Full Length Research Paper

In-service science teachers' and the use of multimedia as a teaching tool

Ameyaw Y and Quansah E

Biology Education Department, Faculty of Science Education, University of Education, Winneba – C/R, Ghana.

The study investigated the attitudes of in-service teachers' towards the use of multimedia as a tool for science teaching in Junior High Schools in the Greater Accra Region of Ghana. The population sample consisted of 100 Junior High School (JHS) science teachers made up of 60 urban teachers and 40 rural teachers from three selected districts in the Greater Accra Region of Ghana. The instrument used in collecting data was a 30-item self designed Likert type questionnaire that yielded scores on a four-point scale, validated by experts advice while its internal consistency was estimated at 0.816 using Cronbach's alpha. Frequency count, percentages and t-test were used in the data analysis. The results indicated that some of the teachers have poor attitudes towards the use of multimedia in some of the question items as a result of their availability; others however, were in agreement that it is a good material for science teaching. The two categories of teachers requested for making them available in schools in order to fully establish the strength and weakness of such a teaching instructional tool.

Key words: Multimedia, in-service, integrated science, rural, urban.

INTRODUCTION

In-service is very useful in facilitating the development, updating professional knowledge and skills of teachers. Similarly, it is a key factor in influencing the professional development of teachers and contributing to the improvement of their knowledge through an active role (Saiti and Saitis, 2006).

Bolam (1982) defines in-service training as activities that teachers and principals go through during training workshops to develop their professional knowledge, skills and attitude in order to educate pupils/students effecttively. Similarly, Mothata (2000) defines in-service training as a continuous professional development of teaching practitioners. Glatthorn (1995) refers to teacher in-service training as the professional growth a teacher achieves as a result of gaining increased experience and examining his or her teaching systematically.

In Ghana, in-service training programmes are occasionally organized by the Ghana National Association of Teachers (GNAT) in collaboration with the Canadian Teachers Federation (CTF), and the Ghana Education Service (GES) for basic school teachers. Since December 2005, the GES has been organizing In-Service Training (INSET) programmes with focus on the teaching of basic school Mathematics and Science. However, a baseline study conducted revealed that although INSET activities at the district and the school levels have increased in the last few years, it does not reflect a change in the output of teachers and head teachers, especially in the instructional strategies in the classroom (GES, 2005). Although, these INSET programmes are meant to improve on the teaching and learning process, students continue to perform poorly in integrated science and other related concepts in Basic Education Certificate Examination (BECE) yearly. There have been a lot of considerations of providing in-service training for teachers using a new instructional strategy, such as multimedia tools for learning.

Multimedia, is the presentation of information using the

---

combination of text, sound, pictures, animation, and video.Common multimedia computer applications include games, learning software, and reference materials. According to Thoman and Jolls (2004), multimedia as a tool cannot replace hands-on learning, however, it has the potential to enhance and strengthen the impact of activities in the field and in the science classroom. The use of multimedia resources as part of a core science curriculum can visually demonstrate scientific ideas and concepts, instill a sense of wonder and excitement in students about the world around them, and provide examples of real people practicing science. Again, it has the potential to generate student interest in science careers, promote 21st century skills, including critical thinking, problem solving and communication skills, and last but not the least provide a common experience shared by all students (Thoman and Jolls, 2004). Similarly, interactive multimedia provides a powerful new educational tool that can greatly enhance teaching and learning. Research and experience indicates that use of multimedia leads to enhanced learning on criteria such as acquisition of content, development of skills, efficiency of learning and satisfaction with instruction (Falk and Carlson, 1992).

In addition, Computer-Aided Instruction (CAI), according to Arnold (2007), is a diverse and rapidly expanding spectrum of computer technologies that assist the teaching and learning process. CAI is also known as computer-assisted instruction. Examples of CAI applications include guided drill and practice exercises, computer visualization of complex objects, and computer-facilitated communication between students and teachers. Arnold explains that information that helps teach or encourages interaction can be presented on computers in the form of text or in multimedia formats, which include photographs, videos, animation, speech, and music. CAI can noticeably increase a student's access to information. Furthermore, the programme helps individual students to adapt to their abilities, preferences as well as increase their personalized instructions. It enables students to benefit from the immediate responsiveness of computer interactions and appreciate the self-paced and private learning environment. Moreover, computer-learning experiences often engage the interest of students, motivating them to learn and increasing independence and personal responsibility for education. Computers can also help students to visualize objects that are difficult to observe naturally. Computers can be used to display human anatomy, molecular structures, or complex geometrical objects (Arnold, 2007).

What is the attitude of in-service science teachers' on the use of multimedia tools in the teaching and learning process? However, the use of multimedia as a new educational tool, according to Falk and Carlson (1992), has had minimal impact on education because they have not been widely used in schools at any level. Reasons for this are many, including a lack of funds for equipment

and applications and a lack of knowledge by most teachers. They argue that if multimedia is to meet its potential as an educational technology, teachers must be given in-service training on how to effectively use it as a teaching and learning tool. Gulbahar (2008) also found that lack of in-service training and insufficient technological infrastructures were the factors that have a significant influence on the effective use of technology by instructors. Teachers should therefore develop positive attitude toward the use of technology, and this calls for more in-service training workshops for teachers in the handling of multimedia tools in the teaching and learning of science.

METHOD

The study area comprises of Tema, Dangbe East and Ga West Districts (Figure 1). The study was a survey type which attempted to look at the attitudes of in-service teachers' towards the use of multimedia as a tool for teaching Integrated Science in the Greater Accra Region of Ghana. The targeted population constituted all Junior High School Science teachers distributed in the six districts in the Greater Accra Region of Ghana (Figure 1). There are six clusters (districts) in the Greater Accra Region namely: Ga East, Ga West, Damgbe East, Damgbe West, Tema Metropolitan, and Accra Metropolitan. This study made use of simple stage-two cluster sampling. Out of this number, three of the clusters were selected using the (SRS) strategy as the sampled clusters. These were Damgbe East, Ga West, and Tema Metropolitan. These three clusters were selected because they could be classified as Rural and Urban. Damgbe East and Ga West Districts were classified as Rural because they have fewer populations, and far below Tema in terms of infrastructure and social amenities, whiles Tema Metropolitan was classified as Urban because of its large population size and known for its high infrastructure and social amenities. One hundred science teachers drawn from these clusters constituted the sample size. A self-structured questionnaire to elicit teachers' responses was used. Each questionnaire item was scored on a four-point Likert type scale (strongly disagree=1, disagree=2, agree=3, strongly agree=4).

To ensure that the items for this study were valid, it was made sure that the questionnaire items represented measurements of the research question. Also the questionnaire items were thorough examined by experts to ensure that it sampled the total content area of the study.

Again, to ensure the reliability of the research instruments, a pilot study was carried out on twenty JHS science teachers drawn from ten Junior High Schools at Agona Swedru in the Central Region of Ghana. The alpha Cronbach's was analysed and the output gave alpha coefficient of reliability of 0.816, which according to Bryman and Cramer (2001) is acceptable at 0.8 and as such highly reliable.

Data analysis

Descriptive statistical (mean and standard deviation) values were tabulated for all the questionnaire items. Again, frequency and percentages were also tabulated for all the items. Bar and pie charts were used. Again, a two tailed t-test statistics for independent samples was used to test the null hypotheses. The aforementioned analyses were statistically. A mean value below 2.5 represents disagreement while a mean value above 2.5 represents agreement.
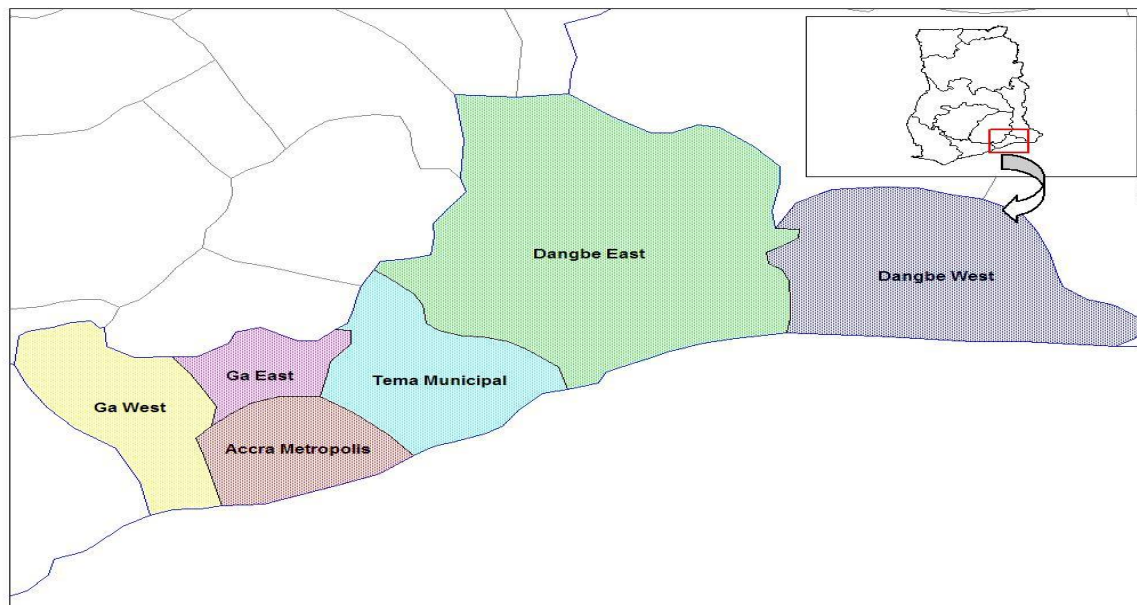
Figure 1. The study area showing the six districts.

Table 1. The attitudes of in-service teachers' towards the use of multimedia as a tool for science teaching by urban and rural JHS science teachers.

Item No.	Statement	*t*-test	
		t	*p*
24	The use of multimedia resources for teaching can promote critical thinking in students.	-3.13	.002
25	The use of multimedia resources for teaching can promote problem solving and communication skills in students.	-1.15	.251
26	The use of multimedia resources for teaching has the potential to generate students' interest in science.	-.93	.354
27	I use multimedia resources when delivering science instruction.	1.28	.205
28	There are multimedia resources in my school but have no knowledge of its uses.	.15	.880
29	My school has no multimedia resources because of lack of funds to purchase equipments.	1.75	.083
30	I have had INSET on the use of multimedia for teaching.	-2.75	.007

RESULTS

The analyses of the results are presented as follows. The attitudes of in-service teachers' towards the use of multimedia as a tool for science teaching by urban and rural JHS science teachers is shown in Table 1.

The mean responses for items on attitudes of in-service teachers' towards the use of multimedia as a tool for science teaching by urban JHS science teachers has been displayed in Figure 2.

At a mean score cut-off point of 2,50, respondents agreed to the fact that the use of multimedia resources for teaching can promote critical thinking in students, thus, it can promote problem solving and communication

skills, and again, has the potential to activate student's interest in science as indicated under items 24, 25, 26 and 29 in Figure 2.

As captured under items 28 and 30, respondents accepted that they have not been acquainted with multimedia equipment because they have not been given any in-service training on their use for teaching. There-fore, the low mean score values obtained were far lower than the cut-off point of 2.50 (Figure 2).

The rural teachers in Figure 3, also agreed with their urban counterparts on the same statement that multimedia resources can promote critical thinking in students, thus, invariably it can enhance problem solving and communication skills, and again, whip up student's interest in
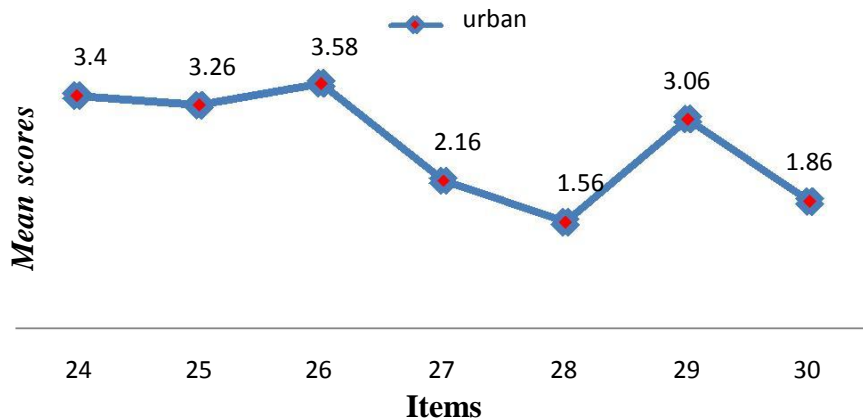
Figure 2. The attitudes of urban teachers' towards the use of multimedia as a tool for science teaching.
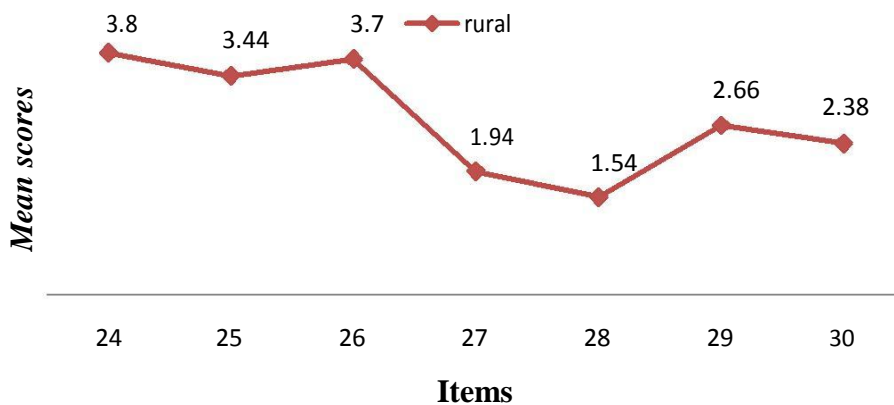

Figure 3. The attitudes of rural teachers' towards the use of multimedia as a tool for science teaching.

science as captured under items 24, 25, 26 and 29 with their mean score values above 2.50, which is the mean score cut-off point.

However, some of the teachers disagreed to the use of multimedia resources as a good science instruction material because of their inadequacies in schools.

Therefore, the mean score values recorded for items 27, 28 and 30 as expressed in Figure 3 did not exceed the cut-off point.

As shown in Figure 4, the mean score values for items 27, 28, and 29, on the attitudes of teachers' towards the use of multimedia as a tool for science teaching for the urban teachers were slightly higher than those of the rural sector. However, the mean score values for items 24, 25, 26 and 30 were higher for the rural teachers as compared to their urban counterparts.

In Table 1, the comparative assessment of the t-test results on the attitudes of in-service teachers' towards the use of multimedia tools for science teaching for both set of teachers have been presented.

From the t-test, t-calculated=-.182 and t-critical, $t_{0.05, 2, 22}$ =2.179. Since, t-calculated is less than the t-critical, we failed to reject the null hypothesis. The results therefore show that there was no significant difference between the mean responses of urban JHS science teachers (M=2.70, SD=.82) and rural JHS science teachers (M=2.78, SD=.89) on attitudes of in-service teachers' towards the use of multimedia as a tool for science teaching (Table 1).

On the other hand, the t-test results showed a statistical significant difference at the level of $P< .05$ between the attitudes of in-service teachers' towards the use of multimedia as a tool for science teaching by urban and rural JHS science teachers for Item 24 and Item 30. However, the t-test results showed that the difference between the attitudes of in-service teachers' towards the use of multimedia as a tool for science teaching by urban and rural JHS science teachers for Item 25, 26, 27, 28 and 29 was not statistically significant at the level of $p<.05$ (Table 1).
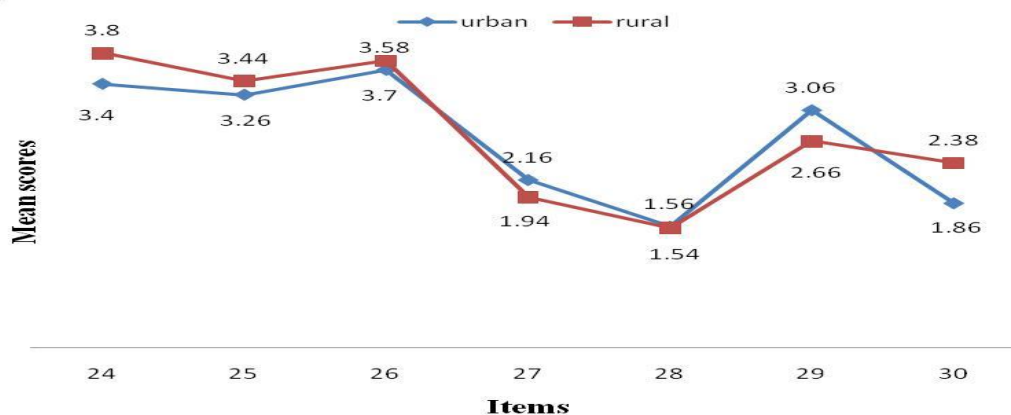
Figure 4. The attitudes of in-service teachers' towards the use of multimedia as a tool in science teaching for both set of teachers.

DISCUSSION

The study revealed that there was no statistically significant difference between the attitudes of in-service teachers' towards the use of multimedia as a tool for teaching Integrated Science by urban and rural JHS science teachers. This implies that both urban and rural JHS science teachers agreed to the fact that the use of multimedia resources for teaching can promote problem solving and communication skills in students and that the use multimedia resources for teaching has the potential to generate students' interest in science. However, both disagreed that they use multimedia resources when delivering science instruction. The reason was that both schools have no multimedia resources because of insufficient funds to purchase such equipments.

Research and experience indicate that the use of multimedia leads to enhanced learning on criteria such as acquisition of content, development of skills, efficiency of learning and satisfaction with instruction (Falk and Carlson, 1992; Thoman and Jolls, 2004). Reasons for this are many, including a lack of funds for equipment, insufficient technological infrastructures, and a lack of knowledge of its application by most teachers (Falk and Carlson, 1992; Gulbahar, 2008).

The findings of the research indicate that the provision of multimedia resources can induce much thinking in learners. Therefore, adequate multimedia resources should be available in schools to enhance the teaching and learning process.

The lack of in-service training hinders the effective use of multimedia by instructors in the classroom (Gulbahar, 2008). Therefore, the teachers must be given enough in-service training on how to effectively use multimedia resources to improve the teaching and learning (Falk and Carlson, 1992).

Finally, teachers need to be trained in the use of modern technologies, such as multimedia resources to improve the standard of education in the country.

ACKNOWLEDGEMENT

REFERENCES

Arnold DN (1997). Computer-aided instruction. In: Encarta Encyclopedia. Microsoft.
Bolam R (1982). In-service education and training of teachers: A condition of educational change. Final Report of CERI Project on INSET. Paris:OECD.
Bryman A, Cramer D (2001). Quantitative Data Analysis with SPSS Release10 for Windows, London: Routledge.
Falk DR, Carlson HL (1992). Learning to teach with multimedia. T.H.E. Journal 20(2):96-100.
GES (2005). In-service Training (INSET) policy for basic education. http://www.jica.go.jp/project/ghana/0604654/pdf/12_GhanaINSET_Sourcebook_PA.pdf.
Glatthorn A (1995). "Teacher development". In: Anderson L (Ed.), International encyclopedia of teaching and teacher education (second edition). London: Pergamon Press.
Gulbahar Y (2008). ICT usage in higher education: A case study on preservice teachers and instructors. Turk. Online J. Educ. Technol. 7(1):32-37.
Mothata S (2000). A dictionary of South African education and training. Johannesburg: Hodder & Stoughton.
Saiti A, Saitis C (2006). In-Service Training for Teachers Who Work in Full-Day Schools–Evidence from Greece. Eur. J. Teacher Educ. 29(4):455-470.
Thoman E, Jolls T (2004). Media literacy: A national priority for a changing world. Am. Behav. Scientist 48(1):18-29.