

**UNIVERSITY OF CAPE COAST**

**ASSESSING THE EFFECTS OF THE INTEGRATION OF ICT INTO THE  
CURRICULUM OF THE RURAL BASIC SCHOOLS IN ATWIMA NWABIAGYA  
DISTRICT IN THE ASHANTI REGION OF GHANA**

**JUSTICE SAMUEL KWASI AYEH**

**2009**

**M.Ed**

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**BY**

**JUSTICE SAMUEL KWASI AYEH**

**Dissertation submitted to the Center for Continuing Education of the Faculty of  
Education, University of Cape Coast, in partial fulfillment of requirements for the  
award of Master of Education, in Information Technology**

**OCTOBER 2009**

## DECLARATION

### Candidate's Declaration

*I hereby declare that this is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.*

Candidate's Signature:.....

Date:.....

Name: Justice Samuel Kwasi Ayeh

### Supervisor's Declaration

*I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.*

Supervisor's Signature: .....

Date: .....

Name: Dr. T A. Ossei-Anto

## **ABSTRACT**

This study looked at the challenges facing the Ministry of Education and other stakeholders and efforts being made to address the ICT situation in some schools based in rural areas in the Atwima District of Ghana.

The design for the study was a descriptive survey. The sample was made up of 105 people drawn from 6 selected basic schools in the Atwima District of Ashanti Region. The main instrument used for the study was questionnaire. After pilot testing , reliability co-efficients of .75 for students' questionnaire and .72 for both teachers and headmasters' questionnaire respectively were obtained. The following were some of the main findings of the study: first, 70% of the basic schools in the districts have been connected to the national electricity grid but power supply is irregular. Second, none of the schools has computer laboratory or internet facility. Third, there is an inadequate computer supply to the schools. Fourth, most of the ICT teachers have the requisite qualification to teach the subject. Finally, there is lack of financial and material support from non governmental agencies

Based on the findings it was recommended that: stakeholders should make effort to streamline regular electricity supply to the schools. Second, Government should provide computer laboratories to facilitate internet connectivity in at least each educational circuit. Third, there should be adequate supply of computers and teaching and learning materials.

## **ACKNOWLEDGEMENTS**

I wish to express my deepest gratitude to all, who in diverse ways helped me to complete this work. I am thankful to my supervisor, Dr. T. A. Ossei-Anto, for his guidance, suggestions and dissertations.

My thanks also go to Mr. Palmas Anyagre, Lecturer of Center for Continuing Education for giving me some vital information in the work. I am grateful to all my course mates especially Vincentte Kofi-Ackam for their encouragement.

My gratitude is due to all who responded to the questionnaire especially headmasters, teachers and the students. I am also indebted to personnel of the District Education Office (Atwima Nwabiagya) and Private ICT personnel for their vital information offered me to complete this work.

I should like to acknowledge my indebtedness to all writers whose works I have depended on, in supporting this research work especially.

Finally I am grateful to Miss Theresa Sarfo Kwarteng who worked tirelessly to type this manuscript.

## **DEDICATION**

I dedicate this work to My lovely boy **NOBEL NII AYEH**

## TABLE OF CONTENTS

	<b>Page</b>
DECLARATION	ii
ABSTRACT	iii
ACKNOWLEDGEMENTS	iv
DEDICATION	v
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
CHAPTER	
ONE	INTRODUCTION
	Background to the Study 1
	Statement of the Problem 6
	Purpose of the Study 9
	Research Questions 9
	significance of the study 9
	Delimitation of the Study 10
	Limitations of the Study 10
	Definition of Terms 11
TWO	REVIEW OF RELATED LITERATURE
	Introduction to the Chapter 12
	Theoretical Review 12
	The Need for ICTs in Education 13



	ICTs and Education in Ghana	18
	Some of the Drawbacks Facing Schools and how these can Possibly be solved to ensure Successful Integration of ICTTs in the Rural Schools	21
	Jearn-O-Vision	22
	Connectivity	23
	Infosat	23
	Personnel Preparedness and Maintenance	26
	Finance	27
	Support Staff and Maintenance	30
	Summary	32
<b>THREE</b>	<b>METHODOLOGY</b>	
	Introduction	33
	Research Design	33
	Setting and Population	34
	Sample and Sampling Technique	36
	Research Instrument(s)	37
	Pilot Testing	37
	Description of the Demographic Characteristics	38
	Data Collection Procedure	38
	Data Analysis	39
	Summary	40
<b>FOUR</b>	<b>RESULTS AND DISCUSSION</b>	

	Introduction	41
	Results of the Study	41
	Responses from Students	42
	Responses from Teachers	45
	Responses from Headmasters	47
	Findings	56
FIVE	SAMMARY, CONCLUSION AND RECOMMENDATIONS	
	Introduction	58
	Summary	58
	Electricity Connectivity	58
	Accessibility of Computer Laboratory	58
	Accessibility of Telephone Facilities	59
	Adequate Supply of Computers to the Schools	59
	Accessibility of Quality ICT Textbook	60
	Funding of ICT Resources	61
	Conclusion	61
	Recommendations	62
	Suggestions for Further Research	64
	REFERENCES	65
	APPENDICES	
	A Questionnaire for Students	71
	B Questionnaire for Teachers	73
	C Questionnaire for Headmasters	75
	D Analysis of Pilot Testing Instruments	77

## LIST OF TABLES

<b>TABLE</b>		<b>PAGE</b>
1	Name and Number of Educational Circuits in Atwima Nwabiagya	37
2	Distribution of Respondents According to Gender	41
3	Frequency Distribution of Response	42
4	Provision of electricity, computers and textbooks	45
5	Qualification of ICT teachers	48
6	Provision of electricity, computers and textbooks	50
7	Provision of Electricity, Computers and Textbooks	53
8	Provision of telecommunication infrastructure for internet usage	54
9	Development of Telecommunication Infrastructure	55
10	Qualification of ICT Teachers, Coordinators and Technicians	56
11	Qualification of ICT Teachers Respondents	57
12	Level of qualification of ICT teachers, ICT Teachers, ICT coordinators and ICT technicians	57
13.	Level of qualification of ICT Teachers, ICT Coordinators and ICT Technicians	59

## **CHAPTER ONE**

### **INTRODUCTION**

#### **Background to the Study**

Technology is advancing everyday. Information and Communication Technology (ICT) is one such area which is growing rapidly in the world. It is turning the world into a global village. It is an undeniable fact that ICTs play a very important role in the development of every nation these days. This is because growth is induced by the flow of information and this realization had led most economies into knowledge based ones. Developing countries including Ghana have realized this and are vigorously pursuing the use of ICTs as a platform for socio-economic development.

Ghana has since independence made significant strides in its education system. The education landscape in Ghana today is the result of major policy initiatives adopted by past government as well as the present one.

Ghana began introducing computers into Senior Secondary Schools in the late 1990s. In the wake of computerization, some attempts were made at school levels to introduce computer studies, through internally generated funds, mobilization of funds from PTAs, donations from old students associations, other philanthropists and private initiatives.

However, the level of achievement has not been as desired for the following reasons:

- (a) Only few schools were to some extent, effectively involved in this exercise with respect to availability of and access to computers by students.
- (b) Non-Availability of sufficient teachers with the requisite level of knowledge, and suitable computer laboratories to make teaching and learning as effective as it should be.
- (c) Even though private initiatives to introduce ICT into education is in the right direction, however, the unco-ordinated approach to the introduction of ICT in education has led to unhealthy developments including the following:
  - (d) Inability to identify the appropriate ICT literature level for different stages in our educational structure.
  - (e) Students and pupils not receiving the desired impact of ICT.
  - (f) Exploitation of schools by private ICT vendors.

Approval was given in 2003 by the then Ministry of Education, Youth and Sports to PTAs of schools to collect some limited amount of money to start providing infrastructure (computers, computer laboratories, Internet connectivity, etc.) for ICT in Education.

In addition, there was also the formation of an ICT Technical Committee to prepare a framework for ICT in education Policy and to prepare draft guidelines for the teaching of ICT in Basic and Senior Secondary Schools. In addition study guidelines now include training guide for teachers and sensitization of District Directors.

The Government's long-term ICT mission as spelt out in the National ICT Policy Framework is to transform the Ghanaian economy to a knowledge-based economy. The policy is aimed at a comprehensive programme of rapid development, utilization and exploitation ICT's within the educational system from Primary School upwards Ministry of Education, Youth and Sports. (2003).

The interventions taken by the government include widening access to education to a wider section of the population; and in literacy education and for facilitating educational delivery and training at all levels including Basic Education.

The government has acknowledged the need for ICT training and education in the Colleges and Universities to produce skilled ICT teachers to teach in the basic levels of education.

In 2007 the then Government launched an education reform based on recommendation of the Anamuah Mensah's committee. The reforms prescribe a four-year programme for students and mandate them to study five core subjects, namely; English, Mathematics, Integrated Science, Social Studies and Information and Communication Technology (ICT). Greater emphasis is being placed on Science, Mathematics and Information Technology. This has led to the signing of a memorandum of understanding between the Government of Ghana and Microsoft to support and provide logistics in terms of ICT equipment.

As a result of the ongoing development of ICT education, a curriculum has been developed for ICT training and examination at all levels of pre-

tertiary education. In addition, effort was made to provide telephone facilities to all district capitals and colleges to enable them access to the internet.

The basic school syllabus is designed to predispose primary schools pupils to basic skills in Information and Communications Technology (ICT) so as to build the foundation for further learning in the subject as they move into second cycle education and beyond.

The syllabus is designed to help pupils to:

1. acquire basic ICT literacy
2. communicate effectively using ICT tools
3. develop interest and acquire skills in the use of the internet
4. develop basic ethics in using ICT tools
5. acquire basic mouse and keyboard skills

There are many benefits that can be derived from the acquisition of ICT knowledge and skills by the basic school pupils and for that matter Atwima Nwabiagya District.

Numerous studies over the years, summarized by Bialo and Sivin-Kachala (1996), report other benefits enjoyed by students who use technology. These benefits involve attitude toward self and towards learning. The studies reveal that students feel more successful in school, are more motivated to learn and have increased self confidence and self esteem when using Computer Assisted Instruction (CAI). This is particularly true, when the technology allows the students to control their own learning. It's also true across a variety of subject areas, and is especially noteworthy when students are in helpless groups (special education, students from inner - city or rural schools).

Teachers and administrators use computer and information technologies to improve their roles in the educational process.

Other benefits of ICT are:

- (a) Speed; that is, computers calculate a whole lot faster than human beings.
- (b) Cost effectiveness; a single computer can perform all the data management chores that were formerly done by many people.
- (c) Record keeping; with the development of the Data Base Management System (DBMS), record keeping has become easier convenient. Keeping record in huge filing system and in cabinet is phasing out.
- (d) Globalization; Networking is a crucial component of IT. Through networking, information can be shared across the world within a second.
- (e) The language barrier is no longer existent as software that translates information to required languages exist.
- (f) Trade convenience: Internet is a great place to post an advertisement for selling any product. As it is accessed across the globe, it is possible to receive quotations from other parts of the world. Similarly, if one needs to buy any product, there is a large variety to choose from on the internet. Goods bought can also be paid for through the internet.
- (g) Communication: Information Technology has taken communication function into its fold. Consequently, sending letters through post offices is no longer a necessary evil. Sending an e-mail is much faster, and much easier. In addition, technological advancements like Voiceover Internet Protocol or Volp



allow people to hold conferences across countries. There are instances where operations have been performed by local surgeons with the help of instructions from senior surgeon residing in some other country.

(h) Creation of new jobs: It is true that information technology has made the mechanical jobs like that of a typist, redundant. But it is also true that new lines like software engineer, hardware engineer, network administrator, data analyst, computer programmers, systems analyzers, hardware and software developers and web designers are just some of the many new employment opportunities created with the help of IT.

These and many more benefits are the reasons why it is prudent to introduce ICT to pupils from the on set of the educational system to enable them acquire the necessary knowledge and skills.

### **Statement of the Problem**

The global onslaught of ICTs has engendered the need for the integration of ICTs into all spheres of life, be it at work, at home, in schools or in the field of entertainment (Herselman, 2003). Against this background, educational institutions are making efforts to incorporate basic computer literacy in most of their courses. ICTs are now acknowledged as an integral component to primary, secondary and tertiary education. At the same time some so-called ICT institutions with questionable credentials are mushrooming all over Ghana. Most of these institutions are not properly registered with the Ministry of Education because they do not have accreditation.

The Ministry of Education has included ICT in its policy and school curriculum. The Information and Communication Policy of Ghana (ICT

4AD, 2003) clearly states that ICT is creating new ways of learning and it has the potential to enhance the management and administrative capacity of schools. The potential of ICTs to drive the education system cannot be over emphasized. Some benefits to be derived from integration of ICTs in education are:

1. Making learning more interactive.
2. Enhancing the enjoyment of learning.
- 3 Customizing curricula to meet learner need and development.
- 4 Capturing data for storage to support decision making.
- 5 Enhancing the avenues for collaboration and family members and the school community.
- 6 Improving ways of accountability and reporting (SAIDE: 2005).
- 7 Education will also become learner centred instead of educator centred

It is the researcher's contention that, whilst some of the urban schools are relatively well resourced and well staffed, the same cannot be said of many of rural schools in the rural district. The latter are confronted with overcrowded classes, lack of classrooms, lack of textbooks, inadequate furniture and other basic resources. In support of this assertion, Herselman (2003) cites Furlonger in her work to make the point that urban schools have advantage of information centres, Internet access to information and experienced educators. ICTs in fact, require more than just classrooms, tables and chairs and stationary. For instance, there is a need for well-trained ICT professionals (i.e. personnel who are capable of utilizing ICT resources in school work, technicians to install and maintain the equipment and others that produce learning content) who will be prepared to work in the rural areas, appropriate

telecommunication infrastructure and the like.

The main thrust of this study is thus to investigate factors (human and material resources) that may hinder or encumber a successful introduction of ICTs in rural schools in the Atwima District and how these affect among other things the aim of providing equal and quality education for all as well as the global benefits derived from the use of ICTs. In spite of the drawbacks faced by rural schools, some schools have managed to introduce ICTs into their curriculum. An indication that the successful integration of ICTs into rural schools can only be realized if the appropriate technologies which can surmount some of the obstacles hindering the introduction of ICTs are provided and if the playing ground is levelled to equal that of the urban schools. That includes bringing resources in rural areas to be at par with those urban areas.

Some significant research has been conducted into the challenges of integration and implementation problems of ICT in rural Schools. Most of these studies however, have been conducted outside Ghana. For example, the work of Amedzo (2007) and Yelkuanu (2006): in their studies they looked at the significance, benefit and problems of integrating ICT in the rural schools.

In Ghana, the introduction of ICT into public basic schools has just taken off; Their findings further indicate that there is lack of infrastructural, human and material resources in the rural areas in that district. Most schools lack basic facilities like classrooms, libraries and other amenities which make academic work more conducive. Roads to most communities are inaccessible. Moreover, there are inadequate telecommunication facilities in the communities. This would hinder the installation of internet facilities at the

rural schools. Teachers of ICT are not available; few are available at the district capital.

In line with the issues discussed, the researcher wished to conduct a study at the Atwima District in the Ashanti Region to find out the problem associated the integration of ICT into the curriculum of rural schools in Ghana. In question form, the issue under investigation is: What problems are associated with the integration of ICT in the rural basic schools in Atwima District?

### **Purpose of the Study**

The aim of this study was to investigate factors that are involved in integration of ICTs in rural schools in Atwima District and to determine the strategies to alleviate problem confronting the successful implementation. It is hoped that the findings of this study, would provide a benchmark for other rural communities elsewhere in Ghana to assess the state of ICTs in Ghanaian schools, particularly in rural schools.

### **Research Questions**

To direct the research the following questions were put in place.

1. Do the rural basic schools in Atwima Nwabiagya District have adequate and regular supply of electricity and computers?
2. What telecommunication infrastructure development are available in Atwima Nwabiagya District to facilitate internet usage for acquisition of knowledge?
3. What level of qualification do ICT teachers, ICT coordinators and ICT technicians have to teach and manage IT resources in the Atwima Nwabiagya District?

### **Significance of the Study**

The result of the study would serve as a good basis and guide for stakeholders in education to help alleviate the obstacle militating the implementation of Information and Communication Technology (ICT) in Atwima Nwabiagya District

Again, the outcome of the study would also help the district assembly and district directorate of Education to formulate policies to solve the problems associated with the integration of ICT in the district.

Also, the findings of the study would help district directorate of Education to know manpower (ICT teachers) needs of the district and to make necessary arrangement and post ICT teachers to the rural schools.

It would further help the headteachers, teachers and the respective communities to identify the challenges confronting the schools; they would collectively find solution to the problem.

Finally, the outcome and recommendation of the study might serve as a resource material for other district policy formulators and implementers on ICT education in their districts. It would also serve as resource materials for other researchers who may wish to undertake similar studies in other districts.

### **Delimitation of the Study**

The study was limited to only students, ICT teachers and headmasters of basic schools in the Atwima Nwabiagya District. It did not cover the other personnel including the schools administrative staff and District education office.

### **Limitations of the Study**

Leedy (1997) points out that during the research process, the researcher

cannot avoid having data contaminated by bias of one sort or another. It is however unethical and unprofessional to fail to acknowledge the possibility of such limitations.

The limitations of this study are varied and may be viewed from different perspectives. Some of the limitations are; some schools failing to permit the researcher to conduct the study there and the fact that the researcher did not have the time and resources to cover as much schools as possible in rural basic school in Atwima District to make generalizations.

Furthermore, this is a small monographic study of a rural area, so the results cannot be generalized. The research findings are at best tentative without any corroboration, challenging and substantiation. Also this research did not cover Private Basic Schools (International Schools) in the district, some of which are well furnished with computers. The research did not also cover second cycle institutions both public and private in the district.

### **Definition of Terms**

ICT – Information and Communication Technology. ICT refers the set of activities and tools that facilitate the capture, storage, processing, transmission and display of information by electronic means to enhance teaching and learning.

BASIC SCHOOLS – In Ghana, Basic School comprise Kindergarten, Primary and Junior High School (J.H.S.)

ICT 4AD – Information and Communication Technology for Accelerated Development.

GETFund- Ghana Education Trust Fund.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **Introduction**

This chapter looks at the need for ICTs in Education in Atwima Nwabiagya District and what the Ministry of Education is doing or has done to integrate ICTs into the school system with emphasis on the rural areas. The chapter also highlights what some individual schools (outside Ghana as presented from the perspective of other writers) have done to acquire computers for their schools and the potential problems they face.

Furthermore, the researcher assesses some of the drawbacks that militate against the successful integration of ICTs into rural schools and how some of these drawbacks can be overcome. The chapter concludes by arguing that despite the lack of basic infrastructure in rural areas, with planning and the adoption of appropriate technology, ICTs can still be smoothly integrated into schools.

#### **Theoretical Review**

ICT as described in the Policy document of the Ministry of Education “represents the convergence of Information technology and communication technology” (ICT4AD, 2003). The White Paper goes on to state that “ICTs are the combination of networks, hardware and software as well as the means of communication, collaboration and engagement that enable the processing, management and exchange of data, information and knowledge” (Ministry of

Education, 2003, pp.39). Isaacs, et al (2004) define ICT as the use of “technology to create, store, process and use information in various forms (data, voice, image, multimedia presentations and other forms including those not yet conceived” (pp. 39)

SAIDE (2005) define ICT as “the technologies which together support people’s ability to manage to communicate information electronically” (pp.120). Examples of such technologies are digital cameras, video recorders, televisions and radios.

### **The Need for ICTs in Education**

Rao (2004) makes the point that the ubiquitousness and utility of ICTs is changing the way people live, learn, work and relate to each other. The explosion and free flow of information and ideas has brought knowledge and its applications to many millions of people, creating new choices and opportunities in some of the vital realms of human endeavour. These developments have created what scholars refer to as the knowledge society or learning society or information society. From this standpoint, it is noted that the global economy is now based on the exploitation of knowledge in addition to labour and natural resources. A knowledge-based economy is one in which growth, development and innovations are driven by the optimal use of information and information products. That is the ability to transmit data over information and communication infrastructure.

To be productive and competitive in the knowledge economy, governments must focus on strategies to provide quality education. A quality education is new which can impart skills that will serve as a tool for productivity. Hawkins (2002) writes of this skill as “information



reasoning” which he posits as “a process in which reliable resources of information are identified, effectively accessed, understood, contextualized and communicated to colleagues” (p. 38). He further points out that employers require workers who possess skills necessary to collaborate, engage in teamwork, and be able to share information across global networks. These workers must also have the ability to learn quickly in a rapidly changing environment. This skill can be gained by providing ICT resources to all including those who have no access.

This view was endorsed by the former President of South Africa, Nelson Mandela who is quoted by Stern (1999) as stating that universal access to information is a means to “promote economic growth and development, consolidate democracy and human rights, and increase the capacity of ordinary people to participate in governance” ( p. 4). Therefore, it is imperative for society to reconsider the way skills are developed so that society can benefit from the use of harnessing of ICT and ICT resources.

All countries wish to enhance the quality and effectiveness of the learning process in schools and are looking to ICT as the means whereby this may be achieved”. UNESCO (2002) also points out that, all governments aim to provide the most comprehensive education possible for their citizens within the constraints of available finance. Because of the pivotal position of ICT in modern societies, its introduction into education will be high on any political agenda.

To this end, many people have acknowledged that acquiring information through the use of ICTs in education is of crucial importance. (Bartman, 2003).

The belief is that ICTs will create a citizenry of lifelong learners who can

adapt to the global economy. Capper (2003) notes that the use of ICTs enhances learners' performance, better prepares learners for most careers and vocation and shifts the traditional teaching method to all earner-oriented method. Cawthera (2001) notes that "If a country is to be internationally competitive it is essential that its labour force is able to utilize and harness the advantages of ICTs. If the education system fails to enable people to do this it also fails to meet the needs of the country and its economy" (p. 11). Isaacs, et al., (2004) have also pointed out that introducing ICTs into education will provide opportunities for the youth to function in the information age. That is, ICTs in education will promote cultural exchange, develop communication skills among learners and assist them with studies. For instance, learners can learn other peoples' culture over the Internet and even exchange ideas about different cultural practices. In South Africa, ICTs are also a good way of making the newly introduced Outcomes Based Education (OBE) curriculum work well in all schools as learners will have numerous sources of information to utilize. ICTs thus will enable the Ministry of Education to attain its goal of providing a unified national education system based on the democratic principles of equity, transparency and participation ICT for Accelerated Development Ministry of Education (2003).

Kante and Savani (2003) have stated that the use of e-learning can reduce the cost of face to face training, time of training, expand educational opportunities and develop knowledge-economy skills which are increasingly demanded in the labour market. A case study in Mali is cited by Kante and Savani (2003) to show the cost effectiveness of adopting ICTs in education. Fletcher (2003) also notes that "Technology-based instruction can reduce time and cost needed for learning. Haddad (2003) supports the cost effectiveness of ICT in education

by pointing out that “ICTs, although expensive, may end up to be the best investment to make acceptable levels of learning affordable for all students, anywhere, within reasonable time and resources” (p. 6).

From the points made so far, it is evident that the use of ICTs in education has the potential promise for cost reduction and for an improvement of training and quality of service.

Some academics have stated that the education of women will promote social and economic development. For instance, Hawkins (2002) quotes a UNICEF (2002) document which reports on a research that states, “An extra year of schooling will increase a woman’s future earnings by about 15 percent, compared to 11 percent for a man” (p. 42). This perhaps supports the popular saying that “if you educate a woman, you educate a nation”. However in most societies, the observation is that women play second fiddle to men, so in such societies efforts must be made to accord women the full benefits of education.

Again in some religions, women are not accorded equal status as men. For example in some Christian churches, women are not accepted as priests or cannot hold some leadership positions. However, in recent times calls are being made for gender equality. For instance in Ghana, the constitution makes provision for gender equity. This move to empower women can be enhanced by providing ICTs in education. The Internet which has numerous sources of information is not exclusively for men. Women can also have access to it. So women can obtain information from the Internet, which they can use to assert their positions in society. Hawkins (2002, p. 42) provides examples in Mauritania and Ghana where girls have indicated that the Internet has given

them the impetus to assert their freedom and rub shoulders with boys as it affords them the opportunity to access information beyond the controlled information provided to them.

In many societies, especially the developing ones, providing proper education to students with special needs pose real challenges. OECD (2002, p.28) makes the point that significant benefits have been derived from the use of ICTs by learners with special needs. The use of ICTs in schools will afford children with visual and muscular difficulties to read, write and express themselves. Integrating ICTs in schools will enable children with special needs to attend ordinary schools.

UNESCO (2002, p. 9) states that ICT permeates the business environment; it has underpinned the success of corporations and provided governments with an efficient infrastructure. It adds further that ICTs have added value to the process of learning, and in the organization and the management of learning institutions. Kante and Savani (2003) also support this view by stating that since ICTs have proved successful in business, there is no harm in trying it in education.

Technology will serve as points of mediation for teachers who are not well qualified. Educational materials can be prepared and distributed to all schools either through the Internet or the broadcast media. In Namibia, the government has noted that the value of ICTs in the classroom goes beyond that of a practical teaching aid (Bringing Computers to the Classroom). It further points out that “the need to use new technologies to raise the quality and efficiency of education cannot be overemphasized. To improve the quality of education and technical proficiency of its human resource, the Namibian

government feels that it is imperative to expose its children, parents and teachers to ICTs. This measure aims to increase productivity and accelerate development. In Zambia, ICTs in education is regarded as important as basic reading and writing skills (Schoolnet Zambia).

In Uganda, the government has indicated its commitment to integrating ICTs into formal and informal education. Kawooya (2004) cites how School Net in collaboration with the Ugandan government has introduced School-Based Telecentres to provide schools and communities with ICT facilities. Details to similar claims to the usefulness of ICTs in education in African countries can be accessed through (SchoolNet Toolkit Guidebook2).

The need to adopt ICTs in school is summarized into three rationales: Economic rationale - to meet the requirements for employability as the 21<sup>st</sup> century unfold. Social rationale - to fulfil the requisite for participation in society and the work place, and Pedagogical rationale - to concentrate on the role of teaching and learning OECD (2001). From the aforementioned, it might be safe to conclude that the value that ICTs will add to education is really exciting and it is worth giving a try.

It must however be pointed out that the use of ICTs in education has some drawbacks and some of the cited drawbacks are:

1. Lack of commitment on the part of both teachers and students to utilize ICT resources.
2. High cost of installation.
3. Lack of competent personnel to use ICT resources.
4. Accessibility to hardware and software.
5. Reliability and quality of computers.

6. Professional training for ICT users.
7. The provision of technical support (Jedeskog, 1999; Pelgrum, 2001; Ward, 2003; Rai, 2006,).

Moreover, Cawthera (2001) has argued that there is no research to prove that the application of ICTs in education will be more successful than other resources such as “textbooks, teacher training or nutritional supplements” (p. 10). A similar assertion has been made by Fletcher (2003) who points out that “the arguments in favour of technology-based instruction are incomplete” (p. 14). In spite of these apprehensions, education cannot ignore the changes wrought in society by the proliferation of ICTs.

The researcher however contends that the ultimate introduction of ICTs in schools will prove more rewarding than sticking to the traditional method of teaching and learning. This does not rule out the need for good planning for harnessing the potential of ICTs in teaching and learning.

### **ICTs and Education in Ghana**

In the light of the developments stated above, OECD (2001) states that “all countries wish to enhance the quality and effectiveness of the learning process in schools, and are looking at ICT as the means whereby this may be achieved” (p. 9). From this standpoint, the Ministry of Education has realized that the provision of the relevant education with the application of ICTs can no longer be ignored. It has become crucial that access to ICTs in education is provided by all concerned. This means that the Ministry of Education needs to devise a new curriculum that will ensure the integration of ICTs into the school system. This is the most optimal way for a country to produce skilled workers who will be able to compete on the highly competitive global market.

The Ministry of Education also sees the integration of ICTs into the school system as a way of providing quality education to all and to redress the past inequalities in education. This view is emphasized by the former Minister of Education and Finance, Mr Osafo Maafo in his foreword to the “White Paper on e-Education” (Ministry of Education, 2003).

Consequently, the Ghana Education Service has introduced Information Technology (IT) into its new school curriculum. A White Paper has been released (Ghana Education Service, 2003), to guide the Service in the introduction of Education into the Ghana school system.

The White paper states that e-Education revolves around the use of ICTs to accelerate the achievement of national goals. Education will ensure the provision of the connectivity to enhance teaching and learning, provide the relevant support services such as pedagogical, curricular, assessment, managerial and administrative (GES, 2003). This implies that, if successfully implemented, the country’s education system will be transformed to produce quality education with equal access to all and a breed of lifelong learners.

It is worthy of note that the private sector and non-governmental organizations (NGOs) are also contributing immensely to supplement the government’s effort to integrate ICTs into education. Some of the projects engendered by the afore-mentioned include orientation training to teachers and provision of computers and accessories. This project has laid foundations to support the integration of ICTs in communities and schools.

It must however be pointed out that almost all of these projects are based in the urban areas and not in the rural areas. This can be attributed to the fact that the urban centres possess the attraction in terms of good job opportunities,

good social life, good infrastructure, and the businesses to provide the financial acumen, etc. This is in sharp contrast to what pertains in the rural areas where according to Ward (in Valentine & Holloway, 2001) "... children are seen to be disadvantaged relative to their urban counterparts because of their physical distance from educational, recreational and employment opportunities and because of their lack of personal mobility" (p. 5). Herselman (2003), also points out that the rural dwellers are struggling to meet their basic needs. The rural schools are faced with overcrowded classes or do not have classrooms at all, have no toilets, lack textbooks, furniture and other basic infrastructure for economic development and thus see the integration of ICTs in education as more of a luxury than a necessity. New technologies that speed up the delivery of education and textbooks are needed more in rural areas than urban areas.

Consequently, some rural schools are not letting the lack of basic infrastructure deny them the opportunity to use computers - a starting point for integrating ICTs into the school system. Educators in rural schools, who have acquired some computer literacy, only try to use computers to prepare their lessons and texts. They encourage their School Governing Bodies (SGBs) and School Management Teams (SMTs) to acquire computers for their respective schools. Some schools have managed to acquire computers from other sources (such as insurance companies, retail outlets, businesses and government enterprises). Some private entrepreneurs have also acquired used computers, refurbished them and in partnerships with the schools have set up computer literacy classes which educators and learners must pay to attend. Usually, once the entrepreneur has made his money, the computers are donated to the schools for their use. This is a clear indication that with or without the



help of government, irrespective of location, schools in Ashanti Region are eager to or are steadily trying to do something to integrate ICTs into the school system.

Though this is a laudable effort by schools, it must be pointed out that some entrepreneurs are providing schools with very outdated equipment which are unable to run modern applications and not compatible with the latest software. The worrying point here is the fact that unsuspecting schools are being turned into dumping grounds for disused-computers. It will be helpful if the Ministry of Education will provide a policy guideline to protect schools from becoming dumping grounds for old disused and dilapidated computers. In addition, GES can explore software on the market that can run on any computer from the oldest 286 to the latest Pentium and provide advice accordingly.

One such software that is the “New Deal” that claims to run on old computers. The “New Deal software is said to run on any computer be it a stand-alone or networked. It is also compatible with DOS, any version of Windows, OS/2 or Linux.

### **Some of the Drawbacks facing Schools and how these can Possibly be Solved to ensure successful Integration of ICTs in Rural Schools**

Cawthera (2001, p11) notes that those who advocate the integration of ICTs in schools acknowledge that there are problems associated with access and equity. The poorest areas are unlikely to benefit from the provision of ICTs in schools and this situation will create increased inequalities in education. Herselman (2003), Kante and Savani (2003) and Isaacs, Broekman and Mogale (2004) have all pointed to the barriers that have

individually or in concert, frustrated the successful integration of ICTs in rural schools. Some of these barriers are; the lack of electricity, telecommunication infrastructure, qualified and competent personnel, preparedness of both educators and learners to fully utilize ICTs resources available, cost of investing in technology, adequate storage facilities and the ability of the Ministry of Education to avail resources that will sustain the project.

Various suggestions have been made by researchers to offset some of these barriers and if the Ministry of Education is to successfully integrate ICTs in all schools in

Ashanti Region, there is the need to consider some of these. Some of the suggestions offered are:

### **Learn-O-Vision**

Herselman (2003) cites Callaghan's description of Learn-O-Vision developed by D. Oosthuizen. Learn-O-vision can provide rural schools with facilities comparable to those of first-rate urban educational institutions even though they do not have electricity. The Learn-O-Vision uses a solar-powered computer system, television set, video recorder, writing and flannel board in a portable and secure box. These are all installed in a standard wardrobe size box on wheels. The front flap opens out and serves as a writing board with the video and television located in front. The solar-powered computer is located at the back of the unit. The unit is powered by two solar panels, which charges a battery. When fully charged, the battery can last one full school day (8 hours). The unit can also use electricity. It can also be locked and wheeled into a secure place after use. With this unit, rural schools can get connected to the Internet if a telephone line is available or other wireless connectivity is

available. With Internet connectivity distance education is possible. Educational materials can be recorded on video or computer discs and used in teaching and learning. The unit can be described as a classroom on wheels; it can be wheeled and used anywhere. So teaching and learning can go on in any convenient place. This unit has many possibilities and guarantees the provision of quality education in the rural areas.

### **Connectivity**

Connectivity refers to the installation of computers in schools and connecting the computers to the Internet. Most of the rural areas in Ghana have very limited or no access to the Internet. This is due to the fact that there are inadequate or no telephone lines and thus limited or no capacity to connect to Internet Service Providers (ISP) (Bartman, 2003). Connectivity of ICTs in Ghana largely relies on telephone line connections and an ISP. In Ashanti Region, Ghana Telcom holds the monopoly for telephone line connection and as such their charges are relatively high. The lack of affordable telephone connectivity is a major set back in connecting schools especially those in the rural areas to the Internet.

Wireless systems are emerging and are considered potentially viable alternatives to higher telephone bills (Bakia, 2003). So schools that do not have telephone lines or cannot afford the high telephony bills can opt for cheaper wireless systems. Wireless systems are now being used in our Universities like University of Cape Coast.

Furthermore, Ashanti Region has nationwide wireless phone coverage from the three mobile (cellular) phone service providers - Vodafone, MTN and Tigo. The mobile phone service providers are huge companies and so the

Ministry of Education can enter into partnerships with them to provide services to rural schools where there are no infrastructure for landline services.

### **InfoSat**

InfoSat is suggested by Cawthera (2001) as another way of getting information from the web in areas where there are no land lines. InfoSat consists of two parts when connecting to the web:

1. Incoming to a PC: receiving information from the web.
2. Outgoing from a PC: i.e. sending or requesting information.

InfoSat performs the first function, with information being transmitted from a satellite to a receiving dish and into a PC. For the second part, a telephone connection is needed to transmit signals to the satellite and to tell the satellite which web pages to transmit down. In the absence of landline connectivity especially in the rural areas, the connection can be made through a GSM system used by mobile phones. This system can be combined with solar power so that schools without landline telephones and electricity can also be connected to the web.

A cheaper method of connectivity for schools that the Ministry of Education can exploit is a new wireless-based technology called Wireless Fidelity (WiFi). WiFi operates on a band of spectrum dedicated for Industrial Scientific and Medical (ISM) application, which is commonly used for personal appliances, such as microwave oven or a cordless home phone and for specialized purposes such as the radar “gun” used by law enforcement to read the speed of a moving vehicle. Unlike a wired network, a WiFi network requires little more an Access Point (AP).

According to Levy (2003), WiFi technology is far less expensive to

deploy than the wireless technologies used by cellular phone providers in the US. WiFi is a broadband network. Two or more WiFi networks can be connected to each other to form ad hoc broadband networks. A bandwidth measures the speed at which data is transmitted. Levy (2003) also posits that WiFi transmits data at a speed of 11 mbps (megabytes per second), which is sufficient for all types of multimedia. WiFi is cheaper, does not need a wired connection and it is easy to deploy everywhere so the researcher feels the Ministry of Education should give WiFi a trial run in schools.

Naidoo (2006) writes of two metros in Gauteng, Johannesburg and Tshwane, which have devised their own communication systems within their administrative offices which are saving them more in terms of cost. These communication systems are independent of Telkom and it provides the two metros with Internet and other related services and it is significantly cheaper. Naidoo (2006) expresses the opinion that these communication systems are set to compete with others in terms of pricing. This development clearly indicates that innovations could be exploited that will bring about cheaper connectivity rates for schools.

There are various intelligent software and hardware on the market, which can be acquired and connected to servers to access the Internet and most of these products are relatively cheap. So the Ministry of Education can find out which will best reduce cost and provide cheaper connectivity.

In terms of speed of access to the Internet, schools will have to opt for broadband technology. Broadband according to Spurge and Roberts (2005) refer to “high-speed ‘always on’ connections to the Internet that support the delivery of innovative content and services”. Compared to the narrowband ‘dial-up’

connections, broadband access is immediate. Large volumes of data can be instantly transmitted, within some few seconds and it is very efficient. There are a number of options available for the delivery of broadband. The narrowband is cheap but very slow and incapable of supporting large volumes of data. The three most common forms of transmission of broadband are; asymmetric digital subscriber line (ASDL) technology, which enables an existing telephone line to be upgraded to offer a broadband access connection, fibre optic lines and cable leased lines. Users in rural areas without landline telephone connections can use wireless and satellite technologies.

As far as ISPs are concerned, there are numerous ISPs whose services are affordable. The ISPs also offer high-speed leased line connectivity as well as a range of specialized services.

Currently, there are various Internet Service Providers (ISPs) to choose from. The Ministry of Education will have to enter into partnerships with some of these ISPs to customize some of their services for schools and provide rural areas with more affordable rates. Alternatively GES will have to set standards for ISPs that want to provide services to schools to meet.

The Ministry of Education can also prepare off-line course content (in CD-ROM format) and distribute to schools that do not have access to Internet connectivity, while arrangements are made to get the schools connected.

### **Personnel Preparedness and Maintenance**

The provision of hardware in a school without the proper ICT training and support will not enhance the integration of ICTs in schools. So there is the need for a support system that will help the integration of ICTs in

schools and help educators acquire the appropriate skills.

Kerr is also cited by (Capper 2003) to the effect that technology in education will see a dramatic shift from the traditional “chalk and talk” method of teaching and hence it will take time for all to fully embrace it. The challenge thereof is, making technology user-friendly to all teachers and motivating teachers to utilize ICT resources.

The Ministry of Education can surmount these problems if a programme is developed to address the competencies of educators. This will call for an extensive staff development and support programme. A once-off workshop will not suffice to successfully integrate ICTs into schools as this form of in-service training would totally inadequate and unreliable in the literature. In pursuit of a successful integration of ICTs into schools, there is a need for a continuous in-service professional development programme put in place by the Ministry of Education.

The Ministry and its partners must ensure that these projects benefits rural schools also. ICT training should be made part of teacher training programmes, so that newly trained teachers will possess ICT skills before entry into the education field. To this end, tertiary institutions can be roped in to assist in providing educators with ICT skills. Furthermore, awards can be introduced to motivate teachers and institutions that integrate ICTs in their normal school functions. Considerations should also be given to set norms and standards to ensure equitable application of ICTs in all schools.

As far as acquiring and maintaining competent ICT professionals is concerned, urban areas will continue to have the edge over rural areas until the GES develops a plan to provide mouth-watery incentives that will entice

these personnel to rural areas and maintain them there.

### **Finance**

Another factor that militates against the successful integration of ICTs in rural schools is the problem of cost. The cost of acquiring ICT resources is not a one-time investment but a recurrent expense. The cost includes among others: acquiring software, maintenance and repairs, replacements, training, Internet access, insurance, setting up a room to use as computer centre and if possible, installing the necessary security devices (Cawthera, 2001). While it is often easier to secure computers and Internet access, the running cost that adds up to the Total Cost of Ownership (TCO) could be a major drain on a schools' budget. The improper management of these costs will result in an ICT system that does not function as an effective tool in education. Herselman (2003) notes that most rural areas live below the poverty line and are impoverished because of the lack of basic infrastructure.

This is reflected in the schools as they also lack adequate classrooms, water, toilets, books etc. So in schools where basic resources like the provision of adequate classrooms, access to clean water and acquisition of text books are lacking, questions will arise as to why go for ICTs when we cannot afford our basic needs (Kante & Savani, 2003). Costs can be prohibitive so schools must know exactly what they want. Cawthera (2001) cites Osin and Bakia who point out that the cost of brand new computers is high. So he suggests the buying of clones rather than brand name products. Alternatively, schools can go for second-hand or refurbished computers.

When it comes to connectivity, Bakia (2003) suggests computers in schools could be networked to reduce cost. Networked computers do not have



to have hard drives. They can be connected to either a local server or the Internet. This method is quite cheaper than standalone computers. Networked machines are simple so they require little maintenance or technical support. Upgrades are done on the server so the individual machines need not be replaced or discarded. Despite these advantages, there is the need for a proficient technical support to attend to troubleshooting. Again, the processing speed tends to be slower when the network traffic is heavy - for example, if there is a class session. The machines will not work if there should be a network collapse.

Rural schools can resort to other means to ensure that they acquire some of their ICTs requirements. Some of these are:

1. Soliciting for donations: there are enterprises like insurance companies, retail outlets, factories, banks, government enterprises and the like whose customer base is educators. So when schools approach these enterprises for help, they will see it as a call to support a customer. Most governments departments, businesses, multinationals and other enterprises regularly replace their computers. So schools can approach them to ask them to donate their used computers. However, it is important to point out that some of the donated hardware is not free entirely.
2. Schools may have to buy other hardware like memory and hard drive; moreover they tend to have short life spans. There is the possibility that companies may just dump disused computers that cannot be upgraded on schools. The donations can be in the form of money so that the schools can purchase their own ICT resources or be

3. Creating an educational network: Herselman (2003) also suggests that schools can form an educational network so that the disadvantaged schools can benefit from schools with Internet at cheaper cost but obtaining high performance. In other words, schools that are nearer to ICT resourced schools can form a cluster and use the infrastructure of the resourced school. Alternatively, schools can pool resources and establish an ICT resource centre for their use.
4. Raising funds through levies: Schools and their PTAs Board of Governors can raise funds through special levies or engage in other fund raising activities where they can involve businesses in the communities. It must be noted that due to the poverty level of rural communities, there are very few businesses that have appreciable turn-over to make any meaningful donation to schools. So fund raising activities do not normally succeed in rural areas. So rural schools should consider turning to big businesses, NGOs, foreign embassies, etc. for funding. Schools must be encouraged to consider forming alumni. Some of the potential members are well placed in society to be able to provide support to the schools. So the alumni can help raise funds or provide their Alma Mater with their ICT resources.

Whether computers are bought or donated, there should be proper planning and budgeting to ensure the successful integration of ICTs in schools. Skimping on the budget for ICT resources in schools may prove to be very costly in the long run. Bakia (2003,) suggests “Total Cost of Ownership”

(TCO) as a way of reckoning the cost involved in the integration of ICTs in schools. TCO is a borrowed concept from business that is applied to estimate the lifecycle of investing in technology. With the proper application of TCO, schools will be able to have a budget to cater for the integration of ICTs in schools. It is the researcher's opinion that considering the benefits to be derived from the use of ICTs in schools, investing in technology will be a worthy cause.

### **Support Staff and Maintenance (Technicians and Coordinators)**

Once computers have been set up in schools, they will need regular support and maintenance otherwise their efficiency will be ephemeral. The need for support staff to do regular upgrades, repairs and maintenance cannot be overlooked. This is a specialized role, which cannot be left to the educators alone. A formal support structure with full-time personnel to respond to trouble-shooting calls must be created by the GES and the schools. This role can be out-sourced to enterprises in the ICT business or located in-house in the education system.

Within the education system, teachers who volunteer to do the job can be provided with basic skills to handle minor repairs and upgrades. This is quite necessary as minor troubling shooting can be attended to just-in-time to avoid delays in schools activities. This again may depend on the extra-curricular time the educator may have. Care must be taken to ensure that this duty does not compete with the educator's curricular duties. Alternatively, the teacher responsible for ICT can select a few learners who are technologically facile and train them to do the minor maintenance and repairs. The Ministry of Education must ensure that there are skilled support staffs that are readily available to attend to calls so that schools are not unnecessarily disrupted

because of system breakdown.

If the Ministry of Education and the various stakeholders solve the problems discussed above, there is a good chance that irrespective of the location of a school, the school will benefit in one way or the other from the use of ICTs. The researcher suggests that, considering the cost involved in integrating ICTs in schools and the numerous problems that beset rural areas, while still encouraging individual schools to adopt their own means of integrating ICTs in the various schools, the Ministry of Education should form partnerships with the private sector to set up educational network of schools or ICT resource centres in easily accessible points in rural areas. The school or centre will have all the appropriate ICT infrastructure and resources that will enable full utilization without any hindrances. Competent and well-qualified educators must man these schools or centres with their necessary technical support group. The stakeholders must then devise a plan on how schools are going to attend the network school or centre.

Furthermore, the Ministry must come out with a policy that oblige all schools to use the network school or ICT resource centres and programmes taught in the network schools or centres must form part of the norms and standards of each school. This programme will ensure uniformity in the kind of curriculum that will be followed. There must also be a set of monitoring and evaluation tools to ensure that desired outcomes of the programmes are achievable. If there are problems, the situation will be evaluated and remedied by competent personnel tasked by the Ministry of Education. As time goes and with the availability of funds, integration of ICTs into individual schools can gradually be done to attain the required standard.

## **Summary**

The chapter looked at the need for integration of ICTs into education and noted that there is ample evidence that ICTs will transform education to produce people who will be adequately equipped to compete in the Knowledge society.

The Ministry of Education has taken up the challenge to ensure that the curriculum offers the right programme which will see learners leaving schools with the necessary ICT skills with the capacity to be lifelong achievers. The Ministry has introduced IT into the school curriculum and produced a white paper to guide it in the provision of Education to schools in Ghana. The private sector and NGOs have joined to support the government's effort. The result is projects like One laptop per child, Microsoft's Agreement with the Ministry of Education to provide free software to schools and many more.

Individual schools are doing their lot to get ICTs introduced into their schools. On the whole, urban schools are edging out rural schools in integrating ICTs in their schools. Rural schools are beset with mainly the problem of basic infrastructure. However, with the appropriate planning, ongoing professional development programme with its built-in evaluation and sustained by financial support and essential technical staff, rural schools can also benefit from the use of ICTs.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **Introduction**

This chapter presents the research methodology of the study. It deals with the research design, population of the study, sample and sampling procedures, and instrumentation. Further, it covers the data collection procedure and analysis, and the survey tool.

#### **Research Design**

This study adopted a descriptive approach, as it gives a description of stakeholders' views and experiences about the use of ICTs in their schools. Stakeholders such as personnel responsible for ICTs in the Atwima District, District Education ICT co-ordinators, school heads, ICT teachers and students. School and class visits are made during which ICT facilities and infrastructure examined. The design mostly involves collecting data through administration of questionnaire to elicit information on the problem of introduction on ICT.

Gay (1997) stressed that descriptive survey technique is useful for investigating a variety of educational problems including assessment of attitudes, opinions, demographic information, conditions and procedures. Polit and Hungler (1995) describe descriptive survey as primarily describing, observing and documenting aspects of a situation as it naturally occurs. The advantage of this is that responses can be collected from a very wide range of

people. A descriptive survey involves asking a large number of individuals the same of questions. It provides a more accurate picture of events and seeks to explain peoples' perception and behavior on the basis of data gathered at a point time.

Sefer and Hoffnung (1991), on the contrary, maintained that there is the difficult of ensuring that the questions to be answered using the descriptive survey design are clear and not misleading because survey results can vary significantly because of the exact wording of questions. It may also produce untrustworthy results because they delve into private matters that people may not be completely truthful about. They further maintained that questionnaires require respondents who can articulate their thought well and sometimes even put such thought into writing.

The questionnaire is, therefore, limited by illiteracy. Another weakness of the descriptive survey design is getting a sufficient number of questionnaires completed and returned so that meaningful analysis can be made.

In spite of these disadvantages, the descriptive survey design was considered as the most appropriate tool since the study focused on respondents information; and attitudes since the population in this situation is purely literates, the descriptive survey design was viewed to be appropriate judging from above. In the survey, detailed data would be collected on a phenomenon to describe and justify existing perceptions practices.

The various data gathered would be triangulated so as to provide a valid, reliable and trustworthy presentation. Vockell and Asher (1995) define triangulation as “the process of using multiple operational and multiple data collection strategies to measure an outcome variable” (p. 193).

## **The Setting and Population**

The study was conducted in the Atwima Nwabiagya District of the Ashanti Region of Ghana. The district shares common boundary with the regional capital, Kumasi; which is only about 24km from the district capital, Nkawie. In spite of its proximity, the district has a number of rural schools. There are 5 senior high schools in the area. Two are privately run. There are 5 circuits, and out of this, there are 60 Government basic schools (primary and Junior High Schools) and 25 privately run basic schools.

The study took place in six (6) of the government run basic schools in the district. These were the schools that responded favourably to the request to conduct an academic research. One school each from each circuit was randomly selected for the study. Table 1 shows the name and educational circuits in the district.

**Table 1: Name of Education Circuits in Atwima Nwabiagya District and the number of schools in each circuit**

<b>Name of circuit</b>	<b>Number of schools</b>
Nkawie	13
Abuawka	8
Toase	9
Akropong	11
Adankwame	7
Barekese	12

Source: Atwima Nwabiagya Education Office, 2009

The target population for the study was made up of 1110 students, teachers and head teachers in the basic schools of the district. The decision to use the teachers is based on the assumption that, they are directly on the ground



and are likely to face or experience the challenges in the integration of ICT in the rural basic schools.

The district directorate of Education was also visited since the District Director, circuit supervisors and other officials would have a lot of information about the problem of the schools in terms of the implementation of ICT in schools.

### **Sample and Sampling Technique**

Vockell and Asher (1995) also state that:

“the term sampling refers to strategies that enable us to pick a subgroup from a larger group and then use this subgroup as a basis for making inferences about the larger group - the researcher’s goal is always to generalize about the population based on observation of the sample” (p. 172).

A population is therefore, the totality of persons, events, organization units, case records or other sampling units with which the research problem is concerned. There are various types of sampling technique; but for the purpose of this study, purposive sampling was used.

Purposive sampling is based on the assumption that “one wants to discover, understand, and gain insight, therefore one needs to select a sample from which one can learn the most” (Merriam, 1991). Patton (in Leedy 1997) also posits that:

Purposeful sampling is done to increase the utility of information obtained from small samples. Participants are chosen because they are likely to be knowledgeable and informative about the phenomenon the researcher is studying.

The sample for the study was drawn from students, ICT teachers, science teachers and head teachers of the Atwima District. The decision to use science teachers is based on the fact that, they have undergone refresher courses in ICT as a result of the introduction of the subject in the curriculum.

Also they form the majority of the teachers population and cut across the primary and junior high schools. The inclusion of head teachers is due the fact they are more involved and confronted with the problems and realities before authorities are made known for solution to be found. Furthermore, headteachers are the managers in almost all basic schools in the district.

### **Instrument**

The pattern and format of the study determine the nature of the data collection methods and how this is implemented. The main instrument used for this study was questionnaire.

Bell (1993), states that questionnaires are a good way of collecting certain types of information quickly and relatively cost-effective. The questionnaires were distributed to Headteachers, teachers and students to complete.

The items on the questionnaire were mostly closed ended which would be scored on a four point likert type scale. A few open ended items that would require respondents to provide their own responses to issues related to the problems associated to the integration of ICT to the curriculum were provided. The aim of the questionnaires was to ascertain the following:

1. The infrastructure and electricity availability.
2. The telecommunication availability.

3. The computers availability.
4. The teaching Aids and Books availability.
5. Professional development for teachers.

### **Pilot Testing**

If the adequacy of the instrument for collecting data was to be ascertained, it became necessary to embark on a pilot testing exercise. The purpose of a pilot testing was to examine the reliability of the questionnaire. It was also to discover weaknesses, inadequacies, ambiguities and problems in all aspects of the instrument; so that they could be corrected before actual data collection takes place.

The pilot test was conducted at Ahafo Ano South District in the Ashanti Region. The district has a unique characteristics which are similar to Atwima Nwabiagya District; both have many rural Basic Schools and share border with the Regional Capital, Kumasi.

At first the whole sample size was forty (40); however, only 35 (made up of 25 students 6 teachers and 4 headmasters) returned the questionnaire. The pilot testing was analysed using the Statistical Package for the Social Science (SPSS) to check the validity and reliability of the instrument. The Cronbach's alpha ( $\alpha$ ) reliabilities for the instruments were 0.75, 0.72 (Appendix D).

### **Description of the Demographic Characteristics**

The information gathered was not compromised in terms of gender issues. This is because the topic permeates through almost all persons in the society – men, women, boys and girls. Table 2 shows the distribution in (percentages) of respondents according to gender.

**Table 2: Distribution of Respondents According to Gender**

<b>Respondents</b>	<b>Male</b>	<b>(%)</b>	<b>Female</b>	<b>(%)</b>	<b>Total</b>
Students	41	46.59	47	53.41	88
Teachers	3	42.86	4	57.14	7
Headmasters	5	83.33	1	16.67	6
<b>Total</b>	<b>4</b>		<b>52</b>		<b>101</b>

Source: Computed from field data 2009

### **Data Collection Procedure**

The questionnaires were delivered personally by the researcher to all the participating schools. The respondents were told that it was for academic purposes and that confidentiality would be assured in order to motivate them to give their responses without reservation. After these, the researcher administered the questionnaire to the respondents; Students, Teachers and Headmasters.

Four schools each received 15 questionnaires for students, 2 questionnaires for teachers and one (1) for headmasters. One school was given twenty for students and two each for both teachers and headmasters. One other school received eleven, two and one for students, teachers and headmasters respectively. The distribution of the questionnaires was done in one day. On the merits of self-administration of questionnaire, Gay (1970) said the person administering the instrument has the opportunity to establish rapport to explain the purpose of the study to the respondents and explain the items that may not be clear.

An appointed time was fixed for the researcher to collect all completed questionnaire. Some of the questionnaires were however not

returned.

Overall, 101 completed questionnaires were received from students out of the 110 questionnaires distributed. Table 3 gives a response rate of the questionnaire served.

**Table 3: Frequency Distribution of Responses**

<b>Respondents</b>	<b>No of questionnaire served</b>	<b>No of questionnaire returned</b>	<b>Total (%)</b>
Students	91	88	96.7
Teachers	12	6	50
Headmasters	7	7	100
<b>Total</b>	<b>110</b>	<b>101</b>	<b>91.8</b>

Source: Computed from field data 2009

### **Data Analysis**

The completed questionnaire was serially numbered, coded and tabulated using 16.0 version of the Statistical Package for Social Sciences, (SPSS) computer programme. Since the study was purely descriptive, descriptive statistical analysis was used.

For computation in the SPSS, the coded questionnaire was fed into the computer. Frequencies for the items were computed into percentages. Results were organized in tabular form. The analysis was done using the research questions.

### **Summary**

In this chapter, the tenets of the research in which the inquiry was conducted were discussed. The researcher explained the format of the study, methods of data collection and processing. This was because the researcher believes that understanding the various components of research and their interrelated nature is vital to conducting valid research. Thus integrated within this theoretical framework, this chapter has aimed to explicate the systematic process of data followed, from its initial gathering, through its

analysis, to the consolidation of the final empirical findings, all of which were presented by means of example and summary. These findings will be discussed in the next chapter.

## **CHAPTER FOUR**

### **RESULTS AND DISCUSSION**

#### **Introduction**

This study has attempted to answer the research question posed in chapter one. This chapter aims to present the findings of the research. The consolidated data will be interpreted against the background of the existing theoretical framework, as well as against new literature, which is referred to as the result of the findings. This is done through a discussion of the conclusion drawn from the findings. Implications for practice, policy and the way forward for the successful integration of ICTs into rural schools are also discussed.

#### **Results of the Study**

The results of the study were based upon data from the questionnaire administered in six (6) public basic schools in six (6) circuits in the Atwima Nwabiagya District of the Ashanti Region of Ghana.

The responses from students are collapsed as follows: Strongly Agreed and Agreed for “Agreed”; Strongly Disagreed and Disagreed for “Disagreed”

Responses from teachers and headmasters are collapsed as: Excellent and Good for “Good”

The research questions on which the questionnaires were based on are;

1. Do rural basic schools in Atwima Nwabiagya District have adequate and regular supply of electricity, computers and quality textbooks?
2. What telecommunication infrastructure developments are available in Atwima Nwabiagya District to facilitate internet usage for acquisition of knowledge?

3. What level of qualification do ICT teachers, ICT coordinators and ICT technicians have to teach and manage IT resources in Atwima Nwabiagya District.

### Research Question 1

Do the rural basic schools in Atwima Nwabiagya District have adequate and regular supply of electricity, computers and quality textbooks?

### Responses from Students (see Appendix A)

**Table 4: Provision of electricity, computers and textbooks?**

<b>RESPONSES ITEM</b>	<b>Agree N(%)</b>	<b>Disagree N(%)</b>	<b>NotSure N(%)</b>	<b>Total N(%)</b>
Electricity is extended to the school to supply power to computers.	52(59.1)	28(31.8)	8(9.1)	88(100)
There is a regular supply of electricity to the school.	31(35.3)	51(57.9)	6(6.8)	88(100)
There is an adequate supply of computers to the school to enhance teaching and learning.	11(12.5)	64(72.8)	13(14.8)	88(100)
The computers available in the school have high speed for teaching and learning.	7(7.9)	52(59.1)	29(33.0)	88(100)
The school is provided with computers laboratory to accommodate computers	1(0.1)	80(91.9)	7(8)	88(100)
The use of computers in the classroom has enhanced acquisition of knowledge.	44(50)	35(39.7)	9(10.2)	88(100)
Students have access to the school laboratory and computers during school hours.	8(9.1)	77(87.5)	3(3.4)	88(100)
Students have access to computers at home for practice and skills acquisition.	11(12.5)	65(73.8)	12(13.6)	88(100)
Computers that malfunction are promptly replaced.	2(2.3)	72(82.7)	13(14.9)	88(100)



**Table 4 continued**

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The school has enough and quality ICT textbooks for teaching and learning.	14(15.9)	72(81.9)	2(2.3)	88(100)
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Source: Computed from field data 2009.

Responding to the question to whether electricity is extended to the schools 52 representing 59.1% out of 88 students (respondents) agreed that electricity is extended to the schools to supply power to computers. On the other hand 28(31.8%) disagreed and 8(9.1%) responded not sure. This finding indicated that majority of the schools have been connected to the electricity grid.

On the issue of regular supply of electricity to the schools; Table 4 indicated that 31 representing 35.3% agreed to item 2 while 51 representing 57.9% disagreed with 6(6.8%) responded not sure.

The responses revealed that there have been regular power outages of electricity. Due to this problem ICT which mostly depended on electricity get disrupted when lessons are in progress.

On the adequacy of computer to the school the study revealed that 11(12.5%) responded to item 3 on the questionnaire and 64 representing 72.8% disagreed while 13(14.8%) respondents were not sure. This result indicates that the schools have insufficient computers to enhance teaching and learning. This finding affirms the issue raised by Helselman (2003) that lack of adequate computers to the rural schools is a draw back to the teaching of ICT.

However, 80 respondents representing 91.9% disagreed. This result indicated that the rural basic schools are yet to be provided with computer

laboratories. Because of lack of computer laboratories, the few computers available are sent to the classroom where the lesson are to be held.

On the question of whether the computers available have high efficiency (high speed); out of 88 students respondents 7.9% agreed while 59.1% disagreed and 33% not sure. The result indicates that the computers have low speed and that their booting time is low. This situation frustrates students and teachers alike when working with the computers.

One (1) out of 88 respondents agreed that schools in the rural areas have been provided with computer laboratory. This number represents (0.1%) responses.

Fifty percent of 88 students respondents agreed to the question to whether the use of computers have enhanced the acquisition of knowledge. While 39.7% disagreed with 10.2% not sure. This result affirms the assertion that ICTs are used to facilitate the capture, storage, processing, transmission and display of information by electronic means to enhance teaching and learning. The 39.7% who disagreed argued that since computers are not adequate for teaching and learning; they do not get the impact of the use of the computers.

In response to the question of the accessibility of the school laboratory during school hours, 8(9.1%) agreed that they have access to it. While seventy-seven representing 87.5% respondents disagreed. This finding affirms the earlier statement that the schools have no access to computer laboratory. If there are no computer laboratories you cannot get access to them.

Out of 88 students respondents, 12.5% of them agreed that they have access to computers at home for practice and skill acquisition. On the other hand, 73.8% disagreed to that item. Lack of personal computers is a draw back to acquisition of computer skills. Since it is difficult to acquire computer

knowledge when the lesson is conducted theoretically. This was buttressed by Salomon et al (1991) when they explained that when learners have better understanding of the task required, they are satisfied for achieving their objectives. This satisfaction leads to motivation to learn the more and the drive for more knowledge results in good output.

Two (2) representing 2.3% of students respondents agreed to the question as to whether computers that malfunction are promptly replaced. 82.7% however disagreed. It was realized that most of the computers in the schools have developed fault and are not in use.

Out of 88 students respondents, 15.9% of them agreed that their schools have enough and quality ICT textbooks for teaching and learning. On this same issue, 81.9% of the respondents on the other hand disagreed.

It was revealed that there were no standardized ICT textbooks for the schools as at the time this data was collected and that different teachers use different ICT textbooks. Teaching and learning materials such as educational software and overhead projectors were non-existence.

### **Responses from Teachers (see Appendix B)**

**Table 5: Provision of electricity, computers and textbooks.**

<b>RESPONSES ITEM</b>	<b>GOOD/YES N(%)</b>	<b>FAIR N(%)</b>	<b>POOR/NO N(%)</b>	<b>TOTAL N(%)</b>
How would you rate the supply of electricity.	2(28.6)	2(28.6)	3(42.9)	7(100)
How would you rate the supply of computers in your school?	1(14.3)	0(0)	6(85.7)	7(100)
How do you access the speed of the computers	4(57.1)	0(0)	3(42.9)	7(100)
Do you have access to computer laboratory?	0(0)	0(0)	7(100)	7(100)
Apart from school do you				

**Table 5 continued**

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have access to a personal computer elsewhere?	4(57.1)	0(0)	3(42.9)	7(100)
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Source: Computed from field data 2009

Of the 7 returned questionnaire two (28.6%) indicated that the rate of electricity supply was good. Three (42.9%) teachers respondents indicated that the supply was poor while two (28.6%) indicated it was fair.

The teachers indicated that frequent power outage rendered teaching and learning ineffective as far as computer studies were concerned. The schools could not afford power plants to supply electricity to the computers.

This means that whenever there was power outage then either a class was suspended or the lesson was done theoretically.

On the rate of the supply of computers to the schools, only one (14.3%) teachers respondents indicated that it was good, while six representing 85.7% indicated that computer supply was not good.

This result confirms the response from students which indicated that 72.8% respondents disagreed that there was adequate supply of computers to the schools. It was realized during the research that, students are crowded around one computer. In some instances they are grouped around computers with one teacher going from one group to the other explaining the functions of the computers to the students.

Four representing 57.1% of teachers respondents indicated that the efficiency or the speed of the computers are good. However, three (42.9%) of the respondents said it was not good. They gave reasons that some of the computers are too slow due to a number of people using the same machines at the same time. They further explained that frequent power outages also rendered most of the computers ineffective.

Seven representing 100% of respondents who completed this questionnaire, responded 'No' to the question as to whether the schools have

access to computer laboratory. The teachers explained the difficulties they go through in the teaching of ICT due to lack of laboratory. Computers are brought to the classroom where the lesson was to take place.

In some schools, computers are kept in the Headmaster's House. Others too, in the Headmaster's office. There were some instances where teachers had to carry the computers themselves to and from the school. Due to the fact that the computers are too heavy for the primary pupils to carry.

Four (57.1%) respondents responded 'Yes' to the question of accessibility of personal computers by ICT teachers at home; while three (42.9%) responded 'No'. Those who responded 'No' indicated that they do visit internet café for educational materials. Others also indicated they had obtained some loans to buy lap tops and desk top computers.

#### **Responses from Headmasters (see Appendix C)**

**Table 6: Provision of electricity, computers and textbooks**

<b>RESPONSES ITEM</b>	<b>GOOD/YES N(%)</b>	<b>FAIR N(%)</b>	<b>POOR/NO N(%)</b>	<b>TOTAL N(%)</b>
Is your school connected to the national grid?	4(66.7)		2(33.3)	6(100)
How would you rate the electricity supply to your school?	2(33.3)		4(66.7)	6(100)
Do you have access to computers to facilitate teaching and learning?	3(50)		3(50)	6(100)
How do you rate the speed/workability of the computers?	2(33.3)		4(66.7)	6(100)
Is your school provided with a computer laboratory to accommodate the computers?	0(0)		6(100)	6(100)
Do you have quality ICT textbooks to enhance	1(16.7)		5(83.3)	6(100)

**Table 6 continued**

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teaching and learning?

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Source: Computed from field data 2009

Results from Table 6 showed that four representing 66.7% respondents indicated that the schools have been connected to the national grid, while 33.3% respondents said 'No' to the questionnaire.

This result affirmed the result from the students and teachers; which showed that majority of the schools have been connected to the national electricity grid. Two representing 33.3% Headmasters respondents showed that the rate of electricity supply to the schools is good while 66.7% respondents said, it was poor. This result was corroborated by students and teachers respondents which indicated that, the rate of electricity supply was not good. There have been frequent power outages in the district; this they explained affect teaching and learning ICT.

Responding to the question on whether the schools have access to computers to facilitate teaching and learning, 50% respondents indicated 'Yes'; while a further 50% answered in a negative.

Both students and teachers respondents however indicated that, there was inadequate supply of computers tot the school.

On the rate of workability or speed of the computers 33.3% Headmaster respondents said it was good to that question. 66.7% on the other hand answered that it was poor.

It was about the same result and reasons that were received from the student and teacher respondents. Thus, it was realized that the rate of workability or efficiency of the computers were not good.

Hundred percent (100%) of respondents answered 'No' to the question of whether the schools have been provided with computer laboratory as corroborated by the student and teachers respondents. The Headmasters

explained that lack of laboratory was hindering the smooth management of ICT resources. The computers are kept in their offices and even houses; especially schools that did not employ security men in their school premises.

One (1) representing 16.7% respondents indicated that there were quality textbooks to enhance teaching and learning. 83.3% respondents however, responded 'No' to the question.

The Headmasters explained that due to lack of standardized ICT textbooks, a number of publishers do approach them to have their books sanctioned or approved to be used in their schools

### **Research Question 2**

What telecommunication infrastructure developments are available in Atwima Nwabiagya District to facilitate internet usage for acquisition of knowledge?

### **Responses from Students (see Appendix A)**

**Table 7: Provision of telecommunication infrastructure for internet usage.**

<b>RESPONSES ITEM</b>	<b>Agree N(%)</b>	<b>Disagree N(%)</b>	<b>NotSure N(%)</b>	<b>Total N(%)</b>
Telephone facilities are provided for the school to facilitate internet connectivity.	1(1.1)	80(90.0)	7(8.0)	88(100)
The school has access to the internet to facilitate acquisition of knowledge.	10(11.5)	1(80.5)	7(8.0)	88(100)
The school has access to wireless technology for internet connectivity.	4(4.5)	67(7.61)	17(19.3)	88(100)

Source: computed from field data 2009

Responding to the question on whether telephone facilities are provided for the school to facilitate interconnectivity, 1.1% out of 88 respondents agreed, while 80 representing 90.9% students disagreed. This result indicates

that most communities in the district lack telephone facilities to enhance internet connectivity. This affirms the position by Baartman (2003) that most of the rural areas in Ghana have very limited or no access to the internet. This is due to the fact that there are inadequate or no telephone lines and thus limited or no capacity to connect to internet service providers (ISP).

On the accessibility of internet facility for the acquisition of knowledge, 10(11.5%) students respondents agreed while 71 representing 80.5% of the 88 respondents disagreed. Most respondents did not know what the internet looks like; others too said they have heard about it but not seen it before.

Out of 88 students respondents, 4.5% of them agreed that the schools have access to wireless technology. However 76.1 respondents disagreed. A further 19.3% students responded not sure. Most of the respondents indicated that they have no knowledge of the wireless technology for internet connectivity. Wireless Technology is an emerging technology in Ghana. And as (Bakia, 2003) posit: Wireless systems are emerging and are considered potentially viable alternatives to higher telephone bills.

#### **Responses from Teachers (see Appendix B)**

**Table 8: Development of Telecommunication infrastructure**

<b>RESPONSES ITEM</b>	<b>YES</b>	<b>NO</b>	<b>TT</b>
Have telephone facilities been extended to your school?	0(0)	7(100)	7(100)
Do you have access to internet facilities for acquisition of knowledge?	1(14.3)	6(85.7)	7(100)
Do you have access to a wireless technology for internet connectivity?	0(0)	7(100)	7(100)

Source: Computed from field data 2009.



On the question of the provision of telephone facilities for the schools, 7 representing 100% respondents answered 'No'. Lack of telephone facilities, is a disincentive to the internet connectivity; since the former is one of the common source of internet connectivity in Ghana.

This result affirms the response from student on the accessibility of telephone faculties to the rural school which revealed that 90.9% disagreed that telephone facilities are provided to the school.

Out of seven respondents who returned the questionnaire 6 representing 85.7% indicated that, they do not have access to the internet; with 14.3% respondents having access.

They indicated that, students occasionally are sent to the Atwima Nwabiagya Information Centre which also houses internet café cum library. The students are introduced to the basic features of the internet. However, this opportunity of visiting the internet café was advantageous to only schools which are adjacent to the district capital. The remote communities did not have the means to visit the facility.

The researcher realized that he rural schools did not have resources to transport the students to District Capital to utilize the internet café. Hundred percent of the respondents indicated there was no accessibility of wireless technology in the district. The teachers indicated that they were not familiar to that technology.

#### **Responses from Headteachers (see Appendix C)**

#### **Table 9: Development of Telecommunication Infrastructure**

<b>RESPONSES ITEM</b>	<b>GOOD/YES N(%)</b>	<b>FAIR N(%)</b>	<b>POOR/NO N(%)</b>	<b>TOTAL N(%)</b>
Are there telephone and wireless facilities in your school	1(16.7)		5(83.3)	6(100)
Do you have access to internet facilities in your school for acquisition of knowledge?	-		6(100)	6(100)

Source: Computed from field data 2009

One (1), representing 16.7% respondents indicated that, there are telephone facilities. However, investigation proved that it was rather Ghana Telecom/Vodafone prepaid telephone booth installed in one of the cluster of schools at the Nkawie Circuit. Apparently this telephone booth was not meant for internet connection. Eighty-three percent responded that there were no telephone facilities in the schools.

On the question of whether the schools have access to internet facilities, 100% of respondents indicated there were no such facilities. As corroborated by both teachers and students; when there was the need for introduction of internet to the students, most schools send their students to the District Assembly Internet Café at the District Capital, Nkawie.

### Research question 3

What level of qualification do ICT teachers, ICT coordinators and ICT technicians have to teach and manage IT resources in the Atwima Nwabiagya District?

### Responses from Students (see Appendix A)

### Table 10: Qualification of ICT Teachers, Coordinators and Technicians

<b>RESPONSES ITEM</b>	<b>Agree N(%)</b>	<b>Disagree N(%)</b>	<b>NotSure N(%)</b>	<b>Total N(%)</b>
There are enough qualified ICT teachers who handle the IT subject in the school	70(80.5)	16(18.4)	2(1.1)	88(100)
The school has qualified technicians and coordinators who manage the computers.	10(11.3)	64(72.6)	14(15.9)	88(100)

Source: Computed from field data 2009.

Table 10 indicates that 80.5% out of 88 student respondents agreed that there are qualified ICT teachers in the schools; with only 1.1% respondents disagreed and 18.4% not sure to that item. This finding indicated that most of the schools have qualified teachers to handle the course.

However, the ICT teachers are not enough. Majority of the schools have either one or two ICT teachers to handle the subject.

On the question of whether there are qualified technicians and coordinators who manage the computers, 10 representing 11.3% of 88 student respondents agreed while 72.6% respondents disagreed. A further 15.9% respondents were not sure. The results revealed that there were no such technical personnel in the schools. This confirms the question on whether computers that malfunction are quickly replaced. Respondents indicated that most of the computers were not functioning properly; and are not replaced quickly. This was because, of lack of personnel to repair the computers.

### **Responses from Teachers (see Appendix B)**

#### **Table 11: Qualification of ICT teachers respondents**

<b>Qualification</b>	<b>N</b>	<b>%</b>
First degree	1	14.3
Diploma in Education	3	42.8
Teachers Certificate 'A'	2	28.6
HND	1	14.3
Non Certificate (Others)	-	-
<b>Total</b>	<b>7</b>	<b>100</b>

**Table 12: Level of qualification of ICT teachers, ICT coordinators and ICT technicians**

<b>Responses Item</b>	<b>Yes N(%)</b>	<b>No N(%)</b>	<b>Total N(1%)</b>
Are you an ICT trained teacher?	4(57.1)	3(42.9)	7(100)
Are there adequate trained ICT teachers to teach the subject?	3(42.9)	4(57.1)	7(100)
Do you have qualified ICT coordinators and technicians to manage ICT resources?	1(14.3)	6(85.7)	7(100)

Source: Computed from field data 2009.

Table 11 indicated that out of the 7 ICT Teachers respondents who answered the questionnaire, one (14.3%) have first degree as their highest qualification, three (42.8%) had Diploma in Education, two(28.6%) had Certificate 'A' while one(14.3%) was HND holder.

The study revealed that none of the teachers in the schools where this study was carried out were a specialist trained ICT teachers. Information Technology was part of the programme or course study in the Training Colleges. And that they offered ICT as part of their programme. This means that the teachers could handle the course in the schools.

Consequently four (57.1%) respondents answered 'Yes' to the question as to whether the teachers are trained ICT teacher; while three(42.9%) answered 'No' to the question.

Of the 7 returned questionnaire, 42.9% teachers respondents indicated there are adequate ICT teachers to teach the subject; while 57.1% indicated that there were no adequate ICT teachers in the various schools.

It was realized that, in the primary schools where the study was carried out, it was the same teachers who handled all subjects including ICT. Thus the work load on the teachers was rather heavy; most especially teaching practical course like ICT.

In the Junior High School, it was realized that, one teacher (ICT) normally handles the subject from Form one to Form three. The work load there was also not any better.

One representing 14.3% teachers respondents indicated that there are qualified ICT coordinators and technicians to manage IT resources in the schools.

It was realized that due to lack of technicians, most of the computers in the schools are: mal-functioned. Thus putting a lot of pressure on the few computers available. It was noted that the ICT teachers at times served as managers of IT resources. When a computer developed faults, it took a lot of time before a hardware personnel is employed to put it in order; all at the expense of the schools.

**Responses from Headteachers (see Appendix C)**

**Table 13: Level of qualifications of ICT teachers, ICT coordinators and ICT technicians.**

<b>RESPONSES ITEM</b>	<b>GOOD/YES N(%)</b>	<b>FAIR N(%)</b>	<b>POOR/NO N(%)</b>	<b>TOTAL N(%)</b>
Do you have adequate ICT teachers to teach the subject?	3(50)	-	3(50)	6(100)
How do you rate the performance/work output of the ICT teachers in the school?	4(60)	1(20)	1(20)	6(100)
What levels of qualification do your ICT teachers have?	-	-	-	6(100)
Do you have qualified ICT coordinators and technicians to manage the PCs and laboratory?	-	-	6(100)	6(100)
Do you get financial and technical support from NGOs to enhance ICT project in your school?	1(16.7)	-	5(83.3)	6(100)

Source: Computed from field data 2009.

Result from Table 13 indicated 50% Headmaster respondents said the schools have adequate ICT teachers to handle the subject. While a further 50% responded that, the teachers are not enough. They argue that the numbers of students are too many for a single teacher to handle ICT. In some of the classes the students' population is over 80 pupils.

In some of the Junior High Schools for instance, only one teacher handles Form one to three. The work load is thus heavy, considering practical subject like ICT.

Responding to the question of the rate of performance or work output of the ICT teachers in the schools; 60% of respondents indicated that it was good.

While 20% answered it was poor. The Headmasters explained that, in spite of the heavy work schedules on the teachers, the latter are dedicated and hardworking.

The study revealed that all the ICT teachers in the basic schools are qualified. Table 8 of teachers respondents showed the distribution of qualification of teachers in the schools where the study was carried out.

Hundred percent of respondents answered 'No' to the question as to whether the schools have qualified ICT coordinators and technicians to manage personal computers and laboratories.

Consequently, it was noted that, whenever any computer developed a fault or malfunctioned; the schools engaged the services of private hardware personnel to repair at the expense of the schools.

Financially, according to the headmasters, the schools are handicapped. They do not get financial and technical support from NGOs to enhance ICT utilization.

The Headmasters further explained that with the introduction of capitation grant by the government, parents are reluctant to pay any money to the schools. Table 12 revealed that 83.3% respondents indicated that they did not get financial and technical support from NGOs to finance ICT projects.

### **Findings**

From the responses of students, teachers and headmasters in the schools in which the research was carried out, the following themes stand out:

1. Most of the schools (62.9%) have been connected to the national electricity grid.
2. No school has access to a computer laboratory.

3. There is no school that had access to telephone and wireless technology facilities.
4. Internet facilities are non-existent in the schools.
5. There is limited supply of quality ICT textbooks.
6. Most of the schools (68.1%) have qualified but inadequate ICT teachers.
7. There are no ICT coordinators and technicians in the schools or in the District Education Office to manage resources.
8. Majority of students (87.5%) have limited access to computers at schools and at home to enhance revision.
9. A greater number of the Schools (83.3%) do not have access to funding from NGOs and PTAS



## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **Introduction**

This section presents the concluding part of the research findings. The summary, conclusion and recommendation are discussed.

#### **Summary**

##### **Electricity Connectivity**

Most (54.6%) schools have been connected to the national electricity grid. Some of the communities are yet to be connected to the electricity grid for their respective schools to have power. It was noted that, the schools that have electricity complained of irregular power supply. And since the schools have limited finances, they have no stand by generator plant, thus any time the power goes off, it disrupts ICT lessons.

##### **Accessibility of Computer Laboratory**

There is a lack of computers in the schools that the study was carried out. Each time there are ICT lessons, the computers are sent to the classrooms where the lesson is to be held.

The computers are kept in the headmasters' office or at the school library.

Schools that do not have such facilities normally keep their computers at the headmaster's houses to prevent burglary. This means that computers are carried to and from school everyday.

### **Accessibility of Telephone Facilities**

The results of the study also indicate that telephone and wireless facilities are non-existence in the rural schools. These two facilities are key to the provision of internet connectivity. Some of the headmasters even noted that due to financial constraints, maintenance and sustainability of these facilities would be a burden of the school administration.

The district however, has access to an internet café at the District Capital – Nkawie. This facility also serves as library and information service. Most of the schools especially the nearby communities visit the facility to access the internet. But the computers are not sufficient to accommodate the large number of students population schools that remote from the district capital and do not have the means of transportation, are denied the accessibility of the internet.

### **Adequate Supply of Computers to the Schools**

The result further revealed that, the computers supplied to the schools are inadequate as compared to the students' population. Most (69.8%) of the schools that the research was conducted the student in a class to computer ratio was fifteen to one (15:1). Some of the schools have at most two computers at their disposal. The computers available frequently breakdown due to many students using few computers. The pressure on the computers also render them inefficient, thus slowing down the booting time.

The result further revealed the students have limited access to computer at home for revision and practice. On the part of the teachers most of them visit the interne café to access the internet for information.

### **Accessibility of quality ICT Textbook**

There are no adequate quality and standardized ICT textbooks in the schools. It was noted that different teachers use different ICT textbooks for their lessons. The ICT textbooks that are available are not adequate for the students to utilize.

The situation has resulted to unscrupulous writers to exploit the students with their textbooks, and pamphlet which the GES has not yet certified.

Professional development of ICT teachers, technicians and coordinate. It was noted that most of the schools have qualified ICT teachers. The teachers are however not adequate. According to the headmasters, the teachers are efficient and dedicated to their work in spite of the constraints under which they work.

Ninety percent (90%) of the teachers are not specialist trained ICT teachers, thus ICT is a core subject taught at the training college. This means all Diploma holders with the exception of the certificate 'A' and 'Youth employment' teachers are computer literate. There are few specialists trained polytechnic and graduate students on national service in the schools.

In addition, the study revealed that there are no ICT technicians and coordinators the schools and at the District Education Office.

Whenever a computer developed any fault or a system breakdown, private hardware personnel are engaged to repair the computers at the expense of the scare resources of the schools involved. Due to the absence of the coordinators, the ICT teachers and headmasters take that role to their already heavy schedules. Managing, harnessing and coordinating the resources of ICT

need professionals to undertake that responsibility, to make a smooth running of ICT successful.

There are no ICT coordinators at the District Education Office. It was revealed that ICT is placed under mathematics, science and technology unit; and that the circuit officer in charge, takes responsibility.

### **Funding of ICT Resources**

It was realised from the study that the Central Government is the major funding of ICT resources in the school. The schools have no other technical and financial support from NGOs. Due to the limited support from Government the schools are unable to undertake any meaningful ICT project.

### **Conclusion**

This study aimed at assessing the effects of the introduction of ICT into the curriculum of the Rural Basic Schools in the Atwima Nwabiagya District. A number of conclusions can be drawn from the findings, with respect to the district. These are;

Computer supply to the schools are inadequate; this situation is making teaching and learning ICT very difficult. Students are grouped during ICT lessons to have access to a computer.

One other major constraint facing the rural schools are lack of computer laboratory to accommodate the few computers available. Computer lessons are conducted in the classrooms where the lessons are to be held. This means that computers are conveyed to and fro the respective classrooms. The computers are accommodated in the Headmasters' houses and for schools that have employed security men in their premises, accommodate their computers in the headmasters' office and libraries.

There are no telephone infrastructure to facilitate the provision of internet connectivity; thus, no school has any internet facility for acquisition of knowledge. Majority of the students are not familiar with the internet. Schools that are closer to the district capital do utilize the District Assembly Internet Café and other Private Internet Café for a fee.

All the schools in which this study was carried out have qualified teachers; but the teachers are not adequate to match the students ratio in the schools. On the qualification of ICT teachers, the result from the study indicated that, there were no specialist ICT teachers in the schools, rather ICT was part of their course of study in the training colleges.

The study revealed that, there are no ICT Coordinators and Technicians in the schools to manage the IT resources. In some instances ICT teachers also double as coordinators and technicians.

The schools are faced with lack of financial and material resources. The Government is the only entity that provides funds to the rural basic schools in the District.

This study acknowledges that there are problems in most of the rural areas in Atwima Nwabiagya district but these should not preclude the deprive areas from benefiting from the use of ICTs. From this study, there is clear evidence that with the proper professional development, appropriate technology and continuous support from the Ministry of Education, rural schools in Atwima District can also have ICTs successfully integrated.

### **Recommendations**

Change is vital and crucial in all human endeavours so all stakeholders must be encouraged to embrace it and ensure the successful integration of

ICTs in education so that the future leaders of the country are globally competitive.

Following the research findings and conclusions, the following recommendations have been made:

1. The Atwima Nwabiagya District Education Office should liaise with the Government to extend electricity to all communities that do not have access to electricity; since power is the main source that drives personal computers. Alternative source of power like Biogas, Solar Energy and Wind Energy could be harnessed, if the cost of providing such facilities are comparatively lower to Hydro Electricity.
2. If the Government's programme of integrating ICT into the curriculum is to succeed, then more computers should be supplied to the schools to enhance teaching and learning.
3. Telephone facilities are the main source of internet connectivity; therefore the educational authorities should make the necessary effort to provide such facility to the Districts, (since internet is one of the technological source of knowledge acquisition)
4. It is further recommended that, the Ministry of Education should invest at least a percentage of the GETFund to provide each Educational circuit in the Country with computer laboratories and eventually turn them into internet café for students and teachers to have access to the internet.
5. In addition, the District Education office should collaborate with the Education Ministry to employ qualified and experts in ICT to write and publish standardised ICT textbooks to the Schools. This

would curb the over reliance on pamphlets and different textbooks by teachers and students

6. Professional training should be instituted for ICT teachers in the District to upgrade their ICT competency levels and skills through workshops, sandwich programme and distance learning
7. Educational authorities should train and employ ICT coordinators and technicians to manage ICT resources in the district.

Parents and Guidance should be encouraged to form association (PTAs) to support their community schools in terms of computers and ICT resources.

8. The Government should speed up the implementation of the “one child per laptop project” to enhance accessibility to all basic school students in the district.

### **Suggestions for Further Research**

1. The study could not delve into the teaching methods employed by the teachers to impart ICT knowledge to the students. It is therefore suggested that further research would be done in that area.
2. Another area recommended for further research would be to find out the output (performance of students at the end of term and year) in spite of limited resources and constrains of the schools. This was not captured in this study.
3. The study was carried out in only few schools in the District. The researcher is of the opinion that further studies be carried out in wider geographical areas in the district.

4. The study could not cover Private Basic Schools (International Schools) in the district. This could have provided the researcher to do a comparative analysis in terms of performance since the Private Basic Schools better ICT infrastructure development. It is therefore recommended that further studies should be done in that area.
5. The study could not also seek the views of the personnel in the district educational office on the problems associated with the introduction of ICT into the curriculum with particular reference to rural basic schools in the district. It is therefore recommended that further studies should cover these areas.



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## **APPENDICES**

## APPENDIX A

### Questionnaire for Students

This questionnaire is in connection with research study involving the integration of ICT into the classroom situation. It would be highly appreciated if you could respond to the items in the questionnaire. Whatever information given will be treated with the utmost confidentiality it deserves.

Please make a tick ( ) at the appropriate place to reflect the extent to which you agree or disagree with the statement.

ITEM	OPTION				
	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
1. Electricity is extended to the school to supply power computers.					
2. There is a regular supply of electricity to the school					
3. There is an adequate supply of computers to the school to enhance teaching/learning.					
4. The computers available in the school have high speed for					



teaching and learning.					
5. The school is provided with computer laboratory to accommodate computers.					
6. The use of computers in the classroom has enhanced acquisition of knowledge.					
7. Students have access to the school laboratory and computers during school hours.					
8. Students have access to computers at home for practice and skills acquisition.					
9. Computers that malfunction are promptly replaced.					
10. The school has enough and quality ICT text books for teaching and learning.					
11. Telephone facilities are provided for the school to facilitate internet connectivity.					
12. The school has access to wireless technology for internet connectivity.					
13. The school has access to the internet to facilitate acquisition of knowledge.					
14. There are enough qualified ICT teachers who handle the IT subject					

in the school.					
15. The school has qualified technicians and coordinators who manage the computers.					

## APPENDIX B

### Questionnaire for Teachers

This questionnaire is in connection with a research study involving the integration of ICT into the classroom situation. It would be highly appreciated if you could respond to the items in the questionnaire. Whatever information given will be treated with the utmost confidentiality it deserves.

Kindly indicate your choice by selecting the appropriate response in each item and feel free to comment where necessary.

1. How would you rate the supply of electricity to your school?  
a. Excellent    b. Good                      c. Fair            d. poor
2. How would you rate the supply of computers in your school?  
a. Excellent    b. Good                      c. Fair            d. poor
3. How do you access the speed of the computers/  
a. Excellent    b. Good                      c. Fair            d. poor
4. Do you have access to a computer laboratory? [    ] Yes    [    ] No
5. Have telephone facilities been extended to your school?  
[    ] Yes                      [    ] No

6. Do you have access to internet facilities for acquisition of knowledge?  
 Yes  No
7. Do you have access to wireless technology for internet connectivity?  
 Yes  No
8. Apart from school do you have access to a personal computer elsewhere?  
 Yes  No
9. If yes, please mention where and the times that you have access to the  
personal computer .....
10. Are you an ICT trained teacher?  Yes  No
11. If yes, please mention your level of qualification.  
.....
12. If No, can you state why and are you prepared to acquire ICTS skills if  
resources are made available to you?  Yes  No
13. Are there adequate trained ICT teachers to teach the subject  
 Yes  No
14. Do you have qualified ICT co-ordinators and technicians to manage  
ICT resources?  Yes  No

## APPENDIX C

### Questionnaire for Headmaster

This questionnaire is in connection with a research study involving the integration of ICT into the classroom situation.

It would be highly appreciated if you could respond to the items in the questionnaire.

Whatever information given will be treated with the utmost confidentiality it deserves.

1. Is your school connected to the national electricity grid?  
[ ] Yes [ ] No
2. If No, please what steps are you taking to enable your school get access to electricity? .....
3. How do you rate the electricity supply to your school?  
a. Excellent    b. Good    c. Fair    d. poor
4. Do you have access to computers to facilitate teaching and learning?  
[ ] Yes [ ] No
5. How do you rate the speed/workability of the computers?  
a. Excellent    b. Good    c. Fair    d. poor
6. Do you have quality ICT text books to enhance teaching and learning?

Yes       No

7. Is your school provided with a computer laboratory to accommodate computers? Yes  No

8. Are there telephone and wireless facilities in your school?

Yes     No

9. Do you have access to internet facilities in your school for acquisition of knowledge? Yes  No

10. Do you have adequate ICT teachers to teach the subject?

Yes  No

11. How do you rate the performance/work output of the ICT teachers in the school?

a. Excellent    b. Good                      c. Fair              d. poor

12. What levels of qualification do your ICT teachers have?

a. Degree   b. Diploma              c. Specialist    d. Teacher's cert 'A'

(e) Others (please specify) .....

13. Do you have qualified ICT co-ordinates and technicians to manage the computers and laboratories?  Yes  No

14. Do you get financial and technical support from Non-Governmental Organizations to enhance ICT project in your school?

Yes     No

## APPENDIX D

### STUDENTS ANALYSIS OF PILOT TESTING INSTRUMENT

```

GET
  FILE='C:\Users\AMOS\Desktop\HOD\Justice students.sav'.
  DATASET NAME DataSet0 WINDOW=FRONT.
  RELIABILITY
    /VARIABLES=Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15
    /SCALE('ALL VARIABLES') ALL

    /MODEL=GUTTMAN.

  RELIABILITY
    /VARIABLES=Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15
    /SCALE('ALL VARIABLES') ALL

    /MODEL=PARALLEL.
  
```

[DataSet1] C:\Users\AMOS\Desktop\HOD\Justice students.sav

### Scale: ALL VARIABLES

**Case Processing Summary**

		N	%
Cases	Valid	19	76.0
	Excluded <sup>a</sup>	6	24.0
	Total	25	100.0

a. Listwise deletion based on all variables in the procedure.

**Test for Model Goodness of Fit**

Chi-Square	Value	215.046
	df	118
	Sig	.000
Log of Determinant of	Unconstrained Matrix	-20.169
	Constrained Matrix	-3.329

Under the parallel model assumption

**Reliability Statistics**

Common Variance	.860
True Variance	.123
Error Variance	.737

## Reliability

[DataSet1] C:\Users\AMOS\Desktop\HOD\Justice students.sav

### Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	19	76.0
	Excluded <sup>a</sup>	6	24.0
	Total	25	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Lambda	1	.667
	2	.786
	3	.715
	4	.723
	5	.782
	6	.949
N of Items		15

## TEACHERS

```
RELIABILITY
/VARIABLES=q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14
/SCALE('ALL VARIABLES') ALL

/MODEL=ALPHA.
```

```
RELIABILITY
/VARIABLES=q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14
/SCALE('ALL VARIABLES') ALL

/MODEL=GUTTMAN.
```

```
RELIABILITY
/VARIABLES=q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14
/SCALE('ALL VARIABLES') ALL
```

```
/SCALE('ALL VARIABLES') ALL
/MODEL=STRICTPARALLEL.
```

## Reliability

```
[DataSet1] C:\Users\AMOS\Desktop\HOD\Justice teachers.sav
```

### Warnings

```
There are too few cases (N = 1) for the analysis.
This command is not executed.
```

## Reliability

```
[DataSet1] C:\Users\AMOS\Desktop\HOD\Justice teachers.sav
```

### Warnings

```
There are too few cases (N = 1) for the analysis.
This command is not executed.
```

## Reliability

```
[DataSet1] C:\Users\AMOS\Desktop\HOD\Justice teachers.sav
```

### Warnings

```
There are too few cases (N = 1) for the analysis.
This command is not executed.
```

## Reliability

```
[DataSet1] C:\Users\AMOS\Desktop\HOD\Justice teachers.sav
```

### Warnings

```
There are too few cases (N = 1) for the analysis.
This command is not executed.
```

## HEADMASTER

```
RELIABILITY
/VARIABLES=q1 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14
/SCALE(ALL VARIABLES) ALL
```



```

RELIABILITY
/VARIABLES=q1 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14
/SCALE('ALL VARIABLES') ALL

/MODEL=PARALLEL.

```

```

RELIABILITY
/VARIABLES=q1 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14
/SCALE('ALL VARIABLES') ALL

/MODEL=STRICTPARALLEL.

```

## Reliability

[DataSet1] C:\Users\AMOS\Desktop\HOD\Justice Head Master.sav

### Warnings

Each of the following component variables has zero variance and is removed from the scale: Do you have quality ICT text books to enhance teaching and learning, Is your sch provided with a computer lab to accommodate the computers, Are there telephone and wireless facilities in your sch, Do you have access to internet facilities in your sch for acquisition of knowledge, Do you have adequate ICT teachers to teach the subject, Do you have qualified ICT coordinators and technicians to manage the PCs and lab, Do you get financial and technical support from NGOs to enhance ICT project in your sch

The determinant of the covariance matrix is zero or approximately zero. Statistics based on its inverse matrix cannot be computed and they are displayed as system missing values.

## Scale: ALL VARIABLES

### Case Processing Summary

		N	%
Cases	Valid	2	50.0

### Test for Model Goodness of Fit

Chi-Square	Value	-1.684
	df	24
	Sig	1.000
Log of Determinant of	Unconstrained Matrix	.000
	Constrained Matrix	2.010

Under the strictly parallel model assumption

### Reliability Statistics

Common Mean	2.000
Common Variance	1.500
True Variance	.600
Error Variance	.900
Common Inter-Item Correlation	.200
Reliability of Scale	.600
Reliability of Scale (Unbiased)	1.200

## Reliability

{DataSet1} C:\Users\AMOS\Desktop\HOD\Justice Head Master.sav

### Warnings

Each of the following component variables has zero variance and is removed from the scale: Do you have quality ICT text books to enhance teaching and learning, Is your sch provided with a computer lab to accommodate the computers, Are there telephone and wireless facilities in your sch, Do you have access to internet facilities in your sch for acquisition of knowledge, Do you have adequate ICT teachers to teach the subject, Do you have qualified ICT coordinators and technicians to manage the PCs and lab, Do you get financial and technical support from NGOs to enhance ICT project in your sch

The determinant of the covariance matrix is zero or approximately zero. Statistics based on its

## Scale: ALL VARIABLES

### Case Processing Summary

		N	%
Cases	Valid	2	50.0
	Excluded <sup>a</sup>	2	50.0
	Total	4	100.0

a. Listwise deletion based on all variables in the procedure.

### Test for Model Goodness of Fit

Chi-Square	Value	1.923
	df	19
	Sig	1.000
Log of Determinant of	Unconstrained Matrix	.000
	Constrained Matrix	-1.456

Under the parallel model assumption

### Reliability Statistics

Common Variance	1.000
True Variance	.400
Error Variance	.600
Common Inter-Item Correlation	.400
Reliability of Scale	.800
Reliability of Scale (Unbiased)	1.200

## Reliability

[DataSet1] C:\Users\AMOS\Desktop\HOD\Justice Head Master.sav

### Warnings

Each of the following component variables has zero variance and is removed from the scale: Do you have quality ICT text books to enhance teaching and learning, Is your sch provided with a computer lab to accommodate the computers, Are there telephone and wireless facilities in your sch, Do you have access to internet facilities in your sch for acquisition of knowledge, Do you have adequate ICT teachers to teach the subject, Do you have qualified ICT coordinators and technicians to manage the PCs and lab, Do you get financial and technical support from NGOs to enhance ICT project in your sch

The determinant of the covariance matrix is zero or approximately zero. Statistics based on its inverse matrix cannot be computed and they are displayed as system missing values.

The scale has less than two non-zero variance items.

This command is not executed.

### Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	2	50.0
	Excluded <sup>a</sup>	2	50.0
	Total	4	100.0

a. Listwise deletion based on all variables in the procedure.

### Reliability

[DataSet1] C:\Users\AMOS\Desktop\HOD\Justice Head Master.sav

### Warnings

Scale has zero variance items.

### Case Processing Summary

		N	%
Cases	Valid	2	50.0
	Excluded <sup>a</sup>	2	50.0
	Total	4	100.0

a. Listwise deletion based on all variables in the procedure.

### Reliability Statistics

Cronbach's Alpha	N of Items
.722	13