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**The State of Teaching and Learning Design and Technology in some Selected Junior High Schools. A Case Study of Bolga Road Zone in The Tamale Metropolis.**

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**Abstract**

The study set out to investigate the state of teaching and learning Design and Technology (D&T) in Junior High Schools (JHS). A case study of some selected schools in the Tamale Metropolis. Specifically, the study investigated the resources available, the recommended strategies being used; the problems encountered by teachers in teaching and learning, as well as the performance of pupils in the (2014) Basic Education Certificate Examinations results. Cluster sampling was applied to select the schools in the metropolis for the study after which the census-sampling procedure was used to include all the 44 teachers and 26 head teachers in the schools. Questionnaire was the instrument used to elicit responses, whilst statistical frequencies and percentages were used to analyse the data. Data analysis and interpretation indicated that quality of teaching is hampered by shortage of qualified teachers, non-availability and / or inadequacy of relevant instructional materials as well as insufficient time allotted to the teaching of the subject. Further investigation revealed that the methods and strategies employed were classroom (theory) based. There was limited use of practical and industrial-visit approach to the teaching of the subject. In the light of these findings, suggestions for improvement in the quality of teaching were made. Areas for further studies were also suggested.

**Keywords:** design & technology, recommended strategies, census- sampling, instructional, industrial-visit

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## INTRODUCTION

As part of its aims, every society makes provision for the acquisition of skills to enhance their standard of living and ensure their survival and sustenance. Since one of the aims of education is the preservation of society's culture (Dalta, 2010) any educational system, be it formal or informal, must impart skills to the people to ensure the cultural survival of the people. The people must be given the practical training in various areas to ensure that there is production, which will lead to development of the society. This was emphasized by Farrant (2008) when he described education as the role of human learning by which knowledge is imparted, faculties trained and skills developed.

Realizing the important role that practical training plays in the development of the society, the Ghana government introduced technical education into the educational system right from the onset of formal education. The 1974 Reform of Education introduced the Junior High School (JHS) concept. It stressed the educational importance of a curriculum, which predisposed pupils to practical subjects, and activities, by which they would acquire occupational skills at school and, after a little further apprenticeship, become qualified for gainful self-employment. The implementation of this reform began on an experimental basis. New subjects such as Technical Drawing, Tailoring, Dressmaking, Metalwork, Automobile Practice, Woodwork, Masonry and Catering were introduced for the first time.

As indicated in the D&T of 2006 the introduction of the subject in the JHS curriculum was intended to provide young persons with D&T as a predisposition to technical pursuits at advanced levels. Additionally, the Ministry of Education (MOE) recognized that the advancement of the country would accelerate if a predominant number of persons were trained in science and technology, with manufacturing as an outlet therefore offers the pupils the chance to acquire valuable skills that will open up a wide range of opportunities for productive work (MOE, 2010).

For some time now, public debate has been going on about the quality of education being delivered under the educational reforms in general and at the JHS level in particular as more of the JHS 'graduates' filter into the society. A section of the public is of the view that the quality of education being delivered at the JHS is not good enough. This observation appears to draw support from some studies done on primary education in Sub-Saharan Africa. On one of such studies done by Heneveld and Craig (2011), they observed that the desire of countries to expand education rapidly tends to "put pressure on the quality of basic education" (p.1) in the region, leading to poor achievement by students and that, where government interventions "do not come close to standards usually expected for formal schools" (p.20).

Over the past few years, The World Bank and other donor agencies have supported interventions in a number of Sub-Saharan countries including Ghana, aimed at improving access and quality of basic education. The focus of these interventions, apart from school construction has been on curriculum, exam reforms, teacher education and supply of textbooks.

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The effectiveness of these interventions is assessed using either two approaches, namely: School Effectiveness or School Improvement.

School Effectiveness approach identifies the outcomes of the schooling process and results them to the variables within the school environment that contributes to these outcomes. School Improvement approach on the other hand identifies the processes that contribute to successful change in the school, the successful change being the outcome. Whichever approach is used for the evaluation of the results, it is clear that the quality of education sought in the interventions is measured principally by the 'outcome' of the educational processes. This outcome is the academic achievement of students who have gone through the basic school system (Heneveld & Craig 2011). This achievement in Ghana is measured by pupils' performance in the BECE.

The performance of pupils in D&T has come under criticisms of late. The Chief Examiner's report for D&T (2010) for instance, stated that generally the standard of the subject in the BECE, compared favourably with those of previous years. The Chief Examiner noted that candidates' performance was still unsatisfactory. He therefore advised teachers to ensure that the subject was taught and studied not only at the cognitive level, but also at the practical level (WEAC, 2010). Furthermore, that pupils should be taught how to use drawing instruments correctly, since it were only the few candidates who exhibited knowledge and good drawing skills by using the appropriate drawing instruments that performed very well. The Chief Examiner therefore advised D&T teachers to be guided by the syllabus, and use the appropriate teaching methods to ensure better performance in subsequent years (WEAC, 2010).

Factors contributing to the state of affairs could be identified as inadequate resources amidst rising intake of pupils in the JHS's. The absence of workshop and other instructional materials, inadequate supply of textbooks, tools and equipment and the recruitment of many untrained teachers could affect the quality of teaching and learning of the subject (MOE, 2010)

It must be mentioned however that, some writers and researchers have criticized the role of vocational education as a solution to employment related problems. Psacharopoulos and Loxley (2007) for example, have criticized vocational education as a solution to unemployment on the grounds that it was unlikely that the returns to investments in vocational education would deliver the sort of benefits required to justify the huge investment involved in diversifying educational curricula. They also maintained that diversification may be part of an overall coordinated national strategy and could not in itself provide solution to unemployment – related problems. Their main conclusion was that both, in terms of efficiency and effectiveness, academic secondary education had better outcomes in developing countries.

Foster (2007) has also criticized the role vocational education could play in solving employment – related problems. Foster (2007), alleged that even though governments might advocate vocational education, most pupils and parents would reject it in favour of academic schooling. This was in the belief of pupils and parents that academic education paved the way to greater career opportunities and higher financial rewards. Foster also maintained that diversification of

educational curricula could either stifle general secondary education or prevent governments from investing in basic education.

Notwithstanding the above criticisms, Psacharopolus (2007) in his study on return to schooling in eleven Latin American countries has noted that individuals, who graduated from vocational secondary schools, generally had higher rates of returns to their investment than their counterparts who graduated from purely academic secondary schools.

Middleton, Ziderman and Adams, (2005) have also reported that vocational education as pre-employment training yields good returns when the labour market is expanding and the training is closely linked to available jobs (that is, when it is demand driven).

Despite the above arguments, the 1987/88 Education Reform Programme has been implemented for nearly two decades, and it appears the progress of the D&T subject in the JHS is grappling with many problems. It is against this background that the researcher wants to investigate the state of teaching and learning of D&T in the Tamale Metropolis.

The quality of instruction is the determinative factor in any instructional program. Just as the teaching of mathematics has its own challenge (Atakpa, 2007; Aidoo-Taylor, 2009) so does the teaching and learning of D&T, which appears to have been beset with a plethora of problems. The most pressing of these is the lack of competent teachers to handle the subject effectively. Aidoo-Taylor (2009) identified lack of competent teachers as the greatest problem facing the teaching of the subject. He is of the view that effective teaching of D&T demands that the teacher possesses adequate knowledge in the subject discipline.

Another major issue of concern is the problem of reconciling different methods of teaching D&T. Because of its integrated nature, the methods that are employed in teaching D&T are not only varied, they are eclectic. On account of these, the teacher has to be well guided in the use of variety of teaching methods and strategies if he or she has to be effective. Materials of instruction are vital components of learning experiences in D&T. However, teaching aids or materials that will add to the effectiveness of teaching (such as textbooks, workshops, workbenches, tools and instructional materials) are also inadequate in the schools (Aidoo-Taylor, 2007).

The unsatisfactory performance of candidates in the BECE, amidst unavailable or inadequate teaching and learning materials, calls for the need to find out the state of teaching and learning of the subject.

Efforts have been made to ensure that D&T is taught satisfactory in the schools. For example, efforts have been made to provide instructional materials such as syllabus and textbooks. Teachers are also being trained in some of the teacher training colleges to teach the subject at the JHS. Unfortunately, none of these seems to be yielding the anticipated results. This is because there are also many problems, some very conspicuous, others rather subtle, plaguing these efforts. Hence, the researcher felt the need to study the state of teaching and learning of the

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subject. The ultimate focus is to identify the strengths and weaknesses in the teaching and learning of D&T and suggest ways for their improvement.

The specific objectives of the study are:

1. Examine resources available for the teaching and learning of D&T in JHS's in the Tamale Central Metropolis
2. Understand the problems teachers and pupils encounter in teaching and learning the subject
3. Explain the extent to which recommended teaching strategies being utilized in teaching of D&T, in the Tamale Central Metropolis
4. Know the performances of pupils in the D&T (2014) BECE disaggregated by gender in the study area in the selected schools

The study was guided by the following specific research questions:

1. What resources are available for the teaching and learning of Design and Technology in JHS's in the Tamale Central Metropolis?
2. What problems do teachers and pupils encounter in teaching and learning the subject?
3. To what extent are recommended teaching strategies being utilized in teaching of Design and Technology, in the Tamale Central Metropolis?
4. What was the performances of pupils in the Design and Technology (2011) BECE disaggregated by gender in the study area in the selected schools

An important reason for engaging in an educational research is to improve on the understanding of specific educational issues. This study was intended to throw light onto the state of teaching and learning D&T in JHS's against the background of poor performance of students in the subject in 2014 BECE. The findings from this study would contribute to a clearer understanding and knowledge of what is actually happening in the area of teaching and learning D&T.

Again, the findings of the study may also be useful to educational planners; policy makers and administrators who wish to identify areas where support and materials are needed to ensure successful teaching and learning of the subject. The results of the study would bring to spotlight the state of teaching and learning of D&T.

## **LITERATURE REVIEW**

This chapter examines relevant literature to the study. The review is focused on the System of Education in Ghana, its historical development, aims and objectives. An attempt was also made at examining various educational reforms from post-colonial days to modern times. Finally, the concept and introduction of D&T as a subject were also examined.

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### **Ghana's Education System**

Since Ghana's independence, successive governments have demonstrated their recognition of the importance of education to national development, by pursuing policies aimed at making education accessible to all and relevant to the social, industrial and technological development of the country.

According to MOE (2010) Ghana's first President, Osagyefo Dr. Kwame Nkrumah, initiated the Education Act 1961, Act 87, aimed at achieving Free Universal Primary Education. The Act endorsed the two-tier system of education as instituted by the British in colonial times, namely primary and middle education, and secondary education.

Thus the establishment of public basic schools henceforth became the responsibility of the local authorities only. The second important feature of the 1961 Act was that it made education compulsory. Section 2(1) stated that: "every child who has attained the school-going age as determined by the Minister shall attend a course of instruction as laid down by the Minister in a school recognized for the purpose by the Minister" (p.1).

A third equally important aspect of this Act was its provision for free education. Section 20(2) stipulated: "no fee, other than the payment for the provision of essential books or stationery or materials required by pupils for use in practical work, shall be charged in respect of tuition at a public primary, middle or special school" (p.1).

The committee also proposed a long-term plan, a six year primary school course followed by four years of secondary school education, with two years of sixth form work leading to a three-year university degree. Within this long-term plan, pupils who could not enter secondary school after the primary school course would have to attend middle school continuation classes for four years.

Thus, by the end of the 1960s, the Structure and Content of Education in Ghana largely remained a heritage of the pre-independence era: long and academic. The National Liberation Council experimented with the eight – year primary course at the end of which pupils who did not gain admission into secondary or equivalent level schools either attended pre-vocational continuation classes to predispose them to suitable occupations in industry and agriculture, or continued the study of the general subject in school. Among the subjects studied were woodwork, masonry and agriculture.

Public desire for change reached a high point in the 1972 to 1974 periods with the development in 1974 of an elaborate programme for education from Kindergarten through Primary and Junior High to Senior High Schools. The proposals in the document; "The New Structure and Content of Education for Ghana" which was the report of the Dzobo Committee were discussed nationwide and subsequently approved by Government for implementation. Consequently, the Ghana Education Service (GES) was established in 1974, principally to ensure the effective implementation of the New Structure and Content of Education (MOE, 2000).

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The 1974 Reform of Education introduced the JHS concept. It stressed the educational importance of a curriculum, which predisposed pupils to practical subjects, and activities, by which they would acquire occupational skills at school and, after a little further apprenticeship, become qualified for gainful self-employment. The implementation of this reform began on an experimental basis. New subjects were introduced for the first time. They included Technical Drawing, Tailoring, Dressmaking, Metalwork, Automobile Practice, Woodwork, Masonry and Catering (MOE, 2010)

However, due to the economic constraints that faced the country in the late 1970s, bureaucratic bottlenecks and sheer lack of interest and commitment from administrators, the new programme never went beyond the experimental stage. There was stagnation and near demise of the experimental JHS system. By 1983 the education system was in such a crisis that it became necessary for a serious attempt to be made to salvage it. Among that many problems of the system were lack of educational materials, deterioration of school structure, low enrolment levels, high drop-out rates, poor educational administration and management, drastic reductions in Government's educational financing and the lack of data and statistics on which to base any planning (MOE, 2010).

Despite the numerous interventions to improve education, achievement levels of school children, especially at the basic level, were low. The results of public schools in the Criterion Reference Test (CRTs) conducted from 1992 to 1997 in English and Mathematics indicated an extremely low level of achievement in these subjects. Indeed, it was evident that although the reforms had succeeded in resolving some of the problems like reducing the length of pre-tertiary education and expanding access to education, some of the problems still persisted (MOE, 2010).

### **Education Reforms of the 1980s**

From the early seventies to the mid-eighties, Ghana experienced a serious national economic decline, which affected all social sectors. Along with other sector, the education system was starved of both human and material resources. In the early eighties, Ghana embarked on a series of International Monetary Fund Structural Adjustment Programmes (IMFSAP) under which the government mounted reforms in all social sectors. The Educational Sector Adjustment Credit (ESAC) became operational with the help of development partners, notably, the World Bank, the Department for International Development (then the ODA) and grants from other friendly countries. This program aimed at arresting the decline of the education sector. Under ESAC, the Education Commission undertook a review of the Dzobo Report in 1986 and the resulting proposals implemented in 1987 (MOE, 2010).

Some of principles, which formed, were the importance of education for all, the need for education to be relevant to professional employment opportunities, and the importance of scientific and technological education to national development. The major considerations for the restructuring of pre-university education in 1987 thus included the need to increase resources to

the sector, to vocationalize education by shifting emphasis from an academic orientation to a more practical, technical one, and to reduce the cost of education by shortening the statutory period of pre-university schooling.

As a result of the educational reforms in 1987, the JHS structure was put in place nationwide. This meant that the six years of primary school and three years of JHS were consolidated into a uniform and continuous nine-year free and compulsory basic education. The length of the school year was increased from 32-35 weeks to 40 weeks to compensate for the reduction in the years spent at pre-university level. The reforms also brought about revisions in syllabuses and provision of educational resources ranging from infrastructure such as classroom blocks and libraries, to school supplies such as books and D&T tools and equipment's. (MOE, 2010) New Senior High Schools were built to absorb the expected increases in enrolment.

According to the MOE (2010), in order to improve on the management of the education system, District Education Offices (DEO) were upgraded with the appointment of Directors and District Circuit Supervisors (DCS), and the supply of logistics such as vehicles, to enhance their management activities. Qualified teachers were appointed to head basic schools.

The implementation of the JHS 1987 Education Reforms was supported with some other interventions. One of them was the Primary Education Project (PEP), which was embarked upon in 1991 with a United States Agency for International Development (USAID) grant to bring about improvement in Primary Education. Another was the Primary School Development Project (PSDP) implemented from 1993 with financial assistance from the International Development Associated (MOE, 2010).

Despite the numerous interventions to improve education, achievement level of school pupils, especially at the basic level, were low. The results of public schools in the CRT conducted from 1992 to 1997 in English and Mathematics indicated an extremely low level of achievement in these subjects. Indeed, it was evident that although the reforms had succeeded in resolving some of the problems like reducing the length of pre-tertiary education and expanding access to education, some of the problems still persisted (MOE, 2010).

### **Aims and Objectives of Education Reform Programme**

The Education Reform Programme introduced in 1987/88 and the free Compulsory Universal Basic Education (FCUBE) 1996 programme, had contributed immensely to the structure of basic education that we have today and the achievements so far made. Basic Education now consists of six years primary education followed by three years junior high (MOE, 2010).

The Education Reform Programme succeeded in solving some of the problems confronting the sector, including the reduction of the duration of pre-tertiary education from 12 to 17 years and expanding access to education. However, the sector was still beset with a number of problems, including; Poor quality teaching and learning and weak management capacity at all levels to the educational system.

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**D&T Syllabus (Junior High 1-3)**

The MOE (2010) Policy Guidelines emphasized among other things the need for the creation of awareness in the Ghanaian child to be able to use the knowledge derived from science and technology to transform his or her environment and improve the quality of life.

The introduction of the JHS curriculum was therefore intended to provide young persons with basic technical skills as a predisposition to technical pursuits at the advanced levels. The MOE recognized that the advancement of the country will only accelerate if a preponderant number of persons were trained in science and technology, with manufacturing as an outlet. The subject therefore offers the pupils the chance to acquire valuable technical skills that will open up a wide range of opportunities for productive work.

Ministry of Education (2010), explained that the D&T syllabus was planned as an integration of knowledge and skills in woodwork, metalwork, block work/brick work, plastics, designing and making, graphic communication (drawing). Good performance in English, Mathematics, Environmental Studies and Science were necessary as pre-requisite skills for the success in the subject. Furthermore the syllabus has been structured to cover each of the three years of the JHS, under the following major units: Designing and Making; Graphic Communication (Drawing) and Materials, Tools and Processes.

It was intended that the majority of pupils who left JHS form three would go into apprenticeship training or go directly into some vocation was allocated three periods a week at JHS form 1-3. Each period consist of 35 minutes (MOE, 2010).

Further, the D&T syllabus (MOE, 2010) stipulated that the subject had three profile dimensions that had been specified for teaching, learning and testing. These were knowledge and understanding 30%: application of knowledge 40% and practical skills 30%. Each of the dimensions had been given a percentage weight that should be reflected in teaching learning and testing. The weights indicated in percentage showed the relative emphasis the teacher should give in the teaching, learning and testing at the basic education level. The weight indicated 70:30 proportional weighting of theory and practice. Within the 70% weighing for theory and practical, application of knowledge counted more, this process is to ensure that D&T is taught and studied not only at the cognitive level, but also ensure practical skill development on the part of the pupils.

**The Importance of the Teacher as a Resource**

Highlighting on the importance of teaching Aggrawal (2008) explained that, teaching is an essential part of education; therefore its special function is to impart knowledge, develop understanding and skills to learners.

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Ryans (2006), on the other hand, acknowledged the importance of the teachers as expressed by the historical philosopher, Henry Adams. According to Ryans, Adams stated that the goodness of any educational program is determined by the degree of teaching that is carried out. It is significantly necessary according to Ryans to identify qualified and trained teaching force for a successful educational program. The availability and utilization of a competent teaching force is a precondition for a favourable educational outcome.

Carron and Ta Ngoc Chau (2007) questioned what determines the quality of a teacher; they criticized the traditional view, which serves to underpin salary scales for teachers' length of general education, teacher training and teaching experience as not enough to determine quality teaching. After proposing the examination of the composition of teaching staff for each school Carron and Ta Ngoc Chau, held the view that the quality of a teacher is determined by the colleagues with whom the teacher is in daily contact. It is, therefore, necessary, according to Carron and Ta Ngoc Chau, that the composition of teaching staff in a given school after teacher qualification perhaps, age, and sex becomes an important factor.

Windham (2008) also held a similar view; she stated that the quality of an educational institution must be expressed in terms of the quality and quantity of its inputs. Those inputs according to Windham include the teacher and the teacher characteristics, the facilities, equipment and educational materials. Windham, Carron and Ta Ngoc, recognized the quality and quantity of the didactic materials as necessary ingredients to determine the quality of education institution.

In recent studies, Owolabi (2010) however, asserted that it is very important to classify the highest academic qualification in order to assess the academic quality of the teacher as a resource. It is assumed that the higher the academic quality of the teacher, the greater is her proficiency in the subject of her discipline. Owolabi illustrated his argument by stating that a teacher is expected to know not only what he or she is to teach in a lesson but something extra. "A teacher should therefore be at least a level of academic education higher than his or her students" (p.88).

Moreover, Owolabi (2010) further suggested that professionalism is an important aspect of a teacher's qualification. He however, was cautious of the fact that there are both trained and untrained teachers who seem to perform creditable and efficiently in some institutions. On the contrary, Owolabi stated that there is an equally both trained and untrained teacher who seems to run into problems with students and whose teaching performances are rather unimpressive. It is however, worthwhile and rational that the higher the professional training of a teacher the better her teaching is likely to be.

It is generally conceded that the success of any human endeavour is closely related to the quality of the personnel who perform tasks necessary for the achievement of purpose as well as to conditions that affect their physical and mental well-being. This assumption according to

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Osie-Anto (2004) is applicable to school as it is to any organizational human effort. "The extent to which public education succeed in delivery services with an effective use of scarce resources will depend largely on the quality of personnel engaged in the educational process and on the effectiveness with which they discharge individual and group responsibilities" (p.43). Osie-Anto concluded by affirming the role of the teacher as most crucial. He stated that money, equipment and materials are sufficient but the most crucial single factor in technical and science education is the teaching resource personnel, comprising teachers and workshop or laboratory technicians who are charged with the task of effecting desirable changes in pupils.

### **Resources for Teaching and Learning D&T**

Teaching-learning resources offer students with enriched opportunities to acquire concepts, values, and skills. They also appeal to the different senses involved in learning as well as cater for varied learning styles of pupils and help them understand and remember what is taught. In view of the importance of resources in the effective teaching and learning of D&T, this segment reviews the availability, adequacy and utilization of requisite resources.

In his study on educational theories, Smith (2009) asserted that educational resources, which include workshop, tools and equipment, learning materials, library books and teaching aids, other than the teacher input are significant to students' learning. This assertion is accordingly fundamental to every educational process. Dawson (1992) on the other hand, had argued that workshop, laboratory, tools and equipment are positively and significantly related to the academic achievement of schools in Canada. Likewise, Hayman and Loxley (2007) in a study in Uganda confirmed that the average number of book per pupil shows an association with their academic performance; hence school facilities and teacher characteristics have strong influence on students learning in developing countries.

The inference of the above studies is that in the developmental society's educational inputs such as books and other materials influence higher achievement rating among students. This finding appears to contradict the assertion of Jenks, Smith and Acland (1992). Jenks, Smith and Acland were of the view that rather, student characteristics are significantly related to the academic performances of the students. The other educational inputs in daterns of human and materials resources allocated to schools are either "secondary" or "irrelevant" to the student learning. However, report from the Economic Community for Africa (1972) supported (Dawson 1922; Smith 2009; Hayman and Loxley 1992) studies. The Economic Community for Africa observed that "..... the quality of West African Secondary education has suffered partly due to inadequate teaching aids, poorly equipped resources, such as laboratories, workshops, technical tools and equipment and teaching aids that are considered critical variables" (p.2). The availability of these items in inadequate number and quality is found to be critical because without at least, some amount of these resources, the pupils may learn little. Yet, little attention is given to the supply of these materials in some schools in developing countries, after payment of teachers' salaries.

In conclusion, Coleman (2006) also declared that, school inputs that include physical facilities and characteristics of teachers do not matter so much to school academic performances as the socio-economic status of pupils. He explained that, the provision of educational facilities including books, teaching aids and science and technical equipment vary from school to school and from classroom to classroom. Therefore, not every learner is exposed to the same amount of service of these facilities, and besides, the amount and quality of instructions affordable and the application of these educational materials in institutions service will depend on the quality of the teacher. These educational facilities would therefore serve as an indirect or direct “mediating” effect on schools academic achievement.

### **Characteristics of D&T**

The JHS D&T is essentially a practical subject, which always involves pupils combining, designing, and making skills with knowledge and understanding, in order to design and make good quality working products. Its practical nature involves the pupils in developing their own personal skills and knowledge of a wide range of materials and equipment. This enables them to begin to understand how technologists design and make things work and gradually develop the knowledge to work through the same process.

According to Delisle (2002), the D&T subject introduced a teaching technique that educates by presenting students with a situation that leads to a problem for them to solve. This principle, which was also termed as problem-based learning, does not just students to find a correct answer, instead, students learn through the act of trying to solve the problem. By so doing the pupils interpret the question, gather additional information, create possible solutions and evaluate options to find the best conclusions.

In their instructive studies Delisle (2002), Glasgow (2004) and Torp and Sage, (2008) compared problem-based learning requires pupils to utilize all their skills in order to answer a driving question. The pupils must research, collect data, interview and adapt information in order to present a possible solution to the presented problem. Educators believe that pupils tend to remember things they have experienced, or to research on, on their own, the reason being that it feels like their own question, not just one presented during class. Problem based learning consists of two main characteristics: a) the engagement of pupil and, b) the organization of curriculum around a specific problem and teachers becoming a coach, or a guide in their students’ quest for a more expensive inquiry. The principle of problem based learning can best be described as ‘minds on, hands on’ learning, which gives pupils an authentic experience, while maintaining their interest; they in turn become part of active learning rather than a passive note taking. As expected this activity increases their motivation and makes them feel responsible for the question being pursued.

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## METHODOLOGY

The study investigated the state of teaching and learning D&T in some selected JHs in the Bolga Road Zone, in the Tamale Metropolis. The Methodology of the study outlines the processes used in conducting the study.

Gay (2011) explained that, research design indicates the basic structure of a study, the nature of the hypothesis and the variable involved in the study. The research design considered most appropriate for this study is the descriptive survey design. The survey method of social investigation was adopted to collect data on the state of teaching and learning D&T in the Tamale Metropolis.

The population of the study includes all the head teachers and D&T teachers, in both private and public selected JHS's in the Tamale Metropolis. The sample that has been selected from the population should be large enough to generate confidence in the data collected and the subsequent generalization of the population (Anderson, 2005). The Tamale Metropolis is divided into 12 circuits. Each circuit has about five schools making a total of 72 schools.

In selecting the schools, the metropolis was stratified into circuits (as it is already). This was to ensure that all the groups are represented in their correct proportions. Simple random sampling was then used to select three schools from each circuit. This method was used so as to give equal chances to every member of the accessible population.

On the part of the heads and the D&T teachers, the census sampling technique was used to select all of them. The census method was used because with both heads and teachers were not many and also the fact that their views were the basis of the study.

The questionnaire was the main instrument for collecting data for the research. The month of March 2014 was used to distribute and collect the data; and the administration was carried out within the duration of about four weeks. Permission and assistance were also solicited from the head teachers and teachers for the administration of the questionnaire. This helped to establish rapport and to explain the purpose of the study to the respondents, which facilitated the collection of data.

Descriptive statistics such as frequencies, percentages and means were used. The current version of Statistical Package for Service Solutions 10.1 (SPSS) was also used for the analysis.

## RESULTS AND DISCUSSIONS

### Teaching and Learning Resources

In relation to research question one, (What resources are available for the teaching and learning of D&T)? . The study found that there was a severe shortage of resources for teaching and

learning D&T in the JHS's. For example, data collected indicated that Dahin Sheli JHS one of the new schools, in the metropolis had some of the following instructional aids: recommended reference books, 94; assorted metal work tools, 35; assorted wood works tools, 38; assorted block work tools, 20 and drawing instruments, 45. These resources were used by a total of 129 pupils in the school.

On the other hand, Tamale Presbyterian JHS, which had a population of 228 pupils, had neither of the recommended reference books, tools and equipment nor drawing instruments. According to the D&T teacher (of Tamale Presbyterian JHS), apart from teaching only theory, the pupils do not use the appropriate drawing instruments during technical drawing lessons, due to the lack of it.

Similarly, in most of the schools, many of the pupils did not have the appropriate drawing instruments. Therefore schools, which lacked the tools and equipment sometimes, rely on local craftsmen in the community during practicals. This situation made lessons ineffective. The pupil to the reference textbooks ratio was 43:1 in the sampled schools.

The cost of teaching D&T is considerably more than their academic counterpart subject areas like English or Mathematics. This is because there are some regular expenses in the teaching and learning of D&T, for example, the maintenance and replacement of tools and equipment and the purchase of consumable materials. The schools lacked adequate funding to enable them purchase tools and materials for D&T practical work, let alone meet the cost of maintenance of existing equipment. As declared by Coleman (2006), school inputs that include physical facilities and characteristics of teachers do not matter so much to school academic performances as the socio-economic status of pupils. He explained that, the provision of educational facilities including books, teaching aids and science and technical equipment vary from school to school and from classroom.

### **D&T Teachers**

The MOE (2010) affirmed that in general, the number of trained teachers to handle all the JHS subjects; particularly the technical and vocational subjects were inadequate. However Windham (2008) stated that, the quality of an educational institution must be expressed in terms of the quality and quantity of its inputs. Those inputs, according to Windham, include the teacher and the teacher characteristics, the facilities, equipment and educational materials. Windham, Carron and Ta Ngoc Chau (2007) also recognized the quality and quantity of the didactic materials as necessary ingredients to determine the quality of educational institution.

Data collected however, revealed that the total number of D&T teachers in the 26 sampled schools were inadequate, against the background of large enrolment in the schools. In all, there were 44 teachers, of whom two were women. Each school had a minimum of one teacher and a

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maximum of three teachers. Indeed, the lowest qualification is the Middle School Living Certificate, whilst the highest qualification is a Higher National Diploma.

The average number of years taught by the teachers' ranged from two to five years. Apart from three teachers' who taught other subjects, most of the (D&T teachers) taught only D&T. The ration of pupils' to D&T teachers in the sampled schools was 88 to 1. In most schools class enrolment were so large that there was clear indication that teachers are being over worked, this situation could affect the performance of pupils in the BECE.

Data gathered also revealed that, in all the schools there were a total absence of in-service courses for the teachers, to keep them abreast with the latest developments in the teaching and learning methods. In-service courses act as a motivational factor in promoting the efficiency and productivity of teachers'. The absence of these in-service courses was therefore most likely to affect the performance of both teachers and pupils adversely.

In addition to problems of recruitment and motivation of teachers, a close study of the background of teachers in all schools, revealed that most of them lacked pedagogical skills necessary to teach at the basic level, even though these teachers had expertise in their occupation areas they still have greater need to assess to educational programmes that would enhance their teaching skills. The concept of pedagogy implies dependence of children to a large extent on their teachers for knowledge, skills and guidance. As a result, teachers are expected to direct learning activities in the teaching situation. For that reason, the teaching and learning of D&T must be balanced (Tamakloe, Atta & Amedale, 2006) to enable the learner to interact with the learning materials to gain experience.

### **Pupils**

There were a total number of 8265 pupils in the sampled schools in the metropolis. Most schools had higher number of males' enrolment than females. The total number of males were 4800, whilst females were 3465. Kukuo MEA Zion JHS recorded the least number of pupils 83, whilst Ridge "A" JHS recorded the highest number of enrolment, 682. Most of the schools had large class sizes; (an average of 188 pupils, per class) these further supports the notion that most JHS's in the metropolis are characterized by high enrolments.

Indeed Likewise, Hayman and Loxley (2007) in a study in Uganda confirmed that the average number of book per pupil shows an association with their academic performance; hence school facilities and teacher characteristics have strong influence on students learning in developing countries.

D&T require pupils to be able to manipulate tools and equipment in their practical lessons to familiarize themselves with their uses. Unfortunately, the large number of pupils in a class, in some schools, did not allow proper use of tools and equipment as well as supervision by teachers, especially during practical lessons.

### Time Table Allocations

One aspect of teacher leadership is the allocation and management of scarce resources to create productive learning environment. The most important resource a teacher controls is time, not only how much time is spent on a particular subject but how much time to manage and focus on students attention on academic issues. Time allocation for teaching and learning a subject not only determines learning experiences, but it also designed to address desired learning. The importance placed on a subject is a schools' curriculum also determines its time allocation.

According to MOE, (2010), the 1999 D&T syllabus recommended that three periods be allocated to D&T in a week at the JHS 1-3, with each period consisting of 35 minutes. The findings of the research indicated that most schools were complying with this rule in their teaching and learning activities. However, a few schools allocated up to five periods in a week, with duration of 30 to 40 minutes a period, respectively.

The D&T syllabus did not stipulate how many periods should be double or single from the periods allocated, therefore there were discrepancies in the period allocated in some schools, for example, whilst some schools had one double period and one single period, others had three single periods per class per week. The results also indicated that most teachers spent all the recommended 105 minutes allocated to D&T on practicals.

Generally most teachers were of the view that the periods allotted to D&T in a week were inadequate. Details of frequency analysis from schools sampled on periods allocated a week are shown in Table 3. Whilst 16 (61.5%) schools had the recommended three periods in a week, the rest of the schools, which constitute 39.5%, had periods ranging from four to six per week. In any case teachers are expected to make do with their scarce resources including time. As stated in the literature, according to Osie-Anto (2004) "The extent to which public education succeed in delivery services with an effective use of scarce resources will depend largely on the quality of personnel engaged in the educational process and on the effectiveness with which they discharge individual and group responsibilities" (p.43).

**Table 3. Allocation of Periods on Time Table**

Period Allocated	Frequency	Percentage (%)
3	16	61.5
4	8	30.8
5	1	3.8
6	1	3.8
<b>Total</b>	<b>26</b>	<b>100</b>

In response to the adequacy of time period for D&T lessons considering the nature of the content of the syllabus and methods of teaching, 60% of teachers' respondents said it was inadequate.

As revealed by the literature, teacher education and experience could affect pupils' achievement through effective time use. According to Avalos and Haddad, (2008) and Fuller, (2007) studies showed strong evidence from developing countries indicating that, institutive time is an important factor relative to student achievement, hence, the more time is available for learning, the more learning that occurs.

Therefore, since over (50%) fifty percent of the respondents were of the view that the number of periods allotted to D&T was inadequate, the conclusions that could be drawn is that the number of periods allocated to D&T in Ghanaian JHSs was inadequate.

### Workshop/Workplace and Workbenches

Literature reviewed affirmed that, tools and equipment for workshop practice were not enough in the JHS, for the use of all pupils in a workshop at a time. On the other hand, the MOE, (2010) D&T syllabus had three basic profile dimensions specified for teaching learning and testing. These were; knowledge and understanding 30%, application of knowledge 40% and, practical skills 30%, each of the dimensions had been given a percentage weighting that should reflect in the teaching, learning and testing. The weights indicated the relative emphasis that a teacher should give in the teaching, learning and testing process at the basic level. The weights indicated 70:30 proportional weighting for theory and practice. Within the weighting application of knowledge counts more. Combining the three dimensions in the teaching and learning would ensure that D&T is taught and studied not only at the cognitive level, but also practical development on the part of pupils. Yet Table 4, indicates that 21, (80.8%) of the schools in the metropolis had no workshops/workplaces. The Economic Community for Africa observed that "..... the quality of West African Secondary education has suffered partly due to inadequate teaching aids, poorly equipped resources, such as laboratories, workshops, technical tools and equipment and teaching aids that are considered critical variables" (p.2)

**Table 4. Availability of Workshop/Workplace for Practical**

Workshop/place	Frequency	Percentage
0	21	80.8
1	4	15.4
3	1	3.8
<b>Total</b>	<b>26</b>	<b>100</b>

### Problems Encountered

The second research question was, "What problems do teachers and pupils encounter in teaching and learning the subject"? the analysis of the questionnaire revealed several problems encountered by the JHS's Among them were: lack of qualified teachers, inadequate workshop facilities, workbenches, tools and equipment and curriculum materials, coupled with large number of pupils' enrolment. Most teachers therefore used only the lecture methods to teach. This method is not appropriate for teaching a practical subject like D&T.

As can be seen in Table 5, the shortage of D&T teachers is seen as problem encountered in the schools. As indicated in Table 6 out of a total of 26 schools 16 (61.5%) reported that shortage of teachers was a problem. Since the rest of the respondents (teachers) constitute less than 50%, it meant that there was a major problem of shortage of teachers. Apart from the shortage of teachers, many of the teachers were also untrained and lack in-service training. Windham (2008) also held a similar view; she stated that the quality of an educational institution must be expressed in terms of the quality and quantity of its inputs. Those inputs according to Windham include the teacher and the teacher characteristics, the facilities, equipment and educational materials. Windham, Carron and Ta Ngoc, recognized the quality and quantity of the didactic materials as necessary ingredients to determine the quality of education institution.

**Table 6. Problems Encountered in Teaching and Learning (Shortage of Teachers)**

Shortage of teachers	Frequency	Percentage (%)
A serious problem	6	23.1
A minor problem	5	19.2
A major problem	5	19.2
Not a problem	10	38.5
<b>Total</b>	<b>26</b>	<b>100</b>

The lack of a workshop or workplace was also another problem of teaching and learning D&T as shown on (Table 7). As many as 16 out of 26 schools indicated that the lack of workshops or work places for practicals, is a major problem, this compelled some teachers to combine all their three periods in a week for theory lessons. Much of the teaching and learning of D&T was therefore done in abstract with no hands-experience.

**Table 7. Problems Encountered in Teaching and Learning (Lack of Workshops/Workplace)**

Lack of Workshops/ Workplace	Frequency	Percentage (%)
A serious problem	16	61.5
A minor problem	2	7.7
A major problem	6	23.1
Not a problem	2	7.7
Total	26	100

Data gathered also indicated the inability of teachers to organize industrial visits to places relevant to D&T topics as recommended by the syllabus. In addition, lack of community support was a serious problem facing the teachers.

Finally, Table 8 shows other problems associated with teaching and learning D&T. Among the other problems, the lack of in-service courses for teachers was high on the list, (10 out of the 26 schools), whilst lack of student interest and motivation for teachers recorded the frequency of 4 (15.4%) each respectively.

**Table 8. Other Problems Encountered**

Other Problems	Frequency	Percentage (%)
Inadequate resources		30.8
Lack of in-service course		38.5
Lack of motivation for teachers		15.4
Lack of student interest in the subject		15.4
Total	26	100

### **The Recommended Strategies being utilized**

In relation to the question three: To what extent are the recommended strategies being utilized for teaching and learning of D&T in the Tamale Central Metropolis? It was found that:

The 1974 Educational Reform Programme emphasized among other things, the need for the creation of awareness in the Ghanaian child to be able to use the knowledge derived from science and technology to transform his or her environment and improve the quality of life. It was against this background that, the researcher question three was asked.

Also, teachers are the main catalysts in the implementation of curriculum; hence teachers should be given all the necessary inputs e.g., (teaching and learning materials) to enable

them perform better. Instructional resources offer students enriched opportunity to acquire knowledge, understanding and practical skills.

A look at Table 9, however shows that due to inadequate number of tools and equipment and other materials needed for effective teaching of the subject, only one (3.8%) of the sampled school often had practicals in a week, whilst 12 (46.2%) says the teaching of practicals was not applicable.

**Table 9. Use of Practical Lessons / week**

Practical Lesson	Frequency	Percentage (%)
Often	1	3.8
Occasionally	4	19.2
Rarely	2	26.9
Never	7	53.8
Not applicable	12	100

### **Performance of Some Schools in the BECE results by Documental Analysis**

In relation to research four: What are the pupils' performances in the D&T for 2003 BECE results disaggregated by gender? It was found that:

The academic performance of pupils at the JHS level depends on a number of factors. Resources critical to academic success includes human and physical resources, pupils' Pre-junior secondary school academic achievements, and type of school, as well as teaching and learning materials. The human resources mentioned refer to competent teachers handling the particular subject, head of school and external inspectors who are in charge of supervising teaching and learning in schools.

The availability of teaching and learning aids, quantity or type of textbooks, workshop or benches, tools and equipment, curriculum load and the duration of course are taken into consideration. There are a lot of these factors good performances of pupils are expected.

Generally, the performance of past pupils in Design and Technolgy, (in the Tamale Central Metropolis) as revealed by documental analysis of the (2011) BECE results, was generally poor. The performance of boys was however better than the girls. Analysis of the results showed the pupils' performance in the 26 sampled schools as follows:

1. 235 boys had grade 1 – 3, whilst 64 girls had grade 1 – 3, also
2. 622 boys had grade 4 – 5 whilst 25 girls had grade 4 – 5. (Appendix D).

Further analysis with cross-tabulation of number of teachers in a school and the performance of pupils in the BECE, D&T results showed that, the increase of the number of teachers from one to three in a school, for example would not necessarily increase the performance of

pupils in the BECE results. This is because performance would depend on other variables like teaching and learning materials. Chi-square was used to find the relationship between two variables; teachers' and pupils' performance, the results with a confidence level of .368 showed no significant relationships between teachers' and pupils' performance.

Table 10 (which shows a cross-section of the sampled schools), indicates that, out of a total number of 30 candidates presented in the BECE by Tamale International JHS all the 30 candidates obtained grade 1 – 3, representing 100% pass. One can conclude that the candidates achieved good results. This high achievement may be attributed to a number of factors. These factors include academically and professionally qualified teacher handling the subject, the availability of a well-equipped workshop, textbooks and the enthusiasm of pupils who are determined to pass.

**Table 10, Performance of Some Schools in the BECE by Documental Analysis**

School	Number of candidates	Grade 1 - 3	Grade 4 - 5
Tamale Int. JHS	30	30	-
1st Nov. 1954 JHS	108	11	33
Sakasaka M/A 'B'	95	9	41
Zegbeli JHS	260	11	45

Again Table 10 indicates that Zegbeli JHS presented a total number of 260 candidates, out of which 11 had grade 1 – 3 and 45 had grade 4 – 5, representing over 60% failures. This poor performance could also be due to problems associated with most of the old established schools, such as lack of qualified teachers, teaching and learning materials, poor infrastructure and high pupils' enrolments.

### Summary

The analytical procedure made use of frequencies and percentages distributions, shows the following data analysis;

1. From investigations it was found that, the quality of teaching D&T in the Tamale Central Metropolis, is hampered by shortage of qualified teachers, non-availability and / or inadequacy of relevant instructional materials as well as insufficient time allotted to the teaching of the subject.

2. It was found that, D&T teachers and pupils encounter many problems in the teaching and learning of the subject.
3. It was found that, the recommended teaching strategies are not being, effectively utilized for the teaching and learning of D&T, (in the Tamale Central Metropolis), as teaching was mainly theory based.
4. It was found that, the Tamale Metropolis JHS pupils' performances in the D&T (2014) BECE results were generally poor.

## SUMMARY AND CONCLUSION OF FINDINGS

The respondents used in the study comprised 44 D&T teachers and 26 head teachers. The research was able to establish that majority of D&T teachers in the Tamale Metropolis possess the required professional qualifications, (Post-Secondary Teacher Training Certificate or Certificate in Technical Education), whilst the rest were untrained graduates from the Polytechnic or Vocational and Technical Institutes.

About the teaching and learning materials, the responses to them indicated that most of the schools lacked the needed materials. In most schools the teaching and learning materials were either not available or woefully inadequate. These material, indicated reference textbooks, tools and equipment, technical drawing instruments, as well as workshops and workbenches. Consumable materials for practical were almost non-existent.

The lack of teaching and learning materials hindered, to a great extent, the ability of D&T teachers to explain critical issues, and practices in the teaching and learning D&T. It also retarded the pupils' ability to acquire basic skills, such as sawing, filling and polishing.

Staff development and participation are vital to successful teaching. To verify this assertion views were sought from respondents as to whether the lack of in-service is a minor, major, serious or not a problem. The majority of respondents were of the view that lack of in-service courses was a serious problem they are encountering, since the provision of in-service courses would sharpen their capabilities in the exercise of their duties.

The study also revealed that majority of the teachers compiled with the 70 minutes is allotted to the teaching of D&T, by the syllabus. However, concerning the adequacy of the number of periods per week, over 50% of respondents felt that it was inadequate considering the extensive nature of the syllabus and time consuming methods recommended.

The findings further established that inadequate materials, lack of competent teachers, and equipped workshops were some of the factors inhibiting the effective teaching of Pre-Technical Skills. Finally, it was found that, pupils' interest in the subject and the presence of resourceful hard working teachers, were of paramount importance in promoting the effective teaching and learning of D&T.

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## RECOMMENDATIONS

On the basis of the findings, the following recommendations are made.

1. The GES should make an effort to post qualified D&T teachers to the schools, which lack teachers.
2. Periodic and regular in-service courses in the form of seminars, workshops orientation and refresher courses should be provided at the Regional and District Resource Centres. Regular in-service courses would not only upgrade the knowledge of participants in D&T methods but also introduce them to new development in technical education. It would therefore keep them abreast with the new ideas in the content and methods of D&T.
3. The GES should ensure that adequate quantities of teaching and learning materials for the effective teaching of D&T should be supplied to all the schools. In addition a mechanism should be put in place to ensure that materials supplied are properly utilized to enhance teaching and learning. Also, JHS's in the metropolis should be encouraged to use available local materials and scraps, as much as possible for their practical.

In connection with the inadequacy of tools and equipment some reputable organizations such as the Appropriate Technology Centres (ATC) should be encouraged by GES to provide some locally made tools and equipment for sale to schools.

4. Another are of importance to the effective teaching and learning D&T was the limited use of industrial visit approach to teaching. Since, the teaching and learning of D&T, (which involves practical's), should not be restricted to the classroom, but should not only be linked to the industry but should also make efforts at involving pupils in practical work, which would provide them with the opportunity to discover information and to explain practical activity themselves.
5. The weaknesses of the JHS's as mentioned earlier, included poor academic preparation of teachers and inadequate facilities among others. A way, by which the weaknesses can be addressed, is by clustering JHSs with the view to sharing resources (e.g. teachers, workshops, tools and equipment).
6. On assessment of the pupils, the MOE should ensure the use of more authentic assessment procedures. For example, pupils' performance tasks that reflect their performance on real life situation such as demonstrating skills should be used as recommended by the syllabus.
7. Schools community – relations should be encouraged. When the need arises, resource persons should be called to help in the teaching of some topics, which may require knowledge of experts in the field. The school should contribute to the socio - economic development of the local community. It should identify itself with the problems and solutions of the local community.
8. Circuit Supervisors, should intensify their supervision and monitoring at the JHS level, this would make the D&T teachers more serious. Through supervision, absenteeism

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among teachers and learners would reduce and the effective use of instructional time ensured.

9. Apart from the professional development drive, the GNAT and the subject association could also contribute to the effective teaching of D&T in Schools. These associations could organize periodic seminars, workshops, orientation and refresher courses for D&T teachers.
10. Finally pupils ability in English Language in particular, could hamper the effective teaching of D&T, it is therefore suggested that serious efforts should be made by the GES to upgrade the teaching of English Language at the JHS level.

## REFERENCES

- Aidoo-Taylor, N (1989, August). Subject integration in technical edugcation. A Paper presented at a trainers course at Kumasi Technical Institute. Kumasi. Ghana.
- Aidoo-Taylor, N. (1989, September). The teaching of technical education in the Education Reform Programme. A paper presented at a trainer's course at Kumasi Technical Institute. Kumasi, Ghana.
- Anderson, G. (2005). Fundamentals of education research. Basingstoke: Burgess Science Press.
- Aggarwal, J. C. (2006). Teaching of social studies. New Delhi: Vikas Publishing House.
- Aggarwal, J. C. (2006). Theory and principles of education. New Delhi: Vikas Publishing House.
- Amedahe, F. K. (2006). Testing practice in secondary schools in the central region of Ghana. Unpublished M. Ed. Thesis, University of Cape Coast.
- Atakpa, S.K. (1997, August). Rationale and objectives of the junior secondary programme: A Keynote Address at a Trainer of Trainers Course, Kumasi.
- Avalos, B., & Haddad, W., (2008). A review of teacher effective research in Africa, Latin America, Middle East, Malaysia, Philippines and Thailand. Synthesis of Results. Ottawa: International Development Research Centre.
- Callan, R. E. (1992). Education and the culture of efficiency. Chicago: Phonnix Books
- Carron, G., & Ta Ngoc Chau. (2007). Reduction of regional disparities: The role of educational

Planning. Paris: Unesco Press.

Dalta, A. (1986). Education and society – Sociology of African education. Hong Kong: Mc Millan.

Dawson, D. A. (1992). Educational quality indices. The Alberta journal of educational Research, 18

Dzobo, N.K. (1992). Report on the education advisory committee (EAC): Proposed new Structure and content of education of education for Ghana. Accra.

Delisle, R. (2002). How to use problem based learning in the classroom. USA: Association for Supervision and Curriculum Development.

Economics Community for Africa (1992) Survey of Economic condition in Africa. New York: United Nations.

Farrant, J. S. (2008). Principles and practice of education. Singapore: Longman

Fullan, M. (2009). Curriculum implementation. In A. Levey (Ed), The international encyclopedia of curriculum. Oxford: Pergamon Press.

Fuller, F. F, & Clark, P (1994). Raising school effectiveness ignoring culture local conditions and the influence of the classroom, tools, rules and pedagogy. Review of Educational Research, 64 (1), 11 9-157

Foster, P. (2004). The vocational school fallacy in development planning. In: Anderson, A.A; Bowman, M.J. (Eds.), Education and Economic Development. Aldine, Chicago.

Fraenkel, J. R, & Wallen, N. E (2000). How to design and evaluate research in education (2<sup>nd</sup> ed) New York: McGraw Hill.

Government of Ghana (2004). Ghana's education system. Retrieved online on 31<sup>st</sup> May, 2004. ([www.the-republic-of-ghana.htm](http://www.the-republic-of-ghana.htm)).

Government of Ghana (1997). Basic education right: programme for the provision of FCUBE by the year 2005. Pp. 1-2. Accra:

- Government of Ghana (2002). Meeting the challenges of education in the Twenty First Century. Report on the Presidential Committee on Review of Education in Ghana: pp, 43-72. Accra. Adwasa-Publications (Ghana) Ltd.
- Glasgow, N. (1997). New curriculum for new times: A guide to student-centered problem-based learning. US; Corwin Press, Inc.
- Gay, R.L. (1992). Educational research competencies for analysis and application (4<sup>th</sup> ed.). New York: Macmillan Publication Company.
- Hadda, W.D., Carnoy, M., Rineldi, R., & Regal, O. (1998). Education and Development Evidence of new priorities. World Bank Discussions Paper 995, Washington D.C., World Bank.
- Heyman, S.P., & Loxley, W. (1992). Influence on academic achievement across higher and low-income countries. *Education*, 50(1), 55-60
- Heneveld, W., & Craig, H. (1996). World Bank Project designs and the quality of primary education in Sub-Saharan African Schools Count. World Bank technical Paper November 302, Washington DC: The World Bank.
- Jenks, C. Smith, M., & Acland, H. (1992). Inequality: A Reassessment of the effect of family and schooling in America. Harmonds worth: Penguin Books.
- Kerlinger, F., (1973). Foundation of behavior research. London Holt Reinhard and Winston
- Locheed, M. E., & Komena, A. (1988). School effects on students' achievement in Nigeria and Swaziland. Paris: IBRD.
- Ministry of Education (1972). Report of the education advisory committee on proposed new structure and content of education. Accra.
- Ministry of Education and Culture (1987). Things you need to know about the Junior Secondary School programme. A brochure, Accra: Nsamankow Presss
- Ministry of Education (1999). Teaching syllabus for D&T. Accra: Curriculum Research and Development Division.
- Ministry of Education (2000). Post independent Era. Retrieved on line on 31<sup>st</sup> May, 2004.

([www.ghana.edu.gh/edu.post.](http://www.ghana.edu.gh/edu.post.))

Ministry of Education (2010). Reforms in the 1980s. Retrieved on line on 31<sup>st</sup> May, 2004.

([www.ghana.edu.gh/edu.reforms](http://www.ghana.edu.gh/edu.reforms))

Middleton, J.A., & Demsky, T. (1989). Vocational education and training: A review of World Bank Investment. Discussion Paper 51, World Bank, Washington, D.C.

Middleton, J.A. Ziderman, A., & Adams, A. (1993). Skills for productivity: vocational education and training in developing countries. Oxford University Press, New York.

Owolabi, S.O. (1996). School mapping and facilities analysis. Ibadan: Agoro Publicity Company

Owolabi, S. O. (1998). Improving management of teaching space. The Wenniba model. Journal of Education Management1 (1), 35-44

Ryans, D. G. (1992). Characteristics of teachers. New York: America Council on Education

Pierce, A. J., & Karwatka, D. (1993). Introduction to technology. New York: West Publishing Company

Psachrapoulos, G. (1993). Returns to investment in education: a global update. World Development, 22(9), 17-24.

Psachrapoulos, G., (1997). To vocationalize or not to vocationalize? That is the curriculum question. International Review of Eduation, 33 (2), 25-36.

Psachrapoulous, G., & Loxley, W. (2007). Curriculum diversification in Columbia and Tanzania: An evaluation. Baltimore: Johns Hopkins University Press.

Smith, A. (2009). Learning disabilities. Educational Theory, 37 (3), 336-339

Torp, L., & Sage, S. (1998). Problems as possibilities: problem based learning for K-12 Education. USA: Association for Curriculum and Development.

Tow Yow, C. (1997). Evaluation at the Planning Stage. In Lewey, A. (Ed.) Handbook of Curriculum evaluation. Paris/New York: UNESCO/Longman Inc.

Tamakloe, E. K., Atta, E.T., Amedahe, F.K. (2006). Principles methods of teaching. Accra,

Ghana: Black Mask Limited.

Windham, T.D., (2008). The efficiency of education. In lower, J, Grant, N and

WAEC (2010). Basic Certificate Education Examination, Chief Examiners Report

(Pre-Technical Skills). Accra: Ghana

World Bank (1995). Priorities and Strategies for Education: A World Bank Sector Review.

Education and Social Policy Department, World Bank: Washington D.C

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