of computer self efficacy may vary from one individual to the other based on many personal factors which also may vary from person

to person, hence, the need to study and find out how factors such as age, gender, teaching experience, computer experience, access to computer and academic qualification correlate with the computer self efficacy of teachers.

Computer Training, Computer Experience and Computer Self-Efficacy

Computer experiences have been associated with computer self-efficacy and computer anxiety (Igbaria & Iivari, 1995). Bradley and Russell (1997), Rosen and Weil (1995) defined computer courses as part of computer experiences but excluded computer exposure or short term computer courses. Chua and Chen (1997), who conducted a meta-analysis of studies of computer anxiety, concluded that the correlation between computer anxiety and prior computer experience was the "most consistent findings" (p. 825). Of 40 studies they reviewed, 36 of them indicated that an increase in computer experience generally reduced computer anxiety. Here, a positive correlation is expected because additional experience and exposure with computers means having spent more time working with computers, thus, increasing the computer self-efficacy and reducing the computer anxiety.

However, the time spent working on a computer should be pleasant; otherwise, it can produce the opposite effect (Bradley & Russell, 1997). Many research findings showed that computer anxiety can be significantly reduced by exposing people to computers, but much of it depends on the type of exposure (Chua et al., 1999). These researchers further hypothesized that studies should not focus only on the exposure to computers, but also on the type and quality of training. Bozionelos (2001) theorized that the magnitude of the relationship between scores on computer anxiety and scores on computer experience attenuated as scores on computer experience increased and scores on computer anxiety decreased.

The study revealed that when individuals gained more experience with computers, they were less likely to be anxious when dealing with technology. Summers (1990), identified lack of knowledge and experience in the computer area as one of the most common reasons for teachers' negative attitudes towards computers. In his study of Pre-service teachers, Kellenberger (1996) reports that belief about success or otherwise with computers in the past has some influence on computer self efficacy. Cassidy & Eachus (2002) noted that Torkzadeh and Koufteros (1994) found that the computer self-efficacy increased significantly followed a computer-training course. They also determined through their samples that positive past experience will increase self-efficacy beliefs while negative experience will reduce self-efficacy beliefs. Thus, computer training and experience results in strengthened self-efficacy.

Age and Computer Self-Efficacy

Over the past years, several researchers have published articles reporting a negative relationship between age and computer performance (Czaja et al, 1999; Dyck and Smither 1996; Gist et al., 1992). Fasan (2009) found that there is significant negative relationship between age and computer self efficacy of teachers with a negative correlation. ($r = 0.282$) This implies that the older the teacher, the less his/her self efficacy in the use of computer. This result is similar to the findings by Charness, Schumann and Boritz (1992). Their result showed that 58% of the respondents who were in the young adults group had higher levels of computer self efficacy as compared to the other respondents. Researchers are beginning to focus attention on the specific barriers which older workers confront when using new technology (Czaja and Sharit, 1993; Dyck and Amither, 1994).

Age-related factors do exist that may inhibit older workers' ability to use computer technology, such as age-related differences in cognitive processes, memory and learning styles (Garfein. et al., 1993; Westerman et al., 1995). Less exposure to and experience with

computer technology may also lower older workers' performance relative to younger workers (e.g. Dyck and Smither, 1994). Older workers may, in fact, limit themselves by perceiving their value as low in a high-tech society. However, little empirical evidence exists to validate whether, or why, age difference might exist in computer performance.

Gender and Computer Self-Efficacy

Gender is of importance in any study on computer education. There has been extensive research on gender differences in computer literacy for a long time. This is because some studies have indicated that females show a greater degree of anxiety towards the use of computer than males (Yusuf, 1998). Theories from Psychology and Sociology suggest that gender disparity in computer competence and use exist due to sex role typing (Aremu, 2008). Some have found differences in anxiety towards use of and access of ICT with males more proficient and with better attitudes than females (Madell and Muncer, 2004; Isman and Celikli, 2009)

Whereas others found no gender differences (Shaw and Gant, 2002; Wong and Hanafi, 2007). Loyd, Loyd and Grassard (1987) reported that females had less computer anxiety than males and that females like working with computers than males. Harrison et al (1992) investigated differences in computer usage by university personnel based on gender. Using both the gender model of work and the job model of work to predict gender differences in computer literacy, they found that men were less fearful of computer technology than women. Young (2000) developed a computer attitude survey that included concepts of internet usage. Relying on previous research (Koochang, 1980; Newman, Cooper & Ruble, 1995). Young (2000) tested gender differences in computer attitudes of middle school and high school students. His findings were consistent with the results of early researchers who found significant gender differences in attitudes toward computer technology. Male students were more confident in their computer literacy than females. However, Atan, Azli, Rahman and Idrus (2002) found that there were no gender differences in the usage of general computer software as well as networking software. Additionally, Creamer, Burger and Maszarous (2004) found no significant differences between computer use by women and that by men. This contradiction of the existence of a gender gap can be explained by the type of computer tasks measured. The scales used in these studies vary widely. When a scale measures only the most basic computer skills (e.g. how to turn on a computer, how to create a folder using the operating system, typing using a word processor), the gender gap appears to have dissipated. It is thus important to investigate the influence of gender on computer self efficacy; educators must become aware of the gender differences and possible biases that they present in the teaching of computer technology to diminish the gender gap in computer use.

Years of Teaching Experience and Computer Self-Efficacy

The use of computers had only been emphasized toward the end of the twentieth century, thus Fletcher and Deeds (1994) concluded that teachers with less than 10 years of services as at that time would have had some exposure to the use of computer. Russell, Debell, Dwyer and Connor (2003) found that teachers with less than 5 years of experience were significantly more confident using computers and technology than teachers who entered the profession 6 to 15 years before or even more than 15 years before. Oscarson's (1976) study revealed that faculty members who had been in their position for a longer period tended to be less interested in adopting the new technology. This finding was further supported by Adams (2002) who discovered that faculty with between 10 to 19 years of experience had the least integration of technology in their teaching. These indicate that year of teaching experience could be an issue in integration.

Access to Computers

It is an obvious logical fact that one who has a constant access to computer would be and large have an increased knowledge of it which would make him/her more experienced in the use of computers, thereby, possessing a higher or strengthened computer self efficacy. In literature, one of the factors influencing computer self-efficacy had been identified to be the frequency of computer use. This conclusion was reached by Topkaya (2010) in her research on pre-service teachers. She found that those student teachers who reported they used computers every day either continuously or a couple of hours appeared to have higher perceptions of computer self-efficacy.

This was also supported in a research carried out by Fasan (2009) on the computer self efficacy of teachers. According to her findings, teachers who indicated having constant access to computers either in school or at home, tended to have a higher level of computer self efficacy than both teachers who had no constant access and those who had no access at all. The fact that some of these factors that have been mentioned as seen from literature could have effect on computer self-efficacy, makes it imperative to further investigate them amongst teachers. This is because, these teachers are the ones expected to implement the curriculum on computer education.

Statement of the Problem

The importance of ICT in national development cannot be over emphasized. Its application spans almost every facet of life such as Media establishment, Medicine, Banking, Agriculture, Law, Armed Forces, Sports, including education industry. With this as a basis, in Nigeria, the Federal Ministry of Education with an intention of improving the quality of education and facilitating national development set up a committee in 1988 to ensure the democratization of computer literacy at the national level. One of the recommendations of that committee was that computer literacy should be introduced to teachers and students at all levels of education system (Idowu, Adagunodo & Odowu, 2004). Since then, both the Federal and State governments in Nigeria have called for increased teacher-training in computer education in order to provide their students the needed tools required in meeting the challenges of academic activities and other fields of endeavour.

Success in these fields is now strongly attached to computer utilization and this is greatly influenced by computer self-efficacy of teachers who are to impact the skills into students. This study therefore sought to determine the factors that could predict the computer self efficacy of public secondary school teachers. The factors investigated are age, gender, teaching experience, academic qualification, access to computer and computer experience.

Research Questions

1. Is the composite effects of all the independent variables (gender teaching experience academic qualification, access to compute and computer experience) on the dependent variable (computer self-efficacy) significant?
2. Which of the independent variables has a significant relative effect on computer self-efficacy?
3. Which of the independent variables could predict the computer self efficacy of the teachers?

Methodology

This study adopted a survey design covering a cross section of secondary school teachers. All the 1,221 secondary teachers in Ondo West Local Government in Ondo State made up the population for this study. In research, at least 10% to 20% is needed to have a chance of having a representative sample. In this study, to have an appropriate representative sample, 60% of the total population of teachers was used for this study. This gave a sample

of 733 subjects, resulting in an average of 23 teachers from each school. Simple random sampling technique was adapted to select the teachers, giving every one of the subjects equal chance of being included in the sample for the study.

A questionnaire – the computer self efficacy of secondary school teachers (CSESST) constituted the principal research instrument for this study. It was divided into two sections. Section A sought personal information about the subjects, while section B was a computer self efficacy scale; an adaptation of the one that was developed by Kerlin of Lakehead University. This was however adapted from a scale developed by Eachus and Cassidy. Cassidy and Eachus (2002) used a sample size of 101 to test the validity of the computer self efficacy scale. Internal reliability as measured by Conbach’s alpha was high (0.94), indicating a particularly high degree of interval consistency. Test retest reliability over a month was also high and statistically significant ($r = 0.86, p < 0.0005$). A total of 637 questionnaires were returned; however the valid number of questionnaires which had indication of gender was 588 and this was used for the data analysis on gender.

Results

Data collected for this study was analysed using both descriptive and inferential statistics. The research questions were answered based on the CSE scores. The research questions were tested using multiple regression analysis as shown in the tables.

RQ1: Is the composite effects of all the independent variables (gender teaching experience academic qualification, access to computer and computer experience) on the dependent variable (computer self-efficacy) significant?

Table 1: Summary of Multiple Regression Analysis Showing Composite Effect

Model	Sum of squares	Df	Mean square	F	Sig.	Remark
Regression	3078.007	5	615.601	29.70	.000	Significant
Residual	12085.193	585	20.73			
Total	15163.2	588				
R = .451						
$R^2 = .203$						
Adjusted $R^2 = .186$						

Table 1 shows there is relationship between the dependent variable and the independent variables ($R = 0.451$). The independent variables accounted for 18.6% of the total variance in the computer self-efficacy of the teachers (Adjusted $R^2 = 0.186$). This joint contribution (composite effect) is shown to be significant ($F_{(5,583)} = 29.70; P < 0.05$).

RQ2: Which of the independent variables has a significant relative effect on computer self-efficacy?

Table 2: Summary of Multiple Regression Analysis showing Relative Effects

Model	Unstandardized coefficient		Standardized coefficient (Beta) β	T	Sig.
	B	Std. Error			
Constant	98.071	2.655		36.938	.000
Gender	-1.521	0.768	-.0122	-1.980	.049
Teaching experience	-0.170	0.112	-0.105	-1.524	.129
Academic qualification	-3.548	0.747	-0.296	-4.748	.000
Access to computer	1.162	0.319	.0272	3.642	.000
Computer experience	1.359	0.563	0.187	2.415	.016

Table 2 shows that academic qualification of the teachers has the highest significant contribution to their computer self efficacy ($\beta = 0.272$; $t = 3.642$; $p < 0.05$); followed by computer experience ($\beta = 0.187$; $t = 2.415$; $p < 0.05$) and Gender ($\beta = -0.122$; $t = -1.980$; $p < 0.05$). Teaching experience of the teachers has no significant relative effect ($\beta -0.105$; $t = -1.524$; $p > 0.05$).

RQ3: Which of the independent variables could predict the computer self efficacy of the teachers?

According to Table 2, the variables that could predict teachers' computer self efficacies are: Academic qualification, access to computer, computer experience and teachers' gender.

Discussion of Findings

The study investigated factors such as age, gender, teaching experience, academic qualification, access to computer and computer experience as correlates of computer self efficacy of public secondary school teachers in Ondo-State, Nigeria. The study revealed a significant positive correlation between the independent variables (age, gender, teaching experience, academic qualification, access to computer and computer experience) and computer self-efficacy. According to the findings, the joint effect of the independent variables on the dependent variable (computer self efficacy) is significant. This implies that the computer self-efficacy of teachers varies as their age, gender, teaching experience, academic qualification, access to computer and computer experience vary.

The implication of this result is that training for teachers should put into consideration the issues of their age, gender, teaching experience, academic qualification, access to computer and computer experience. Increasing the computer self-efficacy of teachers is a must for effective integration of computers in the training processes. Literature has shown that there are various ways of doing this. These strategies are premised on what Bandura (1997) explains as sources of information on computer self-efficacy. There are basically four of them; personal performance accomplishments, observations of the successes and failures of others, verbal persuasion and physiological indices (such as sweating or trembling before a computer class). These four can be factored into the training of teachers irrespective of what issues predict self-efficacy, the teachers are given experiences that would likely increase their self-efficacy.

With respect to age, training on computers should be planned so as to give more time for older people. This is because older teachers most likely never experienced the use of computers during training in contrast to younger teachers who most likely would have been using computers since they were in primary school.

From this study, gender could be a predictor of computer self-efficacy. Preparation of teachers must therefore ensure that no group is left behind. This could be achieved through single sex training, using of role models and mentors especially for women who usually exhibit anxiety over computer use. Facilities must be made available and access must be high if teachers who are being trained on computer utilization and integration would have a better self-efficacy. The greater the access and the more the time devoted to the use of computers, the more proficient a person becomes and consequently the computer self-efficacy would increase. Schemes whereby teachers can possess their own computer systems and monitoring programmes to ensure use should be mounted.

Other facilities such as electricity, internet access and so on, should also be available if the teachers are to develop competency and improve computer self-efficacy.

The academic qualification of teachers in this study, correlated with the computer self-efficacy while teaching experience did not. One explanation for this could be that the higher the qualification a teacher has, the greater the possibility of having used computers for

such studies. It is most likely that if a teacher goes for further studies, he would definitely have to interact with computers and use them for one thing or the other, from purchase of forms to registration and up till examination. A person thus exposed would definitely be more proficient in computer use and as a result could possess a higher computer self-efficacy.

Teachers should thus be encouraged to go for further studies, in-service courses, short courses and so on. All these have a potential for exposing them to more computer use and through such frequent use they may become better capable of handling the computer which would eventually lead to their higher computer self-efficacy. Many teachers never had the opportunity to use the computer or a chance to teach with the computer in their earlier years of teaching so it is no wonder that teaching experience does not correlate with computer self-efficacy. This, on the other hand, gives a very good indication for the training of teachers and that is, no matter the years of teaching, they could develop skills in computer use and integration, thus leading to a higher self-efficacy.

Conclusion and Recommendations

As the impact of information and Communication Technology is getting stronger in education and curriculum pedagogy, there is the need for all school teachers to seize and maximize the opportunity of the wide array of technological devices available across the globe to improve the standard of instruction in schools. This can be achieved mainly through training. This study has shown that for such training to be effective, some factors must be put into consideration. The factors are age, gender, academic qualification, access to computer and computer experience. It is therefore recommended that training that could enhance the computer self efficacy should be packaged putting into consideration, the factors that could inhibit computer self-efficacy.

If developing nations like Nigeria is to make meaningful achievement economically, socially, politically and educationally, teachers of all subjects must come to the realization that the traditional face-to-face mode of instruction should be enhanced with various Information and Communication Technologies. It is therefore suggested that the various Ministries of Education should carry out awareness and enlightenment campaigns to sensitize and motivate all teachers irrespective of subject areas to see the need and the relevance of ICT literacy to effective teaching and learning in schools. The various levels of government and Ministries of Education should also sponsor teachers of varying areas of specialization for ICT training and workshop on regular basis.

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