

Instructional Media Usage And Students' Academic Performance In Colleges Of Education, Ghana

Paul Nyagorme

College of Distance Education, University of Cape Coast, Ghana

Sackey Ben Enoch

Bibiani Senior High Technical School, Bibiani

Valentina Arkorful

College of Distance Education, University of Cape Coast, Ghana

ABSTRACT

This study reported on the extent to which Instructional Media (IM) are being utilized at the Colleges of Education in Ghana and how IM utilization affect students' academic performance. Quasi-experimental design was adopted for the study. Stratified sampling technique was used in selecting five Colleges from the thirty-eight (38) public Colleges of Education in Ghana. The actual sample size used for the study was Sixty-Seven (67) tutors from the five selected Colleges of Education namely: Wiawso College of Education, St. Louis College of Education, Jasikan College of Education, Presbyterian Women's College of Education and Bagabaga. The instruments used for data collection were questionnaire and interview. The collected data was analyzed using Statistical Package for Social Sciences (SPSS). From the analysis, it was revealed that instructional media were not adequately available in Colleges of Education in Ghana. Many Tutors were not competent enough in integrating technology into teaching and learning. From the analysis, students performed better in subjects where technology was used. It was therefore recommended that instructional media should be made available and accessible in the Colleges of Education; tutors should receive frequent technological training; tutors must be motivated to develop positive attitudes towards technology integration in Education. Again, teacher-trainees must be trained in the use of the various tools for educational purposes.

Keywords: Academic Performance, Colleges of Education, Instructional Media, Technology Integration,

INTRODUCTION

In Ghana, basic school teachers are principally prepared by the Colleges of Education (formerly known as Teacher Training Colleges). These Colleges train the basic school teachers to meet the current trends in teaching and learning. The teacher-trainees are regarded as agents of change in the educational enterprise. It is therefore expected of the teacher-trainees from these Colleges to be competent in handling the modern instructional materials and technologies to teach.

Several studies had been conducted in the area of technology integration in education. For instance Gunga and Odundo (2013) looked at effects of application of instructional methods on learner achievement in business studies in secondary Schools in Kenya. Effect of use of instructional materials on learner participation in science classroom in pre-school in Kline zone Kirinyaga county Kenya was studied by Wambui (2013). Similarly, Owusu (2009) also looked at the availability of instructional media and its impact on instruction at the Junior High

school in Ghana. These studies have not looked at the use of instructional media and its effects on students' academic performance in Colleges of Education in Ghana. Hence, there is a gap between the earlier studies and the current study.

A visit to some of the Colleges of Education revealed that some of the tutors in the Colleges of Education are not training student-teachers on how to effectively use instructional media in their lessons. The tutors are basically using lecture method in teaching at the Colleges with very limited instructional media integration. The end result would be that student-teachers could end up teaching from abstract after completion of their programmes because that was what they saw their tutors doing while under training. Supporting this view, Kemp (2000) asserted that "in order for pre-service teachers to demonstrate technology competencies, teacher education faculty must, themselves, model the use of technology in their own teaching" p. 11. However, it appears many tutors do not have the needed skills and therefore cannot encourage their student teachers to use instructional technologies.

The foregoing observation, present an urgent need to assess how instructional media are being used in Colleges of education in Ghana to enhance teacher-students' academic performance.

The objectives of this study are to:

1. find out the availability of instructional media for teaching and learning at Colleges of Education in Ghana.
2. Assess the extent to which the Course Tutors use Instructional media in teaching and learning
3. Ascertain the factors that influence tutor's decision to integrate technology in teaching and learning.
4. Assess how instructional media influence the academic performance of students in Colleges of Education in Ghana.

Research Questions

The following questions directed the study:

1. What are the instructional media available for the Colleges of Education to facilitate teaching and learning?
2. How often do the course tutors use instructional media at the College for teaching and learning?
3. What factors influence the use of instructional media in teaching and learning after College?
4. How does instructional media usage by College Tutors affect the academic performance of teacher-trainees?

LITERATURE REVIEW

Theoretical Framework

The theories that underpin this study are the Connectivism and Constructivism. According to Siemens (2008) Connectivism comes to play when knowledge is distributed across an information network and can be stored in a variety of digital formats for use. Siemens stressed the fact that learning and knowledge is said to "rest in diversity of opinions". Also, advancement in technology is increasingly enabling learners to connect to one another irrespective of their geographical location from the teacher (Siemens, 2008 p.50). Connectivism is characterized as a reflection of our society that is changing rapidly. Society is more complex, connected socially, global and mediated by increasing advancements in technology. It is the orchestration of a complex disarray of ideas, networked to form specific information sets.

The first point of connectivism is the individual. Personal knowledge consists of a system of networks, which supplies an organization, which in turn gives back to the system. The individual continues the cycle of knowledge growth by his or her access back into the system. The advantage is that the learner can remain current on any topic through the connections they have created. Within any defined social network, there is a focus for groups of people with a common goal. Siemens (2004) indicated that "Exponentially developing knowledge and complexification of society requires nonlinear models of learning and knowing" p. 3.

Constructivism on the other hand, is a theory of knowledge that argues that humans generate knowledge and meaning from an interaction between their experiences and their ideas. Fundamentally, constructivism says that people construct their own understanding and knowledge of the world through experiencing things and reflecting on those experiences. Formalization of the theory of constructivism is generally attributed to Jean Piaget (1896–1980), who articulated mechanisms by which knowledge is internalized by learners. He suggested that through processes of accommodation and assimilation, individuals construct new knowledge from their experiences. When individuals assimilate, they incorporate the new experience into an already existing framework without changing that framework.

In relation to this theory, Jean Piaget defined accommodation as a process of reframing one's mental representation of the external world to fit new experiences. Accommodation can be understood as the mechanism by which failure leads to learning: when we act on the expectation that the world operates in one way and it violates our expectations, we often fail, but by accommodating this new experience and reframing our model of the way the world works, we learn from the experience of failure, or others' failure. This means that learners can construct knowledge out of their own experiences.

Constructivism do not only acknowledge the uniqueness and complexity of the learner, but actually encourages, utilizes and rewards it as an integral part of the learning process (Bevel, 2012). This also stresses the importance of the nature of the learner's social interaction with knowledgeable members of the society. Without interaction with other knowledgeable people, it is impossible to acquire social meaning of important symbol systems and learn how to utilize them. Young children develop their thinking abilities by interacting with other children, adults and the physical world.

In the same way, without proper interactions among tutors and students in Colleges of Education, it would be impossible to acquire the skills needed for today's classroom. Information sharing, according to experts, is the best way to learn technological skills. Robin (2015) noted "the more I teach people what I know, the more I ask people to teach me what I do not know, the more knowledgeable I become" (p.15).

The teacher in this context is seen as a facilitator whose duty is to direct the learner towards a desirable behavior. To the Constructivist, for the learner to construct meaning, he must actively strive to make sense of new experiences and in so doing must relate it to what is already known or believed about a topic. Bevel, (2012) opined that students develop knowledge through an active construction process, not through the passive reception of information". In other words, learners must build their own understanding. How information is presented and how learners are supported in the process of constructing knowledge is of major significance.

Bringing these notions into perspective with the topic under review, Alhassan (2015) noted that "it is important for teacher-trainees to explore various forms of instructional media in

order to acquire their own skills under the guidance of the tutor” p’82. The tutor should be seen as a mere facilitator towards learner’s knowledge acquisition. The tutor is to mediate between the learner and the content of study while students explore the various possibilities available to acquire their own knowledge and skills by interacting with each other.

The importance of this interaction is well accepted by many educational technologists as the best way to learn technological skills. Mensah (2015) indicated that when students are exposed to their peers’ thinking processes during the interaction stage; they adopt others’ ideas and ways of thinking. This reinforces the fact that tutors should not spoon-feed students with information but must guide students to search for their own information. This confirms an African adage “teach me how to fish instead of fishing for me”. When they learn to fish for the information, it becomes permanent and retrieval becomes easy.

Constructivism and Connectivism theories were considered most appropriate for this study since the theories view each learner as a unique individual with unique needs and backgrounds who can generate information to influence colleague student-teachers to use instructional media to teach.

Conceptual Framework

The Conceptual Framework adopted for the study is called the Learning Environment, Learning Processes and Learning Outcomes (LEPO) as propounded by Phillips, McNaught and Kennedy (2010). The LEPO conceptual framework consists of three main components which include Learning Environment, Learning Processes and Learning Outcomes as shown in Figure 1.

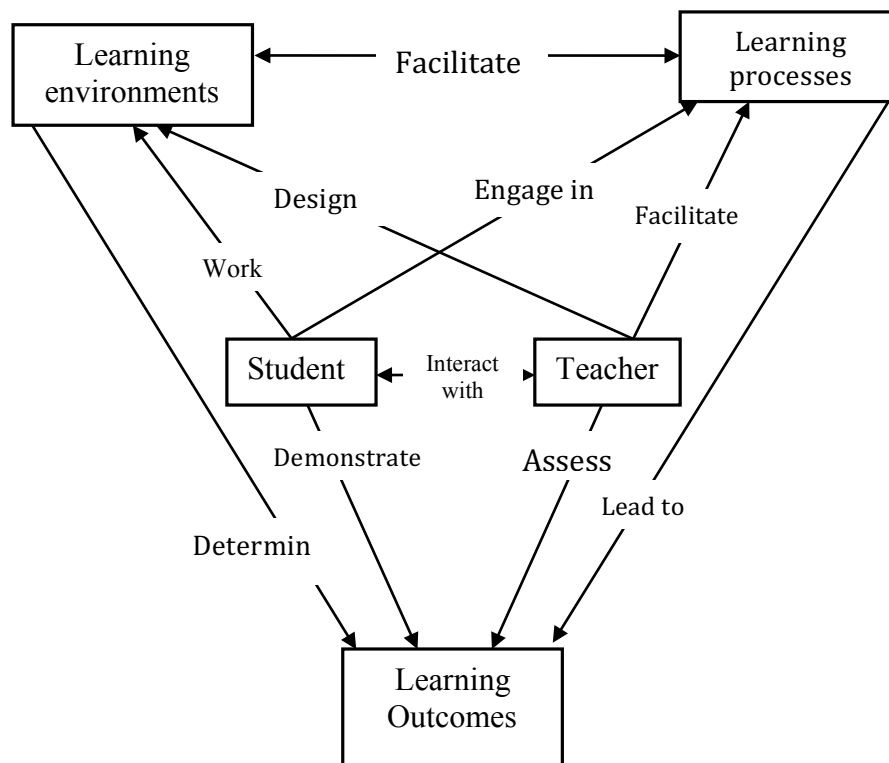


Figure 1: Model of the LEPO framework
Source: McNaught and Kennedy LEPO Concept, 2010

Learning Outcomes

Figure 1 depicts that learning outcome is a product of a dynamic interplay of learning environment and learning processes. Various Authors and Educational Psychologists defined

Learning outcomes in different ways. Many of them (Bloom's cognitive domain: Anderson & Krathwohl, 2001; Bloom, 1956; Krathwohl, 2002) defined learning outcomes generally as the things students are able to demonstrate as a result of their engagement in a course of study.

The contemporary world requires university graduates to have a range of skills to be successful knowledge workers and citizens. Based on these assertions it is important to assess how instructional media influences the learning processes and learning outcome at the Colleges of Education

Relevance of Instructional Media in Teaching and Learning

The importance of technology integration into teaching and learning have been hailed by many educational technologists across the world. Branford (2010) lamented in his book (*Education without Technology*, 2010) that "It does not make sense to think of a higher academic achievement when you had not recognized the important role technology plays in education" (p.32). Technology enthusiasts have long heralded the power of technology; from the printing press, to blackboards, to the laptops—to transform education. With the rapid expansion of information communication technologies around the globe, there is a high level of interest for several reasons in harnessing modern technology to enhance teaching and learning.

A substantial body of research shows that teachers' perception of instructional benefits is an influential factor that affects technology integration in classrooms. Inan and Lowther (2010) examined the effects of teachers' individual characteristics and perceptions of contextual factors that influence ICT integration in classrooms. Their findings showed that teachers' computer proficiency, teachers' overall support, teachers' technical support, and computer availability had a significant influence on teachers' beliefs about technology.

It was also noted from the available empirical studies that teachers' technological competencies had a stronger influence on the use and integration of ICT in classrooms. Knezek and Christensen (2012) revealed that teachers' competence with computer technology is a key factor for effective use of ICT in teaching. Teachers' computer competence is a major predictor of integrating ICT in teaching.

It was observed from the available empirical studies that researches into Instructional media used in Colleges of Education are difficult to find. The empirical evidence of how Colleges of Education teachers use instructional media in teaching the teacher-trainees has not been adequately addressed. In this regard, this study sought to fill the gap by assessing tutors' use of instructional media and how its usage affected academic performance of the teacher –trainees.

RESEARCH DESIGN

The design adopted in the study was Quasi-experimental research design. The experimental group was taught with instructional materials while the control group was taught without instructional materials and Pre-test and post-test was made. This design was concerned with making accurate assessment of the incidence, distribution and relationship of phenomena. It determines and reports the way things are and allow intervention to take place.

Quasi-experimental research design, thus, involves collecting data in order to test hypotheses or answer research objectives concerning the current status of the subject of study. This design was hailed by many scholars. One of them is Amedahe (2002) who maintains that "in quasi-experimental research design, accurate description of activities, objects, processes and persons as well as making room for intervention are the objectives" p.45.

Population

All tutors in the five Colleges of Education were eligible to participate in the study. The total target population for the study was however Sixty-seven (67). The inclusion of all tutors in the selected Colleges of education was justified in the sense that the study sought to assess each tutor's approach to the integration of instructional media in teaching and learning.

Sample and Sampling Procedure

Stratified sampling method was used to select five Colleges of Education. The five zones, in which the Colleges of education were categorized, were taken as strata. The zones were Western/Central (WEC), Ashanti/Brong-Ahafo (ASHBA), Volta, Eastern/Greater Accra (EAGA) and the Northern belt ([ATTRICONS] comprising Upper East, Upper West and Northern region).

Each zone was taken as a stratum. In each stratum, the lottery type of simple random sampling method was used to select one College of Education. The selected Colleges were; Wiawso College of Education, St. Louis College of Education, Jasikan College of Education, Presbyterian Women's College of Education and Bagabaga College of Education respectively.

This technique was adopted to give each College and zone equal opportunity of being selected. This was to ensure that the study depicted a national character. The total sample size for the study was however sixty-seven (67) tutors comprising of thirty-nine (39) male and twenty-eight (28) females and two hundred (200) students.

Research Instrument

The instruments used for data collection were a self-developed questionnaire having a total of 53 items. The instrument was relevant to the study because it elicited information about participant ways of thinking which aided in answering the research objectives and testing of hypothesis.

Pre-testing of Questionnaire Items

The questionnaire item was piloted on five tutors from Wesley College of Education in the Ashanti region. The pretesting was to check for clarity, ambiguity, spelling and grammatical errors. The tutors were given the opportunity to note any wrong spelt word, grammatical errors and ambiguous statements. All errors noted were looked at and corrected accordingly and the reliability co-efficient was $r = 0.82$.

RESULTS AND DISCUSSION

This section looked at the demographic characteristics of respondents from all the selected Colleges of Education.. The result obtained was presented in Table 1 below.

Table 1: Gender Distribution of Respondents

College of Education	Male	Female	Total
Wiawso	13(81%)	3(19%)	16(100%)
St Louis	7(63.6%)	4(36.4%)	11(100%)
Presbyterian Women's	9(75%)	3(25%)	12(100%)
Jasikan	10(71%)	4(29%)	14(100%)
Bagabaga	12(86%)	2(14%)	14(100%)
Total	51(76%)	16(24%)	67(100%)

Source: Field data, 2016

A total of 67 tutors participated in the study. Fifty-one (51), representing 76% were males while sixteen (16), representing 24% were females. The number of respondents differed from Colleges to Colleges based on the availability of tutors during the administration of the survey. In all, the total number of participants from the selected Colleges of Education was sixty-seven (67).

Research Question 1: What are the instructional media available for the Colleges of Education to facilitate teaching and learning?

To establish whether resources were available in Colleges of Education, an inventory was undertaken for each College at the time of this study. The result obtained was presented in Table 2.

Table 2: Inventory of main Instructional media at the Colleges of Education

Colleges	Instructional Media				
	Computer	Overhead Projector	Flip Charts	Video Equipment	Internet Connectivity
Wiawso	40	1	10 reams	3	Available
St. Louis	45	2	9 reams	2	Available
Presbyterian	56	1	11 reams	2	Available
Jasikan.	42	2	8 reams	3	Available
Bagabaga	46	2	6 reams	2	Available
Total	229	08	44	12	

Source: Field data, 2016

From Table 2, all the Colleges reported having internet connectivity. Again the computer dominates over all other instructional media available at the Colleges. Wiawso College of Education recorded 40 computers; St. Louis College of Education had 45 computers while Presbyterian College of Education had 56. The rest were Jasikan College of Education with 42 computers while Bagabaga College of Education reported having 46 computers.

At Wiawso College of Education and St. Louis College of Education, it was reported that twenty (20) and twelve (12) computers respectively were not working because their programs were corrupted by viruses and that they had been kept in the store room awaiting repairs. These computers were however not added to the inventory because they were not usable at the time of the study. In all the Colleges, most of the computers were kept at the computer laboratory which is accessible to both students and tutors while the Principals' offices and College secretariats had internet connectivity.

St. Louis College of Education, Jasikan College of Education and Bagabaga College of Education had two (2) overhead projectors each while Wiawso and Presbyterian Colleges of Education had one (1) overhead projector each.

There were ten (10) reams of flip charts available in Wiawso College of Education while St. Louis, Presbyterian, Jasikan and Bagabaga College of Education had 9, 11, 8 and 6 reams respectively. These flip charts were distributed to the various departments upon request.

There were two video projection equipment at; St. Louis, Presbyterian and Bagabaga College of Education while Wiawso and Jasikan College of Education had three (3) each of the same media.

The inventories as indicated in Table 2 vindicate the position of Ghana government when she lamented that “components to a successful integration of technology into teaching and learning include availability and adequacy of Instructional media” (Ghana Government’s White Paper on Basic School Computerization Programme, 2006, p.3). This points to the fact that the government recognizes the importance of availability of instructional media towards a successful integration.

Research Question 2: How often do the course tutors use instructional media at the College for teaching and learning?

Table 3: Frequency of Use of Instructional Media

Media	All the time		Often		Sometimes		Never	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Computer	2	3.0	8	11.9	51	76.1	6	9.0
overhead Projector	-	-	5	7.5	45	67.2	17	25.4
Electronic Mail	-	-	-	-	8	11.9	59	88.1
E-learning package	-	-	-	-	8	11.9	59	88.1
Video	-	-	7	10.4	50	74.6	10	14.9
Real objects	6	9.0	50	74.6	11	16.4	-	-
Posters	3	4.5	8	11.9	13	19.4	43	64.2
Geographic maps	2	3.0	4	6.0	49	73.1	12	17.9
Internet	-	-	5	7.5	11	16.4	51	76.1
Social Media	-	-	2	3.0	50	74.6	15	22.4

Source: Field data, 2016

Freq. = Frequency

This survey question dealt with frequency of use of technologies by the tutors. Responses of participants in Table 3 revealed that almost all the tutors 59(88%) never used the E-mail and online learning package in teaching. Fifty-one (51) tutors admitted never teaching via the internet. Yet over three-fourth(3/4), that is, 50(74.6%) of the respondents reported sometimes using the social media, which also involve internet connectivity though 15 tutors confessed never using social media while 2 tutors reported often using same.

Sixty-two (62) out of the 67 tutors reported they sometimes use or never used the overhead projector. There was no doubt that, the projector was not regularly used due to the fact that only one existed for most of the Colleges. Similarly, almost all of the tutors 56(83.6%) reported either sometimes or never using posters while 60 tutors reported sometimes or never using videos.

Again, unavailability of overhead projector made it difficult for the tutors to use video. Similarly, almost all the tutors 61(91.0%) either sometimes or never used geographic maps in teaching though 7 tutors claimed they all the time or often used same.

One medium which was reported highly used by tutors is real objects. Real object is used in this research to represent all natural materials used by educators in the classroom, especially the traditional classroom. These include; bottle-top, stones, seeds, plants, oranges, pieces of sticks, etc. Fifty-six (56) representing 83.6% tutors either all the time or often used real objects while 11 tutors sometimes or never used same. Over three-fourths of the tutors 57(85.1%) either sometimes or never used computers. However, with the computer laboratory available,

though they were meant for students with no special provisions for tutors, tutors could have taken turns to be on the computer if they had wanted.

As indicated in the analysis, it is only when resources are available that would ensure the successful integration of Technology in Education. Agreeing with this, Becta (2010) indicated that, "without the relevant materials and accessibility, the crusade for technology integration in education would be in vain" p.37. These assertions were however confirmed by the results obtained from the inventory (Table 2) where scarcity of resources was highly reported.

Table 3 indicated that 59 tutors confessed never using any online learning package. The confession could be linked to lack of skills as 89.5% of the tutors reported little or no competence in using online learning package (table 4). This directly reflects the assertion by Adjei (2010) when he pointed out that, "Teacher's competence is a major predictor of integrating technology in education". It is however significant for tutors to receive the requisite skills coupled with availability and accessibility of instructional media.

Throughout the analysis, it was clear that majority of the tutors did not actually integrate technology into teaching and learning.

Research question 3: What factors are influencing the use of instructional media in the Colleges of Education?

This type of question sought to elicit responses on the factors that influence tutors' use of instructional media. The results obtained are presented in Table 4.

Table 4: Factors influencing tutors' use of instructional media

Factor	Very Important	Important	Somehow Important	Not Important	Total
Training	62 (92.5%)	1 (1.5%)	4 (6.0%)	-	67
Accessibility	62 (92.5%)	1 (1.5%)	4 (6.0%)	-	67
Workshop and Seminars	24 (35.8%)	43 (64.2%)	-	-	67
Personal Interest	53 (79.1%)	12 (17.9%)	2 (3.0%)	-	67
Availability	54 (80.6%)	8 (11.9%)	5 (7.5%)	-	67
Attitude	53 (79.1%)	10 (14.9%)	4 (6.0%)	-	67
Peer Support	11 (16.4)	14 (20.9%)	40 (59.7)	2 (3.0%)	67

Source: Field data, 2016

Responses in Table 4 show that high percentages of the tutors valued all items as being very important with "training" as the most highly rated (93.8%). The only exception was the value placed on "peer support" which was rated important or very important by 25 of the 67 respondents while 40(59.7%) answered somehow important to the same question. 2 (3.0%) of the respondents rated the same factor as Not important in influencing their decision in using instructional media.

The responses given by tutors indicated that such factors were very important in influencing their decision in using instructional media. This is not different from the assertion given by Spodark (2003) when he called these an enabling environment that caters for the total

integration of the appropriate media in teaching and learning” (p. 26). Similarly, Sandholtz & Reilly (2004) in their findings revealed that teacher’ technological skills was a strong determinant of ICT integration, but they are not conditions for effective use of technology in the classroom. They argue that training programs that concentrate on ICT pedagogical skills instead of technical issues and effective technical support, workshop and seminars, help teachers apply technologies in teaching and learning.

Research question 4: How do instructional media affect the academic performance of students?

To answer this question, a sample of two hundred students was selected at Wiawso College of Education to be engaged in a science lesson on the topic ‘Digestion in human’ as an experimental and control group. The experimental group was taught with instructional media (video simulation of digestion in human) while the control group was taught the same topic without any instructional media apart from the traditional blackboard illustration. The achievement scores of students when taught with instructional materials and when taught without instructional materials were recorded in Table 5.

Table 5a: Mean Results of Students based on instructional Materials

Variable	No	Adj. Mean	S
With instructional material	120	66.88	8.5
Without instructional material	80	34.85	11.50

Source: Field data, 2016

The results revealed that students taught with instructional materials (video simulation of digestion in human) had an adjusted mean of 66.88 as against 34.85 scored by the students taught without instructional materials. This means that students taught with instructional materials achieved better scores than those taught without instructional materials.

Table 5b: ANCOVA Results based on Instructional Materials

Source of variation	Sum of squares	Df	Mean square	f-cal	Sig of F	f-crit
Covariates	4679.438	1	4679.438	39.995	.000	
Pretest	4679.438	1	4679.438	39.995	.000	
Main effect	44576.317	1	44576.317	380.990	.000	
Instructional materials	44576.317	1	44576.317	380.990	.000	3.84
Explained	49255.755	2	24627.877	210.492	.000	
Residual	23048.265	197	117.001			
Total	72305.020	197	363.342			

Source: Field data, (2016)

Significant at P<0.05

From the results in Table 5b, F-cal is greater than F-crit. (380.990>3.84) at 0.05 alpha level. This implies that there is a significant difference in the mean achievement of students taught with instructional materials and those taught without instructional materials. This study analysis established the fact that instructional materials are indispensable for teaching and learning.

The outcome of the results confirmed the findings of Adjei (2012) when he revealed “Students learn best when audio-visual materials are integrated in the teaching process” p.31. This finding is supported by the findings of Esu, Erukoha and Umoren (2004) that “instructional materials facilitate learning of abstract concepts by helping students to concretize ideas and also stimulate their imagination” p.42. This finding equally lends credence to the view of Mathew (2012) who had earlier stated that “the use of instructional materials make teaching

effective as it enables learners to participate actively in classroom instruction, which subsequently leads to improved achievement” p.53.

This finding is supported by the findings of Eke (2010) in his study on the role of instructional materials in the teaching of natural science. His study revealed that instructional materials make abstract concepts become concrete. To this end, this study has shown that instructional materials facilitate the teaching of social studies. The implication is that performance is enhanced when teachers use different types of instructional materials when teaching all subjects particularly science. It is therefore important for tutors to integrate technology into the teaching process since it has the potential of improving the performance of students.

RECOMMENDATIONS

1. There must be adequate provision of instructional media by Colleges, government and philanthropist. The availability should be coupled with accessibility to prevent materials from turning into white elephants.
2. There should be training opportunities for tutors to acquire technological skills under the auspices of the Colleges and other educational technologist across the world. The National Council for Tertiary Education may specify IT skill as a requirement for recruitment of tutors into Colleges of Education. The training opportunity could include sponsorships for ICT tutors to upgrade their skills and return to provide support for the rest of tutors.
3. It is recommended that Colleges of Education should set up online and wireless internet services on the various campuses so that students and tutors could access them all the time. The online service should include training programme for tutors to use E-learning packages like Moodle, which would enable teaching and learning to happen anytime, anywhere and any day.
4. It is recommended that the Institute of Education, University of Cape Coast in collaboration with the Teacher Education Division of the Ghana Education Service, take steps to revise and implement the proposed Diploma in Basic Education programme in ICT in the Colleges of Education which is meant to give more rooms for computer literacy skills by prospective teachers since the current one semester ICT course is not enough to provide such needed skills.

References

- Adjei, F. (2010). Teaching in the contemplating way, the role of instructional media. *Journal of Technology Education*, p.45.
- Alhassan M. (2015). Distance learning – The role of technology. *Journal of Education*. p.89.
- Amedahe F. (2002). *Introduction to Measurement and Evaluation*. University of Cape Coast CCE publications, p.60
- Anderson, T. (2009). Distance learning – Social software's killer app? *Breaking the boundaries: The international experience in open, distance and flexible education, proceedings of the 17th ODLAA conference*. Adelaide: Open and Distance Learning Association of Australia.
- BECTA. (2001). *The 'Digital Divide': A Discussion Paper*. Coventry: Becta. Retrieved 12/12/17, from http://www.becta.org.uk/page_documents/research/digitaldivide.pdf
- Bervel, S. (2012). *Curriculum and Instruction: An Introduction to Methods of Teaching – Review of Brown's Literature*. Kuala Lumpur: Macmillan Publishers Limited. p 141, 357 – 362.
- Bloom, B. (1956). *Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain*. New York, Toronto: Longmans Green.
- Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.). (2010). *Executive summary of how people learn*: National Academy Press.

- Christensen, R., Knezek, G. & Tyler-Wood, T. (2014). Student perceptions of STEM content and careers. *Computers in Human Behavior*, 3 (4), 173 -186.
- Eke, S. (2010). Various roles of using instructional materials in teaching social studies in primary school in Isukwata local government.
- Ghana Government's White Paper on Basic School Computerization Programme. (2006). Retrieved 11/12/17 from www.moe.gov.gh.
- Gunga, S. O., & Odundo, P. A. (2013). Effects of application of instructional methods on learner achievement in business studies in secondary Schools in Kenya. *International Journal of Education and Research*, 1(5), 1- 22.
- Inan, F.A (2010). Factors affecting technology integration in K-12 classrooms: a path model. *Journal of Educational Technology Research and Development*, 58 (2), 137-154.
- Kemp, N.G.N. (2010). Utilization of instructional media for quality training in pre-primary school teacher training Colleges in Nairobi County, Kenya. (Doctoral Thesis, Kenyatta University).
- Khan, M. N. H., Hasan, M., & Clement, C. K. (2012). Barriers to the Introduction of ICT into Education in Developing Countries: The Example of Bangladesh system. *International Journal of Instruction*, 5(2), 61-80.
- Krathwohl, D. R. (2002) A Revision of Bloom's Taxonomy in *Theory into Practice*. V 41. 4. Ohio State University. Retrieve@<http://www.depauw.edu/files/resources/krathwohl.pdf>
- Lowther, D. L., Inan, F. A., Daniel S. J., & Ross, S. M. (2008). Does technology integration 'work' when key barriers are removed? *Educational Media International*, 45(3), 195-213.
- Mensah, R., & Isaiah, C. (2010). Accessibility of instructional media by teachers in Ghana. *A case study in selected senior high schools in Ashanti region*. Department of computer science, Kwame Nkrumah University of Science and Technology.
- Owusu, K. S. (2009). *Instructional Media as a tool for ensuring quality teaching and learning for Pupils in the Junior High Schools (Selected Schools In The Kumasi Metropolis)* (Master's thesis, Kwame Nkrumah University of Science and Technology, Kumasi). Retrieved from <http://ir.knust.edu.gh/bitstream/123456789/392/1/Binder1.pdf>.
- Piaget, J.P. (1952). *The origin's of Intelligence in children*. International University Press, N. York.
- Phillips, R. A., McNaughton, C., and Kennedy, G. (2010). Towards a generalized conceptual framework for learning: the Learning Environment, Learning Processes and Learning Outcomes (LEPO) framework. In J. Herrington & W. Hunter (Eds.), *ED-MEDIA 2010* (pp. 2495-2504).
- Robin, P. (2014). Teachers' Attitude towards the use of Information and Communication Technology as a pedagogical Tool in Secondary Schools in Tanzania: The case of Koanda District. *International Journal of Education and Research*, 2(2), 1-16.
- Sandholtz, J.H., Reilly, B. (2004). Teachers, not technicians: Rethinking technical expectations for teachers. *Teachers College Record*, 106 (3), 487 - 512.
- Siemens, G. (2008a). *Description of Connectivism*. *Connectivism: A learning theory for today's learner, website*. Retrieved: 12/11/2017 from <http://www.connectivism.ca/about.html>.
- Siemens, G. (2008b). *Learning and knowing in networks: Changing roles for educators and designers*. Paper 105: University of Georgia IT Forum. Retrieved: 11/11/2017 from <http://it.coe.uga.edu/itforum/Paper105/Siemens.pdf>.
- Spodark (2003). Weaving the World Wide Web into Teaching the culture of Quebec.
- Wambui, S. E. (2013). Effects of Use of Instructional Materials on learner participation in Science Classroom in Preschool in Kline Zone Kirinyaga County Kenya. (Master's Thesis, University of Nairobi). Retrieved 11/11/2017 from cees.uonbi.ac.ke/site