



Pre-Service Teachers' Computer Literacy and Attitude: Gender Perspective of Freshers in the Colleges of Education

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Abstract:

Empirical evidence has revealed that affective-motivational variables such as pre-service teachers' attitudes, computer literacy skills, self-efficacy, self-concept and concerns play a key role in their pedagogical decisions regarding how to integrate technology within classroom practices. This study sought to investigate pre-service teachers' computer literacy skills and attitude when they first enter the teacher training institutions. By means of hierarchical cluster analysis, this study also examined the relationship between male and female pre-service teachers' attitudes as well as their respective computer literacy skills. A total of 449 pre-service teachers

participated voluntarily in the study through a multistage sampling procedure. The results revealed that pre-service teachers' computer literacy skills is generally basic. Also, respondents in the study indicated a positive attitude regarding the use of technology in classroom instruction. Lastly, findings in this study further indicated that there is no significant difference between male and female students in terms of computer literacy and attitude to use computers for teaching and learning. These findings will contribute to stakeholders' realization that gender disparity is being bridged. It will afford stakeholders the opportunity to consolidate the gains that have been achieved by giving male and female equal opportunities to the access and use technology in schools.

Keywords: *Technology, pedagogical decisions, computer literacy computer attitude, gender.*

Introduction

The current phenomena of technology usage in the world has made it difficult for students to be successful without computing skills and knowledge (Danner & Pessu, 2013). More important is that in this 21st century, these computer skills and knowledge have become a functional requirement for people's profession, social and even personal lives. Many studies have posited the potential influence of computer literacy on learning support and development of learning skills, competencies and proficiencies

(Hernández, 2017; Muralidharan, Niehaus, & Sukhtankar 2017; Tarhin, Hone, & Liu, 2015; Yilmaz, 2016). Based on these potentials, many governments have included ICT in different plans and policies for education in their countries of which Ghana has not been left out. The influence of computers on students' life is typically recognised in their use of computers for word processing, spreadsheets, web browsing, electronic games, e-mails, social media among other applications.



Grounded on the Ghana ICT education policy (2015), it is expected that pre-service teachers who gained admission into colleges of education should have some background knowledge and skills in computing since they have studied it in their secondary schools. Nonetheless it is common knowledge that most of the secondary schools the students come from may not have the same standards in terms of infrastructure and teaching personnel to help students acquire the necessary computer skills and knowledge. This is why it is very important that prior to engaging pre-service teachers in computing lessons in the Colleges of Education, their previous knowledge and skills is investigated to help tutors know how to tailor their lessons for the benefit of all students. Moreover, the awareness of pre-service teachers' knowledge, skills and attitude towards computing by tutors at that early stage of the students' training will make the colleges formulate intervention to help overcome challenges these students will face in their learning of computing courses. More so, computer literacy is a general course that all pre-service teachers undertake as part of the requirement for graduating as a teacher in the various colleges of education.

As the use of computers becomes the phenomena in the educational setup, many studies have been conducted on teachers' computing knowledge and skills (for example Gedik, & Baydas, 2013). While previous studies have attempted to investigate computer literacy skills and knowledge of pre-service teachers who have spent a year or two in their programme, there is scarcity of studies available on fresh pre-service teachers' computer literacy skills and knowledge as well as their attitude towards the use of computers. Information gathered from this group, will go a long way to inform Colleges of Education authorities on the entry behavior of these pre-service students in terms of computing skills, knowledge and their attitude towards computers. The information will help them put measures like providing computing resources for pre-service teacher training. Due to the fast pace of change in educational technology, this study hopes to benefit teacher educators by developing awareness and

knowledge of fresh pre-service teachers in computing especially gender perspective.

This study's objectives included:

1. to measure pre-service teachers' computer literacy in computing.
2. to find out pre-service teachers' attitude towards the use of computers.
3. gender difference in computer literacy
4. gender difference in attitude toward the use of computer in teaching and learning

Literature Review

Pre-service Teachers Computer Literacy Skills and Knowledge

Prior knowledge and skills in computing have since become an integral requirement for individual student's knowledge construction, skills acquisition and learning outcome (Shapiro, 2004). Computer literacy consist of the knowledge, attitude and skills one requires to manipulate technologies, surf the internet, understand how to use media and manage information (Ferrari, 2012). A careful observation of the computer literacy course structure for the Colleges of Education in Ghana takes note of all the following highlighted above. It is expected computing that learning materials should be delivered to students considering their wide range of prior knowledge and skills (Davies et al., 2014). Although pre-service teachers may have prior knowledge and skills in computing, it is important to look at how such knowledge and skills influence the students learning of the computing curriculum in the colleges and their attitude towards its use for teaching and learning.

Pre-service Teachers' Attitude Towards the Use of Computers

Several studies have opined that teachers' attitudes and acceptance towards computing affect their pedagogical use of ICT (Hernández-Ramos, 2014; Luan & Teo, 2009; Teo, 2008). Teachers attitude towards the use of computers for teaching and learning is developed during their pre-service stage (Goktas, Yildirim & Yildirim, 2009). Likewise, Kersaint, Horton,

Stohl, and Garofalo (2003) concluded that pre-service teachers who felt comfortable with the use of computers have positive attitudes towards its use for teaching and learning purposes. On the contrary, those who are deterred to the use of computers have negative attitude towards the use of the technology for teaching and learning (Teo, 2009). Having a positive attitude towards the use of computers may lead to significant integration of technology into the teaching and learning space. When teachers show positive attitude towards the integration of ICT into their teaching, it will affect positively their usage of ICT in the educational process (Casillas et al., 2020; Fernández-Batanero and Torres-González, 2015).

A study by Olafare et al. (2018) and Semerci and Aydin (2018), shows that teachers with less work experience had more positive attitudes towards the use of ICT than teachers with more extensive experience. In a study by Onasanya et al. (2010), there is significant difference in gender attitudes of teachers regarding the integration of ICT in the training process. A study by Agyei & Voogt (2011) examined the attitude of pre-service teachers towards computing topics in a flipped classroom setting. It found that pre-service teachers had positive attitudes towards the use of technology in teaching computing. Another study by Ertmer & Ottenbreit-Leftwich (2013) revealed that pre-service teachers' attitudes towards computing were influenced by factors such as their prior experiences with technology, confidence levels, and the support they received during their teacher education programme. Also, Mouza, Karchmer-Klein, Nandakumar, Ozden, and Hu, (2014) research investigated the impact of an integrated approach to developing pre-service teachers' Technological Pedagogical Content Knowledge (TPACK). It emphasized that pre-service teachers' attitudes towards computing improved when they received comprehensive training that integrated technology with pedagogical and content knowledge. These studies demonstrate the importance of providing pre-service teachers with meaningful experiences, training, and support in computing to shape their attitudes positively.

Gender Differences

The role of gender differences in using technology for learning has been extensively researched (Kahveci, 2010). It could be said that the study on gender differences is essential as it may uncover existing divides (Siddiq & Scherer, 2019), and such exposure is necessary in order to bridge the gaps and inequalities. However, it could be noticed, upon survey of literature, that most studies on gender difference in ICT literacy and competence were conducted with students. An example is the study of Calvani et al. (2012) which was carried out with students aged 14-16. The said investigation revealed that there is a gender difference in digital competence with the males taking the front stage. Similarly, Houtz & Gupta, (2011) found that female students, in terms of ICT, lag behind. Corroborating this result is the study of Liaw (2002) which concluded that males are more advanced than females in terms of technological competence. It is remarked at this point that there is no scarcity of studies on gender difference in technological competence directed toward teachers. A study by Ilomäki (2011) found that male teachers' estimation of their technological skill is on a higher level when compared to females. Equally, the study concluded that the gender gap persists although it could be reduced. A similar conclusion was arrived at by Su Luan et al. (2005) claiming further that the divide favors female academicians in some cases. Contradictorily, the study of Javier (2020) revealed that there is no statistically significant difference in male and female computer literacy. In other words, there is no gender gap in technological competence with respect to the studied population. Hence, from the enumeration, it is inferred that it remains inconclusive.

Materials and Methods

Participants' Selection

The descriptive cross-sectional survey was used to collect and analyse data. Multistage sampling was used to select the pre-service teachers for the study. Through purposive sampling, first year fresh students were selected for the study.

The enrolment of these group were six hundred and twenty (620) students. Simple random sampling was used to select four-hundred and forty-nine (449) pre-service teachers. The sample consisted of (Male N = 249, 55.5%, Female N = 200, 44.5%), with ages categorized as 17-20 years (N = 125, 27.8%), 21 - 25 years (N = 301, 67.0%), 26-30 (N = 19, 4.2%) years and 31 years and above (N = 4, 0.4%). Programmes offered by participants were categorized into ICT (N = 62, 13.8%), social sciences (N = 103, 22.9%), Primary Education (N = 84, 18.7%), Agriculture Science (N = 12, 2.7%), Visual Art (N = 20, 4.5%), Home Economics (N = 61, 13.6%), RME and Music (N = 61, 13.6%), and Mathematics (N = 46, 10.2%). The participants were first year pre-service teachers in one of the colleges of education (Kibi Presbyterian College of education) in Ghana. Each participant had completed a Senior high school before gaining admission to pursue the Bachelor of Education (B.Ed.) programme within a period of four years. Any student at the time of data collection, was duly admitted in the Kibi Presbyterian College of Education and have not started taking any course.

Research Instrument

The study used a questionnaire to gather the data to address the research questions. The instrument had a socio-demographic section (i.e., gender, age and programme). The three major variables of interest in this research included pre-service teachers' prior computer literacy skills and knowledge pre-service teachers' prior experience with computers, as well as pre-service teachers' attitude towards the use of computers for learning. The questionnaire used to elicit responses from participants was an adaptation from Son, Robb, and Charismiadji (2011).

Pre-Service Teachers Computer Literacy Skills and Knowledge

Pre-service teachers were asked to indicate their perception about their computer literacy skills prior to enrolling to undertake the B.Ed programme in the college of education. Participants were to select whether their

computer literacy skills and knowledge are none (1) basic (2), intermediate (3) and advance (4). Eight items were used under this section.

Pre-Service Teachers' Attitude Towards the Use of Computers for Learning

A 4-point Likert-scale was used to elicit response from the pre-service teachers regarding their attitudes towards the use of computers for teaching and learning. The responses were made up of four scales, Strongly Disagree (1), Disagree (2), Agree (3) and Strongly Agree (4). In all 10 questions were asked under this section.

Data Collection and Analysis

The intent of the study was made known to the respondents in detail before data was collected. Data collected from respondents were treated as confidential and the respondents were assured of anonymity with regards to the information given. Questionnaires were personally administered by the researchers to ensure a better understanding of the questionnaire items and timely response to the items. This ensured maximum return rate of questionnaires. Respondents were given ample time to respond to the items on the questionnaire.

After screening and editing the data collected, they were checked for outliers, and none was recorded. Descriptive statistics such as frequencies, mean, standard deviation, as well as inferential statistics (independent sample t-test) were used to analyse the data using SPSS 26 version.

Results

Pre-Service Teachers Computer Literacy Skills and Knowledge

To clearly identify the respondents' extent of computer competence, every item in the computer competence aspect of the questionnaire was descriptively analysed individually. The respondents' level of skills and knowledge was assessed through a scale of 1 to 4 ranging from None (1.0-1.74), Basic (1.75-2.4), Intermediate (2.5-3.24) and Advanced (3.25-4.00). The response were analysed using

frequencies, percentages, means and standard deviations. The result of this research question is displayed in Table 1.

Table 1. Descriptive Statistics Computer Literacy Skills and Knowledge

S/N	Computer literacy	M	SD	Description
1	Word processing applications	1.96	.831	Basic
2	Spreadsheet applications	1.81	.802	Basic
3	Database applications	1.68	.713	None
4	Presentation applications	1.83	.709	Basic
5	Communication applications (Email, Facebook, whatsapp, twitter etc.)	2.05	1.226	Basic
6	Internet	1.95	1.135	Basic
7	Multimedia applications	1.91	.828	Basic
8	Web design applications	1.74	.717	None
	Total	1.8651	0.57476	

Table 1 shows that of the pre-service teachers indicate that they have Basic computer literacy skills and knowledge (CLSK) in Word processing (Mean= 1.96, SD=0.83), the data in the table also suggest that the respondents' CLSK in spreadsheet application is Basic (Mean= 1.81, SD=0.80), Again, on communication application the CLSK of the respondents was Basic (Mean= 2.05, SD=1.23), the result in table 1 further indicate that the respondents CLSK in internet, presentation application, multimedia application are Basic with (Mean= 1.95, SD=1.14), (Mean= 1.83, SD=0.71) and (Mean= 1.91, SD=0.83) respectively . However, the result indicate that the respondents has no CLSK in the following database application (Mean= 1.68, SD=0.71) and web design application (Mean= 1.74, SD=0.72). It is obvious from the data that the respondents had higher means CLSK in the use of communication applications like Whatsapp, Twitter, Facebook and email (Mean= 2.05,

SD=1.23) than the other applications. This results is understandable because of the popularity of social media among the technology users. In all the average mean rating for the fresh pre-service teachers is (Mean = 1.865, SD =0.575) which is Basic CLSK.

Pre-Service Attitude Towards the Use of Computers for Teaching and Learning

The research question sought to find out the fresh pre-service teachers attitudes toward the use computers for teaching and learning. Their level of agreement or disagreement was assessed through a likert scale of 1 to 4 ranging from Strongly Disagree (1) to Strongly Agree (4). The interpretation of the scale was Very Low (1.0-1.5), Low (1.51-2.5), moderate (2.51-3.00), and high (3.01-4.00). The response were analysed using Means and Standard Deviations. The result of this research question is displayed in Table 2.

Table 2. Attitude of pre-service teachers towards the use of computers

S/N	Statement	M	SD	Description
1	I enjoy using computers.	3.16	1.136	High
2	I feel comfortable using computers.	3.09	1.144	High
3	I am willing to learn more about computers.	3.33	1.089	High
4	I think that computers are difficult to use.	2.12	1.082	Low
5	I feel threatened when others talk about computers.	2.10	1.124	Low

6	I believe that it is important for me to learn how to use computers.	3.34	1.087	High
7	I would like to use computers in the classroom.	3.26	1.090	High
8	I think that my teaching can be improved by using computers.	3.30	1.081	High
9	I think that computers can make learning interesting.	3.35	1.073	High
10	I believe that training in computer-integrated learning should be included in teacher education programs.	3.28	1.090	High
Total		3.013	0.866	High

From Table 2, the two high means were 3.35 and 3.34 which indicated that most of the fresh pre-service teachers believed that computers can make learning interesting and they believe that it is important for them to learn about computing respectively thus the high means recorded here. However, Table 3 results indicates two low means of 2.12 and 2.10 which showed few pre-service teachers believed that it is difficult to learn about computing and also feel threatened when people talk about computers. The average mean attitude of pre-service teachers towards computing was 3.01 which indicated a high positive attitude towards the use of computers for teaching and learning.

Gender Difference

Hypothesis 1: There is no significant difference in Gender computer literacy.

To determine differences in the computer literacy between the male and female respondents, the means and standard deviations were calculated to analyze the data. Next, the data was treated with the inferential statistics

known as independent sample t-test. Table 3 presents the analysis with these statistics: N = 449 [Females = 200, Males = 249].

Table 3. Summary Table of Gender Statistics in Gender Difference in Computer Literacy

Gender	N	Mean	Std deviation
Female	200	1.8367	.55394
Male	249	1.8942	.59370

The means and standard deviation were calculated to analyze the data. Table 3 shows that the mean value for male students was 1.8942, which was higher than that of female students (Mean = 1.8367). However, there is not much difference in the mean score. The findings show that there is no difference in computer literacy skills of male and female pre-service students. The t-test was then used to test the significant difference between the two genders' confidence in using technology for learning.

Table 4. Independent Sample t-Test on Computer Literacy Difference

Variables		Category	M	SD	Description	Sig. (2-tailed)	Interpretation
Dependent	Independent						
Computer Literacy	Gender	Male	1.90	.059	Basic	.293	Not significant
		Female	1.84	0.55	Basic		

Analysis of the t-test result in Table 5 shows that there is no significant difference (p -value = 0.293; $>$ alpha value = 0.05) in the computer literacy of male and female fresh pre-service teachers. The result also indicate that both male and female have basic computer literacy.

Hypothesis 2: There is no significant difference in gender attitude towards the use of computer for teaching and learning.

To determine differences in gender attitude towards the use of computer for teaching and learning, the means and standard deviation were calculated to analyze the data. Subsequently, the

data was subjected to the inferential statistics known as independent sample t-test. Table 5 presents the analysis with test statistics: N = 449 [Females = 200, Males = 249].

Table 5. Summary Table of Gender Statistics in Gender Difference in Attitude

Gender	N	Mean	Std deviation
Female	200	2.9865	.89360
Male	249	3.0290	.85243

The means and standard deviation were calculated to analyze the data. Table 5 shows that the mean value for male students was 3.0290, which was higher than that of female students (mean = 2.9865). However there is not much difference in the mean scores. The findings show that there is no difference in the attitude to use computers between male and female pre-service students. With this, the data was subjected to an independent t-test analysis to confirm or otherwise, if there is indeed no difference(s) between the two gender variables.

Table 6. Independent Sample t-Test on Attitude Towards the Use Computers for Teaching and Learning

Variables		Category	M	SD	Description	Sig. (2-tailed)	Interpretation
Dependent	Independent						
Computer Literacy	Gender	Male	3.03	.85		.612	Not significant
		Female	2.99	.89			

Analysis of the t-test result in Table 6 demonstrated that there is no significant difference ($p\text{-value} = 0.612 > \alpha\text{ value} = 0.05$) in the attitude of male and female fresh pre-service teachers in the use of computers for teaching and learning. The result also indicated that both male and female have basic computer literacy.

Discussion

The discussion of the findings is done under the heading of the objectives; pre-service teachers in computer literacy skills and knowledge, pre-service teachers' experiences with computers and pre-service teachers' attitude towards the use of computers for learning?

The analysis of the pre-service teachers' computer literacy skills and knowledge showed that their computer literacy skills and knowledge is Basic (Mean = 1.865, SD = 0.575). The result showed that pre-service teachers' computer literacy skills and knowledge can be rated as Basic. Computer literacy skills and knowledge is Basic in Word processing, spreadsheet, communication application, and internet. These applications are core and frequently needed by teachers in the work. The result confirms a study

by Moganashwari & Parilah (2013) which found out that of majority of teachers were knowledgeable in these ICT applications although in the present study, it was observed to be basic. The results however indicates that majority of the fresh pre-service teachers have low or no computer literacy skills and knowledge in database application, presentation application and web design application. This result is understandable since it is an advanced level application which most of the participants may not have been taught or come across in their secondary education. Nevertheless, this will give an idea of the students' prior knowledge in these applications to college tutors for the necessary action to be taken to help them.

A further analysis of data from the study on students' attitude towards the use of computers indicates that most of the fresh pre-service teachers have positive attitude towards the use of computers for teaching and learning. These outcomes support the research findings that reported positive attitude regarding the use of technology by respondents in several countries where studies of this nature have taken place (Shah & Empungan, 2015; Agyei & Voogt, 2011; Nishta, 2012; Kaur, Singh & Subramaniam, 2014) that teachers were more positive about

their attitude towards computers and intention to use computers. This result will likely influence the pre-service teachers' performance in learning the computing course in the college.

On the difference in Gender computer literacy and attitude towards the use of computers for teaching and learning, the results suggest that there is no significant difference in male and female computer literacy. This result supports Javier (2020) and De la Rama et. al, (2020) assertions that ICT literacy between male and female teachers were not statistically significant.

Conclusion

The results of the study indicate that the majority of the fresh pre-service teachers have basic computing knowledge and skills. Tutors teaching computing can use the results of the study to identify students' strengths and weaknesses in terms of computer literacy skills and knowledge so that they can provide the right guidance to help them. The findings showing that most of the pre-service teachers have good experience with the use of computers is a good indication that tutors will not have much problems in teaching practicals since the students come with some background knowledge on how to use the computers. The students' positive attitude towards the use of computers for teaching and learning can motivate the students to perform well in their end semester examination. The findings in this study further indicates that there is no significant difference between male and female students in terms of computer literacy and attitude to use computers for teaching and learning. These findings will contribute to stakeholders' realization that gender disparity is being bridged if not bridged. It will afford stakeholders the opportunity to consolidate the gains that have been achieved by giving male and female equal opportunities to the access and use technology.

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