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Education as an Economic Investment

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Abstract

This paper discusses participation in education from an economic point of view. It highlights the various types of education and their impact on the economic development of a nation. It also presents a rationale for seeing education as an investment rather than a social service. This paper is intended as a guide for education investment decisions at any given level, by individuals, governments, and corporate bodies. The economic concepts of resource scarcity, opportunity cost, and private and social costs/demand are discussed in an education context. The rationale for investing in education is presented. Common obstacles to private and social investment efforts in education are discussed so as to enable future investors to make appropriate projections on resource requirements for the implementation of any education investment plan. This paper concludes that a clear understanding of the contemporary challenges in education as well as the various investment options is pertinent to the process and development of education.

Keywords: Education, Economic, Investment, Demand, Cost, Opportunity, Capital, Benefits.

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INTRODUCTION

The achievement of efficiency in the provision of education is one of the major concerns of education economists. To this end, this paper highlights some of the major concepts in the economics of education, and how they can be explored to achieve optimal social and private economic benefits from the process of education.

Education means different things to different people. From a generic perspective, it simply means the transmission of knowledge from one person to another or the transmission of knowledge from a teacher to a pupil. For Akani (1990), it is the process of molding individuals in society in order to develop their potentials. According to Hornby (2000), education is a process of training and instruction, especially of children and young people in schools and colleges designed to give knowledge and develop skills. It also includes the field of study dealing with how to teach and the process of teaching somebody about something or how to do something. Ololube (2011a,b) associates education with: (i) the act or process of imparting knowledge or skill; systematic instruction; teaching; (ii) the obtaining of knowledge or skill through systematic instruction; schooling; (iii) knowledge or skill obtained or developed through systematic instruction; (iv) learning, a programme of instruction of a specified kind or level e.g. vocational education; university education; and (iv) the field of study that is concerned with teaching and learning; the theory of teaching pedagogy. These definitions of education highlight four dimensions of the concept of education:

- Education as a process
- Education as a field of study or profession
- Education as a programme of instruction
- Education as an institution/agency

Education as a process involves teaching and learning which may occur in a formal setting as in a school, in a non-formal setting as in artisan training centers, or in an informal setting as in families and peer groups. Education as a field of study is concerned with the formal training of teachers for the various levels and programmes of education. A professional teacher is one who is trained and certified in the field of education. In Nigeria, A Nigerian Certificate of Education (three years of education in a College of Education) qualifies one as a primary school teacher. A Bachelor's Degree in Education qualifies one to teach at the secondary level of education and a Master's Degree in Education qualifies one to teach in the Faculty/College of Education at the tertiary level. Ideally, only a trained teacher is qualified to train another teacher. Education as a programme of instruction involves classifications of instructions designed to address teaching and learning in various areas of human activity. This includes, rural education programmes, sex education programmes and HIV/AIDS programmes. Finally, education as an institution/agency involves the organization of education according to the various organs responsible for its management. In Nigeria, the Ministry of Education is the apex body responsible for the management of education in the country. Others include the Universal Basic Education Commission (UBEC), the National Universities Commission (NUC), the National Commission for Colleges of Education, (NCCE), the National Commission for Nomadic Education (NCNE), and the National Board for Technical Education (NBTE).

Based on the above definition, education can be thought of as the process of molding a person's character and preparing such person for functional existence through training and instruction. Education as character training and skill acquisition lends itself to three major types of classification: classification by level, classification by method and classification by programme.

(a) Classification of education by levels

Three levels of education exist by this classification: primary, secondary and tertiary levels. Primary education is the education given to children between ages five and twelve. In Nigeria and in most countries of the world, primary education is compulsory for every child. In Nigeria, it is a punishable offence to deny a child the right to primary education which is a necessary part of the nine-year basic education programme. Primary education equips the learner with functional literacy, numeracy.

Secondary education is the education that is received in a school after primary education. Secondary education is also referred to as post primary education. At this level the learner acquires skills and knowledge that prepares him/her for formal employment in the economic sector or for further education at the tertiary level. Secondary education in Nigeria is a six-year programme divided into three years of junior secondary education and three years of senior secondary education. The three years of junior secondary education are a compulsory part of the Universal Basic Education (UBE) programme.

Tertiary education is the education provided at the highest institutional level. It is the formal education that is received after secondary education. The acquisition of the West African Senior Secondary School Certificate is one of the basic conditions for tertiary education in Nigeria and all West African countries. The highest educational qualification obtained at this level is the Doctorate Degree (PhD) which is acquired through university education. The PhD is described as a terminal degree because formal education in any particular field terminates with it. Institutions classified as tertiary education institutions include Colleges of Education, polytechnics, and universities.

(b) Classification of Education by Methods

There are three method classifications of education: formal, non-formal and informal education. Formal education is the education that occurs in a formal setting known as school. Formal education is given in a school by a teacher formally trained and certified in a field of education. Curricular content and method of administration are clearly defined by law and policy in a school setting. The curricular content of formal education covers virtually all areas of human activity (Ololube, 2011a). Formal education is associated with compulsory curricular activities and an adherence to time schedules. Primary, secondary and tertiary schools provide formal education.

Non-formal education is the education given in non-formal settings, such as on-the-job training or workshops, artisan workshops, and the education provided in training centres. The administrator of a non-formal institution may or may not have a formal education depending on the content of the programme they administer. A high level of mastery of the skill to be transmitted is usually a major qualification. In a skill acquisition programme for instance, the instruction emphasis is on equipping the learner with the basics of the specific skill. In a literacy programme, the emphasis is on literacy and numeracy and the services of a trained teacher are necessary for effective teaching and learning.

Non-formal education is designed for people who cannot tolerate the rigidity of formal education or who for one reason or the other missed the opportunity for basic formal education. The curriculum of non-formal education is therefore designed to suit the learning needs of this category of learners (National Commission for Nomadic

Education, NCNE, (1998). To provide for the education of illiterate and semi-literate adults in Nigeria, most Nigerian universities offer courses in adult and non-formal education up to the PhD level. This is to ensure a high quality supply of teachers for non-formal education. The national policy on education recommends that non-formal education at primary and secondary levels be based on the recommended curriculum for these two levels of education (FRN, 2004; UNESCO, 2005, 2006).

Informal education is the education acquired through interpersonal associations. Informal education can be acquired from family relationships, social organizations, religious associations, and peer groups. In these relationships, teaching and learning may or may not be conscious and deliberate. The curriculum of informal education is often determined by prevailing circumstances (Jeffs & Smith, 2005; Ololube, 2011a).

(c) Classification of Education by Programmes

Education programmes include special education, science and technology education, arts education, and vocational education. Special education refers to the type of education that is given to persons with physical/sensory impairments. It also includes the education of the socially disadvantaged such as children and adults of pastoral nomadic groups, migrant farmers, and migrant fishing families. In Nigeria, the classification of people with special education needs also includes gifted and talented children and adults “who have very high intelligent quotient and are naturally endowed with special traits (in arts, creativity, music, leadership, and intellectual precocity) and find themselves insufficiently challenged by regular school programmes” (FRN, 2004, pp. 47-48).

The curriculum and instructional resources for special education are designed to suit the particular challenges faced by the various groups of learners. For instance, the curriculum for adult members of migrant fishing groups in Nigeria includes functional literacy, vocational training, cooperative education, training in capital formation and loan utilization, and environmental and health education. The curriculum for the education of children from migrant fishing homes follows that of regular primary schools, but with modifications in time-tabling and content to accommodate the fishing times and the cultural background of the learner (NCNE, 1998). Teachers who provide special education are trained to handle the needs of the various categories of learners.

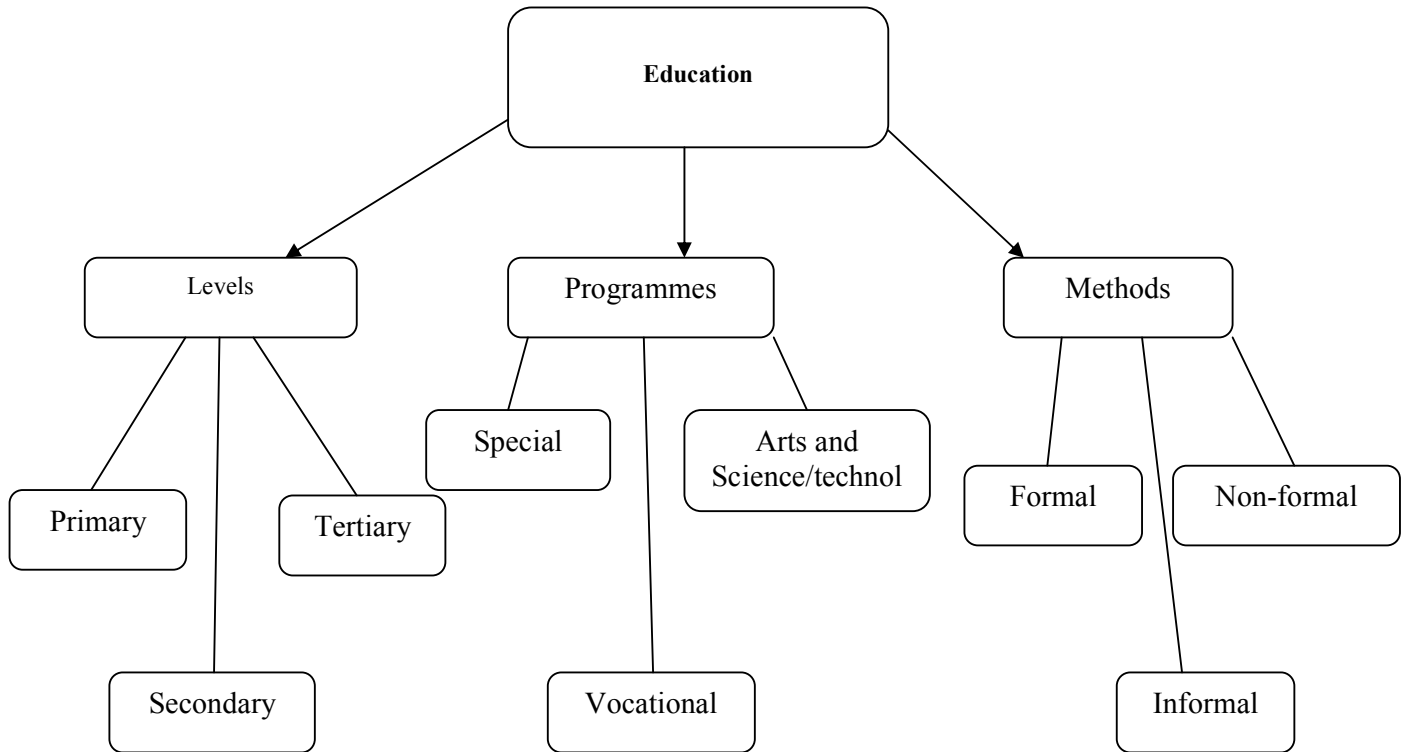
Science and technology education provides the learner with knowledge and skills in the field of science and technology. Science and technology education is often given higher priority in education planning in Nigeria because of the country’s desire to make education relevant in the rapidly changing global economy. Education in the arts is, in contrast, designed to train students in such areas as history, languages, fine and applied arts, education, business studies, accounting, and the social sciences, including economics, political science, and social studies.

Finally, vocational education is education that equips the learner with practical skills in a specific field. Vocational education includes skill acquisition programmes in carpentry, furniture design, tailoring, home management, agricultural science, and fine and applied arts. Vocational education can be acquired through formal and non-formal training in schools and in training centers.

Economic Rationale for Classifying Education

The classification of education by levels, programmes and methods enables an investor to set clear objectives and to make a clear assessment of the investment requirement in terms of material and human resources, as well as the demand for any particular type or level of education. This is where the economic concepts of scarcity and choice come into play. All of these classifications of education can be provided in a regular formal school. They may also be provided in a school that is prepared to cater for the peculiar needs of the prime beneficiaries. The decision to group or separate students is an economic decision because it is guided first, by the level of resource availability, and second by the desire to achieve efficiency in human resource development through education.

Figure 1: Classifications of Education



INVESTING IN EDUCATION

An investment can be generally described as the use of money for the purpose of profit making or achieving success in business. Technically, the term investment is defined as the process of adding to stocks of productive assets, which may include the acquiring of fixed assets such as buildings, plants, and equipment (Black, 2003). An investment may also include spending money to improve the quality of existing human resources in an organization through education.

Education is a service sector because it is designed to produce educated men and women who will contribute to the labour market and ultimately the economy. Given that it is responsible for the development of human resources in any economy, investment in education is tantamount to investment in human capital formation. Investing in education can take many forms including the establishment and management of schools as a business venture and/or the acquisition of any particular type of education by individuals to enhance their employment prospects and income earning capacity. Government can also invest in the development of a particular type of human capital considered important to national development.

Rationale for Investing in Education

The major rationales for investment decisions in education include:

Production of Human Capital

The economic sector benefits directly from the education sector because the products of education are the skilled or semi-skilled labour for the economic sector. The application of economic principles in the provision of education ensures adequate production of relevant human capital and the reduction of wastage in the process of human resource development.

Cost Effectiveness

The application of prudential principles in resource utilization in the practice of education ensures that investment in education produces a labour force that is relevant to the economy in terms of quality and quantity. The production of irrelevant labour amounts to the increased unemployment and a waste of education resources.

Programme Planning

Adequate investment in education ensures that suitable education programmes are properly planned and implemented for the various levels of education. This is irrespective of whether the system of education is formal, informal or non-formal.

Creation of Awareness

Students in various fields of study are exposed, in the course of their study, to the economic opportunities and benefits that accrue from the careful application of the skills they have acquired through education. The student is also equipped with necessary managerial skills that will enable him/her to function in the world of work and entrepreneurship.

SCARCITY OF EDUCATION RESOURCES

In spite of the many benefits that come from human resource development through investment in education, it is still difficult for developing countries, especially in Africa, to provide equal education opportunities for all citizens. The economic realities of developing countries often compel governments and private investors to choose between investment options to enhance the pace of economic development. In Nigeria for instance, investment options competing with education for government attention include the generation of electricity, the provision of adequate potable water, the provision of adequate networks of good roads, the reduction of unemployment through the sustenance of industrial growth, the development of agriculture to reduce food importation, the enhancement of oil and gas production and national security. Existing resources must thus be shared between these competing areas of need. Inadequacy of resources is a major issue in virtually all sectors of developing countries' economies hence national priorities in terms of investment decisions and resource utilization. Choices arise as a result of this scarcity and priorities are set. These priorities can, in turn, result in the elimination of certain programs depending on the level of importance the decision maker places on such programs.

In Nigeria, as in most developing countries, general education is provided in primary schools as a social service. However, the Nigerian government has stated that the provision education as a social service is too enormous a responsibility for it to bear alone. The national policy on education in Nigeria thus encourages private individuals and corporate bodies to help in the education of Nigerians by establishing and administering schools. This has meant a proliferation of private schools at all levels of education. Private schools are not funded by government and are seen as profit making organizations subject to all kinds of taxation. Fees in private schools tend to be high because the school depends solely on those fees, or on bank loans, for operation of the school. Competition for student enrolment has meant that private school proprietors do strive for quality in the provision of education. This in turn, however, increases the capital and recurrent costs associated with private school management.

TYPES OF EDUCATION RESOURCES

Resources in education can be classified into two broad categories: material resources and human resources. Although some education analysts do prefer to use classifications such as: (a) tangible and intangible resources, in which case resources like buildings, money and instructional facilities constitute tangible resources, while time and information constitute intangible resources (Enaohwo, 1990); or (b) physical resources, human resources and financial resources, in which case information and time are grouped with tangible resources as part of the physical resources, human resources consist of academic and non-academic staff, as well as students, and financial resources consist of all the monies that flow into the school (Ebong, 2006). For the purpose of this paper, education resources will be presented as material resources and human resources:

(a) Material Resources include instructional aids, library materials, office and classroom facilities, recreational facilities, science laboratories, workshop equipment, school grounds and all the structures (facilities) on it, funds, information and time. Information and time are considered intangible because of their abstract nature. Education is founded on the use of information and time. The effective transmission of information in education is based on the efficient use of time and other vital educational resources. Education is thus time bound. The effective use of time is therefore as important as the effective use of other resources in the provision of any type of education.

(b) Human Resources have been defined in the education sector as consisting of academic staff (teachers), non-academic staff, and students/pupils (learners). Although students are the prime beneficiaries in the consumption of education goods and services, they do not pay taxes as students since their activities are not immediately directed at

personal income generation. Some students, however, especially in the vocational arts, will produce goods and services that contribute to school revenue. Human resources in education thus consist of all human beings directly concerned with the planning and implementation of education programmes and activities, in other words, the planners, the implementers and the prime beneficiaries. Education planners are responsible for policy provision, resource identification, plan evaluation, and plan implementation assessment. Plan implementers consist of school administrators and all staff members in a school.

DEMAND FOR EDUCATION

Investing in education requires the investor to have a general view of government and private participation in education, as well as the reasons for such pattern of participation. This knowledge enables the investor to anticipate the future demand for any level or type of education he or she may wish to invest in and the factors that are likely to affect such demand. According to Black (2003, p. 113), demand is the quantity of a good or service that people want to purchase and “the function of demand relates it to the factors determining it.” Such factors include customer income, the price of the good or service, and the price of other competing goods or services.

The demand for education can be defined as the desire of an individual or group of persons for a particular type or level of education at any particular point in time. Where private education is concerned, the demand for education therefore refers to the total number of people who desire a given type or level of education, are willing to pay the cost of getting it, and are capable of acquiring it. In Nigeria, where education is comprised of a mix of public and private schools, two types of demand arise: (a) the demand by those who can afford to pay for their education, are willing to pay for it, and are capable of acquiring such education (Private demand); and (b) the demand by those who cannot afford to pay for their education but are capable of acquiring such education if granted public sponsorship (social demand). The former can be referred to as private demand for education, while the latter refers to social demand for education or the willingness of a community or society to fund the education of its citizens. It is for this reason that “it has become common to regard private demand for education as investment demand, and the social demand for education as consumption demand” (Agabi, 2002, p. 105).

FACTORS THAT AFFECT DEMAND FOR EDUCATION

The demand for education is affected by a number of factors. The most prominent of these are government policy, societal innovations, parental attitude and gender bias.

Government Policy

Contemporary planning and financing of education policies and programmes are controlled to a great extent by government policy. The demand for education is in this regard highly affected by the type of policy that governs education in any particular society. In Nigeria, prior to 1976 education was largely controlled by voluntary organizations and religious groups and few people were willing to pay the price for education. However, with the introduction of free and compulsory education in 1976 more people demanded education than facilities could accommodate (Agabi, 2006). The demand for any type of education is generally higher when education is offered as a social service rather than a private investment.

Societal Innovations

Innovations consist of new and more efficient ways of doing things. Innovations in education include open university systems, internet education programs, the incorporation of computer training in all levels of education, special schools for physically and socially disadvantaged persons, part-time education, adult education, etc. Collectively, these are designed to ensure the adequate supply of relevantly educated manpower suitable for employment in today’s technology-driven economy. In other words, these innovations are designed to satisfy the increased demand for educated and computer literate personnel by industries and other employers of educated labour. Demand for education in this regard is influenced by the availability of computer training facilities in education institutions as well as the general accessibility of these types of education.

Parental Attitude

Some parents are reluctant to invest in the education of their children. This is most prevalent among poor agrarian communities and migrant/nomadic groups, in which cases children are often engaged as farmhands. The situation

among migrant fishing families has been captured by Nigeria's National Commission for Nomadic Education, NCNE: "migrant fishermen move from one fishing/selling location to another, with their children who are either too young to be left behind to attend distant schools or are used as helping hands by their parents to whom fishing has become a way of life" (NCNE, 1998, p. 1). The nomadic way of life constitutes "an important impediment" to the effective participation of nomadic families in formal schooling (NCNE, 1997, p. 1). For such families, the cost of sending a child to school is a lot more than tuition fees, transportation and books and it is an opportunity cost they are often not prepared to bear.

Gender Bias

In most developing countries, where socio-economic development prioritizes the advancement of a particular gender, demand for education is impacted. In most countries in Asia and Africa, for example, the education of male children is more important than the education of female children. This is because of the belief that investing in the education of a girl child amounts to investing in another family by virtue of the girl's marriage. Consequently, there remains a high illiteracy among women and girls in developing countries. In rural communities in Nigeria, erroneous clichés, that the education of a woman ends in the kitchen and that too much education is not good for a woman, abound. These beliefs have been a major impediment to female participation in education.

THE COST OF EDUCATION

The cost of education is the price that an individual or group of people pay to acquire education or to provide education for another person or group of persons. The cost of education can be measured in terms of money. It can also be measured in terms of opportunities lost in the acquisition of education. The cost of education may be borne privately or socially and can be thought of in terms of opportunity costs.

Private Cost of Education

This is the price that an individual pays to acquire education. The private cost of education includes the cost of books and other learning materials, transportation to and from school, hostel/boarding fees, meals, uniforms, tuition fees, and all levies paid in the course of schooling. The monetary value of these items constitutes the private cost of education when it is borne by the individual or his/her family.

Private Opportunity Cost of Education

Hornby (2000) defines opportunity as a favorable time or circumstance for doing something. If several opportunities occur at the same time and a person is not able to participate in all of the opportunities, that person is compelled to choose the most desirable opportunity. Opportunity cost is based on this choice between two or more existing alternate opportunities. The opportunity cost of any human activity consists of other activities which could not be carried out as a result of engaging in a particular activity at a particular period of time.

The private opportunity cost of education consists of all the opportunities that an individual loses as a result of his or her decision to acquire an education. Student A, for instance, must choose between tertiary education, skill acquisition and immediate employment. If Mr. 'A' chooses to acquire tertiary education, the forfeited skill acquisition and immediate employment opportunities become the private opportunity cost of Student A's tertiary education. Opportunity costs are inevitable given limitations of time and other resources.

Social Cost of Education

Social cost is the cost of providing social services. Social cost of education is the cost of education borne by the government who fund education. These costs may also be borne by non-profit philanthropic organizations like UNICEF or UNESCO. The social cost of education includes the cost of building public schools, furnishing the schools with the infrastructure and instructional resources, training public school teachers, paying staff salaries, providing recreational resources for public schools, awarding scholarships, etc. The social cost of education is the sum total of public and non-profit expenditure on education. Social costs are incurred when education is provided as a social service and schools are established as social institutions, with minimal cost to individual students and parents.

RATIONALE FOR PUBLIC PARTICIPATION IN FUNDING EDUCATION

There are several reasons that compel the general public to participate in the funding of education. These include:

- (1) Education is the Right of Every Child: the public funding of education enables every child to have access to education irrespective of his/her parent's economic and social status.
- (2) Education is a Tool of Socialization and National Harmony: government participation in the provision of education ensures that its citizens are educated. Since the norms and values of society are imbibed through education, government ensures a higher level of social harmony by expanding opportunities for education.
- (3) Human Resource Development: education is a central tool in the development of human resources needed for a functioning economy. The funding of education by government is always associated with policy decisions which ensure that education curriculum is relevant to the immediate and future human resource needs of the economy. By investing in education, government invariably invests in the development of human resources for the various sectors of the economy. The ultimate purpose of this investment is to reduce the cost of importing human capital from developed economies.
- (4) Quality Assurance: the participation of philanthropic organizations can reduce the education funding burden of government. This can reduce the aggregate social demand for education opportunities in public schools by providing expanded access to free education. It also reduces the pressure of over-enrollment on public school facilities. Over-enrollment manifests in the form of crowded classrooms, excessive workload for teachers, and over-utilized school facilities, all of which adversely affect the quality of teaching and learning.
- (5) Social Opportunity Cost of Education: the opportunity cost of education, as discussed above, refers to the opportunities forgone in favour of education. The social opportunity cost of education refers to the forgone opportunity for providing other social services which can no longer be afforded. These social services can include rural water supply projects, road rehabilitation projects, the construction of dams to aid agriculture, or the establishment of health centers.

Cost Effectiveness in Education

Cost effectiveness can be defined as the achievement of sought after results in the most economical way (Black 2003, p. 94). Cost effectiveness in education is the ability of an investment in education to achieve its education goal and the benefits for which it was made. The Nigerian government may, for instance, decide to allocate twenty billion naira to education every fiscal year for ten years, in order to achieve a 70:30 science-to arts/humanities ratio in the production of its future work force. If at the end of ten years, tertiary institutions in Nigeria are not able to produce this 70:30 science/arts ratio, the two hundred billion naira spent on education over the ten-year period can be regarded as ineffective because it did not achieve its objective. However, if 70 percent of the work force produced by tertiary institutions within the given period falls in the area of science and technology, then the two hundred billion naira spent on education within that period will have been effective. Cost effectiveness is measured in terms of investment objectives.

HUMAN RESOURCES DEVELOPMENT AND HUMAN CAPITAL FORMATION

Human resources refer to all the human beings in an organization. In the generic sense, it may be used in reference to the population of a country. For instance, Nigeria is believed to be rich in human resources because of its large population. Human beings constitute resources because in their developed state (adults), they can be engaged in the production of goods and services. In their undeveloped state (children), they constitute potential factors of productivity. The labour force, on the other hand, refers to the men and women in a country who are physically and mentally ready for employment in the production of goods and services. It excludes school children and adults who cannot take-up wage employment.

Human Resource Development refers to all the activities directed towards the preparation of individuals or groups for positive engagement in the economic sector. It includes all education programmes, on the job or in-service training, skill acquisition programmes, and industrial training schemes. The purpose is to ensure that the human being is continuously relevant in his/her rapidly changing work environment. In the present age of computer technology, for instance, computer literacy has become a prerequisite condition for employment in many sectors of the economy. Computer training has thus become one of the central areas of human resource development activities as seen in the proliferation of computer centers. A prospective investor in the provision of formal and non-formal education, who excludes the provision of computers as education resources, and computer training as part of the education process, has likely failed in his objectives.

Human Capital Formation and Wage Differentials

Human capital is the stock of expertise accumulated by a worker and valued for its income earning potential (Begg et al., 1994). Human capital results from investment in human resource development aimed at enhancing income generation prospects and “is the present discounted value of the additional productivity over and above the product of unskilled, of people with skills and qualifications” (Black, 2003, p. 214). Human capital is a unique type of capital in that it cannot be used as collateral for loans. It is liable to obsolescence through changes in technology and taste.

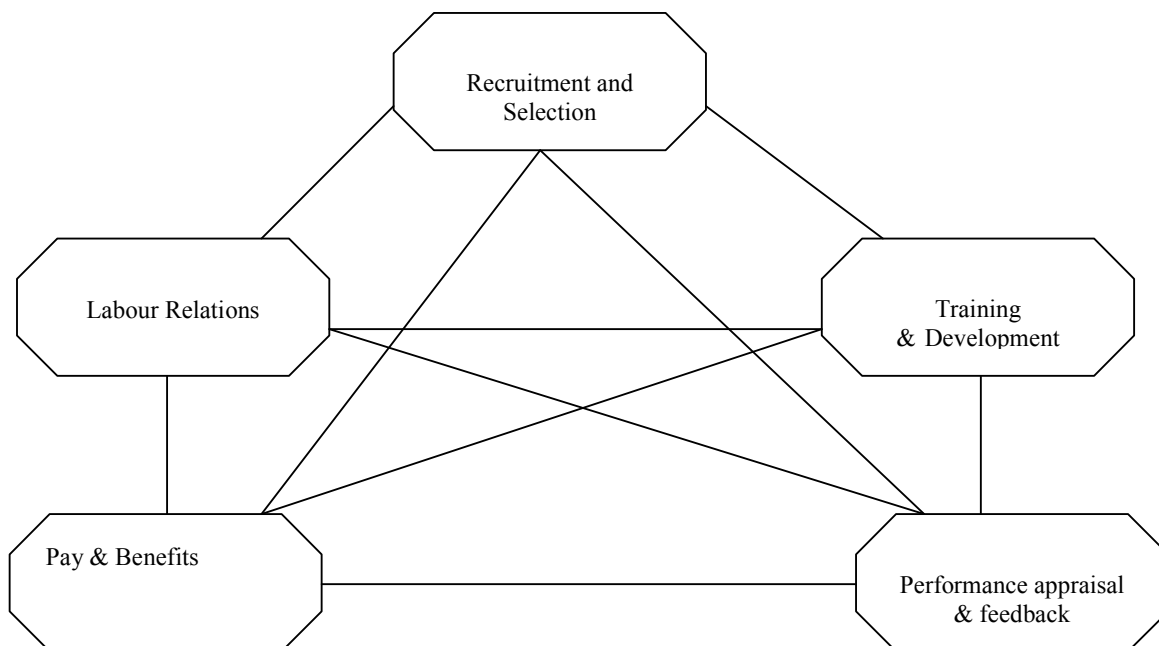
Human capital is based on the notion that skilled workers are more productive than unskilled workers. Investment in skill development through education and training is therefore imperative in the formation of the human capital. The higher wages associated with this caliber of human resource are reflective of the economic value attached to the level of education and skill development which they possess. Wage differentials refer to differences in the wages of different categories of workers. In the school system, for instance, principals earn higher wages than vice principals and classroom teachers. The various positions occupied by these three categories of workers could be as a result of their different levels of education and training or years of work experience or both which have added to their potentials for higher levels of productivity.

In Nigeria’s education sector, the development of school administrators and teachers through in-service training is mostly financed by government. This implies that only teachers that are employed in public schools benefit from such training. Private school proprietors are often hesitant in the provision of further training opportunities for their teachers because of the fear of losing such teachers to other schools that are willing to pay higher wages for those with additional training. This is often the case when adequate measures are not taken to ensure the appropriate management and retention of workers in an institution.

HUMAN RESOURCE MANAGEMENT IN EDUCATION

Human resources management (HRM) in education includes all activities that school managers engage in to attract and retain qualified teachers and to ensure that such teachers perform at a high level and contribute to the accomplishment of the school’s education goals (as set by the school and by the national policy on education). Jones and George (2003) identified the five major components of HRM as being recruitment and selection; training and development; performance appraisal and feedback; pay and benefits; and labour relations. Each of these components influences the others in such a way that they must all fit together for the efficient achievement of organizational goals. This is illustrated in Figure 2.

Figure 2: Components of Human Resource Management (HRM) System



Adapted from Jones and George (2003, p. 265)

Recruitment and selection: comprises the primary and basic step in the management of human resources at the institutional level. Recruitment involves attracting qualified persons to occupy vacant positions. The major task in recruitment lies in identifying existing vacancies and the relevant qualifications needed to fill such vacancies. The next step is to advertise to attract qualified persons. Selection involves identifying the most qualified individuals and separating them from all other applicants for the purpose of employment. Selection can be based on some combination of academic qualification, skill acquisition, relevant work experience, and the interview and/or written examination.

Training and development: of human resources for any education institution begins with the placement of the newly employed in a job that is relevant to his/her area of qualification, under the supervision and guidance of experienced personnel. Skills are generally perfected through practice and so more challenging tasks should be given to the employee when he or she has achieved an acceptable level of mastery in the performance of his/her regular assignment. The employee is further developed through participation at workshops, seminars and conferences organized by industry professionals.

Performance appraisal: involves an objective assessment of a worker's level of development in the system of education. It is one of the basic managerial functions of an education administrator. Performance appraisals guide the administrator in making appropriate decisions on issues such as staff promotion, discipline, wage increases, confirmation of appointment, retraining programmes, and appropriate on- the-job placement.

Feedback from performance appraisal: refers to all information that emanates from the performance appraisal exercise. When members of staff that are being appraised they complete and return the appraisal forms and school management should then provide feedback on its appraisal activities. Feedback to teachers and other members of staff on the outcome of the appraisal exercise is provided by the administrator to individual members of staff, usually in writing. There may also be a public presentation of the general level of performance in the institution.

Pay and benefits: refer to the remuneration associated with positions and tasks in an institution. Where pay and benefits are clearly defined they can serve as motivating factors for those with higher aspirations within the institution, and ultimately result in higher productivity. Higher positions should attract higher pay and greater benefits. Regular training through workshops and other on-the-job education programmes helps to enhance teachers' prospects of attaining higher positions and receiving the associated benefits.

Labour Relations: include the interaction between members of the school staff and school management with regards to the treatment of teachers and other workers in the school. An education institution is said to have positive labour-relations when interaction between the institution's management and all the workers (including teachers) is cordial and satisfying to all concerned. Beyond the institution, labour relations also involve the interaction of the school with labour unions considered to be outside the school.

CONCLUSION

The provision of education as an investment requires the investor to have a comprehensive understanding of the meaning of education as well as the various education investment options. Investor knowledge is also made up of a clear understanding of the economic variables that influence investment decisions in education, as well as the factors that affect these variables. The effective provision or acquisition of education as an economic investment requires that all of the factors that affect education are given necessary considerations. For this reason, concepts like resource scarcity, costs, choices, human capital formation and human resource management have been discussed in this article in relation to education and the school system.

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Borankana (Phathisi) Music Performance, Learning and Transmission among the Bakwena of Botswana

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Abstract

This paper is aimed at discussing the information contained in *Borankana (Phathisi)*, traditional music practiced by the Bakwena in the Kweneng District of Botswana. The paper was conceived through the collaborations between ethnomusicology classes and their subjects/respondents in an effort to better understand *Borankana* traditional music performance, and its daily uses today. This paper addresses not only the traditional music, but also the traditional learning and transmission of the music. Data was gathered by author and students through *kgotla* (tribal administration) visits, oral interviews with the informants, as well as internet search and other secondary printed information repositories such as books and journals. Oral interviews were recorded using an audiotape for future referencing and photographs were taken of the practical music performances. It was evident in the interviews that for the Bakwena of Botswana, *Borankana* music was traditionally used for entertainment by both young and old people. However, it was also evident that dancing activities were largely dominated by men and boys while women sang, clapped hands and ululated. Historically, *Borankana* was performed during tribal activities only. Now it mainly used by men in day-to-day activities for entertainment with women accompanying through singing, hand clapping and ululating. Changes in costumes and the materials used to make instruments over time is also discussed.

Keywords: Learning and Transmission, Bakwena, Borankana, Phathisi, Molepolole, Botswana

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INTRODUCTION

This research is focused on the *Borankana* traditional music of the Bakwena Molepolole village, traditionally called Mosusupe, located in the Kweneng District of Botswana. As understood by most people in Botswana, Nhlekisana and Kezilahabi (1998, p.172) observed that, *Borankana* is a generic term referring to all types of traditional dances and songs found in Botswana. These traditional dances differ from one ethnic group to the next and are deeply connected to different kinds of songs for different occasions. *Borankana* are artistic creations deeply rooted in Setswana ethnicity, traditions, rituals, and all other activities of a cultural nature. Other ethnic groups in the country use different names to refer to their dances, for example *Setapa* (Ngwaketse), *Phathisi* (Kweneng), *Mmamarutla* (South East/Balete), *Modokoda* (Bayeyi), *Ndazula* (North East), and *Dikhwaere* (Kgatleng). This variety of artistic musical expressions has been highlighted by Tumedi et al (2010, p. xvii), who noted that there are many types of songs in Africa and their classification varies from one culture to another. It is now common knowledge that the continent of Africa is not as culturally homogeneous as was

once (Nketia 1974, p.3). Botswana is no exception to this heterogeneity. The goal of this paper is to assess data pertaining to Bakwena traditional music, which is just one type of many found within Botswana.

Six consecutive annual visits were made to Molepolole village from 2005 to 2010. During the first five of these visits, Bakwena elders provided a non-practical oral interpretation of *Borankana* music. The only practical performance observed at the Molepolole *kgotla* was in 2010. Each year that the researcher visited Molepolole village more information was discovered, through the addition of new informants, and added to previous research.

Based on the interviews conducted in Kweneng District, this paper will survey *Borankana* as a traditional musical genre practiced by the Bakwena tribe in Botswana. This music is commonly referred to as *Phathisi*. The name *Phathisi* has been acquired from the costume worn during the performance of the music. The Bakwena informants revealed to the researcher that *Borankana* music originated in Kweneng District and is one of their tribal identity symbols. The informants portrayed *Borankana* in two ways: *Setapa sa Borankana ja Basimane ba tshameka Diphathisi* literally meaning *Setapa* for boys performing *Diphathisi*, and *Setapa sa bagolo ba nyadisa* meaning *Setapa* for elders conducting weddings. It should also be noted that Botswana generally refer to wedding songs as *Setapa* songs. Most *Setapa* wedding songs depict Mafikeng town and marriage registration. In the past, weddings were registered in present day Mafikeng (currently in South Africa) which is the former administrative town of the Bechuanaland Protectorate now called Botswana.

Music making is generally organized as a social event. Public performances, therefore, take place on social occasions – that is, occasions when members of a group or a community come together for the enjoyment of leisure, for recreational activities, or for the performance of a rite, ceremony, festival, or any kind of collective activity (Nketia, 1974, p. 21). In this way, *Borankana* music is performed like many other music types found in traditional African societies. In addition, Bakwena elders viewed *Borankana* as entertainment that keeps children away from wrong doing or crime.

Borankana music is performed by men and young boys who are learning to be future performers. *Borankana* is performed by all but some people feel they are not capable or good enough and so become reluctant to perform. The role of music in contributing to children's understanding of their culture is well recognized today, although not everybody sees it as the primary purpose of *Borankana* (Pugh & Pugh, 1998, p. 2). The research of Stokes (1994) supports this notion in its contention that the child begins to learn the musical style of his/her culture as he/she acquires the language and the emotional patterns of his/her people. *Borankana* is thus an important link between an individual and their culture, and later in life brings to the adult unconscious the emotional texture of the world which formed their personality. Campbell (2004, p. 7) contends that students who grow up with live music within their environment are acculturated into it and it is thus "natural" to be musically engaged. Plummeridge likewise argues that in the works of the great masters, folk songs or hymns are part of the symbolic order that constitutes society. Through them we gain a sense of cultural continuum that gives sense to our society.

Purpose of the study

The purpose of this study was to find and assess information on the *Borankana* (*Phathisi*) traditional music of the Bakwena of Botswana, specifically its learning performances, learning processes and transmission in the societal day to day activities of the tribe. This research also aimed to familiarize those ethnomusicology students involved in the research with *Borankana* music.

In one way or the other, it is anticipated that students will be exposed to certain types of Botswana's traditional musical during their upbringing. In Botswana, with its diverse cultures and musical traditions, young adults who have enjoyed music in the home, in the community in which they grew up, and through opportunities at school, tend to achieve a high level of musical accomplishment and engagement throughout their life. Campbell (2004, p.10) suggests that when the teacher uses the modeling-and-imitation strategy he or she becomes an artist-in-residence within the classroom. By making students familiar with their traditional music, facilitate their future interest and learning in "professional" music education. Indeed, there is a sense that many children cannot help but bring this music with them into school, and it is just a matter of whether or not teachers notice, build on it, and help students to share it with their peers. Swanwick (1999, p. 100) emphasises that, "most communities have rich seams of music-making ready to be mined". Mills (2005, pp. 187-188) agrees but argues for a metaphor that speaks more of collaboration, and of opportunities to learn from community musicians, rather than one associated with mining and potentially with resource exploitation.

METHODOLOGY

Data for this study was collected through oral interviews in Molepolole village with community leaders, musicians and performers. Purposive sampling was used. Purposive sampling is a strategy in which particular settings, persons or events are selected deliberately in order to provide important information that cannot be obtained through other techniques such as random or probability sampling. A group of 10-15 performers or individuals selected by the village *kgosi* (Paramount chief) were tasked with participating in oral interviews on stipulated dates. Based on the fact that the village *kgosi* knows his/her tribe well and so assigned appropriate informants, the researcher found the information provided by these informants to be representative of the Bakwena tribe and its traditions. In addition to audio recordings, photographs were also taken of the musical activities and performances. Internet and other secondary information repositories were also accessed in the execution of this research.

THE ORIGINS AND MEANING OF *PHATHISI*- SINGULAR – *DIPHATHISI* - PLURAL

Performances of *Borankana* among the Bakwena are estimated to have started between 1914 and 1916. *Borankana* represents a type of tradition that is handed down from generation to generation. Historically, the name *Phathisi* came from men who were tying the lowest part of the trouser with a peg when cycling. In the past men who worked in the South African mines traveled by bicycle (and were wealthy enough to afford bicycles) and had to clip the bottom of the trouser to keep it from becoming trapped in the bicycle chain thereby tearing the trouser or falling the rider. The same process of pegging the trousers was traditionally used when men were performing *Borankana*. Later on male *Borankana* performers transitioned from pegging trousers to wearing shorts made from *phuduhudu* (steenbok) skin known as *motseto/mongato*. These shorts were decorated on the front and back with thin pieces of leather (also from *phuduhudu* skin) known as *motlampana*. *Borankana* performers also used to put on *Diphathisi* made from old goat/sheep skin. These skins were cushioned by old one shilling blankets pieces. These blankets formed a protective layer called *semphusu*. *Phathisi* is also the term used for the clip that keeps washed clothes on a washing/drying line.

***Borankana* costume**

In contrast to the aforementioned costumes, *Borankana* male performers today often wear purposely torn and shortened dark trousers (either black or grey) called *Matsekana*, *Matlheketheke*, *matheketheke*, *matseketseke*, or *mathekethe*. These names are used interchangeably in different parts of Kweneng District. Girls below the age of 14 dress their bottom with *makgabe* (ravels) and leave their top undressed. Women aged 15 and above dress in skirts made from *phuduhudu* skins called *diphaeyana*. These girls and women are often used as ornamental features in *Borankana* performances. They are also an active part of the celebration, singing and clapping along with the dancers. Elders wear *maratshane* (a two piece skirt). *Borankana* performers today may also wear *Diphathisi* made of a taut calf's skin with a protective layer *dikgare/matobelo/semphusu* from pieces of old blankets around their shins. Often young men performing *Borankana* are forced to covertly kill calves in order to obtain the materials for their *Phathisi*. When asked why cow skin could not be used, respondents noted that it is found to be too hard and could injure the performers. Although there is no documented evidence of it, it is interesting to consider the possibilities of Bakwena men who are sent to work in mines using Gumboots to improvise a new version of *Phathisi* music.

***Borankana* Performances and Transport**

Borankana performances commenced late to allow those from far away to arrive. Whilst waiting for the experienced performers, young boys called *bathaaphiri* performed as curtain raisers. They were accompanied by young girls who sing and clap for them. These performances went on until about eight or ten o'clock at night when the older performers would come on and perform until the early morning. Some parents were very strict and did not allow their children to attend the overnight *Borankana* performances. However, boys often devised plans with their peers to attend *Borankana* performances nonetheless. They used a mortar and wooden boat to resemble a sleeping person in their bed and when the elders called on them to keep the overnight fire lit, a friend would protect the one gone to the *Borankana* performances and rekindle the overnight fire on his behalf.

Different types of traditional food obtained from the local harvest were used to feed the performers. Some of these foods were *magapu* (water melons), *mmidi* (maize) and *dinawa* (beans). Food was donated from the participants' fields.

Traditionally *Borankana* performers used oxen known as *makaba* for transport. These oxen were tamed by punching the middle part between their nostrils. A control rope was placed in this hole to direct the ox by its rider. In some cases, an ox wagon called a *mmakgotlhokgotlho* was used, an example of which can be seen in the Molepolole

Museum. The use of *makaba* was abolished in 1955/56 by kgosi Kgari Sechele II of the Bakwena when he returned from school. Bakwena elders expressed different reasons for this abolishment. Some believe that he wanted his power to be felt as new Paramount Chief whilst others argued that he realized the importance of cattle as providers of beef and cash when sold to the newly opened Botswana Meat Commission (BMC). Transport to *Borankana* performances was replaced by donkeys whose meat was not edible.

DESCRIPTION OF THE DANCE

As Nhlekisana and Kezilahabi (1998, p. 173) observed, *Borankana* dances are usually performed in the following costume: almost all dancers tie *matlhowa* (stringed leg - rattles) around the ankles of both legs. These give rhythm and rattle in sync with the clapping of hands. While one leg follows the basic rhythm, the other leg is free to add variation.

Traditionally, the dancers danced barefooted but today some of them put on very thin hunting sandals called *dikhube* for ladies and *mpheetshane* for men, to keep their feet safe from pieces of broken bottle, glass, stones and thorns. The male dancers wear *Diphathisi* (a goat skin filled with small pieces from an old blanket) around their shins. This part of the leg is beaten with the palms of the hands to produce bomb-like sounds. Girls wear *diphaeyana* (leather skirts) and body tops to cover their breasts. This is quite modern a modern addition. Traditionally, they danced with the upper part of the body bare. They also wear *dibaga* (beads) made from ostrich egg shells around the neck or as head bands. The best dancer normally wears *leratsha* (long beads). Sometimes girls wear cross beads just to beautify themselves. Boys wear *metseto* (loincloths) and hand bands which are also made from ostrich egg shells. The costumes of both male and female dancers allow for the free movement of legs, hands and shoulders.

A hand bag made from animal skin is another important prop worn by both sexes. It is worn across the shoulders and dangles below the armpit. Male dancers dance in quick rhythmic steps with one hand holding a stick stuck in the sand, so as to emulate elder Basarwa dancers who use it to maintain balance. The *seditse* (fly-whisk) is the most spectacular prop used to beautify the movements along with the wooden *Borankana phala* (whistle). The whistle is the principle earphonic instrument that sets the rhythmic pattern of the feet's movements at an opportune time. This whistle was traditionally made from trees such as *moroeye*, *motubane* (produces white flowers during winter) and *mhutikwane*. In some instances, the *phala* was made from *letlhaka* (river-reed) or *lerapo la motwana wa pudi* (goat's shin bone). The latter *phala* was called a *Limpopo*. Nowadays whistles used by *Borankana* performers are metallic double and single barreled ones. The best dancers hold fly whisks along with the whistle.

As Nhlekisana and Kezilahabi (1998, p. 174) observed, dancers are usually positioned in a two line semicircle with women in front. The back line is usually reserved for male dancers but it can also be for a mixture of the two sexes. Performance is initiated by one girl setting the rhythm of the dance with a hand clapping pattern. This pattern is then picked up by the rest of the group. The performers clap hands leaning slightly while at the same time moving their knees in and out rhythmically. This is followed by the song, which again is started by one performer and picked up by the rest. By this time the audience's expectations and emotions are tuned in and set, and the audience is ready to enjoy and share with the dancers their ontological experience of being.

The entrance of the dancers is heralded by an instrumental whistle, after which the rhythmic leg rattle on pounding legs is heard. Their entrance into the arena is usually very spectacular. The audience notices at once the vigour, strength, confidence and pride of the dancers. Their entrance may call for ululation and mouth whistling from the audience. Normally the dancers enter the arena from the front of the semicircle but sometimes a boy may pick a girl who is at the centre of the back line. The selected girl then enters the arena from where she is. The exit is even more spectacular than the entrance. It often leaves the audience clapping their hands with a sigh after being temporarily suspended in a world of unreachable by knowledge. One or two of the dancers may make phatic sounds to show appreciation and enjoyment of the music. About three sets of dancers dance in every song, each group showing its elegance. The sequence differs with the group, but the most common type of sequence is boys, then girls and then boys again. In some songs they dance in pairs.

In *Borankana* dancing, almost every part of the body is used. The hands are used for clapping; the feet for stamping/dancing; and the head and shoulders are moved in sync with the rhythm of the song. A great deal of facial expression is also used together with other gestures, all of which add to the beauty of the song and dance. In *Borankana*, clapping is done with fingers closed to each other and hands in a position like that of hands in prayer. Nhlekisana and Kezilahabi (1998, p. 175) and Wood (1976) observe that the clapping of hands is in sync with the pounding of the feet, "creating an exciting and titillating rhythmic pattern". During the singing and dancing an ululator sporadically comes to the forefront rubbing her breasts to ululate thus giving the dancers courage to dance more vigorously. The dancers,

especially the boys, blow whistles or mouth whistles and play with the fly whisk while dancing. All of the singers move their feet and bodies to the rhythm of the music. Each of the songs transpires in a call and response pattern.

Borankana Performance Dismissal

The dismissal of the overnight *Borankana* performances was traditionally marked by the rising of the morning star (or the *mphatlalatsane*) which was used as a time telling sign. Before the dismissal of the *Borankana* performance, a number of things took place. This was the time when adjudication by the audience occurred to offer a token of appreciation to the best dancer. These tokens were in the form of porridge *bogobe ja sebube* (porridge cooked with milk), a goat or a cow. A goat or cow was normally given as a present to the *Borankana* overnight overall dancing hero.

The early morning hours were the times when performers would sneak away with their lovers. This was marked by the leader singing songs of love making such as *Naledi ya masa e dule ntshuna ke go sune*, literally meaning the morning star is risen kiss me and let me kiss you. Finally the leader would shout “*A setapa seye monyweng se ye go bina se kaname*” literally meaning let the dance go to the dew and be danced upside down. This lovemaking was, however, done very carefully. If by mistake a boy impregnated a girl, he would be punished severely by the elders since *Borankana* was meant for entertainment and crime prevention not mischief. To escape this punishment, he would immediately flee to work in the South African mines before the elders discovered the pregnancy. He would only come back when the child was long delivered and the elders’ tempers in most cases would have calmed down.

Below are a few examples of *Borankana* songs from the interviews. The songs were metaphorical and free from vulgar language. Some songs were also used to communicate messages to the society as well as to praise and advise *dikgosi* (chiefs).

Praise Borankana song for the chief

Setswana

Are yeng Mokwena

Re ye go bona kgosi Kgari wa Bakwena

O tshwana le naledi ya masa

English Translation

Let us go to Mokwena

To see Chief Kgari of the Bakwena

He is like a morning star.

Praise Borankana song for the tribe

Setswana

Are tsamayeng reye kwaga Mokwena, re ye go bona Bakwena бага Kobokwe.

English Translation

Let us go to Mokwena to see Bakwena of Kobokwe.

Wedding song

Setswana

Fa ke wela wela le dithotanyana lwapa la ga mme le tla sala le mang.

English Translation

When I move through the hilly path who will remain with my mother’s home.

CONCLUSION

Borankana is the traditional music practiced by the Bakwena of Botswana. This music is popularly known as *Phathisi* because of its costume. Batswana use the word *Borankana* as a generic term encompassing different types of traditional

music. However, in this article, as Bakwena elders articulated, *Borankana* means a musical genre practiced specifically by the Bakwena. *Borankana* is performed by men and women. Boys and girls are also allowed to learn to be future performers. *Borankana* music is associated with happiness and is an overnight performance. This music is usually performed when there is good harvest in the fields. In addition, *Borankana* music is performed during *kgotla* (tribal court) meetings and independence celebrations. *Borankana* music has survived through the years because of its support from the lineage of the Bakwena Paramount Chiefs. Like most African music types, *Borankana* is not notated. It has survived through oral transmission from one generation to the next.

Borankana stresses coordination, dance movements, rhythm, pause, and vital force. The movement of legs sideways and forward is properly balanced by rhythmic beats and hand clapping patterns and leg rattles. It is pause that brings in the element of the unexpected surprise and suspense, but it is its vital force that is most admired by the audience, including the muscles of the dancers, the thickness of the chest and thighs, the height of the dancer, and the size of the body. All of this, coupled with individual skill and style, the handling of the fly whisk and the movement of the hands, make the dance a harmonized and polished organic experience for both the dancers and audience. *Borankana* has a good amount of rhythmic repetition of isorhythmic structure but it is not lacking in variation. According to Dundes (1965), “the use of variation is perhaps the greatest single diversifying factor to balance the many unifying elements in folk and primitive music”. Nowadays *Borankana* is performed by a few elders, a number of schools in Kweneng District and contemporary bands such as the Machesa who have modernized it.

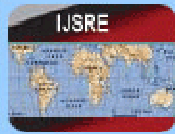
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**Paradigms in 21st Century Global Science Education,
A Review Essay of Derek Hodson's Looking to the Future: Building a Curriculum for Social Activism**

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Abstract

This is a "Review Essay" based on the ideas and theoretical foundations of science education as espoused by Derek Hodson in his book *Looking to the Future: Building a Curriculum for Social Activism* (2011). Taking a more analytical and creative approach to reviewing and commenting on Hodson's work, the author explores the book chapter by chapter, highlighting the main ideas in science education and drawing parallels to concurrent movements and trends. The author explores the different paradigms in science education as communicated within the contents of each chapter and compares them to current trends, problems, challenges and issues in the field. The author critically, yet objectively and fairly, examines the different ideas and strategies suggested by Hodson for improving and promoting science literacy in modern society. Extended analysis and commentaries highlight the major challenges and problems of science education and the idea of Science Ethics or Applied Science Ethics is introduced consistent with the call for focus on sociopolitical action and confrontation of socioscientific issues in science education.

Keywords: Science education, scientific literacy, ethics, science ethics, paradigm shift.

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INTRODUCTION

The global economy and environment of the 21st century have created both challenges and opportunities for teaching and learning in science education. The developments in technology, transformed perspectives on environment and human roles and activities in shaping the future, the many problems and challenges faced by nations and people with regard to sustainability and survival, the emergence of new technology to affect almost every aspect of life, the increase call for accountability and political involvement in social responsibility, environmental and educational sectors, and the need to educate a more diverse population in a highly competitive world with limited resources and insurmountable conflicts have given rise to new paradigms and incentives in science education. One of the salient drivers of the transformed opportunities and challenges for teaching and learning in science is the education arms race which is driving nations to compete against each other on students' performance in the sciences. Currently, the United States with its great economic wealth finds itself in a position where many less politically and economically prominent nations are ahead in science

literacy or scientific literacy at all levels. For example, in 2007 and 2009, international comparative reports found that the United States ranked far below many nations in science achievement among elementary and secondary school children.

The realization that science education is critical to economic growth has led the United States government and other governments across the globe including those of China, Finland, among others to focus on scientific literacy across the board as a competitive educational strategy that promises high technological, social, and economic returns. Thus, the recognition of science education as indispensable to national and global competitiveness and progress has increased over the last few decades, especially after the cessation of the value decade (1990-2000), when phenomena such as global warming, change in climatic patterns and resulting natural disasters across the globe, increased understanding of linkages between human activities and environmental degradation as the green revolution garnered more serious attention from various stakeholders. Science education, especially as connected with environmentalism, economy and survival, has therefore acquired more prominent attention in both policymaking and national-global strategic spheres and initiatives. This has added new incentives to the call for changed approaches to science education from philosophical, pedagogical, methodological and practical perspectives.

Paradigmatic Shifts in the Approaches to Science Education

One author who has blended all of the above factor-considerations and more into the new call for changed paradigmatic approach and considerations on science education is Derek Hodson, Emeritus Professor of Science Education at the Ontario Institute for Studies in Education (University of Toronto), Adjunct Professor of Science Education at the University of Auckland and Visiting Professor of Science Education at the University of Hong Kong. Professor Hodson's deep grasp of the challenges and opportunities for science education and the issues that impact teaching and learning in the field is accurately reflective of his illustrious offices and titles as a most notable expert in the field as he presents to us, supplemented with extensive notes and an impressive array of top scholarly reference books and journals, *Looking to the Future: Building a Curriculum for Social Activism*. The title of the book is not only appropriate but communicates some of the author's fundamental beliefs about science education, but also reflect the paradigmatic shifts in approaches to science education and conceptions of the roles of science in individual, organizational and societal life and progress. The title of the book is highly descriptive of what Hodson calls "the four major elements of science education" and which he has developed and proposed over decades of understanding, writing about, and teaching science education and its history and philosophy. These "four major elements of science education" form the basis of Hodson's propositions and practical recommendations for transforming science education curriculum and teaching and learning strategies and methods to reflect, respond to, and adapt to the changing needs of 21st century global society and individuals. As preface to *Looking to the Future*, Hodson brings us back to the history of these ideas reflected in his writings as far back as 1992, which up to present, leads him to designate these "four major elements of science education" as:

1. *Learning science*: acquiring and developing conceptual and theoretical knowledge.
2. *Learning about science*: developing an understanding of the nature and methods of science, appreciation of its history and development, awareness of the complex interactions among science, technology, society and environment, and sensitivity to the personal, social and ethical implications of particular technologies.
3. *Doing science*: engaging in and developing expertise in scientific inquiry and problem solving, and developing confidence in tackling a wide range of "real world" tasks and problems.
4. *Engaging in sociopolitical action*: acquiring (through guided participation) the capacity and commitment to take appropriate, responsible and effective action on science/technology-related matters of social, economic, environmental and moral ethical concern (Hodson, 2011, p. ix; Hodson, 2003).

These four elements of science education represent in totally what science education in the 21st century entails, especially as Hodson points to the roles of technology, politics and social activism delineating differing stakeholders' interests in the field.

Learning science, learning about science, doing science (practical application of science or applied science), and engaging in sociopolitical actions represent the kind of whole approach to science education that 21st century problems and challenges demand. We must not only understand the philosophical and methodological basis of science, but the source of scientific theories and ideas as facts and apply them to resolve our social, economic, political and environmental problems. The conceptual and theoretical knowledge we acquire should have a major purpose, and that purpose should center on satisfying basic and justifiable human needs and wants, rather than on creating new issues to contend with, for example, nuclear bomb, environmental pollutants, or other heinous examples of the misuse and misapplication of science

that do not serve human needs and general interest. We must embrace a more comprehensible and sensible appreciation of science as an assistive body of knowledge in addressing our common causes, and in doing so, should seek to responsibly learn science, learn about science, do science, and engage in corrective and progressive sociopolitical actions.

Scientific Literacy in Perspective

Scientific literacy has evolved with technology and changes in the political, economic, social, and cultural values and agendas of individuals, organizations and small and larger communities, and thus, Hodson revisits scientific literacy in the first chapter of the book, re-orienting his readers with the decades of developments in scientific literacy perspectives, theories, and ideas across a spectrum of scholars, their works and eras. In Chapter 1, “Scientific Literacy Revisited”, Hodson chronicles the development of the term “scientific literacy” with debates and ideas spanning over 50 years of literature. According to Hodson (2011), scientific literacy has become “increasingly prominent in international debates about science education” (p. 1), and is “a trend mirrored by a similarly expanding interest in technological literacy and environmental literacy” (p. 1). This reflects the views presented in the opening and introductory paragraph of this essay. Technological literacy and environmental literacy have been pursued and developed simultaneously with science literacy and education, acting as drivers of progress and growth in the field. This results from the need to shift the paradigm of science from being a lab-based highly technical and scientists-only matter to approaches and paradigms advocating and understanding the importance of what Hodson calls a “public understanding of science”. This is one challenge for educators of science, making science a major concern for policy makers, and political and national leaders. Hodson also explores the rationale for scientific literacy in this chapter, and addresses this in terms of “why we need it and why we should promote [it]” (p. 2). This rationale has changed, changed in terms of being expanded or adapted to changed worldviews, values, and the requirements of life in the 21st century as reflected in socioscientific issues that are the subjects of the second chapter of Hodson’s book. The rationale of scientific literacy are presented as (i) perceived benefits of science, (ii) benefits to individuals, and (iii) benefits to society as a whole (Hodson, 2011, p.2). Several other subjects highlighted in this extensive review of scientific literacy include value of a scientifically literate population, scientific and technological literacy, the cultural, aesthetic, and moral-ethical benefits that scientific literacy confers on individuals, the benefits of scientific literacy to society as a whole and to democracy and responsible citizenship, the notion of multidisciplinary scientific literacy, sustainable development, and environmental education (McFarlane, 2011).

Socioscientific Issues

Human societies everywhere are heavily pressed by social problems created by our differences, lack of knowledge, values and individual and collective behaviors that create undesirable results. Many of these social problems stem from natural human interaction, others from a combination of nature and nurture, and yet many from our misuse and misapplication of the products and byproducts of science. Because of the widespread impact of science and technology or technology through scientific knowledge on our lives and social well-being, we refer to these issues as “socioscientific” in nature. “Confronting Socioscientific Issues” which is the title of Chapter 2 of Hodson’s *Looking to the Future* presents his argument that “the most effective way of learning to confront [Socioscientific Issues] SSI, is by confronting SSI, provided there are appropriate levels of guidance and significance” (p. 33). Hodson (2011) explains his “3-Phase Approach” to confront SSI as consisting of: (i) modeling, (ii) guided practice, and (iii) application. These three elements represent the cornerstones of new approaches being used in science education across the globe, especially in the United States where accreditation and accountability standards demand higher quality and standards in teaching and learning methods and outcomes. Hodson believes that a “Personalized Approach” which attends “to the particular needs, interests, experiences, aspirations and values of every learner, and to the affective and social dimensions of learning environments” (p. 35), is the best approach to scientific literacy. This is operationalized in the promotion of learner-centered strategies in science classrooms at all levels. Hodson advocates treating “science-as-culture” and making the approach to science education one of a more practical nature that treats of the subject as “functional science” (p. 37) rather than as just science. This emphasizes the paradigmatic shift to more practice-based than theory-based science in the 21st century. This, Hodson (2011) argues, leads to the provision of instruction and examination of students’ learning and knowledge in the field of science from the perspective or notion of “*evidentiary competence*” (p. 39), which has many components. Hodson explains two approaches to science learning and teaching: explicit approach and implicit approach, which are bound in what he calls the “nature of science” (NOS). Furthermore, he discusses the importance of students’ understanding of the nature of technology (NOT) and ability to apply this to science in developing practical knowledge for action based on the idea that, “knowledge requirements are not restricted to science and the nature of science or nature of technology” (p. 42).

Several other issues discussed in this chapter include: language and science, the nature of science argument, media literacy affecting science education and literacy and SSI; the role of information in science education and literacy, ideas of utility, control, risk, fate, and morality as related socioscientific issues and problems, the role of science education and scientific literacy in dealing with controversial issues from those intimate to the person of mankind to those dealing with our environment and broader planetary home, and the affective and social environments of learning as related to science education and the types of pupils that emerge from these environments.

Building Curriculum: Sociopolitical Factors

Chapter 3 of Hodson's book delves into emerging recommendations and debates about practice stemming from the ideas laid down in previous chapters as he discusses "Building Curriculum" for science and its rationale. The responsibility of science and technology educators are stated as "educating students about the complex but intimate relationships among the technological products we consume, the processes that produce them, and the biosphere that sustains us" (p. 71). Here, Hodson links responsibility and education back to scientific literacy rationale and practicality ideas. Hodson examines the challenges and problems that emerge in building science curriculum on a broader social level. Firstly, he sees social and political struggles emerging to hamper sciences rationale as thoughts, values, and aspirations in relation to the status quo of society and science education and literacy battle for supremacy. According to Hodson (2011), science must struggle against social and political norms to assert a more dominant place in individual and societal worldview. There are two groups of people in the world when it comes to the struggle in science: (i) "those who seek to maintain science education's current preoccupation with abstract, theoretical knowledge and with pre-professional preparation courses" and (ii) those "who regard the reformulation of science education in terms of more overtly political goals as undesirable" (p. 74). In order to assail both these contradictions and make science education a universal need and requirement, Hodson proposes a new curriculum for science education which "aims to encourage and support students to ask awkward questions, formulate an alternative view of what is desirable, and work towards changing the status quo, both within and between societies" (p. 75). Several other issues are presented in this chapter that affect the building of science curriculum: ideals of democracy and citizenship education, the viability issues in building a coherent curriculum, the ideals of priorities, interests, values and social justice as they influence and impact curriculum planning, concerns for human health; land, water and mineral resources, food and agriculture, energy resources, industry, IT and transportation and ethics.

Personal Framework for Understanding Science: Values and Science Education

There are many problems and challenges, needs and discoveries, and other drivers of globalization, change, survival and the like, pushing more and more regular people to seek out science for answers. Science has become the religion and faith of progress and survival, and thus, we are increasingly "Turning the Spotlight on Science" as the title of Chapter 4 communicates. Hodson (2011) believes after all, that "Science is a creative, collaborative and culturally embedded activity..." (p. 112), and thus offers the most viable methods for meeting our changing needs and demands. Hodson believes that values can now be construed of as dominantly emerging in scientific spheres "Constitutive Values of Science" as viewed from four perspectives: universalism, commonality, disinterestedness, and organized skepticism. Hodson believes that each individual's "*personal framework of understanding*" or "contextual values" (p. 115) affect individual views of science as a social activity involving investigations. Hodson also focuses on the changing nature of science in this chapter and the worldview theory of science.

Chapter 5 as a continuation of the major subject and themes of Chapter 4 focuses on values in science education ["Turning the Spotlight on Science Education"]. Hodson (2011) believes that science should become a valued-based subject which naturally falls within the stream of indispensable values that go into the creation of school curriculum, and as part of building individual scientific knowledge and literacy in our society. Hodson (2011) contends that school curriculums should contain values derived from three major sources: (i) science values, (ii) education values, and (iii) values of the surrounding society (p. 137). In making the new science education curriculum Hodson recommends asking four important questions: (i) *What* values are included? (ii) *Whose* values are included? (iii) Whose values are *excluded*? and (iv) What is made *explicit* and what remains *implicit*? (pp. 137-138). Hodson feels that a "Consumerist Agenda" dominates science education and curriculums today as many individuals and organizations strive to promote economic growth and technological development through science literacy. Thus, science education is increasingly characterized by ideas of compartmentalization, standardization, intensification, idealization, regulation, saturation, and isolation in impacting the teaching or planned curriculum for science or acquisition and application of scientific knowledge or literacy

(McFarlane, 2011). Hodson believes that the contexts and contents of science education must be examined relative to global economic, environmental and technological needs.

Approaches to Science Instruction

Chapter 6 of *Looking to the Future* discusses “Strategies, Responsibilities and Outcomes” in science education by examining approaches to teaching science, the resources available to enhance scientific knowledge and understanding, and the roles of multimedia and Internet-based activities in developing a curriculum to focus on (socioscientific issues) SSI. Hodson (2011) presents three important strategies in science education: (i) discussion, (ii) debate, and (iii) group work as important bases for successful action-oriented scientific literacy in the 21st century. Hodson believes that one of the most important strategies to enhance discussion approaches to teaching and learning science is encouraging, facilitating and fostering student talk in the science classroom or science education in the forms of exploratory and presentational talks (Barnes, 1988), and disputational, cumulative, and exploratory talks (Mercer, 1995, 2000). This will facilitate and promote understanding as Hodson believes that “SSI-oriented teaching promotes conceptual understanding” (p. 176). Closing this chapter, Hodson examines the concepts of trust, values, ethics, emotions, and intuition as they affect responsibility and outcomes in science education and looks at the problems, difficulties, and anxieties that teachers face in planning science curriculum and education in a diverse society with so many differing interests and needs (McFarlane, 2011).

Chapter 7 of Hodson’s *Looking to the Future* focuses on “Teaching Ethics” in science education. Hodson (2011) examines and explains how ethical perspectives affect what becomes part of scientific knowledge; what becomes accepted as scientific value and facts, and then he examines several problems and issues of science relative to our understanding and ideas of right and as embodied in differing ethical perspectives. The issues dominantly emerging to affect determination of curriculum and teaching in science education include human health issues and rights, social and mental diseases and issues such as ADHD, DNA-genetics and stem cell research and debates, the human-life debate essentially construed in the question of what constitutes human life, ethics in science regarding non-human subjects in experimentation, and a variety of socioscientific issues effecting moral debates (Hodson, 2011). Hodson looks at ethical theories in science such as social construct (contract) theory, consequentialists-utilitarian theory, deontological ethics, virtue ethics, and the meaning of right and unacceptable as used in science research and education. Hodson ends chapter 7 of his book with a discussion of the rationale for teaching ethics in science and examines how science educators can effectively use case studies in science education classrooms.

The teaching of ethics in science is ever more important in current global society where the products and byproducts of science and their uses and applications threaten our very existence, and impose upon our psyche, fundamental questioning of our own worth and value as intelligent and compassionate beings. Science has long become the superior lord over man’s mind and bodily compositions as we have nurtured the subject to dominate us and suppress the archetypal primitive nature, while antonymically and oxymoronically representing the powers of birth and death; creation and destruction over us. Our ethics and sense of sensibility and values have been so misshapen and relativized by science and scientific knowledge and ideals, that the very dimension of human conscience has been damaged beyond the scope of the “classical mad scientist” and has become the caricature and harbinger of confusion, death, disaster, fear, sickness and even hopelessness. Ethics is part of the philosophical tradition of care and caring that regulates the boundaries of human venture into the darker outcomes and application of science. It speaks to the human conscience and teaches us how to use the knowledge and fruits of science to create and cure rather than to destroy and devour with hostility. Science without ethics is science without social responsibility, and we have time and again seen how a lack of social responsibility displayed by both professionals and corporations has negatively impacted individuals and society in varied and many ways. Educational institutions teaching science must make greater efforts to make “Science Ethics” an important and mandatory course for science majors. Specifically defined, Science Ethics (Ethics in Science, Ethics and Science) or Applied Science Ethics as it could be called, deals with teaching socially responsible actions by exploring moral and ethical dilemma in the application of science knowledge, stakeholder considerations and scientific protocols relative to the profession and discipline of science based on various ethical paradigms.

Environmental Issues and Science Education

One of the great paradigm shifts taking place in science education today is that science theories, methods and education are increasingly focusing on environmental issues. This arises mainly out of a combination of factors: recognition of our many environmental problems, recognition of the roles of mankind and its activities in contributing to environmental

problems, the need for new and less toxic forms of energy, sustainability drives and drivers, increased competition for limited resources, climate change, and other factors described in the opening paragraph of this essay. Hodson addresses this focus on science education in chapter 8 of *Looking to the Future*, - "Confronting Environmental Issues". Hodson believes that despite emerging recognition of the relationship between people and environmental problems and well-being, a widespread case of "citizen ignorance" regarding science literacy and education still remains, as people and organizations across the globe as evident in environmentally disastrous practices remain "blissfully unaware of the extent of the problems" (p. 223). This provides added incentive for pushing science curriculum and education in schools at various levels. However, before this can happen, Hodson (2011) believes that we must overcome several barriers including the ways we live and failure to accept science and technology as part of this problem. Hodson believes that curriculum in science education should address root causes of science-related or socioscientific issues (SSI), and that science educators should approach this by starting with students' existing knowledge and expanding into scientifically determined rationale. Hodson sees fear and denial as factors affecting scientific literacy education and learning and believes that science curriculum should now focus highly on instilling "*pro-environmental behavior*" (Kollmus & Agyeman, 2002) in people despite the existing challenges to sustainability education (McFarlane & Ogazon, 2011). Finally, Hodson (2011) explores important propositions such as moralistic and democratic approaches to environmental education from the perspective of "social contract" (p. 238), and demonstrates how we are changing our environment both positively and negative through science education.

Social Activism and Science: Stakeholders' Actions

Social activism requires contexts and people, and these people must be able to understand what behaviors and actions are important in various contexts. Thus, the next chapter of Hodson's *Looking to the Future* is titled "Place, Community and Collective Action" and looks at methods and strategies for rethinking and redesigning science education and curriculum. Factors contributing to the development of the appropriate terrains and values where scientific knowledge is applied come from environmental and technological applications in meeting our needs through science. The idea of context is conceptualized by Hodson (2011) as one requiring educators to expand students' conception of the environment in building a curriculum for social activism. Hodson (2011) believes that an essential part of science education is helping students to develop a "sense of self" which he defines as "focusing on the immediate community in which students live, seeking out local resources, focusing on local issues and helping students learn how to ask and answer questions about the phenomena and events that surround them" (p. 271-272). Hodson believes that science functions in preparing students for social activism in the 21st century and that effective science education combines environmental literacy, technological literacy, and political literacy with scientific literacy, as all these formulate the foundation on which change is built.

Activism conceived of in Hodson's *Looking to the Future*, is not just for students of science to apply scientific literacy or knowledge in meeting the challenges and problems of the constantly changing human and physical world, it is a challenge to science educators and policymakers. Hodson essentially demonstrates through his own scholarly activism as a veteran of science education, the need to "Making It Happen" - the title of Chapter 10, which in essence is a challenge issued to the stakeholders of science education and literacy: "Make it happen!" Hodson has adequately demonstrated the various paradigms, approaches and contexts for enhancing and promoting science education, and he petitions science educators to build strong science education curriculums that engender the principles of modeling, guided practice, application and activism through these new paradigms proposed as ideals for revisiting and reconstructing scientific literacy and education. Hodson (2011) wants science educators and science teachers to transform science and the way it is perceived, conceived and imparted to individuals; the ways in which science is applied and the level of value it represents to individuals and society. Thus, he proposes the development of science educators in the roles of "transformative intellectuals" (p. 302), who possess abilities and authority to make the needed changes to bring scientific knowledge and literacy to the forefront of education systems. Science education must become more than just another body of knowledge; it must become both an indispensable individual and societal value relevant to survival, progress, and well-being.

Sustainability and Science Education

The idea of sustainability has become one, which institutions and individuals across the globe are rapidly embracing. Sustainability offers new hope for applied science ethics and truly understanding science in a more systematic manner as conceptualized under the four-pronged method developed by Hodson (2011): learning science, learning about science, doing science, and engaging in sociopolitical action. While many governmental and nongovernmental organizations (NGOs), as well as individuals are championing the sustainability movement, the challenges remain fundamental when it

comes to our understanding of science and our relationship with science. We must still seek to promote greater and more widespread knowledge of science – science literacy, and the responsibility of ethically applying science knowledge and ideas to make sustainability a realistic goal as science creates as well as destroys. McFarlane and Ogazon (2011) believe that there are significant challenges to sustainability education that must be overcome before true sustainability can become the reality and hallmark of our social, political, and economic institutions. The sustainability movement rests within the grasp of science and science literacy as these are the major avenues through which we come to understand the nature of the issues, the problems and challenges of sustainability efforts and practices (McFarlane & Ogazon, 2011). Science is both source and cause for sustainability, and we should recognize where Hodson’s descriptor “engaging in sociopolitical action” comes in as one of the building blocks of principled and effective science education.

CONCLUSION

Every now and then a book emerges that synthesizes all the theoretical, practical, and philosophical ideals and knowledge relevant to understanding the methods, history, and issues defining a branch of study or discipline. This synthesis is only achieved with profound ability of an author to link subject issues across the wider scope and overlapping themes from which they originate and emerge. Hodson has no doubt achieved this type of difficult synthesis in *Looking to the Future: Building a Curriculum for Social Activism*. This book presents science education in terms of the many issues and challenges we face in the 21st century. The author not only explores how these have emerged, but how we are dealing with them in the face of change and the understanding that science represents more than just a theoretical way to model our world; it is a way of life and increasingly becomes embellished and enmeshed in the ways we go about addressing social, economic, political and other socioscientific issues (SSI) and problems. Understanding the roles that science plays in individual and societal progress has become more apparent with our access to more and better information, increasing research linking human and natural-physical activities, the development of new technologies and methods as solutions and answers to our problems and questions, and concerted efforts by governmental and non-governmental organizations (NGOs) to make science education a priority as part of national-global competitiveness.

Hodson’s book is very engaging and is vital as both a reference manual and textbook for understanding the problems and challenges of science curriculum and education. *Looking to the Future: Building a Curriculum for Social Activism* is well-written, detailed, and rich in theoretical and practical ideas and suggestions. It gets to the heart of the problems and issues facing science educators. Science curriculum developers and teachers should each be exposed to the profound and great ideas presented in this work of literature. Save for its highly philosophical nature and discourse, the ideas and recommendations are not only practical, but very viable and require simply understanding their implications for teaching and learning. Science education should not simply be about teaching facts, but understanding the philosophy of the subject as well as its historical and social development consistent with change in society, and the needs and wants, as well as the problems and challenges facing a civilization.

Science education is being confronted with change, both planned and unplanned, and this calls for a major paradigmatic shift in contents and approaches in the conceptualization of science in both teaching and learning practices. McFarlane (2011) best summarizes the nature of the change impacting the emergent need to revisit and revamp science education, curriculum, and perspectives. Thus, he remarks “Evidentiary toward such a prolific and consternating universal paradigm of 21st century society are the many global, international, regional, national, and local efforts by social, cultural, economic, legal, and political institutions in “building a curriculum for social activism” (p. 315). This means that science education more than ever before must become an increasingly flexible and transdisciplinary-oriented applied field in our quest to find answers to our many questions, resolve our historical, current, and emerging problems and challenges, while providing us or equipping us with new insights, knowledge, understanding, skills, technology, and ideas to secure survival, shape the future, and emerge victoriously as a transformed and enlightened people. Hodson’s work in literature stands out because he has broadmindedly envisioned science outside the scientific method of application, and its power to successfully merge with other disciplines and ideas in helping us to look to the future with greater hope and more creativity. In summary, Hodson’s work is exemplary and his book [*Looking to the Future: Building a Curriculum for Social Activism*] is a great addition to worthy literature in science education.

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Training Pre-service Teachers in Environmental Education: The Case of Colleges of Education in Botswana

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Abstract

Botswana's 1994 Revised National Policy on Education of 1994 (RNPE, 1994) recommended that colleges of education in Botswana train teachers in Environmental Education (EE) methodologies using the infusion approach. To assess the extent to which this recommendation has been implemented, sixty teachers in their final year of study were surveyed. The results of this study show that, to date, colleges of education have not yet introduced environmental education into their teacher education programmes. Consequently, the subjects of the study did not perceive themselves as competent and effective environmental education teachers; however, they did see environmental education as a very important subject that could raise the environmental literacy of children in schools. The results of the study were analyzed using frequencies and percentages and for interview protocol questions thematic analysis was used. Implications for teaching environmental education are discussed in the light of the findings.

Keywords: Botswana, Colleges of Education, Environmental Education (EE), Pre-service Teachers, RNPE (1994)

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INTRODUCTION

For some time, concerns about the deterioration of Botswana's environment have been raised. These included concerns that Botswana was not managing its resources sustainably and concerns that Botswana does not have environmental

strategies which it can use to curb the deterioration of its ecosystem (Cooke & Campbell, 1984, 1987). Two workshops were held on these environmental issues and aimed to teach participants ways of preserving and maintaining the environment and ways of devising solutions to current environmental problems.

It was at these two workshops, 'Management of Botswana's Environment' (1984) and 'Developing Our Environmental Strategies' (1987) that the participants called for the introduction of Environmental Education (EE) into the school curriculum (Cooke & Campbell, 1984, 1987). The participants argued that EE should first be introduced in colleges of education and the University of Botswana (UB), and then infused into other subjects and levels of the school curriculum. They asserted that the teaching of EE would help citizens to support the implementation of environmental legislation and to practice responsible environmental behaviors. Kethoile (n.d.) has likewise noted that the teaching of EE would help citizens to become environmentally literate and as a result, facilitate the implementation of Botswana's environmental laws. The participants at the two workshops thought that if EE is introduced in colleges of education and UB, pre-service teachers would graduate with greater environmental competencies. At the 1987 workshop, the participants recommended that a National EE Conference be held at the UB in which scholars could articulate their views on teacher training and EE (Cooke & Campbell, 1987). A National EE Conference was held at the University of Botswana in 1991.

At the conference, the then Minister of Education Honorable Molomo contended:

Education is one of the key components in the National Conservation Strategy and this Conference is a first initiative to start the planning process for environmental education. Here we refer not only to environmental education for school children but for the whole population- a task that can only be achieved through a joint effort of both Government and Non-Governmental Organizations. A major objective of the Conference was therefore to bring together all those who have a role to play in the provision of environmental education in Botswana. It was in this spirit of cooperation that the Conference was planned and organized. The Ministry of Education regards environmental education as a priority issue and the recommendations from this conference will be most useful in drawing up a plan of action. My Ministry accepts that it has an important role in coordinating and promoting environmental education in the country. This includes incorporating and strengthening environmental education at all levels of the education system and working closely with other organizations, governmental and non-governmental, to provide environmental education for all (Cantrell & Nganunu, 1992, p.1).

Also at this conference, participants recommended that (a) a National Environmental Education Coordinator be appointed to oversee the introduction of environmental education; (b) a curriculum panel for environmental education with representation from all subject areas be formed; and (c) environmental education guidelines for primary, secondary and tertiary institutions be developed to help teachers develop their own environmental education activities (Cantrell & Nganunu, 1992).

According to Stronhorst (1992), there is an urgent need for a sound EE programme for teacher trainees who will subsequently influence changes in attitudes and behavior. He notes that the programme should emphasize sustainable development in which certain qualities of the environment are taught and thus safeguarded. Their objective should be sustainable use of the environment that does not impair ecological productivity. This kind of sustainable development requires solidarity and cooperation amongst all users of the environment. Stronhorst opines that the ultimate goal must be to foster a universal environmental ethic in which citizens unite in a common cause around the slogan 'Think Globally, Act Locally'. Stronhorst (1992) was also of the view that environmental education programmes for teacher trainees must incorporate elements of moral or value education if they are to be effective.

An effective EE programme for teacher trainees is the one that provides skills with which people can investigate and evaluate environmental problems and undertake appropriate action within their community. It is important therefore that environmental education is participatory and focuses on the local environmental problems, be there around the school, village or community since that is where change should take place. Effective environmental education demands much from those who teach it. Training of these educators therefore is of paramount importance (Stronhorst, 1992, p.10).

Marsland (1992) also supports the need for an effective environmental education programme. For him teachers' knowledge of basic environmental issues falls far short of what they are expected to teach. This is because environmental education has never received strong emphasis in pre-service teacher training and there are no avenues for teachers to study environmental education privately. Unfortunately, the introduction of environmental education in colleges of education is

regrettably low not only in Botswana, but across the globe (Gursory & Saglam, 2011; Tuncer, et al, 2009; Yavertz, et al, 2009; Stronkhorst, 1992).

A 1993 National Commission on Education summarized its recommendations in a policy called the Revised National Policy on Education (RNPE) of 1994. In terms of colleges of education this policy paper recommended (a) introducing environmental education methodologies for teacher trainees; (b) having teachers teach environmental education concepts using the infusion approach; and (c) training lecturers in environmental education up to the graduate degree level to facilitate implementation process (Republic of Botswana, 1994). Colleges of education have been identified as legitimate institutions for designing and delivering environmental education courses to teacher trainees. UNESCO has long advocated teacher preparation in EE because such programmes can promote awareness, knowledge and skills that can lead to attitudinal change and citizen participation. The first call for teacher preparation in EE was made by the International Union for the Conservation of Nature and Natural Resources (IUCN) in 1972:

We recognize that teacher training forms one of the most important and significant aspects in the development of environmental education programme and we recommend that; as teacher training in environmental education involves the use of many techniques and methods, all prospective teachers should be given training in the use and evaluation of pedagogic methods, including those relating to inter-disciplinary approaches and team teaching (p.3).

Meredith, et al (2000) suggested that the teaching of EE must first start with teacher educators because a thorough training of teacher educators in EE will be more focused and more likely to lead to success. If teacher educators are well trained in EE they will be proficient at explaining EE concepts to teacher trainees. However, teacher educators who are to teach EE must have a working knowledge of environmental education methods and this depends on their own pre-service training. Training teachers in EE should include both pedagogical content knowledge and subject matter knowledge, both of which are central to teaching.

While there has been a call for teacher educators to develop strong environmental education programmes for teacher trainees for more than thirty years now (UNESCO, 2012), this has not been forthcoming in Botswana. The main reason advanced for this lack of accomplishment is the absence of curriculum development specialists in EE who could help develop EE courses (Mosothwane, 2002). If this be the case, it is important that college lecturers who have received training in EE step up and help develop professional guidelines and standards for teacher trainees. As environmental crises worsen across the region and the globe, individuals with environmental education have an absolute responsibility to offer the needed inputs that will strengthen EE in colleges of education (UNESCO-UNEP, 1990). At the same time, there must be continuous monitoring of the progress of the EE programmes in colleges of education. The programme must also be mandatory if colleges of education are to ensure that they have environmentally literate teacher trainees.

Purpose of the Study

The main purpose of this study was to assess the extent to which colleges of education have implemented the recommendations of the Revised National Policy on Education of 1994 (RNPE, 1994), specifically rec.no.44 (e) which states that “teachers must be trained in the methodologies, at both pre-service and in-service levels, for environmental education to ensure that learning results in attitudinal changes and citizen participation” (Republic of Botswana, 1994; p.26). From this main objective, two other related objectives were derived:

- (a) To assess pre-service teachers’ perception of environmental education and environmental education teaching in colleges of education.
- (b) To assess pre-service teachers’ perception of themselves as effective future EE teachers

Research Questions

The main research questions intended to assess the provision of EE in colleges of education was: to what extent and under what conditions are colleges of education in Botswana training pre-service teachers in EE as recommended by the RNPE (1994)? From this main research question, two other research questions were derived:

- (a) What are pre-service teachers’ perceptions of the provision of EE in colleges of education in Botswana?

(b) To what extent and under what conditions do pre-service teachers perceive themselves to be effective future EE teachers?

METHODOLOGY AND INSTRUMENTATION

Data for this study was collected through both questionnaire and interview-type survey questions. The instrument use for this data collection consisted of three sections.

Section A: *Pre-service Teachers' Perceptions of Environmental Education and Environmental Education Teaching in Colleges of Education*

This section of the survey instrument consisted of ten statements that solicited information from pre-service teachers on their perceptions of environmental education and environmental education teaching in colleges of education. The responses to each statement were tallied and converted into percentages under the categories of strongly agree (SA), agree (A), neutral (N), disagree (D) and strongly disagree (SD) and are displayed in Table 1.

Section B: *Pre-service Teachers Perceptions of Themselves as Environmental Education Teachers*

This section of the instrument consisted of eleven statements intended to assess how pre-service teachers perceive themselves as future environmental education teachers. The responses to each of these statements were tallied and converted into percentages under the categories strongly agree (SA), agree (A), neutral (N), disagree (D) and strongly disagree (SD) and are displayed in Table 2.

Section C: *Open-ended Questions*

This section of the study contained seven open-ended questions. The purpose of this section was to give the respondents an opportunity to express their views on the provision of environmental education in colleges of education and to investigate other competencies required to promote environmental literacy. Open ended questions are important in research because they provide information that cannot be obtained through survey type questions. The responses to open-ended questions in this study were analyzed under themes developed according to the language and responses of the subjects.

Validation of the Instrument

For the survey instrument, forty statements were developed based on EE programmes for Tertiary Institutions (Republic of Botswana, 1999). Three college lecturers were given the statements and were asked to put each statement under one of the following headings: (a) *Pre-service Teachers' Perceptions of Environmental Education and Environmental Education Teaching in Colleges of Education*; or (b) *Pre-service Teachers' Perceptions of themselves as Environmental Education Teachers*. Of the forty statements, the validators categorized only twenty one statements under one of the two headings. The remaining statements were considered inappropriate for the above headings and hence the purpose of the study and so were rejected. The validators also suggested that an open-ended section be included in the instrument to give pre-service teachers the opportunity to state their views on the teaching and learning of environmental education in colleges of education. The researchers thus developed Section C with fifteen questions, seven of which were seen by the validators as corresponding to the objectives of the study and subsequently included in the questionnaire.

Instrument Reliability

We used one survey instrument consisting of two Sections (A and B). The instrument was pre-tested with thirty pre-service teachers from two colleges of education not used in the study. Based on the responses of this pilot study, questions 9 and 10 of Section A were changed. Question 9 was changed from 'I think the teaching of EE should aim for environmental quality and sustainable development' to 'I think the teaching of EE will promote environmental quality and sustainable development'. Question 10 was changed from 'I think EE will help Batswana to use natural resources sustainably' to 'I think EE will teach Batswana how to use natural resources sustainably'.

In Section B of the instruments, question 11 was changed from ‘I think I am a very good EE teacher’ to ‘I think I will be a very good EE teacher when I complete my studies’. Following these changes, the instrument was then administered to twenty five students from another college of education not used in the study. A marking key was developed by the researchers and three additional college lecturers. Since none of the items contained in Sections A and B included negative statements, marks were allocated as follows: 5 for SA, 4 for A, 3 for N, 2 for D and 1 for SD. Subsequently, the Statistical Package for the Social Sciences (SPSS), specifically the KR21, was used to calculate the reliability coefficient, which was found to be 0.68. The researchers concluded that the coefficient was high enough to warrant the use of the instrument to collect data for this study. The consistency of Section C was established by giving the questions to four students who were not participating in the study. Students’ responses were then grouped under a number of themes.

Data Collection and Analysis

Data for this study was collected using questionnaires with close-ended and interviews with open-ended questions. The results of questionnaires were analyzed using statistical analysis in which responses were counted and the frequencies converted into percentages. This was to ensure that the responses of teacher trainees on EE could be assessed quantitatively. The interview questions (qualitative data) were analyzed using interpretative explanation in which the responses were categorized by theme.

Participants

The participants for this study were sixty teacher trainees in the final year of their three year diploma programme. The participants consisted of twenty males and forty females. Their age ranged from 22 to 25. They all completed the questionnaires but only ten of them participated in the interview. The study was conducted in June, 2010.

RESULTS

The results of the study will be discussed in two sections: quantitative and qualitative.

Quantitative Results: Section A

Table 1 presents the frequency of responses transformed into percentages to allow for analysis.

Table 1: Pre-service Teachers Perceptions of Environmental Education and Environmental Education Teaching in Colleges of Education

Statement	Responses in Percentages				
	SA	A	N	D	SD
1. Environmental Education is a well established subject in Colleges of Education	2 (3%)	10 (17%)	16 (27%)	20 (33%)	12 (20%)
2. The training that I have received in environmental education will help me to instill into children responsible environmental behaviors	0 (0%)	2 (3%)	19 (32%)	23 (38%)	16 (27%)
3. I possess skills, knowledge and expertise to teach environmental education with confidence when I complete Diploma	1 (1.7%)	3 (5%)	16 (27%)	13 (22%)	27 (45%)
4. I think environmental education should be made a compulsory subject for all those who want to train as teachers.	48 (80%)	5 (8%)	7 (12%)	0 (0%)	0 (0%)
5. The teaching of environmental education in colleges of education is well organized	4 (6.7%)	1 (1.7%)	21 (35%)	20 (33.35)	14 (23.3%)
6. The teaching of environment education in colleges of education is based on Botswana’s National Environmental Education Goals (Republic of Botswana, 1999)	0 (0%)	0 (0%)	50 (83.3%)	4 (6.7%)	6 (10%)
7. The teaching of environmental education has been	41	15	4	0	0

effective as evidenced by environmental and wild life clubs in colleges of education	(68.35)	(25%)	(6.7%)	(0%)	(0%)
8. In our training emphasis is placed on raising the environmental literacy of our children	11 (18.3%)	9 (15%)	29 (48.3%)	11 (18.3%)	0 (0%)
9. I think the teaching of environmental education will promote environmental quality and sustainable development	7 (11.7%)	16 (26.6%)	37 (61.7%)	0 (0%)	0 (0%)
10. I think environmental education will teach Batswana to use natural resources sustainably.	42 (70%)	13 (21.7%)	5 (8.3%)	0 (0%)	0 (0%)

N=60

Quantitative Results: Section B

Table 2: Pre-service Teachers' Perceptions of Themselves as Environmental Education Teachers

Statement	Responses in Percentages				
	SA	A	N	D	SD
1. I think I will be successful teaching environmental education	0 (0%)	2 (3.3%)	21 (35%)	19 (31.7%)	18 (30%)
2. I have been well trained in environmental education methodologies	4 (6.7%)	9 (15%)	11 (18.3%)	19 (31.7%)	17 (28.3%)
3. I have mastered content taught in environmental education	4 (6.7%)	6 (10%)	27 (45%)	19 (31.7%)	4 (6.7%)
4. I can now be used as a resource person to run environmental education workshops for other teachers.	3 (5%)	5 (8.3%)	32 (53.3%)	17 (28.3%)	3 (5%)
5. I am in a better position to infuse environmental education concepts into other subject of the school curriculum	1 (1.7%)	8 (13.3%)	25 (41, 7%)	17 (28.3%)	9 (15%)
6. I have a clear understanding of the rationale for teaching environmental education.	17 (28.3%)	22 (36.7%)	11 (18.3%)	6 (10%)	4 (6.7%)
7. I can now develop environmental education programme for primary school children	3 (5%)	7 (11.7%)	13 (21, 7%)	27 (45%)	10 (16.7%)
8. I can write environmental education teaching materials with confidence	1 (1.75%)	3 (5%)	15 (25%)	19 (31.7%)	12 (20%)
9. I possess content knowledge, skills and professional expertise to lead environmental education unit in my school	1 (1.7%)	5 (8.3%)	23 (38.3%)	11 (18.3%)	20 (33.3%)
10. I shall be able to conduct research on environmental issues when I complete my diploma programme.	2 (3.3%)	2 (3, 3%)	35 (58.3%)	7 (11.7%)	14 (23.4%)
11. I think I will be a very good EE teacher when I complete my study	4 (6.7%)	11 (18.3%)	6 (10%)	18 (30%)	21 (35%)

N= 60

Section C: Qualitative Results of Interview Protocol Questions

This section presents responses of teacher trainees to interview protocol questions. The interview protocol questions are listed below and the responses to them are summarized by theme:

1. In your own view, are colleges of education adequately training you to teach environmental education as recommended by the RNPE (1994)? Support your answer.

In disagreement

'We are not being adequately trained in EE because our lecturers do not have the expertise to do so. However, EE issues are discussed in Environmental Science which is a part of science. We would like to have more EE courses to increase our knowledge concerning environmental issues'.

In agreement

'We are adequately trained in EE. Lecturers teach EE because we have it under professional studies. We also have field trips. EE is included into other subjects and we get exposed to it in those subjects. We

have environmental education clubs in colleges of education and we will not have them if EE were not offered in colleges of education’.

2. In your own words, how would you describe an environmentally literate person?

Environmentally literate person

‘Someone who participates in cleaning campaigns. Someone who does not pollute the environment. Someone who works with the local people to solve environmental problems in their areas. Someone who is environmentally friendly and behaves responsibly towards the environment’.

3. Some researchers are of the view that EE should be taught as a separate subject. What do you say about this view? Support your answer.

Supporters of EE as a separate subject

“Yes, it should be treated as a separate subject so that it is studied in depth and not superficially. It will also have a recognized status like other subjects”.

Objection to EE as a separate subject

“It should be included into other subjects of the curriculum as is currently the case because if treated separately it will increase the number of courses being taught which means more work for college lecturers and students”.

4. The Revised National Policy on Education of 1994 recommended that EE be taught using the infusion approach. (a) What do you understand by infusion? (b) Do you think using the infusion approach has any advantage?

Definition of infusion

“Infusion is when teaching a particular subject other than EE and introduces some of EE topics in that subject. Infusion is fitting in some concepts into other subjects. Infusion is integrating content into other subjects during teaching but making sure that those subjects do not lose their status. Infusion means including environmental education concepts into other subjects”.

Advantages of infusion

“Infusion promotes creative thinking and saves time because many concepts are taught at one time. More knowledge is gained since one concept is taught in different subjects”.

5. What methods of instruction do your lecturers use in teaching environmental education and why do you think they use such methods?

Methods of teaching used by college lecturers

‘Our environmental science lectures use field trips to actually make us see how the environment is affected. Sometimes we use discussion and debate in our class. In Social Studies, we use investigation, that is we go out and investigate environmental issues to see what effects they have on the environment and we discuss how we can help local people to address environmental problems. In biology we talk about problem solving, where the affected local people could also participate and make contributions. Our Earth Science Lecturer likes learner centered method. She asks us to suggest ways of solving environmental problems. We think participatory methods are the best because local people know their problems better and can suggest realistic solutions to save the environment. These methods are important if EE is to be effective in promoting environmental literacy’.

6. Do you think you need Environmental Content Knowledge (ECK) to teach EE to teach it with confidence?

The Importance of Environmental Content Knowledge

‘Yes, we need a strong EE content to teach confidently. Some EE concepts are taught in primary and secondary schools and if we have not mastered them it will be difficult for us to teach. In biology, we are taught ecology. We learn concepts such as ecosystem, nutrients recycling, net productivity, succession, etc. We also learn about ecological energetic. In Social Studies we learn about population, pollution, natural resources, soil erosion, etc. We need Environmental Content Knowledge to teach EE’.

7 (a) What teaching materials do your college lecturers use to teach EE?

EE Teaching Materials in Colleges of Education

“There are no EE teaching materials, no EE textbooks for us in our college because EE is not taught or offered as a course in colleges of education’.

7 (b) What EE teaching materials did you find in primary schools where you were doing your teaching practice?

EE materials used during teaching practice (TP)

“During our TP we found no EE teaching materials in primary schools. It seems there are no EE teaching materials in all primary schools in Botswana”.

DISCUSSION OF THE RESULTS

The findings will be discussed based on the quantitative and qualitative facets of the data collection.

Quantitative

Pre-service Teachers’ Perception of Environmental Education and Environmental Education Teaching in Colleges of Education

The results of this study suggest that colleges of education have not yet developed EE courses for pre-service teachers as suggested by responses to Section A of questionnaire. As a result, pre-service teachers are unlikely to graduate with required EE competencies given this lack of training. Unless college lecturers put more effort into the design and the development of environmental education courses, it is unlikely that Botswana will have an environmentally literate population anytime in the near future. There is an urgent need for environmental education in college of education as it is needed to help citizens to sustain and safeguard their environment.

Nearly two-thirds of respondents (63%) reported that environmental education was not a well established subject in colleges of education. Three-quarters (75%) of the participants also reported that they have not received training in environmental education and so will not be able to promote environmental literacy among the children they teach. Sixty-seven percent felt that they will complete their diploma without the knowledge, skills and expertise needed to successfully teach EE. Wilke (1985) has noted the same:

The key to successful environmental education is the classroom teacher. If teachers do not have the knowledge, skills and commitment to environmentalize their curricula, it is unlikely that environmentally literate students will be produced (p.11).

Almost all (92%) of the participants felt that environmental education should be introduced in colleges of education so as to teach Botswana children how to sustain and use their natural resources wisely. The future sustainable use of natural resources ultimately depends on the education the people of Botswana have received. Education about the environment is important because it upholds the conservation, preservation and sustenance of their environment. Mmusi’s (1987) remarks support this observation:

The different strata of our society must be sufficiently educated to conserve the environment, to police it from further destruction and to utilize it in such a way that posterity will reap benefits from a fragile ecosystem (p.5).

Pre-service teachers did not see themselves as being successful in implementing EE in schools because they have not received training in it themselves. The fact that EE does not pervade all institutions of higher learning but rather it is scattered in few institutions of higher learning is true in most countries today (Gursory & Saglam, 2011; Kennelly, et al, 2008; Miles, et al, 2006). In Batswana, Primary Education and Language and Social Science Education Departments at the University of Botswana are the only departments that offer some EE courses (Primary Education Handbook, 2011/2012; Handbook of Language and Social Science Education. 2010/2012).

Pre-service Teachers' Perception of Themselves as Environmental Education Teachers

Responses of pre-service teachers to this section indicate that they do not see themselves as being future EE teachers capable of promoting children's environmental literacy. Nearly two-thirds (62%) of the participants reported that they will not feel confident teaching environmental education because they lack training in EE methodologies and subject matter. They contended that environmental education is an integration of subjects sharing common themes and therefore can only be taught after receiving training in its philosophies and pedagogical content knowledge. Sixty per cent of teacher trainees indicated that they have not been well trained in the language of EE and as such will not be able to articulate environmental messages clearly to pupils using effective instructional strategies. Sixty-five per cent do not think they will be good EE teachers because they have not been properly trained and will not be able to workshop other teachers who have likewise not completed EE as part of their pre-service training.

According to the Revised National Policy on Education (1994), pre-service teachers are also expected to infuse EE concepts into other subjects of the school curriculum to ensure that every child has an opportunity to learn EE concepts. This could prove difficult as teacher trainees have not been exposed to the concept of infusion. Pre-service trainees were not sure if they could write EE materials for primary school children because they lack EE content knowledge. This glaring oversight calls for proper and professional training in EE. In order for pre-service teachers to feel like and be recognized as professionals, they must have access to proper EE training in colleges of education. Lahiry, et al (1988) concurs:

Teachers are important professional and like any other group of professionals, they require a proper background in the subject, along with necessary training and commitment to effectively impact desired skills and attitudes on learners, without proper training much energy is wasted and efficacy diminished (p.135)

Qualitative Aspect

Interview Protocol Questions

The participants that were interviewed held opposing views on the teaching of environmental education in colleges of education. Some felt that EE should be taught as a separate subject so that its status as a subject is established and recognized. Being taught separately will also help to ensure that it is treated in depth, and not superficially. The opposing view is that EE should be infused into other subjects of the college curriculum so that every teacher trainee is exposed to it. The infusion of EE into other subjects would mean not having to increase the number of courses colleges of education offer. This approach tends to be favored by EE educators on the grounds that infusing it into other subjects will promote holistic learning.

With regard to teaching methods, Environmental Science students reported that their lecturers used field trips, debate and discussion to teach EE, while Social Studies students reported that their lecturers used investigation, field trips and learner-centered methods. Biology students reported that their lecturers used experimentation and problem solving methods. According to student teachers, field trips had helped them to learn how to write reports and acquire important research skills. Debate and discussion methods, on the other hand, promoted listening and thinking skills which are required for teaching environmental education. Teacher trainees also felt that exposure to different views on environmental issues has enriched their knowledge and promoted their critical thinking.

Implications for Teaching Environmental Education in Schools

Pre-service teachers do not perceive themselves as being competent and effective future EE teachers since they lack EE competencies and as such do not feel equipped to explain environmental issues to children. It is thus unrealistic to expect that the environmental literacy of Batswana children will increase any time in the near future. Given that the attitudes of

our children may not be positive towards the environment, we can expect the attainment of sustainable development to take several more generations.

Recommendations

Based on the findings of the study, the following recommendations are made:

- (1) Colleges of education should be staffed with trained personnel well-versed in EE methodologies and curriculum development. Inadequate teacher training is one of the main reasons college lecturers are not including EE in their teaching.
- (2) EE should be made mandatory for those who aspire to be teachers. This will ensure that all primary school teachers will be equipped to promote children's environmental awareness.
- (3) EE curricula materials for colleges of education should be developed to facilitate the implementation and learning processes.
- (4) A policy document which articulates how to infuse EE concepts into other subjects of the college curriculum should be developed because infusion remains an effective means of promoting holistic learning.
- (5) EE courses for colleges of education should be developed and be implemented in a timely manner to ensure that pre-service teachers graduate with required environmental competencies. Colleges of education in Botswana should call for a National EE Conference on teacher education to give scholars an opportunity to deliberate EE course development and in turn help college lecturers develop relevant EE courses. We propose the conceptual model for training pre-service teachers in environmental education depicted in Appendix A.

CONCLUSION

We were motivated to conduct this study because we strongly believe in the value of teacher education in contributing to environmental education in Botswana. We also believe in its importance to society and to children getting an adequate environmental education. This study has revealed that Botswana, like other developing countries, urgently needs an effective environmental education programme. It seems there is no officer whose task it is to oversee that the recommendation of the RNPE (1994) are implemented in colleges of education. Consequently, EE has permeated few subjects of the college curriculum and this has contributed to delays in the development of EE courses.

Pre-service teachers do not perceive themselves to be effective in teaching EE when they complete their training. This causes concern since the quality and preservation of the environment depends on the education its people have received. The results of the study suggest that colleges of education in Botswana have not been successful in developing EE courses. Urgent action is thus required in the field of teacher training.

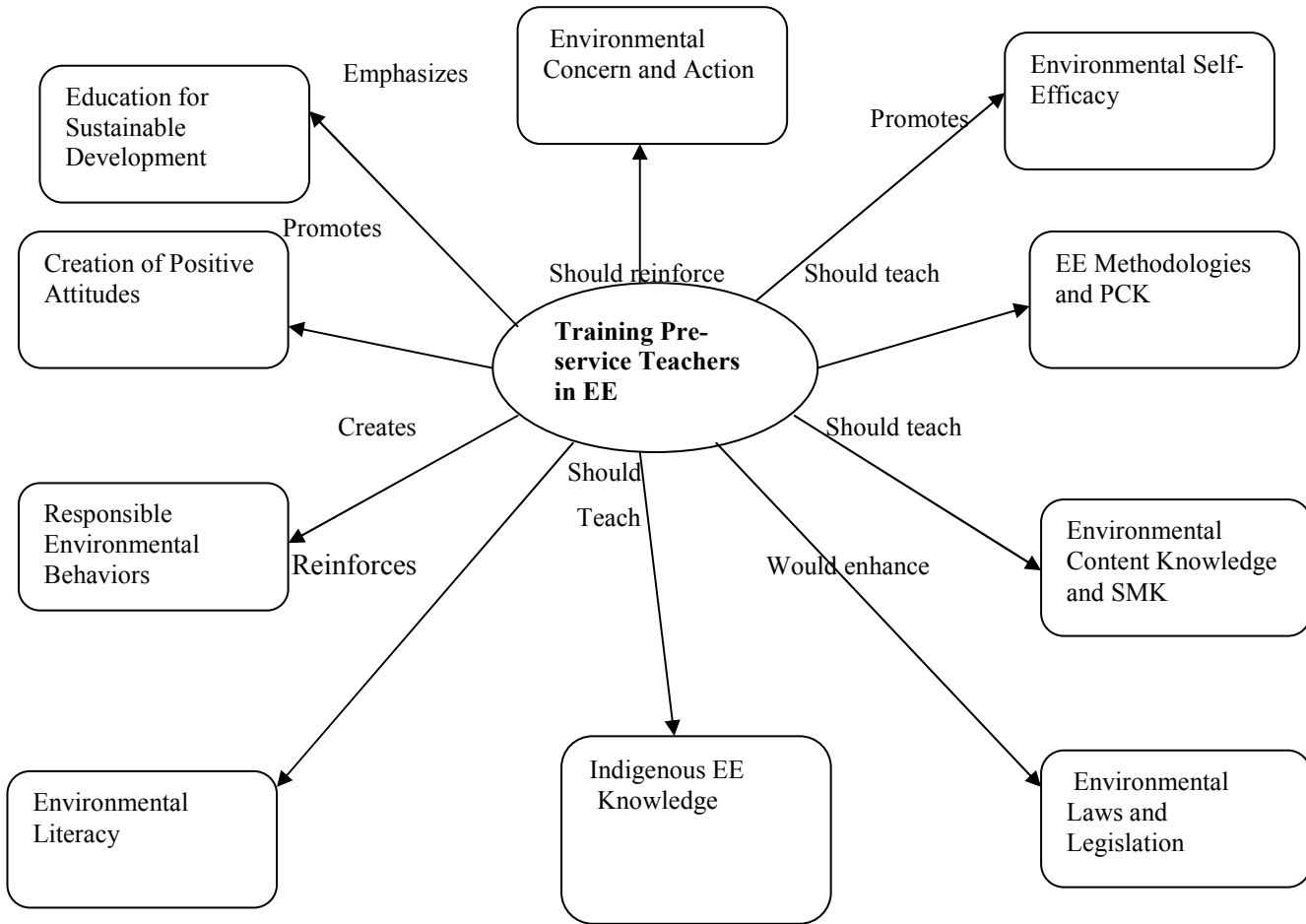
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Appendix A

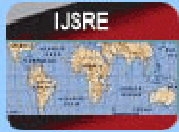
Figure 1: A proposed conceptual model for train pre-service teachers in EE



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Reflections on the Problems Encountered in the Teaching and Learning of English Language in Mozambique's Public Education

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Abstract

Though English as a subject has been successfully implemented in Mozambique's public education, particularly in the 2nd Grade primary education (EP2)—grade 6 and 7 and secondary schools (grade 8-12), there are still serious problems, especially in the teaching and learning of the subject. The implementation of English in Mozambique's public education was done out of the realisation that English is increasingly becoming the global language with speakers in almost all parts of the world. Yet the fact that Mozambique was a Portuguese colony for almost five hundred years (1505-1975) means a lot on how Portuguese as a language has impacted and continue to affect the Mozambican people. The continued use of Portuguese as the official language after independence in 1975, for example, meant that the country will remain isolated from the English world for as long as Portuguese is the dominant language. It is out of this background that the teaching and learning of English in Mozambique has been a mammoth task since its implementation in school curriculum in 1992. This paper examines the difficulties encountered by both Mozambican teachers and students in the teaching-learning process of English in public schools. To identify the problems, a research was carried out in Gaza province. Questionnaire comprising closed and open items was used as a data collection tool. Data was analyzed quantitatively using frequency tables and analyzed qualitatively using evaluative descriptions. The study revealed that lack of qualified teachers and relevant materials (like English textbooks) were among the major problems that make the teaching and learning of English remain a big problem in Mozambique's public education. From the foregoing, the paper offers a number of recommendations that can effectively help the Ministry of Education and Culture, teachers and students in the teaching-learning process of the English language.

Keywords: English, Mozambique, Gaza, public education, teachers, students, Africa

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INTRODUCTION

Approximately there are 6900 languages currently spoken around the world, but the majority of which have only a small number of speakers. About 4 billion of the earth's 7 billion people of the earth's total population speak one of the 10 most spoken languages in the world named in their order: Marandian, English, Spanish, Hindu/Urdu, Russian, Arabic, Bengali, Portuguese, Malay-Indonesian and French (Abbas 2010). At global level and in Africa in particular, English is fast becoming the most spoken and an official language for many countries. While it is still the second most spoken language,

the world-over after Mandarin (Chinese), the fact that English is a universal language, major source of communication in different cultures/civilizations and the most studied of all languages in the world makes it even more popular than Mandarin. This is echoed by Weber (1997), who notes that in terms of the number of countries where each of the ten languages mentioned above is spoken, English is the most spoken language followed by French. More so, in Africa particularly South African region, all countries except Mozambique use English as their official language in schools and job markets. Mozambique is the only country in the region that uses Portuguese as its official language in public schools and job markets. This has made Mozambique to suffer isolation in terms of trading, tourism, exchange of educational resources and in participation in regional and global politics, only to mention a few examples of cases of isolation.

It is out of this realization that after its independence from Portugal and the civil war that ended in 1992, Mozambique took a bold step to introduce English as one of the subjects taught in public schools. Yet, this has never been an easy task given Mozambique’s crippling poverty levels, lack of adequate training for English teachers had its unfortunate long period (almost five hundred years) of domination by the Portuguese people (Rambe and Mawere). As a result of these compound problems, Mozambique has been confined among the laggards of the world in effectively using Information and Communication Technologies (ICTs). Mozambique ranked 106th, post important improvements in their overall networked readiness since 2010 (up 10 positions) out of the 138 countries surveyed (World Economic Forum, 2011).

Networked Readiness Index

Edition (No. of economies)	Score	Rank
2010–2011 (138)	3.3	106
2009–2010 (133)	3.0	116
2008–2009 (134)	2.9	124
2007–2008 (127)	2.8	121
2006–2007 (122)	2.6	115

Source: The Global Information Technology Report 2010-2011, p.249

While the problem of English in public education is widely known by Mozambicans, little research has been done, particularly on the problems encountered in the teaching and learning of the subject (English) in the curriculum. Yet lack of research on such an important subject will always have negative impact to society’s socio-economic and political development that cannot be underestimated or ignored. This is because although indigenous/local languages are as important as any other language in the world, it is important to acknowledge that English is increasingly becoming the most widely spoken language in business, education, job markets and many other arenas the world over. As such, it is now a necessity for non-English speaking people to acquire knowledge of English if they are to be able to “operate well and sensibly” in the global world.

That said, this paper examines the problems encountered by Mozambique’s public education in the implementation of English in the curriculum. In particular, the paper focuses on the problems that both teachers and students of English are facing in the teaching and learning of the subject. It is acknowledged that this important project should have covered the entire country (Mozambique) in order to capture the status of English as a subject in all public schools in the country. However, due to limited resources this was impossible. As such, the paper adopts Gaza province as a case study. Gaza being a province dramatically affected by problems that have to do with the teaching and learning of English in public schools, it represents other Mozambican provinces with the same problem.

Background to Mozambique’s public education and the teaching-learning of English

In sub-Saharan Africa, Mozambican is one of the countries with both sad histories and a plethora of systems too complex to characterize with precision. The complexity of Mozambique’s systems is predicated on the country’s long tumultuous history under the Portuguese dominance, sixteen years of civil war after independence from Portugal in 1975, crippling poverty levels, rising levels of unemployment, lack of adequate training and limited deployment of public personnel to underserved communities, and adoption of Portuguese as an official language after independence. The complexities of Mozambique’s systems are not only visible in the country’s economic and political systems, but in social landscapes such as education. In view of the latter (education), Mario (2002) has aptly developed taxonomy of the literacy development trajectory that seems to be a prototype of the landmark political developments as they impacted the Mozambican

education sector. The taxonomy comprises the period of national reconstruction, marked by the growth of adult education nationally (1975 to mid 1980s), the reduction in adult literacy and the disbanding of national adult training institutions due to civil war (1977–1995), and the period of rediscovery of an adult education system that emphasizes sustainable development and gender equity in a post conflict state (1995 to the present).

In Mario's (2002) characterization, the literacy landscape of Mozambican educational system has generally been split into distinguishable phases although there is little consensus on what each of these historic epochs constitutes. Mario and Nandja (2006), for example, identify three main phases that summarized the Mozambican education provision and system:

1. *The reconstruction* phase (1975 to mid 1980s) – this immediate post-independence phase was characterized by the national reconstruction project and the building of a coherent adult education infrastructure (adult education and training schemes) to support adult literacy and education campaigns nationwide.
2. *The Destabilization* phase (mid 1980s–1995) – was characterized by internal instability accentuated by civil war insurgences that destabilized the existing adult literacy and educational activities in the country. This phase was marked by human emigration to neighboring war-free zones, destruction of academic infrastructure, the scaling down of literacy efforts and adult literacy programs in the rural areas and the disbanding of National Adult Education Department.
3. *Resuscitation phase* (1995 to date) has emphasized the re-emergence of the adult literacy initiatives and education in the context of social and economic development with a focus on the use of education as a vehicle for poverty eradication, national unity, and providing the population with moral values and social empowerment.

It should be emphasized that although English was introduced in the early 1990s, particularly in Mozambique's public secondary schools (grade 8), this phase falls in *resuscitation phase*, and not in Mario and Nandja's (2006) phase 2. This is because the introduction of English in Mozambique's public education was mainly done with the objective to eradicate poverty and to do away with the country's isolation in the region and the global world. English was believed to be a vehicle of change that would improve the country's relations with the global world, open avenues for Mozambicans to the global job market, tourism, educational and political participation. As a result of this the Mozambican government, initiated series of national interventions (such as those explained by Mario and Nandja above) especially after independence, aimed to improve education system in the country.

However, while there were a series of national interventions aimed at supporting the education systems, especially in terms of teachers' training and the alleviation of their economic status to expedite pedagogical delivery, it should be noted that the education sector has remained poorly remunerated in almost all aspects. For example, the newly introduced subjects like English remains with a critical shortage of resources such as textbooks, classrooms and qualified teachers. This is mainly because sometimes these resources need to be hired from outside the country. On the other hand, teacher wages are generally not typically fully responsive to local labor market conditions or to individual characteristics, so many teachers receive substantial rents (Chaudhury et al., 2006) in the form of illegal private tutoring to supplement their incomes. According to Rambe & Mawere (2011), such transactions can be two-way; where a teacher corrupts a student by demanding bribe or parents offering bribes to educators to secure students' progression to another grade or even pass an exam, thus compromising and diluting professional integrity and educational quality. Rent seeking behavior, which indeed erodes commitment to professional instruction can be partly explained by abject poverty in the country. Mozambique has high levels of poverty (54.1% in 2008) and child (0-59 months) malnutrition (46.2% in 2004) and currently faces escalating staple food prices (US Government Report, 2009). This is further compounded by differential levels of educator training across the country. Rural and outlying areas often have less access to educator development and support services than their urban counterparts, and fewer opportunities to attend in-service courses, which lead to lower quality education provision (Mulkeen, 2005).

The brief background to the Mozambican educational landscape articulated above sets the stage for my informed analysis and critique of the nation's schooling in general and the teaching-learning of English in particular.

RESEARCH QUESTION AND METHODOLOGICAL ISSUES

The present study seeks to address the question: Could results from a critical examination of the problems faced by Mozambique's public education impact a positive change on the country's educational policies and socio-economic situation?

Having taught in Mozambique's public education and researched extensively on Mozambique's educational issues for the past six years, I realized that most researchers on Mozambican education (Mario 2002; Mario & Nandja 2006; Mulkeen 2005; Chaudhury et al., 2006) have paid insignificant attention to the problems that both the English teacher and student face in their teaching and learning of English in this context referred to as subject. Yet it is through constant reflection on daily experiences of both teachers and students of this troubled and newly introduced subject that problems are identified and solutions sought. The Mozambican history of education therefore makes a sorry reading with its failure to document, by default or otherwise, the problems being faced by both teachers and students of English since the implementation of the latter in the country's education curriculum in the 1990s (at least in secondary schools). As well as in the 2nd Grade primary education (EP2) grade 6 and 7-in the 2000s.

As part of my research design, I relied on observations (lessons observations of some English teachers in public schools), questionnaires and in-depth interviews (formal and informal). I carried out my study in ten schools (6 secondary schools and 4 primary schools) in Gaza province in Mozambique between February and November 2010, and I sampled education stakeholders, that is, students, parents and teachers in the study area. The study involved a selected sample of 100 people (70 students, 20 English teachers and 10 parents/guardians). I located my study within Gaza province, in particular, using students, teachers and parents affected in that region as representative of other public schools in Mozambique having similar educational challenges.

As previously pointed out, unstructured interviews were among the data collection techniques used in this study. Generally speaking, interviews entail presenting questions to the informant orally and recording the responses either in written notes in pocket books or on an audio-recording for later transcription and analysis. Wray and Bloomer (2006), articulate that any subjects can be used provided they are able to understand the questions and provide responses. In framing questions for the in-depth interviews, I was guided by the works of Erik Hofstee. According to Hofstee (2006, p. 135), "background type questions are important when carrying out in-depth interviews and it is also important to keep the interviewee to the topic being discussed, but it can also pay not to be too rigid". One of the advantages of in-depth interviews is that the interviewee may even give you more than what you will have bargained for. However, as Hofstee (2006, p. 136) observed, "if not carefully administered, interviews can produce misleading responses, thereby affecting results". To avoid this problem, the researcher asked the participants simple questions, most of which required one word answers. The aim of interviews was to complement and substantiate data collected from questioners and lesson observations. It must be emphasized that a wealth and elaborate explanation of respondents' views and opinions on problems affecting teachers and students in their teaching and learning of English at school can best be acquired through a combination of all the methods mentioned above (lesson observations, interviews and questioners).

In interviewing the voluntary participants: both individual and group interviews were used. The use of individual and group interview as well as lesson observations and questioners was suitable for the gathering of comprehensible information on the problems faced by teachers and students in the teaching and learning of English in public schools.

The people participated in the study were from different societal classes, ranging from students, educators and parents/guardians. The participants were drawn from different societal classes with the hope of obtaining a balanced research result that could be representative of all the parties that directly affected and involved in the teaching and learning of English in Mozambique's publication. Participants ranged from the ages of 11 to 65 years. This age group was considered appropriate for the study given that most of the people involved in the teaching and learning of English in Mozambican schools are between the aforesaid ranges. Equal number of women and men were sampled to ensure gender balance, in terms of representation. More so, it is generally believed that the problems faced in the teaching and learning of English in public education equally affect both male and female.

In using questionnaires, the researcher administered same to the participants in the different areas they were found. A "questionnaire is an instrument with open or closed questions or statements to which a respondent must react" (White, 2005, p. 126). In this study, the questionnaires consisted of limited open-ended (free response) questions and closed-ended (fixed alternative) questions. This was in agreement with the CACC Module (n.d) which states that "practically a good questionnaire should contain both open-ended and closed-ended questions so that the responses from the two forms can be checked and compared" (p.103). The open questionnaire was used as it enables the respondent to reply as s/he likes and does not confine the latter to a single alternative (Behr, 1988). This is to say the advantages of open-ended or free response questions are that they give a respondent an opportunity to answer sufficiently, giving all the details to clarify the answers. Put differently, open-ended questions are more suitable for complex questions or issues that cannot be elaborated in closed-ended questions. This was in agreement with White's (2005, p.131) view that "open-ended questions probe deeper than the closed question and evoke fuller and deeper responses". They evoke a fuller and richer response as they go beyond statistical data into hidden motivations that lie behind attitudes, interests, preferences and decisions. Furthermore, White observed that, open-ended questions may lead to collection of worthless and irrelevant

information. With this in mind, the researcher avoided being gullible of everything by selecting only the data he thought were relevant to this research.

Besides, the closed form of questionnaire was used because it facilitates answering and makes it easier for the researcher to code and classify responses especially in this case where a large number of questionnaires were dealt with. This is echoed by White (2005, p. 130) who articulates that “closed form of questionnaire is suitable for large number of questions and they do not allow any chances for irrelevant answers”. However, closed-ended questions should be posed with caution as they may have the effect of forcing the respondent to think along certain lines which he might not have done had he been left to make up his own responses. It is view of this understanding that both questionnaires were used in this study. Behr (1988) suggests, in practice, a good questionnaire should contain open and closed forms of questions so that responses from the two forms can be checked and compared; this guided the research method used in this study. Participants in this study were assured of the confidentiality of their responses and were asked not to identify themselves by names.

In addition, the researcher observed some of the English teachers’ lessons in their respective schools. This was done with the hope to obtain first hand information on methodologies used by English teachers, materials/resources available to teachers and students and the general interaction between teachers and students during English lessons. Data collected from lesson observations, questionnaires and in-depth interviews were tabulated to show frequencies before being subjected to evaluative analysis. Tables 1 and 2 contain details of the people who participated in the study and the data that was gathered during the study:

Table 1: Details of the people who participated in the Study

Occupation/Status	Age range	Gender	
		Male	Female
Teachers	20-60	10	10
Parents/guardians	32-65	5	5
Students	11-20	35	35

Table 2: Responses to closed questionnaire items on problems faced in the teaching and learning of English in Mozambique’s public schools

ITEMS	RESPONSES		
	Strongly agree	Strongly disagree	Uncertain
1. Reading, writing, speaking and listening are skills that teachers should teach their students.	100	0	0
2. Most of the students have problems in grammar, reading and speaking.	90	5	0
3. English songs, films, stories, group work and home work help students in the learning of English.	90	5	0
4. Scarcity of primary educational material contributes greatly to poor performance of students studying English.	98	1	1
5. Some English teachers in Mozambican schools are under-qualified to teach the subject.	85	10	5
6. Very few English teachers make use of the local community (ie friends) in improving performance of their students.	90	8	2
7. Some teachers are forced by their superiors to teach English instead of subjects they studied at college/university.	60	10	40
8. English workshops are often (annually) held to improve teachers’ skills.	0	75	25
9. Most of the teachers use either local language or Portuguese to teach English.	91	7	2
10. Most of the students like to learn English.	65	15	20

11. Text books being used in schools are unsuitable and should continue being used.	40	50	10
12. Students have the opportunity to use English outside school.	9	90	1
13. Some teachers do not plan for their lessons and rarely use teaching aids such as charts, black board and physical objects.	65	15	20
14. Teachers always revise home work and exercises given in class with their students.	50	47	3
15. Most of the students think that English is less important to other subjects studied at school.	60	20	20

DISCUSSION

Findings presented in this research are based on the data that were collected from participants in Gaza province over a period of ten months. The research results in Table 2 above show different perceptions on problems being faced in the teaching and learning of English in Mozambique's public education. The main problem faced by both students and teachers of English in Gaza province is scarcity of primary educational material. According to majority of the participants (98 %), the main reasons for the scarcity of secondary material are poverty and economic hardships as well as shortage of local experts to write textbooks in the area of English. Due to poverty and economic hardships, schools and parents cannot raise the required money for textbooks to use at school and home respectively. In fact, where educational budgets for teacher training are limited, there will be limited primary educational resources (books, periodicals and journals are outdated) and weak supervision of teaching personnel. In such educational contexts, weak literacy practices persist and students' capacity to dissect texts for hidden meanings will be severely compromised (see Rambe and Mawere 2011). Mulkeen (2005) reports that, in Mozambique teacher deployment is done at the provincial level but provinces often have insufficient funds to recruit all of the newly qualified teachers and this leads to high teacher-student ratios. This also leads to under-staffing in some isolated areas. Worse still, the prolonged Portuguese domination resulted in very few Mozambicans specializing in English. Consequently, there are very few Mozambican teachers capable of teaching and of producing English textbooks that can be used in schools. Such a problem could have been lessened by way of conducting annual workshops for English teachers. Unfortunately, this study revealed that rarely are such workshops conducted in Gaza, a signal that delivery problems will persist in as long as no action is taken.

The other serious problem cited by majority of the respondents (85%), was that of under-qualified teachers who are employed/hired by the Ministry of Education and Culture to teach the English in public schools. This negatively impacts on the learners' psychological access to learning resources. This in turn compromises the quality of education and in particular of students produced from such a system. Rambe and Mawere (2011, p. 46) argue "structural dysfunctions such as corrupt practices (demanding bribes from students to pass exams/tests, appointments influenced by rent seeking behavior, teacher absenteeism, poor instruction) in the education sector frustrate the delivery of quality learning outcomes". I therefore argue that for impoverished Mozambican students, most of whom are coming from deprived backgrounds; their capacity to grasp the fundamental assumptions underpinning dominant discourses in the learning of English is constrained by the quality of the instructors they encounter in the classroom. In most cases, this often results in bribes from students (especially those from middle class families) who after realizing the impossibility to master the subject with the caliber of teachers they have in their schools would simply preoccupy themselves with passing on to the next grade/level. On the other hand, under-qualified teachers tend to privilege middle class learners because in an educational system where educators are under-qualified, educators are motivated to "pass" their students by the pursuit of rents and underhand deals rather than motivating students and supporting access to quality education. Students from humble background, even those who are intellectually gifted, are deprived both of "epistemological access" (Morrow, 1994) to resources and opportunities to embrace diversity and fully exploit their capacities in their learning endeavors.

From the results obtained during this study, it was also revealed by majority of the participants (91 %) that most of the teachers use either local language (Changani) or Portuguese as a language of instruction in conducting/delivering their English lessons. Speaking local languages or Portuguese is not wrong per se as to argue otherwise could be interpreted to mean discrediting these languages. However, it can be argued that teaching English using a local language or Portuguese deprives the student of the opportunity to be exposed to the language s/he is learning. As a matter of consequence, students hardly learn the speaking and listening skills of English. To confirm this, the present study together with my vast personal teaching experience in Gaza revealed that majority (90 %) of the students struggle with grammar, reading and speaking. Because of these deficiencies, majority of the students get up to grade twelve before acquiring the

necessary skills required to master the subject. This further limits the students' competency in the job market and in their choice of the place to pursue tertiary education after high school. In fact, due to language problems, those who want to go straight to tertiary education or into the job market are restricted to the local institutions and/or markets and to those in the few Portuguese speaking countries such as Brazil, Portugal, Congo and Cabo verde.

Other problems that were cited as contributing to poor performance of students studying English include teachers' reluctance to revise home work and exercises with their students (50 %), Misconception by some students (60 %) that English is not equally important as other subjects in the curriculum. Poor lesson planning by some English teachers (65 %) is also one of the reasons given by respondents'. Old and sometimes outdated textbooks with grammatical errors (40 %), and student's lack of exposure to English speaking environment outside class are all factors that militates against the effective implementation of English teaching and learning. In the case of the latter, 90% of the respondents agreed that the Mozambican students lack the opportunity to practice what they learn at school since their home uses either Portuguese or the local language most of the time.

How the teaching and learning of English in Mozambique can be improved? Some recommendations

This study sought an in-depth understanding of education stakeholders' (students, guardians/parents and English teachers) perceptions on the problems encountered by both teachers and students in their teaching and learning of the subject. From data obtained, the study concluded that both teachers and students in public education are experiencing serious problems in their teaching/learning of English. Mozambican education system still seems to be in a dilemma as to what exactly should be done to improve the situation. As previously noted, one should note, however, that some steps like introducing English in the 2nd Grade primary education (EP2), that is, grade 6 and 7 have been taken by the Ministry of Education and Culture. I however argue that this step can hardly yield significant results according to the evidence in the data obtained in this study. In fact, even with the introduction of English at EP2 level, it was revealed that majority of the students (of those participated in this study) who started learning English in that level (EP2) get up to their Advanced level (Grade 12) still struggling to master the subject. In view of this observation, I recommend that the Ministry of Education seriously consider introducing the subject in earlier grades, particularly at grade one level. Such a measure is most likely to have a positive impact on the part of the students as they will be exposed to the subject at an earlier stage and for a longer period. This is the situation with Portuguese language in Mozambique's public education and most of the students do not have problems in learning the subject (Portuguese). This is confirmed by Instituto Nacional do Estatística (2007) which reported that the official and most widely spoken language of Mozambique is Portuguese, spoken by more than 50% of the population, majority of who are students.

Also, from data obtained it was apparent that in Mozambique's public education system, most of the English teachers are either under-qualified (85 %) or forced by their superiors (60 %) to teach the subject even if it is outside their area of specialization. This is mainly because of lack of qualified teachers in the country (see Rambe & Mawere, 2011) to teach English in public schools. That said, it appears more convincing in the context of Mozambique to recommend that the country invest in teacher training and hire qualified teachers from neighboring countries such as Tanzania, South Africa, Zimbabwe and Malawi to boost English teaching and learning. As part of teacher training, the Ministry of Education and Culture can conduct annual workshops for English teachers in their respective provinces to ensure that teachers are constantly equipped with the necessary English teaching skills. From a critical and reflective perspective as well as drawing from my professional experience in Mozambique, it is a truism that poorly qualified teachers always compromise the quality of education and in particular that of the products (students) in the country. As Khin and Fatt (2010, p. 2) articulate, in the reflective-practitioner approach, a researcher draws on "personal experiences, a personal story of his [sic] development as a heuristically critical reflective practitioner [and] search [es] into his past so that he can account for his values and actions in the present." Thus, my recommendation draws primarily on the findings of this research and my professional development journey, stock of practical knowledge of the educational terrain, personal reflections and experiences as a researcher and educator in Mozambican public and private schools and universities for many years.

In addition to the two recommendations given, I propose close collaboration between education stakeholders (students, guardian/parents and teachers) to ensure commitment, hardworking and the development of self-discipline in children. This is to say that even if English is to be introduced at a lower level (grade one) and qualified teachers are provided, quality education that embraces ethical practices and high levels of comprehension of students in a fragile post-conflict landscape such as that of Mozambique can only be achieved if all stakeholders work together as a team. This will help to foster high level of comprehension of the English as a subject and critical literacy as a necessary tool for learners. Critical literacy is crucial in education as it "helps teachers and students expand their reasoning capacities, seek out

multiple perspectives, and become active thinkers” (McLaughlin & DeVogd, 2004, p. 52) who seek practical solutions to the problems at hand. Rambe and Mawere (2011, p. 45) argue that “in contexts like Mozambique with high teacher-student ratios, limited deployment of teachers in resources constrained communities and limited training of educators, the use of critical literacy practices to overcome poor quality educational delivery cannot be over emphasized”.

CONCLUSION

The arguments and recommendations put forward in this paper have been primarily drawn from data obtained during research and my professional development journey, personal reflections and experiences as a researcher and educator in Mozambique. Statistics have shown that majority (85 %) of the respondents agree that English teaching in Mozambican schools is poor as some teachers are under-qualified to teach the subject. An even larger percentage (90 %) reported that most of the teachers use either local language or Portuguese to teach English which in turn limits the learner’s participation and exposure to the subject. It therefore appears that the call for qualified teachers in Mozambican schools to replace and further train those currently holding these positions is a worth considering recommendation.

More importantly as part of my concluding remarks, this study acknowledged that the teaching and learning of English in Mozambique still desires that more should be done. However, there are divergent opinions and no consensus as to what exactly should be done. The momentum for these divergent perceptions has to a larger extent, been predicated on Mozambique’s unfortunate tumultuous history of colonialism and civil war, mounting international debts, crippling poverty levels and lack of adequate training of teachers. Another impetus for the divergent perceptions is predicated on the disagreement on whether English language teaching should be prioritized at the expense of local or “indigenous” languages or accorded the same status as other school subjects. A significant percentage (60%) of the respondents for example reported that most students think that English is less important to other subjects studied at school. Yet the fact that not all respondents participated in the present study subscribed to the same view on what exactly should be done on the question of English teaching and learning in Mozambican schools illustrates the complexity of the issue at hand. Overall, the teaching and learning of English in Mozambican schools remain an issue deserving further serious research in all corners of the country in order to identify the best possible course of action to take.

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Evaluation of Teacher Factors Associated with Mathematics Performance in Primary Schools in Kenya

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Abstract

The focus of this study was to investigate teacher-related factors associated with performance in mathematics in public day primary schools in Nandi Central district, Kenya. Seventy-four (74) mathematics teachers participated in the study. Stratified, random, and purposive sampling techniques were used to obtain the samples for the study. Data collection was done using questionnaire which had been validated and subjected to a pilot study to establish its reliability. Each subscale of the questionnaire yielded a Cronbach's alpha reliability coefficient of 0.60 and higher. The study employed the descriptive statistics and inferential statistic (t-test) to analyze gathered data. The study revealed that the majority of mathematics teachers in Nandi Central district public day primary schools were trained with a teaching experience of between 11–20 years. However, they gave an average rating on the mathematics teachers' use of learning resources, teaching methodology, teacher preparation, commitment, and assessment and evaluation. Further, teachers in high performing schools rated the attitudes toward mathematics, teaching methodology, commitment, preparation, and use of learning resources, evaluation and assessment higher than their counterparts in the low performing schools. Future research ought to link research on teacher preparation with teacher induction with professional development.

Keywords: Performance, mathematics, learning resources, attitude, teacher preparation, Kenya

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INTRODUCTION

Mathematics study has long been recognized worldwide as important in the understanding of other subjects like chemistry, biology, and physics. Salau (2000) points out that there exists an impregnable link between mathematics and other science subjects. For example, the teaching of practical aspect of chemistry can hardly be achieved without the knowledge of mathematics. He concludes that there is a relationship of mathematics' ability on students' overall outcomes. That is to say, a student who is performing well in mathematics is most likely to have high scores in overall outcomes.

In Kenya, mathematics is a prerequisite subject to many advanced careers like medicine, pharmacy, and other business courses (accounting, finance, and banking). One has to score high in mathematics for him or her to be allowed to pursue any of the above careers (University of Nairobi, 2008).

According to Baldachino and Farrugia (2002), the quality of education cannot be seen or improved by simply providing physical resources like books, extending duration of learning, training more teachers and providing other learning resources, but by teachers interpreting the learning to the pupils and appropriately using teaching and learning approaches. It is the teacher who has to establish the right climate for learning, use learning resources and appropriate teaching methods to attainment of mathematical greatness (Baikie, 2000).

Onwuakpa and Nweka (2000), state that mathematics learning largely depends on the teacher. The job of a teacher is to impart knowledge, skills, attitudes and mathematical concepts into the learner. To achieve this, teachers are advised to give assignments, projects and tests to their pupils and discuss the results with them.

Performance in mathematics has remained of a global concern. Studies conducted by American Institute for Research (AIR) to investigate mathematics performance on USA students – 4th and 8th grades as compared with their peers around the world and another by National Assessment of Education Progress (NAEP) assessed the progress in mathematics of students in grades 4, 8, and 12. The results showed that grade 4 pupils performed below the average mark consistently from 1996-2007. The survey also revealed that teachers are the major cause of poor mathematics performance in the US (AIR, 2007). In another study, Schmidt et al. (2002) found out that teachers in USA follow text books which are too wide because publishers produce elementary mathematics text books that cover a variety of topics so that they can sell in different states. As a result, teachers do not develop in their pupils a deep conceptual understanding of mathematics topics and their application (Schmidt, Houang, & Cogan, 2002).

According to Opolot-Okurut et al. (2008), the public in Uganda continues to decry the poor performance of pupils in national mathematics examination. In his study at Makerere University, Opolot-Okurut investigated factors that hinder pupils' opportunities to learn mathematics in primary schools. The findings revealed that 83% of the factors that hinder mathematics' learning are teacher-related factors, which include: poor teaching methods, lack of teaching experience, teachers' weak academic background, poor teacher attitudes towards mathematics, and lack of a continuous professional development.

According to Prof. Kiptoon, former Permanent Secretary in the Ministry of Education, the poor performance in primary mathematics is largely caused by teachers (MoEST, 2001). He claims that most teachers teaching the subject are unskilled, incompetent, and lack expertise. This is the reason why the government in 2001, through the Ministry of Education, introduced a distance learning course called 'School Based Teacher Development' to improve primary school teachers. The aim of the course was to help teachers understand how pupils learn mathematics and to equip teachers on how to provide support for their pupils' learning of mathematics (MoEST, 2001)

Ngirachu (2010), in an article entitled "*Children troop to school, but still illiterate*" featured in the *Daily Nation* of Friday, April 23, 2010, reported a study that was conducted by a team of researchers from Kenyatta University and non-governmental organization called *Uwezo*, which covered 70 districts. This study interviewed 40,386 pupils and revealed that "one out of 10 standard eight pupils could not solve a class two mathematical problem, 30% of class five failed the same sum, and 20% of class two were able to solve it.

The *Standard Newspaper* on Thursday, 26th August 2010, in an article entitled "*Some teachers weaker than their pupils*," reported a study that was conducted by African Population and Health Research Centre (APHRC, 2010). The report pointed out that teachers who were supposed to impart knowledge to the students could be the source of poor performance in mathematics. The organization tested mathematics skills in a study covering 72 primary schools, 2,437 pupils and 211 teachers. The results indicated that the average score was 60% for teachers and 46% for pupils, with some teachers scoring as low as 17% (pp. 1-4).

In Kenya, poor performance in mathematics at Kenya Certificate of Primary Education (KCPE) has been and still is a subject of much debate among politicians, teachers, parents, educational experts, and other stake holders. In the year 2005, 671,417 pupils sat for KCPE exam in Kenya, and the mathematics raw mean was 46.9%. In the year 2006, 660,531

pupils sat for the exam and the mathematics raw mean was 53.94%, while in the year 2007, 698,364 pupils did the exam and obtained a percentage raw mean of 49.24% (Ministry of Education, 2010)

Nandi Central District registered 4,779 candidates for the year 2009 KCPE and mathematics mean score was 52.71. In 2008, 4,673 candidates were registered and they attained a mathematics mean score of 53.27, while in the year 2007, 4,566 candidates sat for the exam, and attained mathematics mean score of 53.25%. In 2006, there were 4,398 candidates and they got 53.78%, and in 2005, 4,269 pupils sat for the exam and obtained a mean score of 52.49. This is an indication that mathematics is poorly performed in the district (DEO, Nandi Central, 2010).

It was therefore necessary to assess and compare teacher factors associated with primary school pupil's performance in mathematics in order to discover whether there exist any differences between the ratings of teachers' variables in high and low performing primary schools in Nandi Central District.

The following null hypothesis was tested: There is no significant difference between the evaluation ratings of mathematics teachers of high performing schools and low performing schools in Nandi Central District in each of the following teacher-related variables:

- Teacher attributes (attitudes and commitment)
- Teacher preparations
- Teachers' use of learning resources
- Teaching/instructional strategies
- Evaluation/assessment methods

THEORETICAL FRAMEWORK

This study was guided by the social constructivism theory, a theory that was developed by Vygotsky and Wood (1998). According to Jonassen (1999), constructivism is a synthesis of multiple theories diffused into one form. It is the assimilation of both behaviorists and cognitive ideals. The constructivist stance maintains that learning is a process of constructing meaning; it is how people make sense of their experience. Jonassen (1999) further observes that constructivism is a learning theory that gives teachers another perspective to rethink how students learn and to focus on process and provide ways of documenting change and transformation. It also reminds teachers to look for different ways to engage individual student, develop rich environments for exploration, prepare coherent problem sets and challenges that focus the model building effort, and elicit and communicate student perceptions and interpretations.

In his theory, Vygotsky observed that when children were tested on tasks on their own, they rarely did as well as when they were working in collaboration with an adult. It was by no means always the case that the adult was teaching them how to perform the task, but that the process of engagement with the adult enabled them to refine their thinking or their performance to make it more effective. Hence, for him, the development of language, arithmetic and articulation of ideas was central to learning and development (Atherton, 2010).

The theory is considered to be related to the teaching and learning to a large extent. Constructivism is not a specific pedagogy, but it has a wide ranging impact on learning theories and teaching methods in education. The constructivism view involves two principles. First, knowledge is actively constructed by the learner, not passively received from the environment. Knowledge is a changing body not fixed. Secondly, knowledge is internalized by learners in a social atmosphere, combining previous experience and contribution from all members in the social group (teachers and peers). Knowledge is formed by the process of combining experience and previous learning with ideas presented to the learner by instructors (Atherton, 2010)

Social constructivism views learners as unique individuals with unique needs and background, a complex and multidimensional. It acknowledges not only the uniqueness and complexity of the learner, but also encourages, utilizes and rewards it as an integral part of the learning process (Wertsch, 1997).

According to constructivism view on teaching resources in mathematics, mathematics systems are learned throughout the learners' life as he/she interacts with knowledgeable members of the society (Wertsch, 1997). The learner, according to Von Glaserfeld (1998), should be actively involved in the learning process, not the traditional method where the instructor is to teach and the learner play a passive, receptive role. All senses should be utilized in the learning process.

In the constructivist classrooms' methodology, the teachers' role is to prompt and facilitate learning. The main teacher focus should be on guiding pupils by asking questions that will lead them to solve a given problem by their own. The learning environment should be designed to support and challenge the learners' thinking (Jonassen, 1999).

According to Doolittle and Camp (1999), teaching students to learn in a constructivist methodology requires consideration by the teacher. Teachers serve as guide or facilitators of knowledge, learning environment should be authentic, lessons should be relevant to students, and they should be encouraged to reflect upon what they learn and be encouraged to be reflective and finally be evaluated to discover their future educational needs.

LITERATURE REVIEW

Teacher Commitment

Numerous authors and researchers agree that teacher commitment is central to the work of teaching and functioning of education system. Elliott and Creswell (2002) argue that teacher commitment and engagement have been identified as amongst the most critical factors in the success and future of education. It contributes to teacher's work performance, absenteeism, burnout, and turnover as well as having an important influence on student achievement.

Becker (1999) defines commitment as the investment in a particular career, in this case, teaching. Lortie (1995) regards commitment as the willingness an individual enacts in investing personal resources to the teaching task. Nias (1991) looks at teacher commitment like an organizational commitment, which is conceptualized as being multidimensional.

Joffress et al. (2006) wrote that teachers' commitment is a crucial factor to an effective school, teacher satisfaction, and retention. They claim that low levels of teacher commitment results into decreased student achievement tests, than in areas where teachers were found not to be committed to their responsibilities, learners performed poorly. It is important to note that teachers' commitment to their duties is quite significant to pupils' performance. Committed teachers tend to produce good results at national examinations. Woods in Truman et al. (2008) in the study entitled "*primary teacher commitment and attractions*," claims that teacher commitment takes three forms, with the most important one being professional commitment. They argue that a professionally committed teacher rates their teaching abilities very highly and are committed to their professional advancement.

Day, Elliott, and Kingston (2005) argue that there are different forms of commitment to teaching. According to them, the nature and intensity of commitment to teaching depends on factors derived from personal and professional lives. Commitment is a word they use to distinguish those who are caring, dedicated, and who take their job seriously from those who put their own interest first. The professionally committed teachers take their job seriously and they get enjoyment from it (Elliott & Crosswell, 2001).

It is believed that teacher commitment decreases progressively over the course of their career (Frazer et al., 1998). At the beginning of the teacher's career, Frazer argues that teacher's commitment is associated with professional identity, followed by a stage of experimentation and research for new challenges. Thus, transition from an enthusiastic engagement with the profession to a more limited involvement reduces teacher's classroom practices and engagement. Joffress, et al. (2006), in a study entitled "*elementary teachers' commitments decline*," found that teachers who served in rural schools for more than six years reported a high level of commitment to teaching which appears to increase as teaching experience increases.

Nias (1991) and Tyree (1996) wrote that teachers who are committed are those who see their students' welfare; they care for, responding to, and meeting students' needs. They strived to improve on their practice and look at pedagogies and research. They also talk and listen to their children, at the same time they work as a team with others, appropriately prepared for their lessons, and are reflective practitioners. Another view shared by committed teachers is that teaching is not just a job. Teachers invest their personal time even outside school contact hours. They have made teaching as a lifestyle. They often contemplate on their class programs and students while engaging in a range of personal activities like in shower, shopping, or watching television (Tyree, 1996).

Teacher Beliefs and Attitudes

Beliefs are defined as personal constructs that provide an understanding of a teacher's practice. Perry and Howard (1999) argue that the pedagogy used in the classroom is determined by the philosophies the teacher holds about mathematics. That is to say, the teacher's belief about mathematics has great impact on the teaching of mathematics and learning of mathematics in the classroom. Cobb (1996) argues that teacher beliefs about mathematics and the learning of mathematics impinge on students' beliefs and goals within the subject area. This shows that teacher beliefs and attitude about mathematics largely shapes the pedagogy they use hence the response they obtain from their students.

Charalambos, et al. (2002) and Ernest (2000) argue that teachers' beliefs about mathematics *have* a powerful impact on the practices of teaching. A teacher with negative beliefs about mathematics influences his or her learners negatively, whereas the learners of teachers with positive beliefs about mathematics enjoy and successfully perform in mathematics. They conclude that what goes on in the mathematics classroom is directly related to the beliefs teachers hold about mathematics. Researchers like Askew et al. (1997) and Beswick (2007) agree to that teacher beliefs such as nature of mathematics and the capacities of their students to learn mathematics influence their practices in teaching the subject. If a teacher has a positive belief that his or her students will achieve in the subject, definitely he will influence higher achievement. At the same time, if his feelings about the subject are negative – that mathematics is hard, definitely he will impact the same to his/her learners.

Other researches claim that teacher beliefs relate to teacher classroom practice (Thompson, 1992; Kagan, 1992). Fang (1996), on the article entitled “*A review of research on teacher beliefs and practice,*” argues that teacher beliefs and attitudes significantly contribute to enhancing educational effectiveness and achievement. A strong positive belief causes higher achievement among students. Relich et al. (1994) observes that a positive teacher attitude contributes to the formation of pupils' positive attitudes. Carpenter and Lubinski (1990) show that classroom strategies used to teach a subject are influenced by teacher attitudes, which in turn influence pupils' attitudes. This implies that teacher attitudes towards the subject actually produce the same attitude on the learner. It is therefore assumed that teachers who hold more learner-centered, socio-constructivist oriented beliefs would translate into their classroom practices greater enthusiasm towards actively engaging their learners in acquiring mathematical concepts and developing mathematical thinkers and problem solvers (Ernest, 2000).

Teacher Experience

You (2009) describes experience as a long period of practice over a period of ten years, or more, an individual who is skilled takes in developing an activity, or mastering a performance. Madsen and Cassidy (2005) claim that research findings have shown that experienced teachers are more critical in their classroom teaching than pre-service teachers. Learners find their course materials given by experienced teachers interesting and meaningful. They find that explanations and activities given in class by this category of teachers are clear.

Clotfelter et al. (2007) performed a longitudinal analysis of a 10-year administrative data set from North Carolina and concluded that teacher experience had positive impact on student mathematics achievement. Klecker (2008), in his research paper entitled ‘*Teacher quality of eight-grade math achievement,*’ presented at the annual meeting of mid-south Educational Research Association, argued that the eighth-grade students who were taught by teachers with 20 and above years of experience had the highest average scale scores.

Teacher Qualification

The No Child Left Behind Act (NCLB) defines teacher-quality variables as:

(1) the highest academic degree, (2) type of teaching certificate, (3) major/minor in mathematics, and (4) number of years a teacher taught mathematics (NCLB, 2002). Klecker (2008) conducted a study using a secondary analysis of the 2007 National Assessment of Educational Progress (NAEP). Results were reported in terms of statistical significance. This study found out that an eighth-grade mathematics teacher is more effective with (1) either a major or minor in mathematics, (2) a professional degree, (3) a regular/standard teaching certificate, and (4) with 20 and above years of experience in teaching mathematics. The teacher quality variables had an impact on the average scale scores of the student academic performance.

Teacher knowledge of mathematics is pivotal to their capacity to provide effective mathematics instruction and to their ability to access students' learning (Ball et al., 2005). The National Council for the Teaching of Mathematics (NCTM, 2000) makes it clear that teachers need knowledge about the important ideas that are central to their grade level. The measurement of teacher knowledge of mathematics has been a problem occupying researchers for several decades but they sort to use characteristics of teachers and their educational background. Other studies sought to focus on pedagogical content knowledge of teachers (Begle, 1999).

Rowan and Ball (2005) refer to mathematics knowledge for teaching as knowledge that is specific to the profession of teaching and is closely linked to student achievement. In a study carried by Ball, et al. (2005), on the effects of teachers' knowledge on students' achievements, the results showed that teachers who scored higher on mathematics knowledge also produced better gains on student achievements. That is, their students achieved good grades than their counterparts who scored low on mathematics knowledge.

Goldhaber and Brever (2000) found out a positive relationship between this variable with higher levels of performance among students whose teachers held a bachelor's or master's degree in mathematics than among those whose teachers were out of field. They found out that those students whose teachers were certified in mathematics but did not hold post-secondary degree mathematics did not perform as well as students whose teachers held post-secondary degree mathematics. Ball et al. (2001) argue that mathematics instruction is effective through the use of reform ideas, using strategies and all depend on teachers' knowledge of mathematics. Darling-Hammond (2001), in his study relating to teachers' preparedness and effectiveness, found that teachers who are fully prepared through teacher education and licensing were more effective in their fields than those teachers who did not have much professional education. Wilson, et al. (2002) reported in their study that students of certified mathematics teachers scored higher on certified test than those of uncertified teachers.

Teacher Preparation

Armstrong, et al. (2009), indicates that in order to provide quality learning experience for all students, lessons must be well planned and prepared effectively. They describe responsibilities and characteristics of the 21st century teacher as: matching instructions and programs to learner's characteristic, conducting task analysis to identify an appropriate beginning point, and a logical sequence for instruction, specifying learning intentions. Lessons should be well prepared to suit the learners' capabilities and interests. Lessons must stimulate learners to want to learn the new information. Armstrong, et al. (2009) further confirms that as one plans for a group of learners he/she needs to engage in what is called "task-analysis activities." Task analysis requires that one takes the content that is to be taught and first, identify the desired results from learning of the content; secondly, break the content into smaller components or sub- tasks that logically build towards the desired results; and finally, define appropriate teaching approaches for each of the components and specify lesson objectives.

Once task analysis has been done satisfactorily, then follows lesson presentation. Effective lesson presentation, according to Armstrong, has several key elements that include stimulating and maintaining of interest. Content presented should interest and motivate individual learners. The teacher has to use a variety of approaches to motivate learners. Variety is essential because each learner's needs are unique. Motivation should be at the beginning of the lesson, during learning sequence, and finally, at lesson conclusion. Finally, on sequencing of lessons, a lesson presentation follows a logical sequence. Information is presented in an organized manner, regularly checking pupils' understanding, providing an opportunity for practice, giving frequent feedback, and concluding lessons by reviewing main points (Armstrong et al., 2009). Planning is a requirement for any program to succeed. A plan is an arrangement or a method for doing something. It is a future intention to act in a certain way in order to achieve set objective. It is a process of arranging and organizing how to do something carefully in advance (MoEST, 2001).

A scheme of work is a key planning document for all teachers. It is a personal plan to cover the syllabus, taking into account variables like time allocation, pupils' ability levels, and pupils' previous experience, available resources and putting content in a logical sequence. Other considerations involved in planning the scheme of work include scope to be covered, sequence, objectives, learning activities, learning resource and evaluation. Learning activities refer to the experience you give learners to support the learning of mathematics. They should be well thought out and planned in advance. The activities should be varied involving the child in a practical work, watching demonstration and problem solving and reinforcement activities. Mathematics lesson plan is a short, carefully developed and written outline designed to help the teacher achieve the objectives of a specific topic, skill, or idea (MoEST, 2001).

Indimuli et al. (2009) claimed that teacher preparation is vital for effective teaching and learning process. Effective teaching include: preparation, implementation, and evaluation. In preparation, they said that the teacher refers to the syllabus so as to make the scheme of work and lesson plans. In implementation, the teacher is involved in the actual teaching of the content, class management and uses teaching/learning materials to achieve the specified lesson objectives. Evaluation is administered in form of continuous assessment, and end-of-course examination.

They further describe teacher preparation to include class management. They define class management as involving the creation of a stimulating learning environment in which effective teaching/learning can take place. In order to achieve this, they say that it is advisable to consider grouping of pupils, observing class routine and class organization. On classroom organization, they say that seating arrangement needs to be done in groups. At the same time equipments specific to mathematics lessons should be placed in positions which are easily accessible (Indimuli et al., 2009).

Assessment/Evaluation in Mathematics

Accurate assessment of students' academic abilities has been identified as one of the most crucial variables related to effective instructional planning and positive student outcomes (Shinn, 1998). It has been argued that without a valid assessment of students' academic skills, instructional decision making is unlikely to promote academic competence (Martens & Witt, 2004). According to Stiggins et al. (2007), there are two kinds of assessment during instruction: assessment for and assessment of learning. Assessment for learning involves use of homework assignments, quizzes, and self assessment drafts. This kind of assessment is child centered and gives the learner an opportunity to find information about areas of strengths and areas of further learning. Assessment of learning is a periodical assessment like midterms and final examinations which are teacher centered and judgmental for they are meant to inform the final grade of the learner.

Stiggins et al. (2007) further described four fundamental questions that instructors (teachers) need to address whenever he/she plans for what they call accurate assessment and effective use which include the purpose of assessment, the learning target, the assessment methods and the ways of reporting the results. Ballard and Johnson (2004), in their educational research on mathematics assessment, confirmed that frequent quizzes do yield benefits. They compared test results of students who were exposed to quizzes with a control group who experience no quizzes. They found significantly higher scores for students who experienced quizzes and concluded that frequent quizzing influences learning performance. The mean scores for these students were significantly higher than for students in the control group who experienced no quizzes.

MoEST (2001) describes how assessment helps a teacher. A teacher is able to identify pupils' achievement, pupils' needs, weaknesses, and strengths. A teacher can carry out assessment either informally or formally. Informal assessment involves listening to pupil's explanations, demonstration or questioning pupils deliberately, while formal assessment is timed, marked and invigilated by external person. According to Indimuli et al. (2009), evaluation is a process of determining the extent to which the stated educational objectives are being achieved. Evaluation is done in order to: identify the knowledge, skills and attitudes that pupils have acquired, find out weaknesses and strengths of teaching strategies and learning resources used, motivate pupils as they prepare for a test or examination, help pupils to know their progress in specific areas, and provide a basis for promoting pupils from one level to another.

METHODOLOGY

This study employed causal-comparative and descriptive research designs. Causal-comparative research design is a non-experimental research method that provides better evidence of cause and effect relationship. According to Gay (2006), causal-comparative research design determines reasons or cause for the current status of the phenomena under study. Descriptive research design attempts to collect data from members of a population in order to determine the current status of that population in respect to one or more variables. According to Gay (2006), descriptive research determines and reports the way things are. It is intended to produce statistical information about aspects of education that interest policy makers and educators. It involves collecting numerical data to answer questions about the current status of the phenomena under study.

Descriptive method was used because it can tell what actually exists and helps to record, analyze, and interpret the current status (Mugenda & Mugenda, 2003) of the variables. The causal-comparative method was used in order to describe how teachers and pupils in each category of schools may differ in their evaluation of teacher-related factors hypothesized to be associated with performance in mathematics.

Population

The population in this research comprised of the mathematics teachers of public primary schools in Nandi Central district. In Nandi Central, there are 129 public day primary schools with about 640 mathematics teachers. The mathematics teachers were targeted because they were involved in the actual teaching and guiding the learning of mathematics in schools. They are responsible for planning and implementing the process of teaching of mathematics in schools.

Sample and Sampling Techniques

To obtain the desired sample in this study, purposive, stratified, and simple random sampling techniques were used. For the purpose of the study, the researchers chose to study public day primary schools. The researchers obtained a list of KCPE Examination analysis from the DEO for the last 5 years. They stratified them into two groups-high performers and

low performers. There were a total of 18 high performing schools and 31 low performing schools. The researchers obtained 30% of 49 schools to constitute a sample of 14 schools, seven from high performers which have maintained top position for the last five years and seven bottom low performers. The high performing schools in this study comprised of schools which had maintained a mathematics percentage mean score of above 60% and low performers being those schools which had scored a percentage mean score of below 50% in the K.C.P.E for the last five years. The KCPE mean percentages for each school are shown in Table 1.

Table 1: *Mean Percentages in KCPE (2005-2009)*

School Code	High Performing	Low Performing
1	67.4	39.8
2	64.2	45.3
3	69.7	38.2
4	66.1	46.3
5	70.1	40.9
6	71.4	37.7
7	64.9	46.0

Since only 14 schools were under investigation, all mathematics teachers were involved in responding to the questionnaire; thus thirty eight (38) teachers from high performing schools and 36 from low performing schools participated.

Research Instruments

A Self-constructed questionnaire was used to collect data from mathematics teachers. The questionnaire had the following items: teacher attitudes, methods of teaching, use of learning resources, teacher commitment, and assessment and evaluation using the four-point scale of (4) Strongly agree (3) Agree (2) Disagree, (1) Strongly disagree (1) as well as (4) Often (3) Sometimes (2) Rarely (1) Never. The teachers circled the appropriate number to indicate their agreement or disagreement to the given statements.

To verify the instruments for content and face validity, the researchers consulted with a working group of scholars at the School of Education, University of Eastern Africa, Baraton. Content validity here is the degree to which the content of the instrument really measures teacher factors associated with performance in mathematics. Face validity refers to the likelihood that a question will be misunderstood or misinterpreted which was done by pre-testing the questionnaire and amending by deleting the ambiguous items as advised (Fraenkel and Wallen (1996).

Reliability of Research Instruments

Cronbach’s alpha coefficient was employed to determine the internal consistency of the instrument. This is based on the relationship among the scores derived from the individual items or subsets of items within a test (Ary, Jacobs, & Razavieh, 2002). A computed alpha coefficient varies between 1 (denoting perfect internal consistency) and 0 (denoting no internal consistency).

A pilot study was carried out in a neighboring district. The questionnaires were administered to 20 mathematics teachers from four schools. The reliability coefficient for each section of the questionnaire addressing different variables was computed based on the responses of the teachers. The cut-off value for the reliability coefficient was set at 0.60. The sub-scales that had reliability coefficients lower than 0.60 had statements that were deleted. In the sub-scales on teachers’ attitude and teaching methodology, one statement each was deleted, while in the sub-scale on teachers’ use of learning resources, one statement was modified. The reliability coefficients were re-computed using the data in the final study and the new reliability coefficients were determined as shown below.

Table 2: Cronbach's Alpha Reliability Coefficients

	Original	*Modified/Recomputed
Teachers' attitude	0.770	
Teaching methodology	0.516	*0.828
Teachers' use of learning resources	0.659	
Teacher commitment	0.667	
Teacher preparation	0.776	
Assessment and evaluation	0.739	

*Reliability coefficients after selected statement was deleted or modified and re-computed.

Data Gathering Procedures

After the establishment of the reliability of the instruments, the researchers secured permission from the National Council of Science and Technology, Ministry of Education to collect data from the teachers of public day primary schools. Also, a letter from the District Education Office (DEO) of Nandi Central District was solicited to introduce the researchers to the sampled schools in the district.

The researchers started to collect data from the concerned schools from April 13, 2010. The head teachers introduced the researchers to the teachers, requesting them to fill the questionnaire. The researchers assured the teachers that their responses were for purposes of research and would be treated with strict confidence. Seventy four (74) questionnaires were filled by the teachers.

Statistical Treatment of Data

Inferential statistics (t-test) was used to specifically determine if there was any significant difference between the ratings of mathematics teachers of high performing schools and low performing schools in each of the following teacher-related attributes (commitment, qualification, experience, and attitudes)

- Teacher preparation
- Teachers' use of learning resources
- Teaching strategies/methods
- Evaluation/assessment methods

RESULTS AND DISCUSSION

Comparison on Attitude towards Mathematics

Teachers' Self-evaluation on Attitude towards Mathematics

Table 3 shows the t- test analysis on teacher attitude towards mathematics based on teachers' self evaluation.

Table 3: T-test on Teachers' Attitude towards Mathematics

Group Statistics (teachers' ratings)

	Category	N	Mean	Std. Deviation	Std. Error Mean
Teachers' Attitude toward Mathematics	High-performing	38	3.9737	.09899	.01606
	Low-performing	36	3.4815	.64584	.10764

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Teachers' Attitude toward Mathematics	Equal variances assumed	84.559	.000	4.643	72	.000	.49220	.10602	.28085	.70355
	Equal variances not assumed			4.523	36.558	.000	.49220	.10883	.27160	.71281

The group statistics table revealed that teachers in high performing schools had a mean self-evaluation of 3.9737 while those in low performing schools have a mean of 3.4815. The t-test yielded a t-value of 4.523 with a *p*-value of 0.000, which is less than 0.05, implying that the null hypothesis was rejected, concluding that there was a significant difference between the self-evaluation ratings of mathematics teachers of high and low performing schools in terms of teacher attitude towards mathematics. The mathematics teachers in high performing schools had a more positive attitude toward mathematics than the teachers of low performing schools. As Cobb (1996) states, teacher beliefs and attitude about mathematics largely shapes the pedagogy they use, hence the response they get from the students.

Comparison on Teaching Methodology

Table 4 shows group statistics and independent samples t-test on teaching methodology based on teachers' self-evaluation ratings.

Table 4: *T-test on Teaching Methodology*

Group Statistics (teachers ratings)

Category	N	Mean	Std. Deviation	Std. Error Mean
Methodology High-performing	38	3.6349	.22583	.03663
Methodology Low-performing	36	2.3438	.47615	.07769

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Methodology	Equal variances assumed	21.632	.000	15.289	72	.000	1.29112	.08445	1.12277	1.45946
	Equal variances not assumed			15.031	49.958	.000	1.29112	.08590	1.11859	1.46365

Group descriptive statistics showed that teachers from high performing schools often used teaching methodologies as shown by a mean of 3.6349 as compared to low performing schools which shows that teachers rarely used stated teaching methods as indicated by a mean of 2.34. The t-test yielded a t-value of 15.031 with a *p*-value of 0.000, which implied that the null hypothesis was rejected and therefore there was a significant difference between the self-evaluation ratings of mathematics teachers of high and low performing schools in terms of teaching methodology in mathematics. The mathematics teachers in high performing schools agreed more on the use of teaching strategies reflected on the questionnaire than their colleagues from low performing schools.

Comparison on Teachers' Use of Learning Resources

Table 6 shows the t- test analysis on teachers' use of learning resources in mathematics based on teachers' self-evaluation.

Table 6: *T-test on Teachers' Use of Learning Resources*

Category		N	Mean	Std. Deviation	Std. Error Mean
Use of Learning Resources	High-performing	38	3.4895	.21659	.03514
	Low-performing	36	2.0556	.38429	.06405

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Use of Learning Resources	Equal variances assumed	6.904	.011	19.909	72	.000	1.43392	.07202	1.29034	1.57750
	Equal variances not assumed			19.628	54.562	.000	1.43392	.07305	1.28749	1.58035

The group statistics table reveals that high performing school teachers sometimes used learning resources in mathematics as indicated by a mean of 3.489 while teachers in low performing schools rarely use learning resources in mathematics as shown by a mean of 2.0556. This suggests that teachers in high performing schools used teaching resources more often than the low performing schools. The t-test yielded a t-value of 19.628 with a *p*-value of 0.011, which implies that we rejected the null hypothesis and therefore, there was a significant difference between the self-evaluation ratings of mathematics teachers of high and low performing schools in the use of learning resources. The mathematics teachers in high performing schools often used learning resources reflected on the questionnaire than their colleagues from low performing schools.

Comparison of teacher commitment

Table 7 shows the t- test analysis on teacher commitment in mathematics based on teachers' self-evaluation.

Table 7: *T-test on Teacher Commitment*

Category		N	Mean	Std. Deviation	Std. Error Mean
Teacher Commitment	High-performing	38	3.8684	.20843	.03381
	Low-performing	36	2.3810	.42653	.07109

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Teacher Commitment	Equal variances assumed	22.766	.000	19.217	72	.000	1.48747	.07740	1.33317	1.64177
	Equal variances not assumed			18.896	50.197	.000	1.48747	.07872	1.32937	1.64557

The group statistics table revealed that high performing school teachers are often committed as shown by a mean of 3.8684 while the low performing schools are rarely committed as shown by a mean of 2.381. The t-test yielded a t-value of 18.896 with a *p*-value of 0.00 which implies that the null hypothesis was rejected indicating that there is a significant difference between the self-evaluation ratings of mathematics teachers of high and low performing schools in teacher commitment. The mathematics teachers in high performing schools are often committed than their colleagues from low performing schools.

Comparison on Teacher Preparation

Table 8 shows the mean comparison (group statistics and independent samples t-test) on teacher preparations based on teachers' self-rating.

Table 8: *T-test on Teacher Preparation*

Group Statistics (Teachers' Ratings)

Category		N	Mean	Std. Deviation	Std. Error Mean
Teacher Preparation	High-performing	38	3.8070	.27544	.04468
	Low-performing	36	1.6389	.61914	.10319

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Teacher Preparation	Equal variances assumed	22.780	.000	19.638	72	.000	2.16813	.11040	1.94804	2.38821
	Equal variances not assumed			19.281	47.767	.000	2.16813	.11245	1.94201	2.39425

It is noted that teachers from high performing schools often prepared before going to teach than teachers in low performing schools as supported by a mean of 3.8070 and 1.6389, respectively. The t-test yielded a t-value of 19.281 with a *p*-value of 0.00, which implies that we reject the null hypothesis and say that there was a significant difference between the self-evaluation ratings of mathematics teachers of high and low performing schools on teacher preparation. This finding is supported by Armstrong et al. (2009) who wrote that in order to provide quality learning experience for all students, lessons must be well prepared and planned effectively. He wrote that the 21st century teacher has to specify his objective for the lesson well, conduct task analysis and match instructions to learners' characteristics. Indimuli et al. (2009) also agrees that teacher preparation is vital for effective teaching and learning process. Effective teaching involves preparation, implementation and evaluation of lessons (Indimuli et al., 2009).

Comparison on Assessment/Evaluation

Table 9 shows the comparison of means on evaluation and assessment based on teachers' self-rating.

Table 9: *T-test on Evaluation and Assessment*

Group Statistics (Teachers' Ratings)

	Category	N	Mean	Std. Deviation	Std. Error Mean
Assessment and Evaluation	High-performing	38	3.7368	.18072	.02932
	Low-performing	36	1.9667	.33295	.05549

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Assessment and Evaluation	Equal variances assumed	15.752	.000	28.630	72	.000	1.77018	.06183	1.64692	1.89343
	Equal variances not assumed			28.205	53.334	.000	1.77018	.06276	1.64431	1.89604

The group statistics table reveals that high performing school teachers often used assessment and evaluation as shown by a mean of 3.7368 while the low performing schools rarely used assessment and evaluation as shown by a mean of 1.9667. The t-test yielded a t-value of 28.205 with a *p*-value of 0.00 which implies that we reject the null hypothesis and conclude that there was a significant difference between the self-evaluation of mathematics teachers of high and low performing schools on assessment and evaluation. The mathematics teachers in high performing schools often use assessment and evaluation than their colleagues from low performing schools. Accurate assessment of students' academic abilities has been identified as one of the most crucial variables related to effective instructional planning and positive student outcome. Without a valid assessment of students' academic skills, instructional decision making is unlikely to promote academic (Shinn, 1998; Martens & Witt, 2004; Stiggins et al. 2007).

CONCLUSIONS AND RECOMMENDATIONS

From this study, it was noted that mathematics teachers in Nandi-Central District public primary schools have a positive attitude toward mathematics. Mathematics performance in those schools where the teachers were committed to their duties, had positive attitude towards mathematics, prepare well before going to teach, used plenty of teaching relevant resources, and engaged their pupils through evaluation and assessment. The effectiveness of mathematics teachers should be enhanced in areas relating to teaching strategies such as use of clear questioning technique, creation of an effective climate for learning, planning for individual child's interests, being a reflective practitioner, encourage practical teaching in mathematics and inquiry learning styles.

On assessment and evaluation, mathematics teachers should be encouraged by Quality and Standards Office to make use of quizzes and tests to give pupils an opportunity to practice what they have learnt. Frequent exercises, assignments, home works and projects help to develop deep understanding of mathematics ideas and concepts. Teachers' commitment is vital in the teaching and learning of mathematics. All mathematics lessons have to be attended, punctuality in mathematics should be enhanced, and workbooks are promptly marked and returned to motivate pupils' interest in the subject.

The following points will be found useful by any mathematics teacher. First, learning to do mathematics in school, given the ways in which it is typically taught, may not equip even the successful student with adequate or appropriate knowledge of *or* about mathematics. Second, knowing mathematics for oneself may not be the same as knowing it in order to teach it. While tacit knowledge may serve one well personally, explicit understanding is necessary for teaching. Finally, subject matter knowledge does not exist separately in teaching, but shapes and is shaped by other

kinds of knowledge and beliefs. Further, some future research ought to link research on teacher preparation with teacher induction with professional development.

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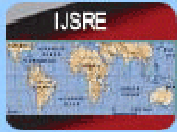
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Theory Vs Practice: The Case of Primary Teacher Education in Botswana

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Abstract

This study investigated the perceptions of pre-service or student teachers regarding their teacher education program. Data was collected through in-depth semi-structured interviews with 17 pre-service student teachers in one primary college of education in Botswana. In addition, there was an analysis of documents from the Ministry of Education and Skills Development that outlined how the training of pre-service teachers should be run. Participants indicated that they spend too much time learning/exploring theory and less time of hands on experience. Research has also shown that teacher educators overemphasize theory and focus less on practice in the preparation of pre-service teachers. The study results indicated that student teachers are taught too much theory and did less of teaching practice. Pre-service teachers should be given more time to do teaching practice and less time on content, as they need the application skills more than they need the content. Based on the findings in this study, it is recommended that the Tertiary Education Council in Botswana should revise the teacher education training program and to reconsider increasing the amount of time for teaching practice for the pre-service teachers.

Keywords: Teaching practice, theory and practice, pre-service teachers, Botswana, teacher education.

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INTRODUCTION

Teachers in any society play a vital role in the development of the individual child. More importantly primary school teachers have a great responsibility for developing a holistic individual. Primary education lays the basic foundation for all other levels of educational development. It is a pre-requisite for higher education. According to Great Education (2009), “Elementary education should be given the highest priority because this is the children’s stepping-stone for them to pursue higher goals. Elementary education will serve as their primary weapon against illiteracy. Elementary education is no doubt of extreme importance, as everything a child learns in these early days is built on as they get older” (p. 3).

The importance of primary education is further supported by the National Commission on Education Botswana (NCE, 1977) that “primary education is the foundation on which further learning is based, and opens up to the young person a range of opportunities for further study and work which are closed to the uneducated” (p. 53). Because primary education is so vital in every person’s life, primary school teachers should be well trained to develop the children physically and mentally. Educationists (McLaughlin & O’Donoghue 1996) noted that “Developing countries have recognized the importance of the quality of primary education for economic development and for the later transmission of technical skills. As a consequence of such recognition, support has been given to the argument that the provision of quality primary teachers should be given priority in the development of the educational systems of developing countries” (p. 23).

As it is clear that primary school teachers have a great responsibility; therefore, their preparation should be more on the practical applications of teaching, that is, hands on experience in contrast to preparation that is focused on theory. The benefits of practical application have been observed by other authors like Kiggundu (2007) that it provides the student teachers the opportunity to integrate theory into practice. Furthermore, Kiggundu and Nayimuli (2009) noted that teaching practice does grant the students teachers “experience in the actual teaching and learning environment” (p. 25).

Historical Development of Teacher Education in Botswana

Education in Botswana, like other African countries, did not begin with the introduction of formal schooling by Europeans. Botswana had their own traditional education which was regarded as “informal education” by the West as it was not documented but passed on from one generation to another by the word of mouth or orally. Another form of education that existed in Botswana before colonialism was the initiation ceremonies. Western people regarded this as informal education since it was also not documented. However, Africans view it as ‘formal because it included some characteristics of Western formal education. Mafela and Mgadla (2000) noted that initiation ceremonies “are labeled ‘formal’ because in their operations they had formal trained instructors, an established time span, place, and content of instruction, which was mostly oral” (p. 2). As the saying in African culture, “It takes a village to raise a child,” “It takes a village to educate a child,” Botswana was no exception. The education of the child was the responsibility of every member of the society. The siblings, parents, initiation instructors, and neighbors were all teachers. Particularly, young boys learned by imitating their brothers, fathers, uncles, and grandfathers while girls learned by imitating their sisters, mothers’ aunts and grandmothers (Mafela & Mgadla, 2000).

When the British through the missionaries came to Botswana (then Bechuanaland) in the 19th Century, they introduced ‘formal’ education which is the Western education. Trained teachers to teach in these newly introduced Western schools were now needed. The British government, which was the colonial power did not intend to spend money in building teacher education institutions. Instead Botswana were taken to the neighboring countries of the Republic South Africa and Zimbabwe (formerly Rhodesia) for training. They trained at Fort Hare College near Cape Town and later, Tiger Kloof College Vryburg, both in the Republic of South Africa. It was in the late 1940’s when Botswana’s first college for training Primary teachers was established in Kanye. A few years later the college relocated to Lobatse. The college offered a programme leading to one of two types of certificates (i. e. two year for junior certificate holders – leading to Primary Higher (PH); and a three year programme for primary certificate holders, leading to Primary Lower (PL) certificate. PL certificate holders were eligible to teach lower primary standards; while PH holders taught the primary upper standards. In 1963 a second primary teacher training college was established at Serowe village. Later in 1969 another was established at Francistown. Even though these primary teacher colleges were established in Botswana, the British government was still unwilling to assist in terms of the curricula (Abosi & Kandjii-Murangi, 1998).

Abosi and Kandjii-Murangi (1998) stated: “To illustrate how unprepared the Colonial Administration was to offer a viable teacher education program, at first they adopted the Basutoland Teacher Training Curriculum and later turned to South Africa Cape Province syllabus. However progressive these curricula, they were not designed for the needs of Botswana children” (p. 24).

As the author, I feel that the education during the colonial period indeed did not address the need of the Botswana as it emphasized the culture of the colonial power and despised the Tswana culture. According to the National Commission on Education (1977) “Botswana were encouraged to believe that their own cultural inheritance was inferior to that imported by the British” (p. 11).

Primary teacher education was indeed of low quality as the student teachers admitted at these colleges were mostly standard seven leavers and junior certificate (Form 3 and later Form 2) failures. As Botswana gained independence, education became a priority for the newly liberated government. The first National Commission on

Education (1977) noted that, “the quality of teaching is the most important influence of the quality of the education provided in schools” (p. 127). To improve the quality of teacher education, the Commission recommended raising the quality of entrants to the teaching profession from junior certificate failures to those who passed junior certificate. This recommendation was further refined by the 1994 revised National Policy on Education thus: The entry qualifications into primary teacher training should be raised to a minimum COSC “O” level and the period of training should be three years. The pilot Diploma programme should be extended to all the primary teacher training institutions so that all future primary teachers will be trained for the Diploma in Primary Education qualification (p. 45)

This recommendation has been achieved as all the four primary teacher colleges are offering the diploma certificate. In addition, the University of Botswana is also offering a Bachelor’s Degree in Primary Education. Botswana Vision 2016 (1997) has confirmed that Botswana has achieved quantity of educational facilities, but is still lagging behind in quality of education.

LITERATURE REVIEW

Teacher education institutions have always been blamed of producing ‘not well trained’ teachers. Rama (n.d) stated that: Teacher education neither addresses the reality that one faces when one begins their career nor presents issues of quality. Most of the programs require the teacher trainees to spend a prescribed number of hours each day on different subjects and to follow text- books in a prescribed sequence-jumping from one chapter to the other within days-in a way that does not really make any sense...overall, our teacher education contributes nothing in developing a good teacher (p. 1).

One may ask what a good teacher education program is. Darling-Hammond (2006) noted that teacher education should consist of a “tight coherence and integration among courses and between course work and clinical work using pedagogies that link theory and practice” (p. 300). This means teacher education should help student teachers apply the theories to teaching practice in classroom settings. According to Darling-Hammond, one of the components that can make a good teacher is to have “extended clinical experiences—at least 30 weeks of supervised practicum and student teaching opportunities in each program” (p. 305). She further noted: “The most powerful programs require students to spend extensive time in the field throughout the entire program, examining and applying the concepts and strategies they are simultaneously learning about in their courses alongside teachers who can show them how to teach in ways that are responsive to learners. Such programs typically require at least a full academic year of student teaching under the direct supervision of one or more teachers who model expert practice with students who have a wide range of learning needs, with the candidate gradually assuming more independent responsibility for teaching. This allows prospective teachers to grow “roots” on their practice, which is especially important if they are going to learn to teach in learner-centered ways that require diagnosis, intensive assessment and planning to adapt to learners’ needs, and a complex repertoire of practices judiciously applied” (p. 307)

According to Gordon and O’Brien (2007), “students must engage in activities that permit them to experience or assimilate the essence of a concept (p. xiii)”. In this view, teaching should promote experiences that require students to become active in their learning process through practical work in classrooms. Winch and Gingell (1999) supported this view thus “educators should enable students to engage fully in the world and find a place there through the pursuit of their own projects which would in most cases involve gaining employment.” (p. 186). There should be adequate practice so that pre-service teachers engage in hands on practice before obtaining employment in the teaching profession.

It is generally accepted that learning to teach is highly complex. However, with practice it can be manageable. It is important that pre-service teachers acquire teaching skills to make them competent teachers. Eraut (2000) suggested that skills are part of this knowledge and are closely integrated with propositional knowledge in representations of competence. Acquiring skills mean getting into the classrooms and having a feel of teaching. Expert knowledge is developed “through the processes of reflection and conscious deliberation in which practical knowledge is theorized and theoretical knowledge is interpreted in practice” (Tsui, 2009, p. 437).

Purpose of Study

The purpose of this paper is to discuss the theme “too much theory and less practice” in the preparation of preservice teachers. This theme emerged from a large qualitative study carried out in one of the primary teacher training colleges in Botswana in 2008. The paper will further discuss the importance of teaching practice to the pre-service student teachers.

METHODOLOGY

Research Design

This article was a qualitative case study that was implemented in one of the primary teacher education colleges in Botswana. Data was collected through open-ended semi-structured in-depth interviews and classroom observations. In support of the open-ended questions, Drake (1989) believes that one reason why open-ended questions are helpful is that they convey a strong interest in what the other person has to say on the topic . . . use of open-ended questions says to the interviewee, "I care about your ideas. I recognize that what you think is important, and because of that I'm willing to give you the freedom to flash out your thought as you choose" (p. 2).

Participants were able to express themselves very well. The researcher probed for more explanations whenever the ideas/points were not clear. The interviews were 45-75 minutes long and were audio-recorded by the researchers. The researcher also observed two teacher educators teaching. One teacher educator was observed 10 times teaching Social Studies. The other teacher was observed eight times teaching a course called Theory and Practice in Education. The researcher observed the teaching pedagogies employed by the teacher educators and wrote detailed notes on each observation.

For analysis, the researcher transcribed the audio-tapes. Written transcriptions and field notes were then compiled to find emerging themes for analysis. All procedures were completed by the researcher who was the principal investigator. This helped the researcher to have a deep connection with the data. Merriam and Simpson (2000) noted that "in qualitative research, the researcher is the primary instrument for data collection and analysis" (p. 98). Having first-hand information from the participants helped the researcher to interpret the data.

For confidentiality, participants were assured that pseudonyms will be used and that the raw data will only be accessed by the researchers, and the audio-tape and transcripts were to be destroyed after the study. The participants were provided with full information about the purpose of the study and that the risks were minimal. The researcher had also obtained permission from all relevant authorities in the Ministry of Education and Skills Development and the research boards.

Population

The population for this study was comprised of third year student teachers at Fellow College of Education (pseudonym). A total of 17 students, seven males and ten females were interviewed. Purposive sampling and snowball sampling techniques were employed to obtain the sample for the study. According to Gay, Mills and Airasian (2006), purposive sampling "Is the process of selecting a sample that is believed to be representative of a given population" (p.113). To Ary, Jacobs, Razavieh, Sorensen (2006), qualitative researchers tend to use purposive samples because it is believed "to be sufficient to provide maximum insight and understanding of what they are studying" (p. 472). Since third year students had taken most of the courses in foundations and they were in their final year in the program, their expressions regarding experience and knowledge provided the relevant and meaningful data for the study.

FINDINGS

From the data collected, student teachers believed that practical training was the most effective way to acquire (practical) knowledge. From the interviews, participants described how they spend too much time in the teacher preparation classrooms learning the theories and less time practicing those theories. One of the students, Seabelo, noted that, "we should be more at the field and not in the classes like it is happening now. We should spend more time at the field practicing to be teachers." He was supported by another student "Refilwe" who stated that:

We should spend more time being on the field than being in the classroom. We are given more time in the classroom doing theory and less time in the field. If we could be given more time in the field we can develop better attitudes of how to be a better teacher since we will be learning by doing since you know that people learn more when they are doing than when they learn and do nothing on it. Since we were in the class we were focusing on the theory Part Two to teach, how to prepare for lessons, how to . . . how to . . . how to . . . conduct classroom management. And also in our second year we were given only three months for our Teaching Practice (TP). I

think 3 months is not enough looking for us who have no teaching experience. We cannot master everything for one to be a teacher just in three months. If may be given the whole year doing TP. Maybe first year one term, second year another term and final year another term. That could have been better because what you have learned in first year you will add on in second year, and you may correct your mistakes in year two and in third year now you know what is expected of you as a teacher (sic).

Neo concurred with Refilwe by stating that our program is more academic than practical. We spend most of the time here doing the academic work but we . . . we are expected to do practical work when we graduate. Academic work is vital but the material that we are doing you find that is a repetition of what was done at senior secondary school or even at junior secondary school. Instead they should teach us how to manage our pupils in the classroom by giving us more time to do the practical part. I believe I should do more of practical work. It is my wish that one day they should change the system for training teachers. There should be more of practical work than academic work (sic).

In addition, Kabelo affirmed that, “TP is not enough, looking at the fact that most of the content that we are doing, we have been taught at junior and senior schools, so we should do more of the practicum so that we have that knowledge, skills, and confidence to stand in front of the children and be able to teach very well.” Similarly Hamotho indicated that inservice teachers should not go on teaching practice as they had been teaching for fifteen to twenty years; instead pre-service teachers should be the ones spending more time in the field doing teaching practice and less of theory.

In addition to what the participants stated in the interviews, the researcher observed that most of the content that student teachers were being taught was exactly what the Junior Certificate and Cambridge “O” level syllabus covered. The repetition of the content seemed to be boring to most learners, as they did not actively participate in the teaching/learning environment.

DISCUSSION

For one to understand the idea of too much theory content and less practice that was raised by the participants, it is important to first give a brief outline of how these novice teachers are trained at the colleges of education. According to the Management Manual for the colleges of education Botswana (2000), the diploma for primary teacher educators is a three year program for pre-service teachers. In these three years, the first year is spent on doing course work only. During year two the student teachers spend only six weeks of the term doing their first teaching practice. In year three they have six weeks in term one (January-April), and another six weeks in term three (September-November). Based on the program outline from the primary teacher education manual novice teachers spend most of their time doing theory in the classrooms rather than applying the theories in real classroom situations.

The Value of Combining Theory and Practice

There is a disproportionate between theory and practice in pre-service teacher education in Botswana. To ameliorate this imbalance, student teachers should be given ample time to practice the teaching theories that they have learned in their respective classrooms. They are expected to put theories into practice, as Marais and Meier (2004) noted that “teaching practical is an integral part of teacher training (p. 220).

Research has shown that most teacher education programs emphasize more theory and less focus on practice. Dunkin (2008) observed “In England in 1992, when, partly on the grounds that the content of teacher education was too theoretical, Kenneth Clarke, the then Secretary of State for Education, announced that 80 percent of programs in secondary teacher education should be "school-based." In North America, Bruce Joyce and Beverly Showers, among others, called for a more central role of the school in teacher education. A somewhat similar complaint about the excess of theory in the curriculum of teacher education programs was reported in 1991 by Andrea B. Rugh and colleagues with reference to Pakistan, and in 1986 by Linda A. Dove regarding Papua New Guinea” (p. 45).

One can conclude from the interviews and literature that many teacher education programs tend to give student teachers a lot of theory and overlook the importance of practicing the theories. Teaching practice gives the student teachers the experience that cannot be found in a non-school setting (Marais & Meier (2004). Student teachers learn to assess their strengths and weaknesses and further find ways on how to improve to be competent teachers.

Amedeker (2005) noted that “a longer duration of teaching practice has been seen by some educators as a concrete sign for the society to appreciate the professionalism of teaching” (p. 100). The longer the time the student teachers spend on the field, the more they get exposed to the realities of teaching. Some student teachers may exhibit negative attitudes

towards teaching while others may develop positive attitudes as they are exposed to the actual teaching environment that they will encounter when they graduate. Amedeker further argued that teaching practice helps “boost the confidence of the teacher-trainee” (p. 101). A student teacher who has confidence in her work tends to perform better and improve in his/her teaching.

Ghani (1990) also noted that teaching practice “provides the opportunity for the students to observe and practice the skills for which they have been trained. It is also seen as the opportunity for the students to translate into practice what they have learned in theory” (p. 46). As Vygostky the social constructivist theorist noted “Just as you cannot learn how to swim by standing at the shore to learn how to swim you have to, out of necessity, plunge right into the water even though you still don’t know how to swim, so the only way to learn something, say, how to acquire knowledge, is by doing so, in other words, by acquiring knowledge” (Vygostky in Daniels, 2001, p. 35).

It is difficult to assume that mastering skills in the classroom implies that the student teachers can apply them effectively when they complete their teacher education program. It is, therefore, important for the student teachers to practice the skills while still at the teacher training institutions. Therefore, there is the need for more teaching practice by student teachers (Darling-Hammond, 2006; Tang, 2010). The most powerful (teacher) programs require students spend extensive time in the field throughout the entire program, examining and applying concepts and strategies they are simultaneously learning about in their courses alongside teachers who can show them how to teach in ways that are responsive to learners. Such programs typically require at least a full academic year of student teaching under the direct supervision of one or more teachers who model expert practice with students who have a wide range of learning needs, with the candidate gradually assuming more independent responsibility for teaching. This allows prospective teachers to grow ‘roots’ on their practice which is especially important if they are going to learn to teach in learner-centered ways that require diagnosis, intensive assessment and planning to adapt to learners’ needs, and a complex repertoire of practices judiciously applied (Darling-Hammond, 2006).

In addition, during teaching practice, student teachers are also involved with the community as they attend parents’ teachers’ meetings and other activities held in the community. This helps student teachers to build a sound relationship with all school stake holders. Student teachers learn the roles and responsibilities that they have to undertake with parents and other teachers. From various researches regarding teacher education programs, it is apparent that if pre-service student teachers are given more time for teaching practice, they might be better qualified teachers when they graduate from college. These novice teachers would have gained more experience on classroom management, and of working with different pupils from different backgrounds and cultures.

CONCLUSION

Based on the research, and the findings in this study, it appears that most teacher education programs over-emphasis theory at the expense of classroom practice. Most pre-service student teachers in the study expressed their dissatisfaction on the little time that they were given to practice the theories into real life situation. Even though the participants noted the importance of having enough content, they still felt that hands-on experience would make them better teachers when they graduate from the program. Participants indicated that teaching practice exposes them to real classroom experience that they will encounter as teachers.

It is important to note that the mastery of theories in the classroom does not guarantee that the student teachers are able apply those theories in real classroom settings. Student teachers should be given more time during their training to apply the theories and to develop a better sense of what it is to be a classroom teacher. As it is said, to know and not to use is not yet to know. Hand- on is the best exposure needed by the pre-service teachers. Pre-service teachers may learn about theories related to management, discipline, assessment, diversity, learner-centered strategies, however, experience in the classroom applying these theories and strategies may help novice teachers become more confident when they graduate from their training.

By going to the schools for practice, incorporating it with the teaching from their lecturers can be useful. During teaching practice, student teachers learn the skills and attitudes of the teaching profession. They also learn the difficulties of teaching, therefore, when given ample time to practice, they can be confident to face teaching challenges and thus become competent teachers when they graduate from their teacher education program.

Recommendations

The study recommends that the Tertiary Education Council in Botswana should modify the teacher education training program and to reconsider increasing the amount of time for teaching practice for the pre-service teachers.

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