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Junior High School Teachers' Knowledge and Attitude towards the Teaching of Information and Communication Technology in the Savulugu-Nantong District, Ghana

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Abstract:

The research assessed Junior High School teachers' knowledge and attitude towards the teaching of information and communication technology (ICT) in the Savulugu-Nantong district. The study involved 68 teachers. Cross-sectional descriptive survey with non-probability convenient sampling design was used. Four-point Likert type of instrument was administered. Factor analysis and descriptive analysis were carried out. The research identified the impact that training of ICT teachers and the provision of ICT facilities have on the teachers' knowledge and attitude to the teaching of the subjects. The research concluded that there is a relationship between teachers' knowledge and attitude of teachers on one hand and access to ICT facilities on the other. The two main teacher universities; the University of Cape Coast and the University of Education, Winneba as well as the colleges of education that train pre-tertiary level teachers should improve on their facilities to train high quality ICT teachers. District directors of education, Government of Ghana, parent teacher associations and non-governmental organizations that are into education should organize in-service training workshops and seminars for ICT teachers to create positive attitude in them. They should assist in the provision of ICT facilities for the schools and personal computers to teachers to help them develop innovative, competent skills, knowledge and positive attitude to the teaching of ICT.

Keywords: Communication, descriptive, non-probability, innovative, competent skills

1. Introduction

1.1. Background to the Study

The effectiveness of the use of computers in education is an important factor in determining which countries will succeed in future (Harvey, 1983). In most schools, computers are used to assist management in its day to day administrative activities. Besides, computer is used in schools as an object of instruction to meet the challenges of the information age.

The computer is able to shorten learner cognitive load by taking on a huge amount of information processing load off the learner. It can also dynamically model a process, activate or increase the learners' own processes as well as accommodating arrange of tasks. Additionally, the computer is able to provide verbal knowledge, model intellectual skills, activate, or increase cognitive strategies to create better learners (Kozma, 1987).

Since 1990, many teacher training institutions in the country have been graduating teachers with basic skills to teach ICT (Oliver, 1993). However, research shows that this does not translate into more or better teaching of ICT. Most of the teachers who had formal training in the use of computers as a personal tool are not different in their use of computers for teaching from their colleagues who had not had the training. Teacher education programmes are not effective at increasing teachers' capability for integrating technology, because decision about teachers' beliefs and attitudes, accessibility of hardware and relevant software, the nature of the curriculum, innovativeness and confidence of teachers, instructional strategies and time are not given the desired attention. An appreciation of these factors would permit their development to be followed and the design of courses to be adjusted to achieve the desired outcomes. It is debatable that there are factors other than technical knowledge and skill which contribute to teachers' success at technology integration in their teaching.

According to Brownell (1997) teacher education faculties have been struggling to deal with the challenges of preparing teachers well to integrate technology using a variety of different approaches for years. However, there seemed to be a consensus that technology is important and teacher educators need to serve as role models. Brownell added that there is little evidence to guide the development of effective programmes, so more evaluative research on technology in teacher education programmes are recommended. Some

components of the knowledge and skills required for teaching with technology can be assessed easily. They include technical skills such as the operation of hardware or software, knowledge of relevant curriculum and policy documents.

Besides, other computer determinists are of the view that introduction of computers will result in an improved teaching and learning (Elen, Lowyck & Van den Berg, 1999). The provision of computers and access to internet to schools will bring about a positive change in the learners. Their view for the provision of hardware and software has confirmed Brownell's belief that computer and its accessories are a strong factor for effective teaching in ICT.

Over the past years, government and other partners such as Microsoft Corporation, have made attempts to develop ICT, to produce the human resource needed for the educational institutions and the emerging ICT industry in Ghana. One of such development is Kofi Annan ICT Centre. In view of these, in 2004, Parliament passed into law Ghana's Information and communication technology for accelerated development (ICT4AD) policy (ICT policy document, 2004).

Empirical evidence derived from a major study in eight selected schools on the teacher ICT skills and training in Ghana, shows that 71% never used computers in the classroom, 24% had some form of training and could use it, and the rest (5%) indicated no response. The study focused on the pedagogical skills, internet search, and general classroom activities with respect to usage of computers (Boakye & Banini, 2008),

Furthermore, a survey conducted by the Savannah Signatures (2010), in collaboration with the Initiative for Integrated Development, a non-governmental organization in the three northern regions of Ghana, revealed that 54.10% of basic schools had no ICT facilities while 45.90% had computers. The facilities available are not being put to good use, due to either lack of well-equipped computer laboratories; or qualified ICT teachers to handle the subject at the basic schools.

Additionally, the report disclosed that government supply of computers to basic schools in Northern Ghana stood at 11.10%; and that of Parent Teacher Associations to respective schools is 48.20%. Non-Governmental Organizations that are into education and school authorities contributed 40.70% of the supply of computers to the basic schools. These figures include those in the Savulugu-Nantong district of the Northern Region.

Prior to the introduction of the Information and Communication Technology, a lot of workshops and forums were held in both Tamale and Savulugu by the government of Ghana and non-governmental organizations into education. The aim was to create awareness in teachers to provide the requisite skills and knowledge to handle ICT in the schools (NINKS, 2007). The workshops and forums continued after the implementation of ICT into the education system in order to realize the objectives. These include the teachers' forum on ICT integration into teaching and learning in schools organized on 15th July, 2010 in Tamale. The forum drew its membership from schools in the Tamale Metropolis and the Savulugu District. It was organized by Savannah Signatures with the support of the International Institute for Communications and Development. In attendance were teachers, selected students and non-governmental organizations such as Action Aid Ghana and Initiative for Integrated Development (Savanna Signatures, 2010).

Also, Savanna Signatures in partnership with the community Outreach Programme of Radboud University in Netherlands organized a three-week workshop for twenty teachers and head teachers of basic schools in Savulugu-Nantong district and Tamale Metropolis. The training started from 8th August, 2010 to 27th August, 2010. It was due to the outcome of the survey conducted earlier by the organization.

A seminar on the Ghana ICT for accelerated development policy by the Ghana Information Network for Knowledge Sharing (GINKS) in partnership with its local counterpart Savanna Signatures took place at Radach memorial Centre, Tamale, on 23rd November, 2010. It drew its participants from a cross-section of JHSs. Some of which include Dabokpa JHS, Shishegu JHS, and Kamina Barrack JHS. Others came from selected senior high schools like Vitting Senior High School and Northern School of Business (GINKS, 2010). It is, therefore, important to carry out an evaluation study to establish the impact that all these activities and interventions have had on the knowledge and attitudes of JHS teachers in the Northern Region in general and Savulugu-Nantong district in particular.

1.2. Statement of the Problem

Research findings show that teacher training institutions are facing a challenging task of producing teachers to handle ICT effectively. Inadequate equipment and facilities in the schools affect teaching and learning negatively. Despite this, teachers graduate from the training intuitions every year.

With all the acknowledgement of the potential to promote quality ICT teachers in the Savulugu-Nantong district by the stake holders in education, there still remains a gap in the state of teachers' knowledge in teaching Information and Communication Technology. Most teachers claim they learned how to use computers on their own volition without the necessary skills used in teaching, while others do not make any effort to learn it at all. The state of teachers' knowledge in teaching of ICT in the district still raises serious questions, which need to be answered: What contributes to the current state of teachers' knowledge in the teaching of ICT? Are the teachers in the JHSs given the required training in ICT? How adequate are the ICT facilities in the schools? What is the attitude of teachers towards the teaching of information and communication technology in the district? And what is the level of awareness of the teachers in teaching ICT among others needs to be investigated.

1.3. Specific Objectives of the Study

1. To assess teachers' knowledge in teaching Information and Communication Technology.
2. To examine Information and Communication Technology facilities in the district.
3. To determine measures to improve the current state of teachers' knowledge in teaching the subject.
4. To ascertain the attitude of teachers towards the teaching of Information and Communication Technology in the district.

1.4. Research Questions

Analyzing the statement of the problem and the purpose of the study indicates that the following research questions are appropriate to form the focus of this study.

1. What is the attitude of teachers towards the use of computers in the class room?
2. What level of ICT training were JHS teachers given?
3. Does access to ICT facilities affect teachers' knowledge in teaching in the district?
4. Does access to ICT facilities affect teachers' attitudes in teaching in the district?

1.5. Significance of the Study

Information and Communication Technology is used in every sphere of life, particularly in teaching and learning activities. The results of the study may be used to help policy makers in decision making for the teaching of ICT at the basic level of education in the district. Besides, it will serve as a tool to make teachers enthusiastic about the subjects they teach and integrate ICT well. Again, it will help educational authorities to properly organize in-service training for teachers at the JHS level in the district, which may be adopted by the rest of the country. Additionally, the outcome stands to assist learners to gain confidence in learning ICT. Finally, it will be used as a resource document for all categories of teachers and students to face the increasing demand of Information and Communication Technology (ICT) in the twenty-first century.

2. Review of Related Literature

The relevant literature is focused on the following sub headings:

1. Definition and concept of evaluation.
2. Evaluation approaches to educational programmes
3. Attitude and perception of teachers towards the use of ICT in teaching and learning
4. Access to Information and Communication Technology facilities.
5. ICT teacher education and training in Ghana.

2.1. Definition and Concept of Evaluation

There are various definitions of evaluation in education. An evaluation can be defined as the systematic process of obtaining or gathering useful information and taking decision or making judgment on this information (Wentling, 1980). Besides, an evaluation is the making of judgments about the worth and effectiveness of educational intentions, processes and outcomes; about the relationships between these; and about the resource, planning and implementation frameworks for such ventures (Adelman & Alexander 1982). Additionally, evaluation is the systematic process of judging the worth, effectiveness or adequacy of something according to definite criteria and purpose (Joshua, 2005).

These definitions of evaluation show that every good evaluation should include three basic processes: prescribing specific goals to be achieved; securing specific evidence concerning the existing quantity and quality of a condition of process; and making judgment with respect to the available evidence, concerning the extent to which the goals have been attained. Thus, evaluation is a more comprehensive term which includes testing and measurement and also qualitative description of the student behaviour. Every good evaluation should lead to the improvement of what or whoever is being evaluated (Joshua, 2005). Again, a systematic process to determine effectiveness of an educational programme, with respect to evidence has four uses; to appraise academic attainment of individual learner, to assess the effectiveness of an educational programme, to find out learning difficulties, and to assess the educational progress of a larger population (Joshua, 2005).

Additionally, Alkin (1990) stated that evaluation includes systematic collection of information, used by specific, identifiable groups or people to make decision or improve programme effectiveness. The word systematic as applied to evaluation means a planned activity that has to be followed to a logical conclusion. Again, evaluation in general does not mean to replace decision makers' experience and judgment, but to provide systematic evidence that informs experience and judgment.

2.2. Purpose of Evaluation

There are many reasons for evaluating educational programmes just like the definitions. However, Scriven (1967) grouped the conduct of an evaluation into two. These are the formative and summative evaluation. The formative provide information during the developmental and design stages of instructional procedures and materials. Whereas the summative evaluation is carried out at the end of an instructional segment to determine if learning has taken place.

Also, Patton (1995) pointed out that one of the purposes of evaluation is to serve as a check on reality. Patton said reality is not absolute and one-dimensional, but rather relative and subject to several interpretations. For instance, when an evaluation is conducted on a programme, it attempts to compare the perceptions of the reality of the programme with those of the stakeholders. Patton added that evaluation of a programme is often influenced by philosophical beliefs of those who carried it out. The decisions they make with respect to what to evaluate, how to evaluate, who should take part and other decisions are a reflection of their conscious and unconscious beliefs about a number of evaluation issues: whether the participants and stakeholders should have a role to play in the design, conduct and use of the evaluation; whether the information gathered for the evaluation consists of tangible, observable and measurable qualities.

2.3. Evaluation Approaches to Educational Programmes

Worthen, Sanders and Fitzpatrick (1997) classified the different approaches of evaluation into six categories. These are Objective-Oriented Approach; Management-Oriented approach; Consumer-Oriented Approach; Expert-Oriented approach; Adversary-Oriented approach and Participant-Oriented Approach. In this study, only the Objective-Oriented approach is discussed.

2.4. Objective-Oriented Approach

The objectives-oriented evaluation approach focuses on specifying the goals and objectives of a given programme and determines the extent to which they have been attained. Tyler (1942), who conceptualized the objectives-oriented approach to evaluation, is recognized as being the pioneer of this approach (Stufflebeam & Shinklefield, 1985). According to Worthen and Sanders (1987), it is scientifically and logically acceptable, but for evaluation to succeed; goals and objectives must be defined. However, Stufflebeam and Shinklefield (1985) criticized that by saying, not all objectives could be evaluated since the process by which objectives are selected was open to bias. In sum, there is no one definition for evaluating a programme, also no single correct method of evaluation is suitable for all situations. The approaches and methods depend upon the situation as well as the goals and objectives.

2.5. Teachers' Attitudes and Perception towards the Use of ICT in Teaching and Learning

Achieving a meaningful use of computer technology in the field of education can be influenced by many factors. One of these factors is teachers' attitude towards the use of technology in teaching and learning process. Attitude plays a key role in determining people's reactions to situations. A review of the psychological literature reveals diverse definitions of attitude. Allport (1935) defined attitude as "a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related" (p.810). Besides, Fishbein (1975) defined attitude as a learned predisposition to respond to an object or class of objects in a consistently favourable or unfavourable way. Attitudes are key factors in determining whether teachers accept computer as a teaching tool in their teaching practices. Correspondingly, a number of studies were carried out to determine teacher attitudes toward computer use.

Research shows that the successful utilization of technologies in the classroom depends mainly on the teachers' attitudes toward these tools (Kluever, Lam, Hoffman, Green & Swearinges, 1994). Additionally, the success of technology use in the educational settings largely depends on teachers attitudes toward technology use (Baylor & Ritchie, 2002). Teachers' attitudes are considered as a major predictor of the use of new technologies in the educational settings (Albirini, 2006). Teachers' attitudes toward computer can play an important role in the acceptance and actual use of computers. Therefore, the attitude further related to the usage frequency of technology and the amount of the technology being used.

Harrison and Rainer (1992) found in a study that participants with negative computer attitudes are less skilled in computer use and are therefore less likely to accept and adapt to technology than those with positive attitudes. Albirini (2004) conducted a study to investigate the attitudes of English as foreign language (EFL) teachers in Syrian high schools toward technology in education. The results from the study indicated that teachers' attitudes toward the use of technology in education really promote learning.

Roblyer and Edwards (2000) suggested that there are five important reasons for teachers to use technology in education: (1) motivation, (2) distinctive instructional abilities, (3) higher productivity of teachers, (4) essential skills for the Information Age, and (5) support for new teaching techniques. To use technology effectively in the classroom, teachers' attitude toward technology should be positive and they should be trained in how to use the modern technologies in the field of education. Ching and Hortin (1994) stated that the teacher must act as the agent of change in the relationship between technology and the student.

Recent studies indicated that teachers' attitudes toward computers have significant implications for behaviours of teachers in the use of computers for teaching (Kellenberger & Hendricks, 2003). In the process of combining ICT with education, teachers' attitude towards using knowledge besides their talent and desire will be a crucial point affecting the results of application. The basic agent for establishing and making the system work effectively is the teacher. It is argued that successful integration of ICT in education enables teachers to transform instruction from teacher-centred to learner-centred, where learners will interact with their peers and use the computers and Internet facilities for their own learning needs. But many teachers do not regard themselves adequately prepared and comfortable in using ICT in educational settings, they rather feel more confident with their traditional teaching styles (Hawkins, 2002).

Several studies attempted to develop instruments for measuring teachers' attitudes toward the use of computers. However, only a few of them focus specifically on measuring teachers' attitudes toward the use of computers in schooling for instructional and management purposes (Sadik, 2006). For example, Singapore teachers' attitudes toward using computers in schools were assessed by Ching (1999) using Selwyn's Computer Attitude Scale CAS (1997). Besides, Allan and Will (2001) measured Chinese teachers' attitudes toward the pedagogical use of computers within the theoretical framework proposed by Selwyn. Another widely used instrument in this field is Teachers' Attitudes toward Computers Questionnaire (TAC). Likert-type scales are used in all the scales. These attitude scales also play an important role in the effective investment in computer technology to support instruction and successful integration of computers in teaching (Koohang, 1989).

Additionally, research studies suggested that male teachers tend to show slightly more favourable attitude toward computer use than females (Dupagne, & Krendi, 1992). Other studies, however, report little or no differences in teacher attitudes on the basis of gender (Woodrow, 1992). Bradley and Russell (1997) also reported a correlation between gender and levels of computer anxiety, with females reporting a greater degree of anxiety than males. Particularly in primary schools, where the ratio of female to male teachers is much greater, this issue as a hindrance to the use of ICT may be much more significant. However, the European Commission, (2003), noted

that gender is an issue which determines the use of ICT by teachers, stating that 77% of male teachers use a computer off-line, compared with 66% of female teachers, and points out that the gap is wider when looking at the use of the internet; 56% of male teachers compared with 38% of females. There could be several reasons for the differences illustrated by these figures. As the majority of teachers in primary schools are female, this could perhaps explain why less female teachers used a computer online. Shapkaa and Ferrarib (2003) indicated that there are no consistent results on the gender issues.

Also, many studies indicate that there is no significant relationship between age and attitudes (Handler, 1993). However, some studies showed that teachers' age have important effects on the teachers' attitudes (Chio, 1992). Also, Chio revealed that older teachers in the study, who had more positive attitudes toward computers, had less computer literacy than the younger teachers. In another study by Bradley and Russell (1997), it was found that levels of computer competence or anxiety do not vary significantly with respondent's age. They suggested that computer anxiety increases with age and that younger teachers are unlikely to need professional development. However, a report by the EC (European Commission, 2002) found that age is a factor contributing to the use of computers and the internet, showing that the percentages of teachers using computers falls as their age increases. The report, however, acknowledged that the importance of this factor is falling and does not support the current findings. The fact that older teachers do not necessarily become more anxious about the use of computers, suggest that age is not, in itself, a significant problem to the use of ICT by teachers in the class room. In spite of that Deniz (2005) determined that teachers' age is significantly related to teachers' attitudes. The age 36 is considered to be the limit for the positive attitudes of primary school teachers in Turkey.

Teachers' computer experience has been the most commonly cited variable correlated to positive attitudes (Gaudron & Vignoli 2002). For example, Woodrow (1992) reported correlations between computer experience and attitudes toward technology. Chou (1997) also highlighted that computer experience influenced teacher attitudes toward computers. Ropp (1999) found that there is significant relationship between computer access and hours of computer use per week and computer attitudes.

The effects of computer ownerships on teachers' perceived computer competence, concentration on improving the quality of current practice and computer attitudes have been investigated in many studies (Monk, Swain, Ghrist, & Riddle, 2003). In summary, computer ownership has been consistently correlated to attitudes toward computers and positive effects for preparing teaching and learning materials.

According to Akkoyunlu (1996), there was a meaningful relationship between pre-service teachers' knowledge about technology and their attitude towards technology. She also found that pre-service teachers with more information about technologies have more positive attitude towards the use of technologies in teaching and learning environments. Altun (2003) also found out that pre-service teachers' cognitive styles were not affected by their attitudes toward computers.

Most of the literature looking at the obstacles to ICT use in schools suggests that in the teaching profession generally, there is an inherent resistance to change and that this is a barrier to some teachers' use of new technologies in education. Albaugh (1997) explained that teachers are always suspicious of new claims and the implementation of new ideas without proof of effectiveness. They will only accept a new technology when it helps them to do what they are currently doing well. Veen (1993) described this as the 'persistence of beliefs'. Teachers hold views that persist during the introduction of new innovations and as a result educational change is a slow process, with teachers needing time to gain experience with computers. An example of this is found in Snoeyink and Ertmer (2001), where a teacher explained that she wished to remain comfortable with her conventional method of teaching. Although this may have kept her from adopting the best teaching methods, being comfortable was important to her. The same teacher was not highly skilled in using computers, and so using them would have resulted in her having to leave her 'comfort zone', which she did not feel able to do.

Ertmer (1999) discussed the importance of attempting to overcome problems caused by teachers' beliefs and attitudes concerning ICT, referred to as second-order barriers, before other external factors, or first-order barriers, are tackled. First-order barriers, such as the lack of access or training, it is claimed, are more readily observed and more easily tackled, whereas other barriers may require major changes in daily routines and underlying beliefs about effective practice. Mumtaz (2000) agreed, suggesting that teachers' beliefs about teaching and learning with ICT are principal to integration.

Dawes (2000), however, was critical of the belief that teachers resist change in their professional practices merely as a result of their personal beliefs. She states that the reported attitude of teachers towards ICT tells us more about what equipment the teacher has access to, what training they have had, and what sort of community they are part of, than it does about the willingness of the teacher to use ICT. The suggestion here then, is that the perceived resistance to change is actually a symptom of hindrances to the use of ICT.

The idea of resistance to change as a difficulty to ICT need not only be attributed to teachers' own attitudes in the teaching and learning process. According to Cuban, Kirkpatrick and Peck (2001), the school as an institution resists the kinds of change needed for the successful teaching and learning of ICT. The organisation of the school, such as the numerous subjects and co-curricular activities with strict time schedules and departmental boundaries, considerably reduces the coordination of ideas within and between departments. In this regard, teachers find it difficult to share ideas, plan together, and observe each other's lesson to bring about innovations which encourage diversified teaching using computers.

Another important area of teachers' attitudes towards ICT is their understanding of how it will benefit teachers and pupils in the learning processes. Snoeyink and Ertmer (2001) noted the importance of teachers seeing the purpose in using computers in their teaching and learning; and suggested that this can be achieved through focused training. Specifically, it shows teachers how technology can help them in their own individual situations. Simply watching other teachers using technology will not show them how they can use it to their benefit in their teaching and learning situations. Cox, Preston and Cox (1999) found out that if teachers see no need to question or change their professional practice, then they are unlikely to make use of ICT. They concluded that the perceived

usefulness of computers to teaching is an important factor for teachers, and as such should be included in any ICT training programme to ensure that teachers are convinced of the value of using ICT in their teaching.

Yuen and Ma (2002) also discussed the importance of perceived usefulness, stating that this factor influences computer acceptance to a much greater extent than perceived ease of use. They added that a computer system is useful only if it is applied to a context and that without understanding how computers can be integrated into teaching, teachers may not perceive computers as useful at all. A study by Robertson, Caldert and Fung, cited in Mumtaz (2000), found that some teachers who were given palmtop computers to use remained unconvinced about the computer's potential, and concluded that training should ensure that teachers are made aware of the range of uses and possible benefits of ICT.

2.6. Access of Information and Communication Technology Facilities

The issue of teachers' access to ICT facilities is a complex area and in order to understand this more, it is helpful to break it down into several 'sub-headings'. The inability of a teacher to gain access to ICT resources may be the result of one of a number of factors, and is not always simple because the hardware or software is not present within the school.

2.7. Urban and Rural Schools in Ghana

Since the introduction of formal schooling in Ghana, educational resources have been unequally distributed in the school system (Folson, 1995; Foster, 1965; Graham, 1971; McWilliam and Kwamena-Poh, 1975). In view of this, it is critical for policy makers to ensure that ICT does not become another tool for perpetuating educational inequalities in Ghana's school system. But a review of the available literature shows significant inequity in the implementation of ICT in Ghanaian schools (Dankwa, 1997; Parthemore, 2003). The literature clearly stated that ICT provision to secondary schools is skewed in favour of schools categorized as premier schools and schools in urban centers.

According to Parthemore (2003), computer literacy education in Ghana has been concentrated in major urban areas. A few better schools in rural areas have attempted to reach their urban counterparts by contracting with private companies and non-governmental organizations to provide computer education. The cost for private computer training is relatively high and all students may not have access to it. Other schools have taken part in the Ghana Education Service sponsored scheme where for every hundred textbooks they purchase from a private firm, they receive one computer and its accessories.

Mfum-Mensah (2003) revealed that SchoolNet, a foundation based in Switzerland, chose fourteen schools in Ghana which to implement ICT programmes. Of these schools, five are located in Accra, three in Kumasi, four in Cape Coast, one in Tema and one in Aburi. Looking at these fourteen schools, eleven belong to those schools categorized as premier schools, such as Achimota and Wesley Girls. Apart from Aburi, the rest of the locations are all cities. Aburi, is however located about twenty minutes' drive from Accra. Now that the distribution of ICT in schools is also progressively skewing in favour of the urban schools, as it has been with other educational services since Western-type formal schools started in the country, policy makers face the challenge of promoting equitable provision of ICT facilities. The equitable implementation of ICT in the secondary school system is a complex issue.

However, recent educational policies offer some perspectives on this issue. The government reiterated its commitment to extend computers to all schools in the country in the news media. The government also emphasized its commitment to remote equitable ICT in the school system so that all students will equally benefit from ICT regardless of their geographical location. The successful implementation of such a policy would be a great achievement in the educational system. However, existing inequality and poor infrastructure in the nation is likely to pose a challenge to implementing equitable ICT in the school system (Mfum-Mensah, 2003).

Additionally, accessibility of ICT in secondary schools also interconnects with other development issues, such as accessibility and connectivity to electricity and telephone grids. The themes that emerged from the policy arena challenges to ICT in rural schools are lack of telecommunication and resources such as: finance, infrastructure, personnel and their training, software, and textbooks. Since 1998, the government of Ghana has extended electricity to many rural communities in the country (Ministry of Education, 1999). However, many rural communities are yet to be connected to the electricity grid. Most rural communities that have secondary schools do not currently have access to electricity and telephone services. In such localities, the idea of promoting computers in classrooms will require more financial backing, and a considerable amount of time, considering the pace of development in Ghana.

According to Ismail (2002), it is obvious that the high costs for providing electricity (where there is none) and connectivity to telephone services are major setbacks to providing ICT in rural areas in Ghana. Students enrolled in premier schools like the Achimota School, Wesley Girls School, and Prempeh College and those in urban areas who have easy access to computers and Internet cafés have already made a considerable increase in the use of computers and the Internet do not face such challenges. On the contrary, most students enrolled in rural secondary schools have never set eyes on a computer. While students in urban areas can now boast of their proficiency in the use of Internet and basic computer programmes, the silent majority of their colleagues in the rural secondary schools do not have a clue as to how to boot a computer or click a mouse.

Availability of an appropriate environment for ICT facilities is another issue that will determine accessibility of ICT for rural schools (Mfum-Mensah, 2003). Some schools have successfully implemented ICT projects because they possess the infrastructure to accommodate ICT equipment donated by benevolent organizations. Inadequate infrastructure is a problem facing many rural secondary schools. The infrastructure of most rural schools lacks the appropriate environment and the needed security for storing ICT equipment.

In conclusion, Amenyo (2003) cautions that any attempt to implement a well-meaning ICT project in a haphazard and context-independent manner would not help in sustaining it. Nations in the developing world are not the only regions caught in the "digital

divide “phenomenon, brought about by ICT implementation. Recently, emergent in-country case studies and other comparative studies (Harding, 2002; Hartviksen & Akselsen, 2002; Nachmias, Mioduser & Shemla, 2001; Sutherland-Smith, Snyder, & Angus, 2003) point out that even in advanced countries like Australia, Canada, Israel and United States, there is evidence of a persisting digital divide, despite a significant growth in computer ownership and overall usage. In the United States, evidence shows the disparity between whites on one hand and blacks and Hispanics on the other hand. Similarly, in Canada one finds the same problem between rural and urban areas where approximately 53% of rural households have access to the Internet, compared to 68% of urban households (Harding, 2002). As a result of equitable educational provision in school systems, the emerging revelations pose serious policy implications for governments, educators and the development community. In the Ghanaian society, the disparity in ICT provision in schools can be seen as an example of the digital divide that is likely to be created between the rural and urban schools.

2.8. Access to ICT Facilities in British Schools

Mumtaz (2000) points out that evidence of very good practice in the use of ICT is invariably found in those schools that also have high quality ICT facilities and that lack of computers and software can seriously limit what teachers can do in the classroom with regard to the teaching of ICT. The importance of schools being well resourced in ICT equipment is also highlighted by a recent Becta publication, “Primary Schools – ICT and Standards” (Becta, 2003). This study, which explored the relationship between schools’ use of ICT and pupils’ achievements in Britain, presented strong evidence to show that those schools which were well resourced in ICT tended to have better achievements than schools with unsatisfactory levels of ICT. The report stated that the relationship was not simply as a result of the higher achieving schools having better socio-economic circumstances, and also that it was not as a result of schools with better quality leadership. The lack of good ICT facilities in a school, will not only prevent teachers from making good use of ICT in their teaching and learning processes, but it is also likely to bring about poor standards.

Besides, the study also identified absence of resources physically available at some schools and the poor quality of few resources that were available. In some cases teachers at schools with sufficient quantities of good quality resources were still experiencing problems, as a result of the organisation of those resources. It also highlighted the need for teachers to have better access to ICT facilities for their own use, such as for the planning and preparation of lessons.

2.9. Personal Access to Computers

When discussing the issue of access to resources, it is important not to only think of the access teachers need in order to teach with ICT, but also to consider the need for teachers to have their own personal access to ICT, to allow them to plan and prepare lessons, for example. One of the factors which contribute to the degree of a teacher’s confidence in using ICT in school is the amount of personal access to ICT that the teacher has. Ross, Hogaboam-Gray and Hannay (1999) made a direct link between teachers’ use of ICT to accomplish their own personal goals and their confidence in making use of ICT in their teaching. Perhaps unsurprisingly, those teachers in their survey who made little or no personal use of ICT had a low level of confidence in using it in their lessons.

Cox, Preston and Cox, (1999) also found this relationship. The results of their study showed that teachers who use ICT regularly are confident in using it and have a positive attitude towards it, perceiving it as a useful tool in both their personal and their teaching work. Guha (2000) found similar responses from teachers interviewed and confirmed that initially there was a lot of phobia, but now teachers have computers at home hence they have less fear in using computers. The interim findings of the Teacher Workloads Study for the Price Waterhouse Coopers in 2001, highlights the importance of teachers having access to ICT at home to allow them to make use of the technology in their own work. In the Becta (2003) survey, a number of comments were made about the need to have more personal access to computers at home and at school. Some of the comments include: teachers who have laptops to take home end up making more use of ICT than those without laptops. It makes them develop confidence, being given a laptop that works for personal use. Shared use of a computer when at school is not in the least convenient. Absence of instant access to resources (computer or laptop) on the teacher’s desk affects teaching of ICT.

In sum, the review so far shows that there are difficulties and challenges facing ICT education all over in this twenty first century. The disparities are not only peculiar to Ghana, but both advanced and developing nations.

2.10. ICT training in Pre-service Teacher Education Programmes

A study conducted by Mereku, Yidana, Hordzi, Tete-Mensah, Tete-Mensah, and Williams, (2009) showed that at the pre-tertiary levels, teachers are not trained to use ICT for teaching and learning, though the new curricula required that teachers integrate ICT into instruction across the curriculum. The research indicated that the colleges of education are doing little to equip trainees with skills necessary to integrate ICT into teaching during their pre-service teacher training programmes. This study has also shown that the teaching universities, University of Cape Coast and University of Education, Winneba are not doing much in this regard.

According to the study, only one department in UEW is offering a programme which trains teachers to teach computer education in secondary schools - the Department of ICT Education at the Kumasi Campus. This department enrolls less than 5% of the university’s students. The remaining 95% of the students enrolled by the university take only an introduction course in ICT in order to acquire basic computer literacy skills and knowledge. It is a general course studied by all students at Level 100 to give them the necessary skills for ICT applications commonly found in educational settings. Students are taught basic skills in word processing, spreadsheets, PowerPoint, web designing and how to preview educational software. Also, this course provides students the required skills and knowledge to use the computer to enhance classroom instruction, communication and management.

In addition to the general course in ICT studied by all first year students, certain departments provide additional courses that require usage of computers. They include the Department of Mathematics Education, Art Education, Music Education and Technology Education. They take an ICT course in Graphic Design, Automatic computer Aided Design and using ICT to compose music. It can be concluded that over 95% of UEW students, like the trainees in the colleges of education, are not taking programmes that will offer them adequate opportunities to develop their pedagogical skills in integrating ICT. This observation had been confirmed by a recent study by the 'ICT in Education Programs Unit' of the Ministry of Education (MOE) which recommended that the ICT training courses of the colleges of education and the teacher training universities need to be reviewed to ensure that graduates possess the necessary skills needed to support ICT as a subject or use ICT as a means of integration (MOE, 2009).

2.11. ICT Training in In-service Teacher Education Programmes

The Ghana Education Service is expected to provide ICT in-service training that would empower teachers to effectively use ICT in teaching and learning, but the training had not taken place as expected. However, at the pre-tertiary level, predominantly the Core ICT teachers reported to have participated in continuing professional development activities that did not include ICT integration. These constitute about 10% of educators while 90% of pre-tertiary educators are yet to receive ICT related professional training. None of the educators reported to have participated in continuing professional development activities that included ICT integration (Mereku, Yidana, Hordzi, Tete-Mensah, Tete-Mensah, and Williams, 2009).

Additionally, the study shows that most of the educators have limited skills and knowledge in ICT integration for teaching and learning. The few that claim to use ICT integration techniques in instruction basically rely on PowerPoint presentations as if that was the only way to integrate ICT into instruction. As pre-service and in-service teacher education programmes have failed to provide adequate ICT training that would empower teachers to effectively use ICT in teaching and learning. Almost all the educators at the pre-tertiary and tertiary levels indicated that they require training in ICT competencies and skills including the following: typing and advanced word processing; using spreadsheets (or excel); using AutoCAD; using PowerPoint in creating presentations as well as how to present the slides when teaching; browsing the internet; creating multimedia instructional materials using multimedia tools; creating course websites to upload digital teaching and learning content; using statistical data analysis packages such as SPSS and how to use ICT integration techniques in instruction.

2.12. Impact of ICT Use on Teaching and Learning

A study conducted by Becta (2003) revealed that some educators and learners pointed out the positive impact of ICT applications on students' access to knowledge. The report also indicated that some of the students interviewed stated that the use of ICT had equipped them with skills to search for information (from CD-ROMs or Internet) and this had helped them gain more knowledge of some of the things they study in many subjects, increasing their confidence in making contributions during class discussions. They also stated that the use of computer illustrations had helped them in understanding abstract ideas and concepts and the "Mavis Beacon Typing" software had made it easier, cheaper, and quicker for them to learn how to type. Besides, the ICT instructors interviewed did not only confirm that ICT had been helpful in increasing the students' information search skills, but also added that the grammatical and typographical errors in their completed assignments had reduced because of the ability to use the spell and grammar check functions of the word processing program on the computer.

At the universities, students used the Internet for searching for information, downloading driver software for repairs, and for communication with lecturers and friends. A few also used Microsoft Word for producing their assignments. An example of ICT-based productions by teachers and learners is little documentation produced by learners using CT is available in the pre-university institutions. It indicated that students had used the computer for assignments in subjects other than the Core ICT Becta (2003).

Finally, a challenge for pre-service education is finding classrooms where pre-service teachers could observe teacher educators using technology appropriately and to understand where and how to include technology in their lessons. The computer has moved from an object to be studied to a teaching and learning tool for teachers and students. Hence, teacher preparation programmes could no longer rely on an introductory course. Teachers studying the technology in teacher education curriculum need to take proactive steps for its integration in teaching and learning. Teacher education and technological competence should involve all aspects of the preparation of teachers that is, introductory competencies, use of technology and methods in classes, school placements, and student teaching. Pre-service teachers need to develop a vision from the very beginning of their careers for using computers in their classrooms. For this reason, student teachers must understand computer operations and programming--leading them to develop a vision of the value and use of computers in learning.

Therefore, it is crucial that teacher preparation programmes should develop the cognitive, social, and physical environments that will help teachers feel efficacious and in control of learning to teach with technology, a domain that is often overwhelming even for experienced teachers. Another challenge of preparing teachers to teach with technology is that as a result of knowledge generation, our knowledge about computer technology is constantly changing. In addition to this factor, there are various other dimensions like attitude, motivation, computer anxiety, and computer self-efficacy which play an important role in developing skills and competencies among prospective teachers.

In short, the chapter reviewed the available literature that will assist the researcher to conduct the study. The literature is comprehensive, it discussed teachers' attitude to the teaching of ICT in Ghana and other parts of the world.

3. Methodology

3.1. Research Design

The research design used in this study was the cross-sectional descriptive survey. A cross-sectional design collects data on relevant variables one time only from a variety of people, subjects, or phenomena (Abramson, and Abramson, 2000). It can provide data on the entire population. Besides, it can be used to describe absolute risk and not only relative risk. It is also used to describe prevalence of an outcome of interest such as poor performance in an examination.

This type of survey was used in this study because it is essential for a large population. Additionally, it is very easy to use. The cross-sectional design allows for sampling of the population and where the sample is representative generalization can be made based on the findings.

3.2. Population

The target population was all the 92 teachers in the twenty two JHSs in the Savulugu-Nantong district. The accessible population was teachers in Savulugu, Pong-Tamale and Nantong who agreed to take part in the study. These teachers teach ICT in their respective schools.

3.3. Sample and Sampling Procedure

The sampling design used was non-probability convenient sampling. In this sampling, each member of the chosen population does not have equal opportunity of being selected as part of the sample. However, due to their presence at the place, where the data is being collected, they have the chance to be part of the population. According to McMillan & Schumacher (2006), it is the most common sampling design used in educational research. This design was selected due to convenience. An average of four to six teachers in each school was chosen. In all, 75 teachers were conveniently sampled for the study. However, 72 submitted their completed questionnaires. Four of the submitted questionnaires were not containing enough data during the data screening, as a result of this, 68 were used for the study. The sample size 68 conveniently used, Research Advisors 2006.

3.4. Instrument

The study relied on questionnaire schedule to generate data for analysis. The construction of the instrument was based on the research questions and literature review. The questionnaire items are divided into six sections. The first section was on the demographic information survey of the sample. It was a multiple choice type of instrument. Respondents were asked to show their views on a four-point Likert scale type of instrument starting from strongly disagree to strongly agree for the remaining sections. The second part was on teacher's attitudes towards the teaching of ICT. The third section focused on teachers' awareness. Section four was on teacher ICT training, while section five was on availability of ICT facilities in the schools. The final section looked at the knowledge used by teachers in lesson delivery

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.797
Bartlett's Test of Sphericity Approx. Chi-Square	1.964E3
df	378
Sig.	.000

Table 1: Kaiser-Meyer-Olkin and Bartlett's Test

3.5. Factor Analysis

According to (Suhr, 2006), factor analysis is to identify fundamental variables, or factors, that explain the pattern of correlations within a set of observed variables. It is often used in data reduction to identify a small number of factors that explain most of the variance that is observed in a much larger number of manifest variables. It is also used to generate hypotheses regarding causal mechanisms or to screen variables for subsequent analysis for example, prior to performing a linear regression analysis.

Confirmatory factor analysis. Confirmatory factor analysis (CFA) is a statistical technique used to test the hypothesis that a relationship between observed variables and their underlying latent constructs exists (Suhr, 2006). It requires the knowledge of theory, empirical research or both relationship patterns.

Scree plot shows a plot of the variance that is associated with each factor. A scree plot was used to illustrate the factors identified. It can be seen that several factors were identified, but those that have eigenvalues of more than 1 were retained for the study (as shown in figure 1).

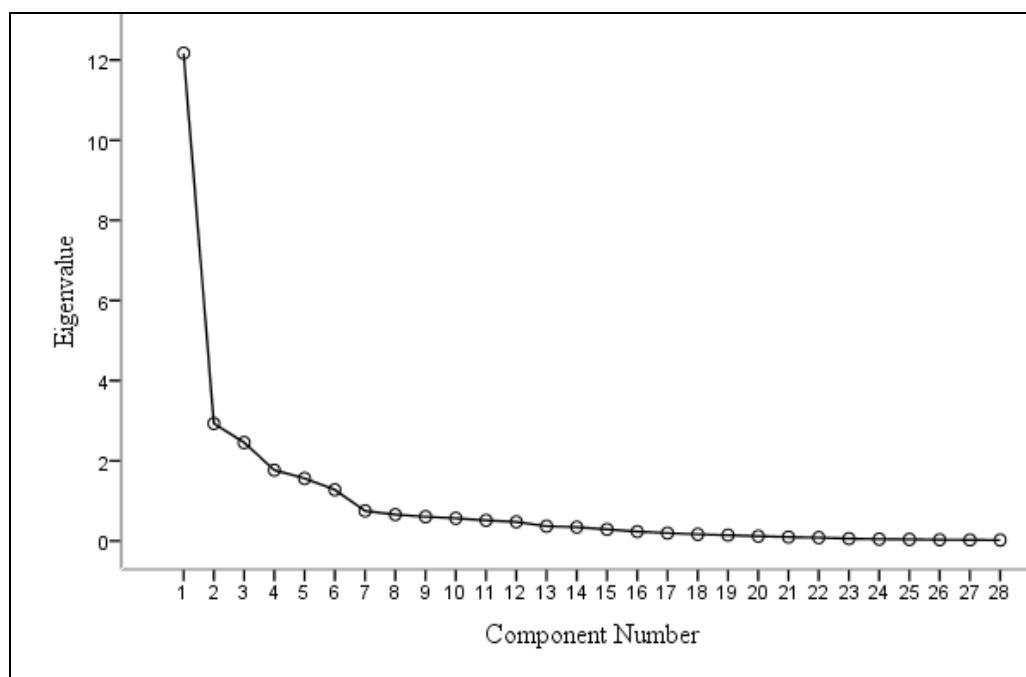


Figure 1: A scree plot illustrating factors identified in the study.

The principal component analysis with varimax rotation was conducted on the data. The initial factor analysis provided five factors with eigenvalues greater than one and collectively accounted for 65.8% of variance (as in Appendix B). Besides, appendix C presents the rotated factor matrix for the components. The component 2, perceived teachers awareness of ICT had only two significant statements loadings as such there were deleted. Again, 7 other statements on teachers' attitude to teaching of ICT were deleted due to poor factor loadings. Besides, 3 statements on teachers' 'training were removed because they attempt to measure what they were not supposed to measure. Another principal component factor analysis with varimax rotation was conducted on the rest of the statements, which led to the deletion of a statement on teachers' knowledge. This analysis was to determine best fit. Twelve statements (as in Appendix D) were deleted at the end of the analysis. In all, 28 items were used for the study and are listed under the various components (as shown in Appendix E).

3.6. Results of the Factor Analysis

After thorough scrutiny of the relationships among the variables under each component, the following interpretations were derived for various dimensions of the component. Component 1 was tagged perceived teachers' attitude; component 2 availabilities of facilities; component 3 teachers' ICT training and component 4 teachers' ICT knowledge.

Considering component 1 (perceived teachers' attitude involving 4 items), teachers' responses ranged from 1 to 4. Coded value 1 or 2 on factor 1 shows that the responded item has a negative attitude to teaching ICT, while, 3 or 4 indicates positive attitude to ICT teaching. Its grand mean is 1. The descriptive statistics of teachers' attitude responses are illustrated in table 2.

	N	Minimum	Maximum	Mean	Std. Dev
I use computers regularly in the school	68	1	4	1.57	.779
We use internet for entertainment only	68	1	4	1.59	.777
Computers are used for all the lessons I taught in the school	68	1	4	1.50	.723
We use printers in the school	68	1	4	1.57	.834
Valid N (list wise)	68				

Table 2: Descriptive Statistics of Perceived Teachers' Attitude Scale

For component 2 (perceived availability of ICT facilities, involving 10 items), coded values ranged from 1 to 4, with a total average of 2. A coded value 1 or 2 on factor 2 shows that respondent believe there are ICT facilities in their schools. However, 3 or 4 indicate the teachers' response to absence of ICT facilities. The descriptive statistics are in table 3.

	N	Minimum	Maximum	Mean	Std. Dev
My school has enough computers for teaching and learning ICT	68	1	4	1.76	1.067
Ghana government provided the school with all the computers	68	1	3	1.43	.527
I use the school wireless service.	68	1	4	1.71	.963
The school uses cable network service	68	1	4	1.44	.741
My school is connected to the internet	68	1	4	1.57	.779
Every student has a computer in the school.	68	1	2	1.31	.465
The school is connected to the national grid	68	1	4	2.65	.989
There is enough time to teach ICT in the school.	68	1	4	1.81	.950
The computer laboratory is well furnished	68	1	4	1.66	.956
There is sufficient curriculum materials in the school	68	1	4	1.72	.789
Valid N (list wise)	68				

Table 3: Descriptive Statistics of Perceived Availability of ICT Facilities Scale

Third component (descriptive statistics of perceived teachers' training in ICT, involve 6 items), has a total average of 2. A coded value of 1 or 2 indicates absence of training by respondents. On the other hand, coded values 3 or 4 confirmed adequate training of respondents. The mean, range and standard deviation are on table 4.

	N	Minimum	Maximum	Mean	Std. Deviation
I can type very fast with a computer.	68	1	4	1.71	.899
I had pre-service training in ICT from the college.	68	1	4	2.32	.854
I attend ICT workshops and seminars every term	68	1	4	1.56	.817
I did soft ware programming at school.	68	1	4	1.97	1.051
I can design educational soft wares very well.	68	1	4	1.71	.865
I did only Microsoft office at the school	68	1	4	2.71	.847
Valid N (list wise)	68				

Table 4: Descriptive Statistics of Perceived Teachers' ICT Training Scale

Finally, component 4 descriptive statistics of perceived teachers knowledge, involving 6 items), teachers responses vary from 1 to 4 with the grand average of 3. The coded value 1 or 2 shows respondents belief of no knowledge in teaching ICT, while coded value 3 or 4 indicates in depth knowledge in teaching ICT. Table 5 shows the descriptive statistics of perceived teachers' knowledge in ICT teaching.

	N	Minimum	Maximum	Mean	Std. Deviation
Behavioural approach is the best for teaching ICT in the classroom	68	1	4	2.01	.985
I use the world wide web to access different types of information for my lessons.	68	1	4	2.43	.834
I use educational games and simulations to motivate my students in the classroom.	68	2	4	3.15	.554
I format the computers and do installation every month to prevent virus attack	68	1	4	1.94	.991
I use ICT to facilitate transfer of knowledge	68	1	4	2.19	1.096
Higher order thinking skills and creativity are facilitated by Information and communication technologies	68	2	4	3.15	.526
Valid N (list wise)	68				

Table 5: Descriptive Statistics of Perceived Teachers' Knowledge Scale

Furthermore, the average coded values for each component were approximately 2. This shows that teachers appeared to have positive opinions on all the items. Considering the intra-individual comparison of the items on attitude, availability of facilities, training and knowledge, there had greater consistencies. The internal reliability estimate values for the four components are: .61 to .87 = attitude, .60 to .87 = availability of facilities, .57 to .80 = training and .60 to .88 = knowledge.

Above all, through pre-test the instrument was done by asking a colleague to review the items for feedback, after which the supervisor did the final review and gave guidance. A pilot test was conducted afterwards in the Tolon-Kunbungu district in the Northern Region with 40 teachers. Additionally, the principal and confirmatory factor analysis met the construct validity of the instruments, hence the instrument was valid for the study.

3.7. Reliability

Reliability of instruments refers to the extent to which the instruments measure whatever it is measuring consistently (Joshua, 2005). Thus, any instrument which showed similar results of the same person or a quantity for a number of times irrespective of time and places is reliable. The concept of instrument reliability covers a wide aspect of scores consistently. There are many types of internal consistency measures, they include, test-retest, equivalent form, split half, Kuder-Richardson-methods and Cronbach Coefficient alpha.

To determine an effective and efficient internal consistency of the instrument, Cronbach alpha was used. It is a general form to determine consistency, hence, very good for statements that are neither correct nor incorrect. The internal consistency of the items for various sub-scales of the questionnaire was determined. This was done by finding the Cronbach alpha's α -coefficient with the help of the SPSS 16.0 computer software program. The detailed analysis of the reliability of the instrument is shown in appendix F. McMillan and Schumacher (2006) considered an acceptable range of reliability of the coefficient for instruments to be between .70 and .90. The Cronbach alpha's α -coefficient of the instrument was .835. The information gathered from the calculation of the Cronbach alpha's α -coefficient on the research instrument can therefore be used with confidence.

3.8. Data Collection Procedure for the Study

The researcher sent a letter to the target schools to seek for their involvement and to facilitate the administering of the instrument. Also, the letter assured them that their responses would be treated with confidence. They were required to respond to the four-point Likert scale to indicate their agreement or disagreement to the statement posted. The data collection took a maximum of two days in each school since the schools are far from one another.

3.9. Data Analysis

Newman and Benz (1998) stated that research questions are vitally important because they dictate the type of research design, the type of instruments administered as well as the data analysis techniques (statistical or qualitative). The data analysis technique was both quantitative and qualitative based on the research questions. The responses were edited and coded as follows: 4 = strongly agree; 3 = agree; 2 = disagree and 1 = strongly disagree to facilitate the data analysis.

The research questions 1, 2, 3 and 4 were examined through the computer software program known as the statistical package for social science (SPSS) version sixteen. Tables and charts were used to support the analysis to clarify issues and also give a quick visual representation of the values obtained.

Research question 4 was investigated using linear regression technique to predict the effect of access to ICT facilities on teachers' knowledge and attitude. The purpose of simple regression analysis is to evaluate the relative impact of a predictor variable on a particular outcome. This is different from a correlation analysis, where the purpose is to examine the strengths of the relationship between two random variables.

4. Results and Discussion

This section presents the specific descriptions of the teachers' knowledge and attitude towards the teaching of ICT and discussion of the results based on the research questions

4.1. Demographic Characteristics

A cross tabulation analysis was carried out on the characteristics of the sample as shown in Table 6. The ages of the respondents range from 20 to 49. All the 68 participants responded to the statement concerning gender.

	Respondent Age	Respondent Gender		Total
		Female	Male	
Age	20-29 Years	11	32	43
	30-39 Years	5	19	24
	40-49 Years	1	0	1
Total		17	51	68

Table 6: Respondent Age and Respondent Gender cross tabulation
Field Data, 2011

With the sixty eight participants who responded to the item on gender, 43(63%) were in the 20-29 age group. Female respondents form 17(25%) out of this, 11(16%) were between the age 20-29, 5(7%) representing the age 30-39 and 1(2 %) for the age 40-49. Male respondents represent 51(75%) with 32(47%) in the 20-29 age group and 19(28%) were in the 30-39 age group.

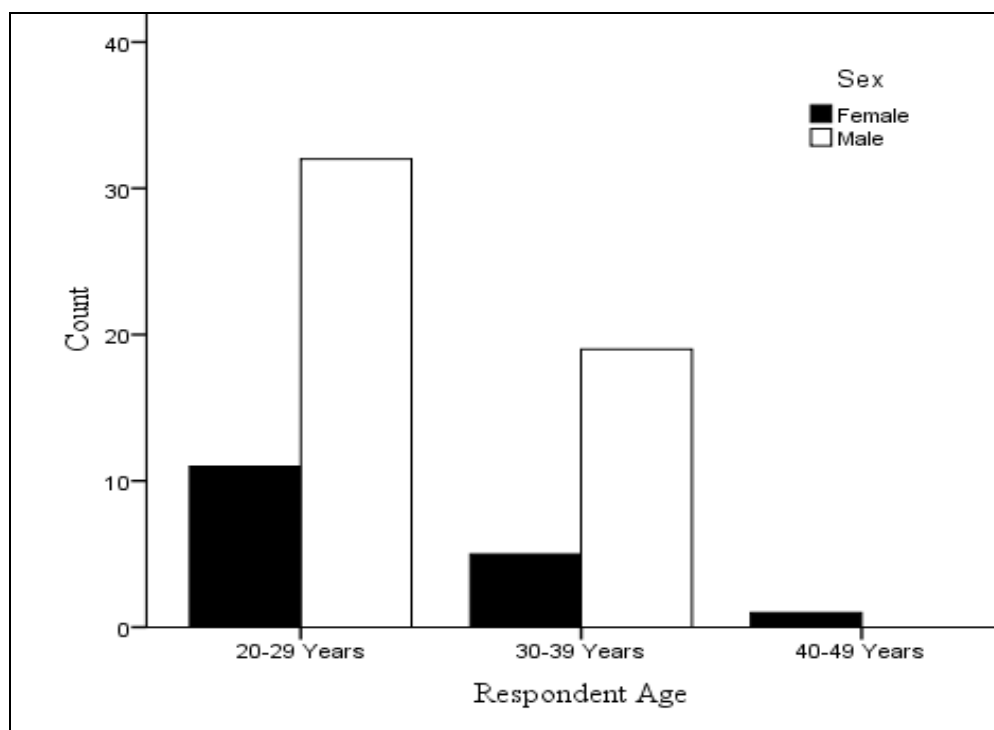


Figure 2: A bar chart showing the gender distribution by age groupings

The response shows that majority of the teachers are young, so it is likely to have a positive impact on teachers’ knowledge and attitude towards the teaching of ICT. Deniz (2005) noted that teachers’ age is significantly related to teachers’ attitudes. The limit for positive attitudes of basic school teachers’ age is 36years, afterwards the anxiety slows down. These findings seem to suggest that teachers’ attitude can be influenced by the age.

		Age			Total
		20-29 Years	30-39 Years	40-49 Years	
Qualification	Certificate	4	4	0	8
	Degree	0	1	1	2
	Diploma	39	19	0	58
Total		43	24	1	68

Table 7: Respondent Qualification and Age Cross Tabulation
Field Data, 2011

From the cross tabulation, 58(85%) respondents hold diploma, 39(57%) were in the 20-29 age group and 19(28%) in the 30-30 age group. Besides, 8(12%) were certificate ‘A’ holders, consisting of 4(6%) within the 20-29 age group and another 4(6%) for the 30-39 age category. Additionally, respondents with a degree were 2(3%) with 1(1.5%) in the 30-39 age group and another 1(1.5%) in the 40-49 age group. This indicates that respondents had some form of training that might change the attitude of teachers towards the teaching of ICT in the JHSs in the district. On the other hand, their training might not relate to ICT teaching.

4.2. Analysis of Main Data

The following section indicates how the research questions were answered. It consists of tables, figures and discussion of the analysis in response to the research questions.

4.2.1. Research Question One.

What is the attitude of teachers towards the use of computers in the classroom?

It attempted to find out teachers’ beliefs, feelings or values when it comes to the teaching of ICT. The data gathered in this regard is analysed in Table 8.

Item	N	Valid	Mean	Mode	Std. Deviation	Range
I use computers regularly in the school		68	1.57	1	.779	3
We use internet for entertainment only		68	1.59	1	.777	3
Computers are used for all the lessons I taught in the school		68	1.50	1	.723	3
We use printers in the school		68	1.57	1	.834	3

*Table 8: Descriptive Statistics of Teachers' Attitude to the Teaching of ICT
Field Data, 2011*

Table 8 shows that the mean score for each item was 2, indicating that teachers responded very well to the instruments. Besides, the range proved that all the four items were given equal attention. The N Valid 68 indicated that all the respondents had enough data on the variable to answer the research question; hence, no respondent was missing.

Descriptive statistics was used to find out the attitude of teachers to the teaching of ICT. The standard deviation and the mode suggested negative attitude of teachers towards the teaching with computer as shown in Table 8. This gave acceptance to Harrison and Rainer (1992) study that participants with negative computer attitudes are less skilled in computer use and are therefore less likely to accept and adapt to technology than those with positive attitudes. Thus, effective and efficient use of computer in the class room mainly depends on the attitude of a teacher. The attitude may control the knowledge and skills that a teacher exhibits with respect to the lesson delivery. This mental position of an individual could facilitate instruction or undermine the methods and media use in a subject.

This finding also gave credence to Albirini (2004) study which indicated that teachers' attitudes towards the use of technology in education really promote learning. Positive attitude that one develops motivates the teacher to acquire more skills in order to give of his or her best in using the new technology. It implies that teachers' positive attitude brings about motivation, distinctive instructional abilities, higher productivity of the teacher, create essential skills for the Information Age, and support for new teaching techniques. On the other hand, negative attitude demotivates teachers to explore how to utilize the ICT efficiently in the learning processes.

Additionally, the relationship between teachers with pre-service training knowledge in the use of ICT and those without differs. ICT training promotes positive attitude to the use of computers than those without pre-training. Prior knowledge motivates teachers to be more proactive than their colleagues who never had the opportunity to acquire computer skills.

In sum, attitude of teachers to the use of computers could either be positive or negative based on beliefs and values a teacher attach to the teaching of ICT. If he or she sees the usefulness of the subject, then a change can result in his or her perception. Empirical evidence shows that attitude contributes to the skills and knowledge development in the use of modern technologies such as the ICT.

4.2.2. Research Question Two

What level of ICT training were JHS teachers given?

This question sought to find out the level of ICT training given to teachers to impart knowledge to the learners in the classroom. The analysis of the data concerning this research question is presented in Table 9.

Item	N	Valid	Mean	Mode	Std. Dev	Range
I can type very fast with a computer.		68	1.71	1	.899	3
I had pre-service training in ICT from the college		68	2.32	2	.854	3
I attend ICT workshops and seminars every term		68	1.56	1	.817	3
I did soft ware programming at school		68	1.79	1	1.051	3
I can design educational soft wares very well		68	1.71	1	.865	3
I did only Microsoft office at the school		68	2.71	3	.847	3

*Table 9: Descriptive Statistics of Teachers Training
Field Data, 2011*

Table 9 indicates that every participant responded to the items well, based on the range. Besides, N valid 68 shows that participants had enough data to answer this research question and so no one was dropped. However, the mode, mean and standard deviation were unsatisfactory.

The mean and the mode on Table 9 suggested that majority of the teachers had no training to teach ICT. This gave credence to the study conducted by Mereku, etal, (2009) that at the pre-tertiary levels, teachers are not trained to use ICT for teaching and learning, despite the fact that the new curricula required teachers to integrate ICT into instruction across the curriculum. They also, indicated that the Colleges of Education are doing little to equip trainees with knowledge and skills necessary to teach and integrate ICT into teaching during their pre-service teacher training programs. Additionally, the research shows that the two teacher universities, University of Cape Coast and University of Education, Winneba are not doing much in this regard, they only introduce learners to ICT and not to make them experts to handle ICT.

The basic agent for every effective teaching and learning is knowledge and skills of a teacher. Proper training is required for a teacher to be able to plan and design instruction which can easily be transformed from teacher -centered approach to learner-centered

approach for learners to interact with their computers easily. But considering the teachers' responses, they feel that they are not well equipped with the requisite knowledge and skills to teach ICT. The best method therefore is to continue with the traditional delivery system.

Additionally, Parthemore (2003), noted that computer literacy education in Ghana is based in the major urban areas. The cost of Computer training is relatively high as such not all teachers under training have access to computers during training. The rural areas are left out with just a few trained teachers trying to cope up with their urban counterparts. Private companies, the Ghana Education Service and non-governmental organizations provide little computer education. All these justify this research finding.

Provision of ICT in-service training is important for the teaching of this technology. Mereku etal (2009) indicated in their study that only 10% of the pre-tertiary teachers had in-service training. Several in-service training has been held across the country since the introduction of ICT at the basic level. But a little has been done in this direction, most of the in-service training do not include ICT teaching. The responses made by the teachers show that they had no training or knowledge, to teach the learners.

In conclusion, effective and efficient teaching of ICT depends on the kind of the pre-service and in-service training that a teacher had. This goes a long way to assist the teacher to plan and design instructions that are measurable and achievable. Teachers' computer experience will enable them to build confidence in teaching the subject.

4.2.3. Research Question Three.

Does access to ICT facilities affect teachers' knowledge?

This research question attempts to find out if there is any relationship between teachers' knowledge and availability of ICT facilities. Correlation on teachers' knowledge and available ICT facilities was done by using the scores for teachers' knowledge and available ICT facilities summed together to produce a new variable containing the total value. Finally, linear regression was computed to predict the effect of access to ICT facilities on teachers' knowledge. It makes it easy to see the relation between selected values and observed values.

A scatter plot summarizes the results as shown in Figure 3.

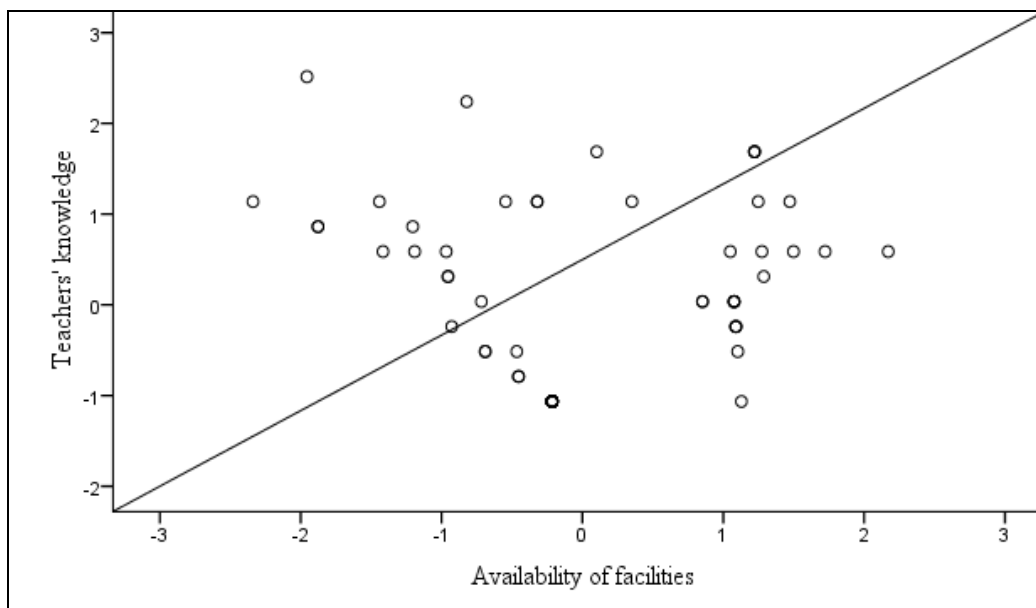


Figure 3: A scatter plot of teachers' knowledge and available facilities

This analysis in Figure 3 shows a steep rise from left to right of the line of best fit. The data points are bunched up around the line of best fit suggesting a strong positive correlation between teachers' knowledge and available facilities.

A Pearson product-moment correlation coefficient was computed to assess the relationship between teachers' knowledge and available ICT facilities in the district. The result is presented in Table 10.

	Available facilities	Knowledge
Pearson Correlation	1.000	.656
	.656	1.000
Sig. (1-tailed)		.000
N	68	68

Table 10: Correlation between Knowledge and Available Facilities

*. Correlation is significant at the 0.01 level (1-tailed).

The results in table 10 shows that there is a moderate and significant positive correlation between the two variables, $r = .656$, $n = 68$, $p = .000$. Thus, the variance in knowledge is accounted for by availability of ICT facilities. Despite the inconclusive reports on knowledge and availability of facilities, the study indicated that very good practices in the use of ICT is invariably found in schools that have high quality ICT facilities and lack of computers and software seriously limit what teachers can do in the classroom with regard to the teaching of ICT (Mumtaz ,2000).

The relationship indicated that access to ICT facilities both at school and home bring about confidence building in the teacher, since practice makes man perfect. Becta (2003) also seemed to support this study, that a school with well resource ICT equipment produces high achievers. The strong positive correlation suggests that if teachers practice hard before teaching, learning processes are likely to be enhanced.

In addition to the correlation, linear regression was used to find out whether availability of ICT facilities can contribute to teachers' ICT knowledge. The result is reflected in Figure 4.

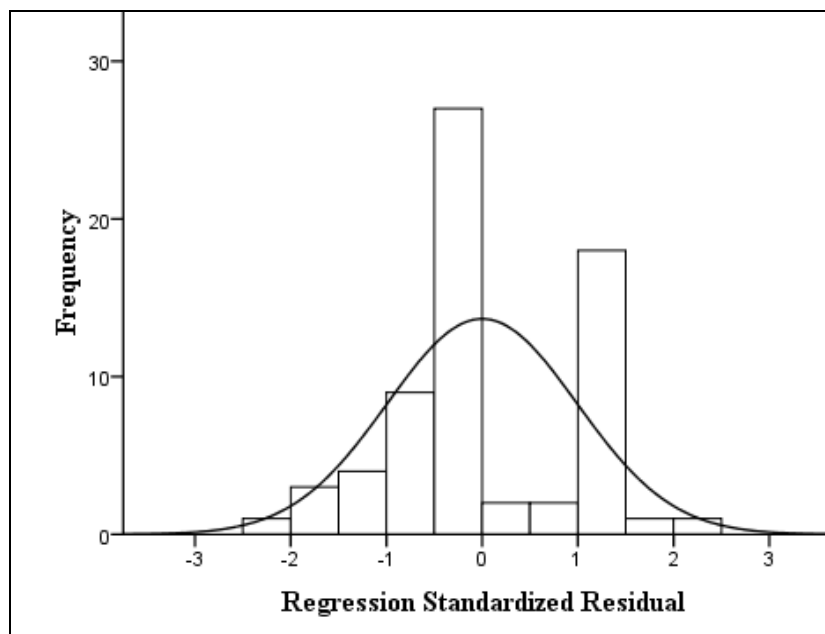


Figure 4: A histogram showing regression standard residual of teachers' knowledge and availability of ICT facilities

To examine if the data is normally distributed, a residual plot of a histogram with a line that portrays the shape of the data was compared with the normal distribution curve. The histogram shows that the residual is normally distributed, hence satisfying the desired condition for conducting linear regression. Also, the residual should be independent and measured the Durbin-Watson statistic test, which tests for correlation errors. It tries to find out whether adjacent residual is correlated. The test statistic could vary from 0 to 4. In this research the Durbin-Watson test statistic is 1.181, which satisfies another condition. Further analysis was conducted to establish whether teachers' knowledge predicts the use of ICT facilities. The outcome is presented in Table 11.

Model		B	Std. Error	Beta
1	(Constant)	.132	.230	
	Knowledge	.635	.090	.656
Dependent variable : Availability of ICT facilities				

Table 11: Prediction of Teachers' Knowledge Using Availability of ICT Facilities

The predictor variable accounted for 43% ($r=.656$) variability availability of ICT facilities (as shown in Table 11). Additional analysis of the prediction of teachers' knowledge using availability of ICT facilities is shown on Table 12.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.903	1	9.903	49.759	.000 ^a
	Residual	13.135	66	.199		
	Total	23.038	67			
a. Dependent: (Constant), Knowledge						
b. Predictor Variable: Availability of facilities						

Table 12: Prediction Model of Teachers' Knowledge and Availability of ICT Facilities Using Analysis of Variance (ANOVA)

Prediction equation: $\text{Knowledge} = .132 + .635\text{Available facilities}$

The prediction of the variables is significant, (as shown on Table 12). Considering the significant level, the prediction suggests that availability of ICT equipment could promote teachers' ICT knowledge. This prediction is related to the findings of Cox, Preston and Cox, (1999) that teachers who manipulate with computers regularly turn to develop interest and acquire more skills and knowledge. Analysis of variance (ANOVA) results for the regression (prediction) produced an F-ratio of 49.759, which is significant at .000 as shown in Table 12.

4.2.4. Research Question Four.

Does access to ICT facilities affect teachers' attitude?

The question tries to examine if there is any relationship between teachers' attitude and availability of ICT facilities. Correlation on teachers' attitude and available ICT facilities was conducted. Linear regression was computed in addition to predict the effect of access to ICT facilities on teachers' attitude.

A scatter plot summarizes the results in figure 5.

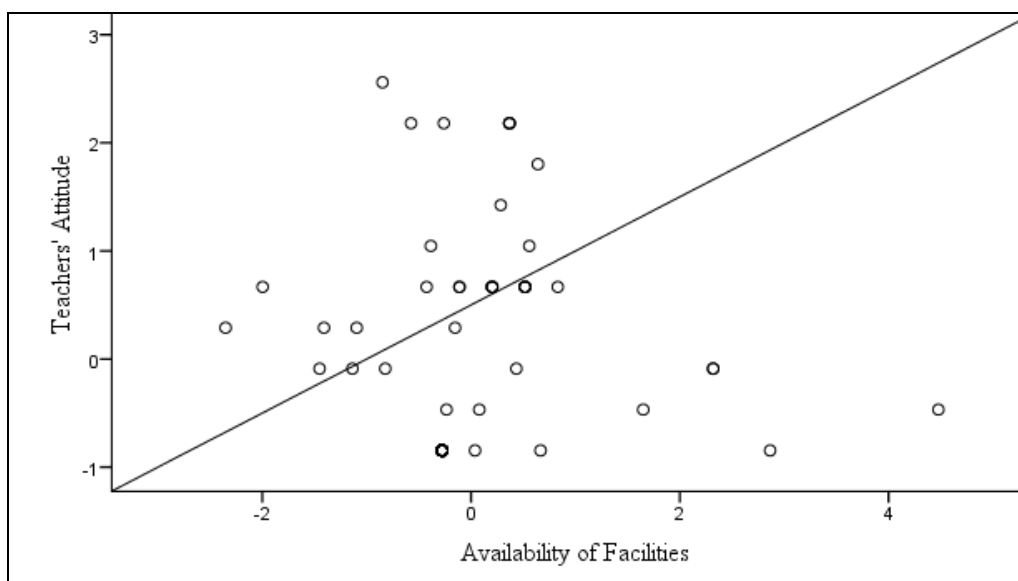


Figure 5: A scatter plot of teachers' attitude and available facilities

The analysis in figure 5 shows a gentle rise from left to right of the line of best fit, the data points cluster around the line of best fit suggesting a strong positive correlation between teachers' attitude and availability of ICT facilities. To ascertain this problem, further analysis was carried out and the result is reflected in Table 13.

	Availability of facilities	Attitude
Pearson Correlation	1.000	.843
	.843	1.000
Sig. (1-tailed)		.000
	.000	
N	68	68

Table 13: Correlation between Teachers' Attitude and Available ICT facilities

* Correlation is significant at the 0.01 level (1-tailed)

A Pearson product-moment correlation test was conducted on the two variables to measure the relationship between teachers' attitude and availability of ICT facilities. The results indicated a very strong positive correlation between the two variables, $r = .843$, $n = 68$, $p = .000$ (as shown in Table 13), that is (.843)71% of the variation in attitude is accounted for by availability of ICT equipment. This finding seemed to support Cox, Preston and Cox, (1999); study which showed that teachers who use ICT regularly develop confidence in using it, and also build positive attitude towards ICT usage, perceiving it as a useful tool in both their personal and teaching work. They develop positive attitude as a result of easy access and constant practice.

Additionally, Guha (2000) found similar responses from teachers interviewed and suggested that availability of computers eliminate ICT phobia, since teachers have computers at home and school, they have less fear in using them. In short, the study suggested that teachers attitude increases corresponding to availability of ICT equipment. However, inadequate supply of computers could negatively affect the attitude of teachers in the teaching and learning processes.

Besides the correlation, a linear regression was computed to predict if access to ICT equipment will influence teachers' attitude to the teaching of the subject. Figure 6 shows a histogram used for the prediction.

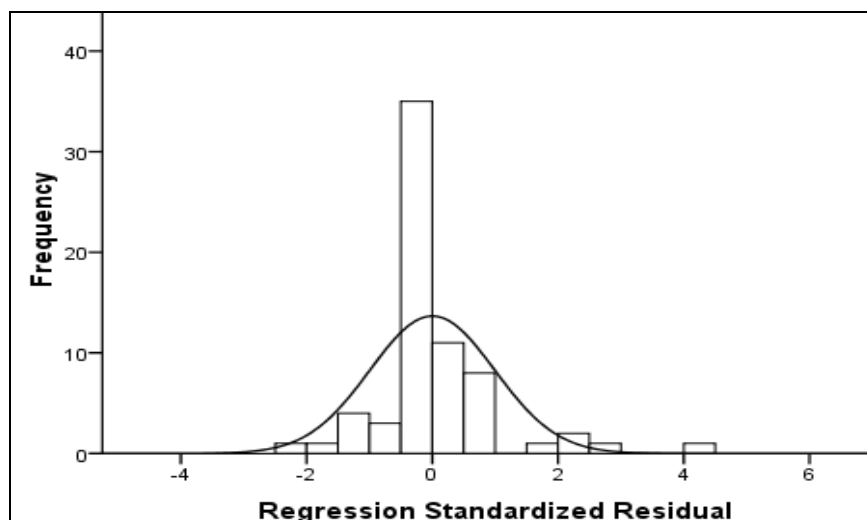


Figure 6: A histogram showing regression standard residual of teachers' attitude and availability of ICT facilities.

A residual plot of a histogram with a line depicting the shape of the data was compared with the normal distribution curve to examine, if the data is normally distributed. The histogram indicates that the residual is normally distributed, which satisfies the desire condition for conducting linear regression. Besides, the independent of the residual assist in measuring the Durbin-Watson static test, which test for correlation errors. In this research the Durbin-Watson static test is 1.292, which satisfies another condition, since it ranges from 0 to 4. Further analysis was carried out using the same variables. The result is shown in Table 14.

Model		B	Std. Error	Beta
1	(Constant)	.541	.099	
	Attitude	.748	.059	.843
a. Predictor Variable: Available facilities				

Table 14: Prediction of Teachers' Attitude using Availability of ICT Facilities

The predictor variables accounted for (r=.843)71% (as shown in Table 14), of the variability availability of ICT facilities, which is significant, (as shown on Table 15). Considering the significant level and the percentage, the prediction suggests that availability of ICT equipment could affect teachers' attitude positively. This research gave credence to the research findings of Ropp (1999); that there is significant relationship between computer access, the number of hours a computer use per week and teachers' computer attitudes.

Furthermore, Ross, Hogaboam-Gray and Hannay (1999) research suggested that teachers' access to computers will assist them to accomplish their goals and create positive attitude to the teaching of ICT. Analysis of variance (ANOVA) results for the regression (prediction) produced an F-ratio of 161.476, which is significant at .000 as shown in Table 15. The study indicates that access to ICT facilities create positive attitude in teachers.

Model	Sum of Squares	df	Mean Squares	F	Sig.
1 Regression	16.353	1	16.353	161.476	.000 ^a
Residual	6.684	66	.101		
Total	23.038	67			

Table 15: Prediction of Teachers' Attitude using Availability of ICT Facilities

- a. Dependent: (Constant), Attitude
- b. . Predictor Variable: Available ICT facilities

Prediction equation: Attitude = .541 + .748Availability of ICT facilities

5. Summary, Conclusions and Recommendations

5.1. Summary of the Research

Descriptive design was used. In this study both qualitative and quantitative methods were employed due to the nature of the research questions. In view of these, correlation was used to find out the relationship between teachers' knowledge and access to ICT facilities

as well as relationship between teachers' attitude and access to ICT facilities. Furthermore, linear regression was carried out to predict the outcomes of teachers' knowledge, teachers' attitude using access to ICT facilities by teachers.

The key research findings are summarized as follows:

1. The study identified a moderate positive relationship between teachers' knowledge and access to ICT facilities.
2. It also came out with a positive relationship that exists between attitude of teachers and access to ICT facilities.
3. The research identified that pre-service training and in-service training are necessary for effective teaching and learning.
4. The study identified that professionally trained teachers are few in the district.
5. Finally, the research identified that there is inadequate provision of ICT equipment in the district.

5.2. Conclusion

The conclusion of the research is that there is a relationship between teachers' knowledge and attitude of teachers on one hand and access to ICT facilities on the other. So the research has stressed the need to give attention to the impact that training of ICT teachers and the provision of ICT facilities will have on the teachers' knowledge and attitude to the teaching of the subject.

5.3. Recommendations

Based on the findings of the study, the following recommendations are made:

1. The two teacher universities; thus University of Cape Coast and the University of Education, Winneba as well as the 38 colleges of education that train pre-tertiary level teachers should improve on their facilities to train high quality ICT teachers.
2. The district directorate of education as well as the non-governmental organizations should organize in-service training workshops and seminars for ICT teachers to create positive attitude in them.
3. Government of Ghana, parent teacher associations and non-governmental organizations that are into education should help provide ICT facilities for the schools to promote positive attitude of teaching.
4. Personal computers should be given to teachers to help them develop innovative, competent skills, knowledge and positive attitude to teaching of ICT.

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