

COMPARATIVE ANALYSIS OF INTEGRATED TECHNOLOGY PEDAGOGY WITH THE VARIOUS TRADITIONAL TEACHING METHODS IN SENIOR HIGH SCHOOLS IN GHANA. A CASE STUDY OF WESLEY GIRLS' SENIOR HIGH SCHOOL.

Grace Asakeboba¹, Joseph Kobina Panford², James Ben Hayfron-Acquah³

^{1,2,3} Dept. of Computer Science, KNUST, Kumasi, Ghana

Abstract: Improving excellence in education is an important and critical issue especially for developing countries. The traditional pedagogy approach to teaching and learning, has until recently been seen and accepted as the effective way to impart knowledge. It involves the transfer of information from teacher as source to student as container. This strategy is typically based on pre-packaged teaching and learning materials, and fixed deadlines. But this research has shown that integrated pedagogy can catalyze a dramatic shift in performance, time management, participation and collaborations, and promote problem based learning. This work does a comparative analysis of the integrated pedagogy to the various traditional methods of teaching in senior high schools in Ghana. It also identified various barriers to the incorporation of ICT in the integrated pedagogy lesson delivery and learning outcomes. It assessed the availability of ICT infrastructure and the capacity of teachers and students to use them. Although the Ministry of Education has made frantic effort to improve the ICT infrastructure base of senior high schools, there is the need for equal effort in providing assistance in maintaining them.

Key Words: traditional pedagogy, integrated pedagogy, ICT.

1. INTRODUCTION

1.1 Background of Study

The world has over the years undergone numerous changes with technological changes being principal among these. (Dutta & Bilbao-Osorio 2012). ICTs are basically information handling tools – hardware, processes and systems, applications and services that are used to produce, store, process, distribute and exchange information. With appropriate content and applications, these tools are now able to work together, and combine to form an effective way of lesson delivery. Planning for the effective use of these technologies is crucial if they are to have the positive impact expected. The integration of information and communication technology is gradually taken over from the traditional teaching and learning practices (Chhabra, 2012). Learning from the widespread use and effects of technology on teaching and learning, as well as the critical need to develop and apply technology to education, the government of Ghana

took pragmatic steps to introduce technology into the education. This effort was enshrined in the national ICT policy (Fobih, 2008). However, there still exist a wide gap among schools in Ghana in terms of adopting technology in teaching and learning (Amenyedzi et al. 2011; Aduwa-Ogiegbean & Iyamu, 2005). This study is aimed at undertaking a comparative analysis of the integrated technology pedagogy with the different traditional methods in senior high schools in Ghana, using WGHS as a case study.

1.2 Statement of the Problem

It has been evident through research that technology has become a key component of the classroom environment (see Guzman, and Nussbaum, 2009; Hew & Brush, 2007; Lawless & Pellegrino, 2007). After years of efforts to integrate technology in education, learners and teachers continue to struggle with issues of using educational technology in teaching and learning. Ghana is of no exception in this situation. On the basis of the suggestions of the Information and Communication Technology for accelerated development, the country introduced ICT into the school curriculum in September 2007. However, some studies have found the status of Ghanaian secondary educational institutions in terms of technology use to be very poor. Agyei, and Voogt (2011a); Agyei and Voogt (2011b) found that even after the government of Ghana has established computer labs and procured computers for secondary schools, teachers are yet to incorporate technology in their teaching methods. Hence, teachers mostly use the chalk and talk. Teachers at the secondary schools found it difficult to integrate technology into their instruction as it challenged them to alter their procedures of teaching (Koehler and Mishra, 2008; Voogt, 2008). Teacher training programs was also found to be dependent on lecture-based instruction (Agyei, and Voogt 2011a; Agyei and Voogt, 2011b). Hence, the need for a comparative analysis of the integrated technology pedagogy with the different traditional methods in senior high schools in Ghana.

1.3 Research Objectives

The overall objective of the study is to undertake a comparative analysis of integrated technology pedagogy with the various traditional teaching methods in senior high

schools in Ghana. To achieve this, the following specific objectives will be pursued:

- i. To examine the adoption technology by students and teachers in pedagogical activities.
- ii. To find out teachers' delivery under integrated technology pedagogy as against the various traditional teaching methods.
- iii. To ascertain students' performance under integrated technology pedagogy as against the various traditional teaching methods.
- iv. To establish the availability of ICT infrastructure and the capacity of teachers and students to use them.

1.4 Research Questions

The research tends to solve the challenges below:

- i. How technology is being used by students and teachers in pedagogical activities?
- ii. How do teachers' delivery under integrated technology pedagogy as against the various traditional teaching methods?
- iii. How do students perform under integrated technology pedagogy as against the various traditional teaching methods?

1.5 Significance of the Study

The ICT in Education Policy (2008) states that "It is the government's desire that through the deployment of ICT in Education, the culture and practice of traditional memory-based learning will be transformed to education that stimulates thinking and creativity necessary to meet the challenges of the 21st Century". As noted by Swarts (2006) "ICTs can be forceful, very important tools for learning: understanding, interpreting and communicating about the real world OR they can be black holes into which we pour our money, intelligence and time, getting very little in return". It is on the grounds of this that an evaluation and comparison need to be done on the integrated pedagogy as against the various traditional methods of teaching in Senior High Schools.

2. LITERATURE REVIEW

Pedagogy is focused on the effective learning of subjects with the support of the various components of technology. Olakulehin (Olakulehin, 2007), emphasizes that the pedagogic application of technology involves effective learning with the aid of computers and other information technologies as learning aids, which play complementary roles in the classroom, rather than supplementing the teacher.

Technology tools ease communication, upsurge access to information, provide better access to learning to children of special needs, model and stimulate a variety of scientific phenomena and usually inspire students to improve problem solving competences (Selinger, 2000). However, without competent users and effective leaders who facilitate technological change in schools, most of the advantage of technological integration will not be achieved. These technologies include computers, the Internet, e-mail, web based PC, Mobile phone, wireless sets, projectors, interactive boards, broadcasting technologies (radio and television) and different interactive boards. Thus, technology is a system that gathers different information or data to communicate over some distance with the help of modern trends. Learning however, can be most operative when pedagogical strategies are prudently established, with computer technologies used as mediators of learning and combined into the pedagogical strategy.

3. METHODOLOGY

Data was gathered in the form of field notes through observation, questionnaire and interviews were transcribed in narrative and descriptive forms and also processed into individual reports and tables portray how technology influence teachers' delivery and students' performance. The primary data was collected through interview with the science teachers and students of Wesley Girls High School involved in the study. A final test was also constructed to assess the student performance under both the integrated pedagogical approach and the rational pedagogical approach. The test instrument had at least five questions in each arrangement, which comprised True/False, Matching, Fill-in-the-Blank, Multiple Choice, and five essay questions. Primary data collected from were analysed in both quantitatively and qualitatively. The quantitative data were presented in graphs, tables and charts while the qualitative were descriptive responses given by staff and students of the school during interview.

3.2 Study Population and Sample

As per the plan towards completing this research, the population that will suit the objectives of the research was chosen. The target population of this study was all SHS science students and teachers in all the 5 science classes at Wesley Girls High School. Out of this number of classes, two (2) of them will serve as the sample for the study comprising 20 teachers and 76 students. Thus, 20 teachers and 76 students of the science students of the Wesley Girls High School formed the sample for the study.

3.3 The Sampling Criteria

The school has five science classes, four general arts classes, a business class, a home economics class and a visual arts class. The science classes were chosen because there are topics in the science subjects that seem to be abstract to

girls. The reason has been that if girls can/will perform better under such approach then real-life issues and practical topics could also be easily grasped. For the questionnaires, they distributed to most science teachers and few other teachers. Biology and physics were the subjects used in this study.

3.5 Reliability and Validity

The two selected classes have class averages that are always and almost close marks from the school's records. A drop box was created and placed at a vantage point where both teachers and students could easily answer the questionnaire and drop at their convenient time without pressure which introduces errors. The drop box idea produced best results since anonymity and confidentiality were maintained throughout the study. All the teachers and students approached to participate in the research completed the questionnaires. Generalizing the findings to all members of the population is therefore justified.

4. ANALYSIS

4.1 Students' Performance under Integrated Pedagogy against Traditional Methods

In order to test for the effect of integrated pedagogy as against that of the traditional teaching method, two of the form two science classes who served as the sample for the study were taught two different topics with and without ICT tools. The two classes were labelled as "Group A" and "Group B", each consisting of 30 in the class. Group A were taught the first lesson with the traditional method while Group B were taught with the integrated pedagogy. In the second lesson, Group A were taught with the integrated pedagogy while Group B were taught with the traditional approach. After each of the lessons, the groups were made to take written exams. The ICT tools used in the integrated pedagogy were computers, internet, loudspeaker, projector and interactive board. Under the integrated approach, the lesson was introduced followed by self-research where the students were given computers connected to the internet to research about the topic. Students were made to work in groups, discussing their findings from the internet and their understanding of the topic. After which, a projector was mounted and video lessons on the topic were shown to the students. The outcome of the test shows that students' performances were averagely higher when they were taught with the integrated approach as compared to when they were taught with the traditional approach. As can be seen from Table 1, a total of 12 (40 percent) of the students that were taught with the integrated approach had grade "A" or "excellent" in the written examination as against 5 (16.7 percent) of those that were taught with the traditional approach who had "A" or "excellent". On the average, a student from the group which were taught with the integrated approach scored grade "B" while students from the group that were taught with the traditional approach

scored "C". Results displayed in figures figure 1 to figure 6 in appendix also confirms.

Table 4.1: Students' performance under integrated technology pedagogy as against the various traditional teaching methods facts and opinions of both teachers and students

Grades	Traditional Teaching method		Integrated pedagogy	
	Number of students (Frequency)	Percentage (%)	Number of students (Frequency)	Percentage (%)
A	5	16.7	12	40
B	4	13.3	8	26.7
C	10	33.3	5	16.7
D	7	23.3	3	10
E	4	13.3	2	6.7
Total	30	100	30	100

4.2 Field survey on students' opinion about integrated technology pedagogy as against the various traditional teaching methods

Table 4.2: Students' performance under integrated technology pedagogy as against the various traditional teaching methods

	SD	D	U	A	SA
Integrated pedagogy improves students use of computer and internet search	3 (5%)	1 (1.7%)		23 (38.3%)	33 (55%)
Integrated pedagogy improves students' use of word processing application to type letters among others	2 (3.3%)		4 (6.7%)	23 (38.3%)	31 (51.7%)
Integrated pedagogy improves students' understanding of what is taught in class	2 (3.3%)		6 (10%)	33 (55%)	19 (31.7%)
The use of Integrated pedagogy has helped in my retention in some difficult subjects	2 (3.3%)	3 (5%)	7 (11.7%)	29 (48.3%)	19 (31.7%)

SD= Strongly Disagree, Disagree, U = Uncertain
A= Agree, SA = Strongly Agree

4.3 Correlations

In addition, correlational performed on the use of ICT tools and their performance (see table 1.0 below) shows that, students' use of computer and internet search is positively correlated with increase in students' attentiveness in class, having yield a Pearson Correlation Coefficient of 0.626 with a significant level of less than 5%. There was also a Pearson Correlation Coefficient of 0.677 with significant value of less 5% between students' use of computer and internet search

and their attentiveness in class. Again, a Pearson Correlation Coefficient of 0.565 with significant value of less than 5% was found between the students' use of computer and internet search and their understanding of what is taught in class. It can therefore be concluded that students use integrated pedagogy in the form of internet and internet search is positively impact on their wiliness to learn, their attentiveness in class, their understanding of what is taught and moderately impact on their performance. Similarly, the use of word processing applications was found to increase students' wiliness to learn, students' attentiveness in class, and their understanding of taught in class leading a moderate impact on their overall performance in class.

5. CONCLUSION

The study found teachers do not undertake professional programmes on integrated technology pedagogy. There are limited computers at the computer lab which are not easily accessible to both teachers and students; despite the tremendous advantage integrated technology pedagogy has over the traditional methods of teaching. Benefits to teachers including creation of a good relationship with students and making of lessons more interesting were found to be embedded in the use of integrated pedagogy. Moreover, the overall performance of students who were taught with integrated pedagogy were found to increase extremely as against those who were taught with the traditional approach.

5.1 RECOMMNDATION

Based on the findings of the study, the researcher recommends the following

1. Considering the role integrated pedagogy plays in the performance of students, there is the need for the administration of the schools and various schools across the country to ensure that their teachers undertake professional programmes in the field which could help them adopt integrated pedagogy in their delivery in the class.
2. There is the need for government to equip educational institutions with the adequate ICT equipment needed to achieve the objectives enshrined in the National ICT Policy.
3. There is the need for GES and the ministry education to mainstream Pedagogical integration of ICT in the Teacher training curriculum

REFERENCES

Agyei, D. D. & Voogt, J. (2011a). ICT use in the teaching of mathematics: Implications for professional development of pre-service teachers in Ghana. *Education and Information Technologies*, 16(4),

423-439. <http://dx.doi.org/10.1007/s10639-010-9141-9>Agyei and Voogt 563

Agyei, D. D. & Voogt, J. (2011b). Exploring the potential of the will, skill, tool model in Ghana: Predicting prospective and practicing teachers' use of technology. *Computers & Education*, 56(1), 91-100. <http://dx.doi.org/10.1016/j.compedu.2010.08.017>

Dutta S. and Bilbao-Osorio B. (2012). *The Global Information Technology Report 2012: Living in a Hyper Connected World*. Accessed from http://www3.weforum.org/docs/Global_IT_Report_2012.pdf

Fobih D. (2008). Ghana on the National ICT for education strategy and Programme in Ghana at the 2ND African High-Level Policy Maker and Industry Leader Round Table and retreat in Accra, Ghana on May 27, 2008

Guzman, A., & Nussbaum, M. (2009). Teaching competencies for technology integration in the classroom. *Journal of Computer Assisted Learning*, 25, 453-469.

Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Education Technology Research Development*, 55, 223-252.

Koehler, M. J. & Mishra, P. (2008). Introducing technological pedagogical content knowledge. In AACTE Committee on Innovation and Technology (Eds.), *Handbook of technological pedagogical content knowledge for teaching and teacher educators*, 3-29. New York: Routledge.

Ministry of Education (2008). *ICT in Education Policy*, Selinger, M. (2000), *Information and communication technology in schools*. Imfundo Knowledge Bank. Retrieved October 25, 2014, from <http://www.mtnforum.org/sites/default/files/pub/1535.pdf>

APPENDIX

The following are facts and opinion about Integrated technology pedagogy as against the traditional methods

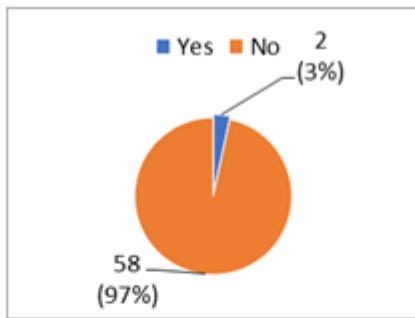


Fig - 1: Availability of permanent ICT technician

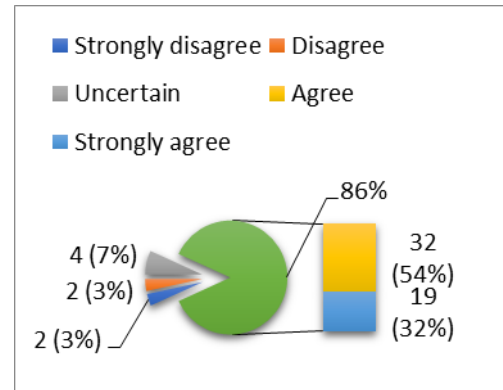


Fig -4: Integrated technology pedagogy enhances my role as a teacher

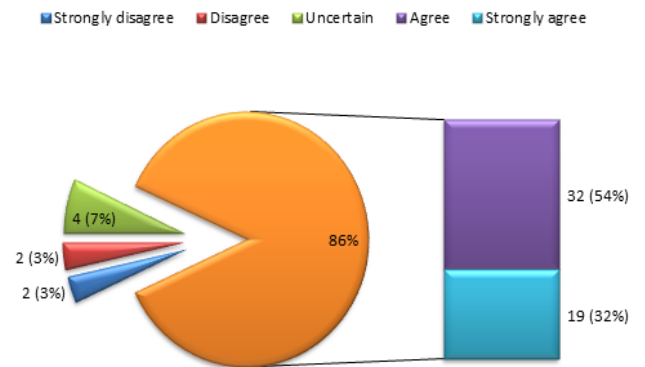
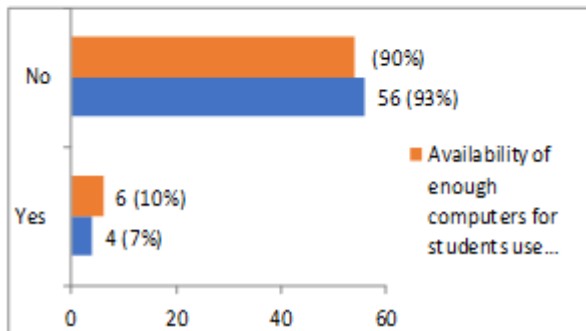


Fig -5: Integrated technology pedagogy makes me feel more professional

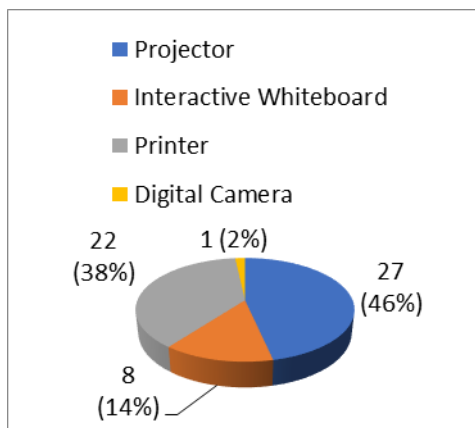


Fig -2: Other tools commonly available in schools

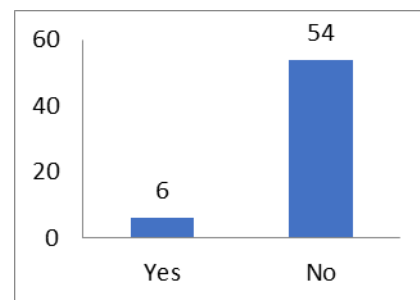


Fig- 6: Professional training programmes on integrated technology pedagogy by teachers

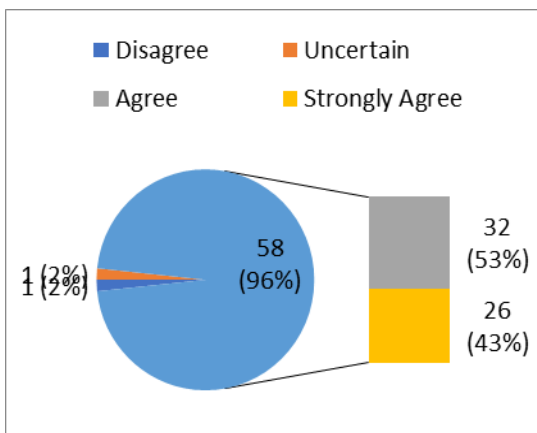


Fig-3: Availability of enough computers for teachers' personal use and students' use by any teacher