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Transformative Education from Multiple Perspectives



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Transformative Education from Multiple Perspectives: Second Volume of the *Global Journal of Transformative Education*

Serafin M. Coronel-Molina¹ & Michael T. Ndemanu², Editors-in-Chief

The *Global Journal of Transformative Education (GJTE)* is an open-source, peer-reviewed journal designed to share high impact educational research and practical applications germane to transformative education worldwide. *GJTE* publishes academic articles on high impact practices in the area of pedagogy, curriculum, learning environment, educational policy, instructional materials, and reviews of educational resources that support transformative teaching and learning in PK-20 institutions and adult education programs. *GJTE* is focused on sharing educational research and research-based practices with all stakeholders in the design and implementation of transformative education. Articles are offered as resources for teacher educators, teachers, school leaders, policy makers, community groups, and academic researchers. Content may include research articles, lesson plan ideas, assessment and management strategies, book reviews, and discussions about curriculum and connections between schools and communities that are geared toward maximizing educational outcomes for learners. It is becoming increasingly clear that traditional educational models are no longer sufficient to benefit vast sectors of the world's population; hence the need for new, transformative education models. And it will take transformative research to light the way to these new educational paradigms.

Most of the articles published in this second volume of *GJTE* were initially reviewed and accepted for presentation at the 2020 World Conference on Transformative Education (WCTE) in Cape Coast, Ghana, under the theme, "The Future of Africa and the Role of Transformative Education." The conference was postponed to a later date due to COVID-19. A call for papers was then sent out for to the would-be conference participants to

submit their manuscripts to be considered for publication in the second volume of *GJTE*. All the submissions underwent a rigorous double-blind peer-reviewed process prior to being accepted for publication. Out of several manuscripts submitted, eight were found to meet the standards and rigors of transformative education ideals as enunciated on our website, www.gite.education

This volume is composed of eight articles that delve into transformative education from multiple perspectives. They focus on diverse topics such as learning spaces, science curriculum and pedagogy, schooling and pedagogy, school and democracy, health education, geography of education, and education and development. The articles included in this volume cover four geographical locations which include Kenya, Ghana, Nigeria, and Cameroon. The contributions are relevant to scholars, educators, practitioners, educational policymakers, graduate students, governmental and non-governmental organizations, academic institutions, and grassroots organizations interested in transformative education across the globe.

The first article, titled "Implications of Outdoor Environment on Children's Learning Experiences in Public Preschools in Borabu Sub-County, Kenya" is authored by G. N. Ayaga and E. K. Okaya. Their research was impelled by the evident failure of the current competency-based learning paradigm in Kenya, particularly for early childhood learners. It is known that environmental quality is key to enhancing learning, so they set out to investigate the implications of an outdoor environment on children's learning experiences in public preschools. They found that a rich outdoor environment proved beneficial to preschoolers' learning experiences and development of locomotor and rhythmic movement abilities, as well as to their general academic achievement and development of various social, emotional and

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cognitive skills. Based on the findings of their study, the authors make recommendations for the incorporation of outdoor play in the preschool curriculum.

The second article, "Effect of Hands-on Science Activities on Ghanaian Student Learning, Attitudes, and Career Interest: A Preliminary Control Study" by H. Beem, focuses on junior high school-aged students in Ghana and their participation in STEM-focused classes. More specifically, it examines the effect of training the teachers of these students to employ hands-on activities using low-cost, locally available resources on student learning outcomes, attitudes towards learning science, and interest in STEM majors or careers. Although objective results (e.g., exam scores) were mixed across schools, more subjective measures, such as students' engagement in class and enjoyment of science, improved significantly. These effects were disproportionately visible among females, who experienced decidedly greater learning gains, increases in engagement, and a shift in interest towards STEM majors and careers than their male counterparts.

T. J. McConnell and B. Giorgio-Booher coauthored the third article, "Collaborative Teams for Self-Publishing: A Model for Creating Locally Relevant Educational Books." Realizing that the learning materials are still mostly Eurocentric and not culturally responsive in many developing countries, these two authors share a model used to develop a series of books called Conservation Tales. They developed these books, which were designed to make education more relevant and accessible for children, in collaboration with university faculty, students, and scientists, and leveraged the skills of artists, writers, and content experts from among these groups to provide a rich learning experiences for readers while also offering affordable options for self-publishing.

In the article, "Classroom Democracy and Learning Outcomes in Primary Schools in Francophone Africa," A. M. Njong offers a look at existing data on student performance and indicators of classroom democracy to evaluate the impact of democratic practices in the classroom on learning outcomes. The results show the importance of both teachers and parents in the process of children internalizing democracy in the classroom, and further highlight the importance of preserving and promoting indigenous cultural values, because they facilitate learning achievements.

With respect to health education, E. N. Nwagu authored "Transformative Learning Potentials of Trainee Health Workers in Nsukka, Enugu State, Nigeria." In this

article, she focuses on health workers in training and the impact of transformative learning and demographic characteristics on their absorption of the material. This was a descriptive study based on self-reporting by the respondents (learners). Participants indicated a high degree of transformative learning, with the most frequently selected learning components being field trips and presentations. Students felt that such hands-on activities gave them a better understanding of health, illness, and health care. The study demonstrated the importance of discussion and debate in developing critical reflection among learners.

In current educational research, the geography of education analyzes the disparity of educational outcomes based on the geographical location of the schools students attend. The urban and rural schools in Ghana exhibit that disparity. M. K. Nyatsikor, W. K. Abroampa, K. Esai-Donkoh examine the difference between rural and urban environments in "The Impact of School Locale on Pupils' Competencies in Selected Subjects: Does It Matter More for Specific Regions in Ghana?" They were specifically interested in student competency on English and Mathematics tests at the primary level. Results showed statistically significant differences in achievement between rural and urban school pupils both nationally and regionally, with urban schoolchildren outperforming rural ones on both tests. Rural school children in the Eastern Region were the most disadvantaged. The paradigm flipped in Northern Region, where rural schoolchildren achieved higher average scores than their urban peers. This would suggest that it makes a significant difference in which part of the country a child attends school, and leads to the conclusion that it is necessary for resources for schools and communities to be equitably distributed and effectively utilized in order to provide quality inclusive education for all pupils.

In the next article, B. O. Nyatuka discusses "Education for Sustainable Development in Kenya: Rhetoric and Reality in Basic Education." The importance of sustainable development is becoming increasingly clear, and the role of education in forming responsible global citizens to believe in and engage in such practices cannot be overlooked. The ultimate goal of such education is to foster ideal policies and practices for enhancing the social, economic, and ecological viability of present and future generations. This article offers a review of research on the importance of Education for Sustainable Development (ESD), reflecting on its utility for realizing the objectives of Kenya's Competency-



Based Curriculum (CBC), particularly with regard to the acquisition of core competencies like creativity, problem-solving, and self-efficacy. The author presents some of the challenges that ESD implementation faces, as well as some of the pertinent pedagogical theories and their implications, and relevant legal and policy frameworks.

In the final article, "Transformational Leadership and Wealth Creation in Educational Organizations: The Case of Higher Education in Cameroon," P. P. Teneng explores the education industry and the influx of educational subsidiary enterprises created by graduates who have been unable to find jobs upon graduation. Most of these enterprises end up failing within five years. This raises the question of what prevents these small- and medium-sized education businesses from thriving, which is the question Teneng seeks to answer in this survey study of 210 small and medium-sized educational firms. The findings suggest that a lack of transformational leadership, due in large part to a lack of leadership or wealth creation education, is a major contributor to the failure of these businesses. The author makes recommendations for transformational and strategic leadership education to be a required part of higher education curricula, to introduce students to the business world through meaningful partnerships and quality entrepreneurship courses.

Invitation to Prospective Authors

We invite authors keen on transformative education from all walks of life to consider GJTE as an avenue for dissemination of their ideas germane to curriculum and teaching. GJTE accepts submissions for its Open Call, with no deadlines for submissions, and no publishing fees for authors. The journal's website includes Author Guidelines to help prospective authors with formatting specifications, and an online Submissions system to help with the submission, review and editing process. New authors are invited to register in the system. GJTE also invites readers to join our Editorial Board of Reviewers by selecting the "reviewer" role and indicating content expertise.



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Acknowledgments

[The Global Journal of Transformative Education \(GJTE\)](#) is a singular publication venue since its main objective is to share educational research and research-based practices on transformative education from local and global perspectives. Despite the great amount of time and effort we have invested in the conceptualization, development, implementation, production, and publication of this second volume, we could not have done all this by ourselves. The publication of this volume is the result of the hard work and dedication of many people. First of all, our profound gratitude goes to the [Global Institute for Transformative Education \(GITE\)](#) and its founding members for their sustained sponsorship to make this volume happen. We are deeply thankful to Tom J. McConnell, who provided us with invaluable assistance in his role as Managing Editor, taking care of the daily operations of GJTE. We are also grateful to our colleagues who serve on the Editorial Board, as well as to institutions, friends, colleagues, and social media networks from around the world for their help in publicizing the GJTE website and Facebook page widely.

We would also like to thank all the contributors to this second volume for choosing GJTE to publish their work. Many thanks to IUScholarWorks for hosting GJTE's website. Without the generous assistance and contribution of all these great people and institutions, GJTE would never have become a reality.

We are equally grateful to our colleagues worldwide who spent significant number of hours reviewing the papers. We thank them for their time and diligence in the review process. We also owe an immense debt of gratitude to Fred Bay for his continuous generous donations to GITE for transformative education conferences, which have been the springboard of GJTE. We wish him a long life.

Authors

¹**Serafin M. Coronel-Molina** (scoronel@indiana.edu) is an Associate Professor in the Department of Curriculum and Instruction at Indiana University, Bloomington, Indiana, USA.

²**Michael T. Ndemanu** (mtndemanu@bsu.edu) is an Associate Professor of Education in the Department of Educational Studies at Ball State University, Muncie, Indiana, USA.



Implications of Outdoor Environment on Children's Learning Experiences in Public Preschools in Borabu Sub-County, Kenya

Godfrey Nyaoga Ayaga¹ & Edward Khasakhala Okaya²

Abstract

This paper presents results from a study conducted in Borabu Sub-county in Kenya to determine the implications of outdoor environment on children's learning experiences in public preschools. The major findings suggest that the general state of outdoor environment component was unsatisfactory. It found a positive relationship between the outdoor environment and pre-schoolers learning experiences and ability to perform loco-motor activities and rhythmic movement activities and general academic achievement. The results further indicated that all the four states of outdoor environments (the site, availability, adequacy and effectiveness) combined to explain 35.2% of the variance in the preschool overall learning experiences. The results indicated that a rich outdoor environment has a positive influence on preschool children's development of various social, emotional and cognitive skills. The study recommends that teachers and pupils should participate in outdoor play, and governments should enact policy guidelines to increase the availability, adequacy and effectiveness of outdoor activities.

Keywords: Competency-Based Curriculum; Outdoor environment; Learning experiences

Introduction

The government of Kenya recognizes early childhood development and education as an important pillar for accelerating the attainment of *Education for All* (EFA, UNESCO, 2010) and the *Sustainable Development Goals* (Republic of Kenya, 2006). To ensure quality education and learning environment during a child's formative years, EFA's first goal stipulates that it is the responsibility of every government to expand and enhance comprehensive early childhood education where young boys and girls fully develop their competencies which facilitate smooth learning in other advanced levels. According to a 2002 report by The World Fit for Children Conference, it is important for every child to have a good start to life whereby a child receives quality nurturing, care and safe environment (Githinji & Kanga, 2011).

In this regard, many developing and developed nations have been developing and implementing policies that are perceived to improve the state of early childhood education in various countries (Kang'ethe,

Wakahu & Karanja, 2015), this has galvanized many countries, especially in sub-Saharan Africa (SSA), into confronting their historically low access to quality early childhood education (Murunga, 2015). This has brought a remarkable success in attracting many children into schools (UNESCO, 2010). However, filling the classrooms is not enough in the process of ensuring access to basic education and Education for all. The goal is geared towards having positive social and economic returns in which improving the quality of Education is the key emphasis. Unfortunately, the 2010 UNESCO report indicate that the quality in terms of pre-schoolers' acquisition of early year competencies is not satisfactory in many countries and many preschool learning centres have poorly established learning environment in most sub-Saharan Africa countries Kenya inclusive.

Ideas of Early Childhood Development and Education (ECDE) can be traced back to 400BC in Plato's book, "The Republic". Plato advocated that early childhood education should be made interesting, and attractive through music, plays, number work and geometrical exercises which are implemented better in a rich

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© Ayaga, G. N., & Okaya, E. K. 2020. **Open Access** This journal is distributed under the terms of the Creative Commons Attribution NonCommercial NonDerivative 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits unrestricted use, distribution, and reproduction without revision in any non-commercial medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license,

a rich outdoor environment (Njoroge, 2011). Similarly, Githinji, & Kanga (2011) notes that philosophers like Jean Jacques, Rousseau and Jean Heinrich Pestalozzi emphasizes on the significance rich outdoor environment to help children acquire the necessary skills, knowledge and attitudes necessary for holistic development.

In particular, a child's psycho-social development is a long process that requires a critical mass of organized individuals involved in a variety of participatory educational processes and actions to produce cumulative results (Lyabwene, 2010). Therefore, the children's interactions with a rich outdoor environment is necessary for the children's holistic development and acquisition of early year's competencies. It has consistently been observed by many scholars that for effective learning to take place, children need mental stimulation and plenty of opportunities to exercise and develop their talents through the use of both fixed and movable equipment (Lyabwene, 2010). Thus, for preschool centres to foster social competencies, prepare children for future interactions and acquiring of early literacy and numeracy skills, the use of adequate, safe and effective outdoor environment is usually regarded.

In the last three decades, the use of rich outdoor environments has held a prominent place in the field of early childhood education since its beginning with German educator Friedrich Froebel's kindergarten and nursery school movement in the early 1800s (Gray & MacBlain, 2015). The founders of early childhood education emphasized the importance of learning within a well-established outdoor environment. This was in stark contrast to the predominant theory of the day which held that learning was done within classroom (Gray & MacBlain, 2015). These early educators were viewed as radicals as they promoted the theory that children learn through their interaction with the environment.

In the USA, children's playtime has steadily decreased due to limited access to play spaces, changes in the way children are expected to spend their time, parent concerns for safety, and digital media use among young children (Bishop, 2013). Social changes and new technologies in the country have also impacted negatively on the way children play and the amount of free time they are given because children between the ages 3-11 use most of their free time at school completing homework and shopping with parents (Ginsburg, Lee, & Boyd, 2008). In addition, Lovell (2009) observes that children's playtime continues to decrease in the USA as

a result of an emphasis on academic preparation at an early age, 30% of American kindergarteners no longer have recess, 71% of children and teenagers have a TV in their bedroom, and parental perceived risk of play environments and limited access to outdoor play spaces.

A study done by Nairn and Mori (2011), evaluating the lives of children in United Kingdom, Spain and Sweden, pointed out that children in the United Kingdom had less chances for pleasurable outdoor activities compared with Spain and Sweden and that this was a contributor towards reduced well-being and learning in United Kingdom. The study further found that the decisions to reduce funding for outdoor play and spaces was disadvantageous for children, particularly those from poor groups of children whose families struggle to find reasonable play provisions.

In Singapore, early childhood education remains a self-regulated programme as preschools in the country vary in terms of their programme content and overall teaching and learning approaches, catering to different social strata and cultural groups (WenTzuo, 2010). Despite of the fact that play should be an integral part of the preschool teaching in the country, it remains unclear whether preschool centres incorporate play-based methods of teaching into their practice as recommended under the Kindergarten Curriculum Framework (Peng, 2011). In some instances, preschool supervisors in Singapore are not advocating or adopting play-based teaching into their curriculum because of parental expectations and the demands of a meritocratic and economically-driven society that perceives education as a commodity to be obtained for financial success and social mobility (WenTzuo, 2010).

Despite the relevance of early childhood education, Tanzania is among African countries that has given Early Childhood Development (ECD) program minimal attention in the past three decades (Tarimo, 2013). However, in 2001, the government of Tanzania adopted an inter-sectoral ECD service delivery initiative resulting in the inclusion of ECD in the National Strategy for Growth and Reduction of Poverty (NSGRP). Since then, emphasis has been put on use of Child-Centered Teaching Methods (CCTMs) like the use of play as a teaching approach in both indoor and outdoor teaching (United Republic of Tanzania, 2008). Despite the government's effort, a report by UNICEF (2007) indicates that more than 95% of young children in the country lack access to early childhood stimulation characterized by rich outdoor environment.



Despite the challenges facing Early Childhood Education in many parts of the world, the early years of a child's life are globally accepted as the most critical years for the lifelong development of a child (Kang'ethe, Wakahiu & Michael, 2015). In this regard, there is evidence of a positive correlation between the child's quality of early childhood nurturing, health, environment, learning and future holistic development and academic achievement in subsequent grades in primary, secondary schools and colleges (Bradbury, 2007). This fact has been emphasized by most founders of Early Childhood Development and Education (ECDE), especially Johann Froebel, Heinrich Pestalozzi and John Dewey, among others who consistently indicated that early childhood is a crucial stage of life in terms of a child's physical, intellectual, emotional and social development. Growth of mental and physical abilities progress at an astounding rate and a very high proportion of learning take place from birth to age six (Murunga, 2015).

To address the problems inherent in early childhood education in Kenya, the Constitution of Kenya (Republic of Kenya, 2010) establishes government at two levels, national and county governments. Therefore, Kenya transited from a centralized government to devolved system of government. With the advent of the implementation of the Constitution of Kenya (ROK, 2010), the devolution process heralded the devolution of pre-school among other devolved functions of the county governments. In this regard, Article 43 of the Constitution says that every person has a right to education including preschool children. Further, the education sector is governed by the Basic Education Act, 2013 and the Sessional Paper No.14 of 2012 on Reforming Education and Training Sectors in Kenya. The Basic Education Act, 2013, aims at giving effect to Article 53 of the Constitution, and to promote and regulate free and compulsory basic education. However, this has not been the case because there is no county government in Kenya which provides free preschool education.

A major landmark in education in early years learning has been a shift from 8-4-4 system of education to Competency Based Curriculum. The 8-4-4 system of education was introduced in 1985 following the recommendations of the 1981 *Presidential Working Party on the Establishment of the Second University in Kenya* (Republic of Kenya, 1981). The guiding philosophy of the system was education for self-reliance. Several Task Force reports as well as summative and formative evaluation reports led to curriculum reviews in 1992, 1995 and 2002. However, these reviews only addressed

issues of curriculum content, unnecessary overlaps and emerging issues. The reviews have not adequately addressed fundamental issues that would transform society by enhancing the productivity of every Kenyan citizen and accelerate economic growth.

The summative evaluation of the curriculum (ROK, 2006) indicated that the curriculum content and its implementation was academic and examination-oriented. In addition to curriculum overload, most schools were not adequately provided with equipped workshops to facilitate the learning of practical skills and teachers were not sufficiently trained. Furthermore the 8-4-4 system of education did not provide flexible education pathways for identifying and nurturing the talents and interests of learners early enough to prepare them for the world of work, career progression and sustainable development.

In the same vein, the *2010 Report of the Task Force on the Re-alignment of the Education Sector to the Kenya Vision 2030 and Constitution of Kenya 2010* was formed which led to the sessional paper No. 2 of 2015 on "Reforming Education and Training in Kenya" (ROK, 2015). The Sessional Paper states that the education sector is guided by the national philosophy, which places education at the centre stage of the country's human and economic development. The Sessional Paper recommends reforming the education and training sector to provide for the development of the individual learner's potential in a holistic and integrated manner, while producing intellectually, emotionally and physically balanced citizens. It recommended a competency-based curriculum; establishment of a national learning assessment system; early identification and nurturing of talents; the introduction of national values and national cohesion and their integration into the curriculum; and the introduction of three learning pathways at senior secondary school level among others. The Competency Based Curriculum Framework vision and mission (ROK, 2006) are supported by three important pillars: values, theoretical approaches and guiding principles.

Currently, in many counties, early childhood education programs operate on the basis of partnership, collaboration and networking. However, in 2003, free primary education was introduced in Kenyan primary schools. ECDE was not included in this setup despite the fact that most components that make a rich outdoor environment are expensive. With the current poverty index in most rural Kenyan setting, most preschool centres operate under poor conditions which are perceived to hinder their full participation and full development



(Ngaruiya, 2006). Worse still, parents do not understand why primary education should be free and not Early Childhood Education [ECE]; they have therefore begun resisting paying ECE fees, choking off a vital source of funding.

Many county governments have devolved Early Childhood Education to bring efficiency in the management of these units of education. There is, however, a small but convincing body of research knowledge which indicates that there are still many challenges in implementation of Early Years Education in most counties (Mahindu, 2011). Currently there are disparities in the 47 counties on their priorities in the implementation of early childhood education where some counties have set some reasonable funds to support preschool education, while to other counties, ECDE is not a priority in their budgetary allocations. This has resulted in diversity of practices by various county government and stakeholders, compromising the quality of service offered at preschool centres.

In Kenya, Mahindu (2011) conducted a study in Nairobi and found that many pre-schools had many children learning indoors without outdoor play experiences because some of the pre-schools were located in residential plots with rooms turned into classrooms. Hence children stay indoors most hours of school day. Mahindu (2011) also found that many pre-schools did not have play items for their pupils and in most cases where pupils were found playing or learning outside, they were left to play and learn on their own without teachers' supervision and guidance.

The researchers are of the opinion that if the issue of outdoor environment and play is not addressed well with the seriousness it deserves, the quality of pre-school education will be hampered leading to negative implications in schooling. There was therefore a necessity to undertake a study to assess the implication of outdoor environment on pre-schoolers' learning experience.

Statement of the Problem

The government of Kenya initiated Competency-Based Curriculum in the view to enhance skills of learners. A competency-based approach focuses on the skills and talents needed to be able to perform a particular task to a certain standard. Early childhood care and education offers a holistic development of a child's social, emotional, cognitive and physical needs in order to build a solid and broad foundation for lifelong learning and well-being. This eventually shapes young learners'

minds, attitudes and often behaviours. If it is not well managed it is likely to compromise holistic development of these pre-schoolers, leading to maladjustment. This calls for proper structuring of pre-school learning environment to foster creativity of learners through play. It is however becoming clear from emerging research that children spend limited time doing outdoor activities. This is against the findings of current literature and theories of child development that advocate for providing appropriate outdoor learning environment that offers a sense of freedom for children to play freely with peers, expand their imagination beyond the restraints of indoor activities, release energy, and explore their senses of touch, smell, taste and motion.

An attempt has been made by the government of Kenya, to cater to the well-being of young children, by developing service standard guidelines to ensure that quality services are delivered efficiently and effectively at all times in ECDE centres. This was envisaged to ensure the provision of adequate, safe and effective outdoor learning environments. Despite the Kenyan government's effort to ensure quality and rich outdoor environments, the strategies and efforts have not been effective due to the current condition of the outdoor environment and equipment in most pre-school learning centres, characterized by inadequacy and unsafe fixed and movable equipment. It is against this setting that the proposed study sought to investigate into the influence of outdoor environment on pre-schoolers' learning experience.

Research Questions

The following specific questions guided the study:

- i. *What is the state of outdoor environment in ECDE centres in Borabu Sub-County?*
- ii. *How does the outdoor environment affect children's learning experiences and physical development in Borabu Sub-County?*



Theoretical Framework

This study was guided by socio-cultural theory. The theory arises from the works of Vygotsky (1978) who emphasizes on the role socio-cultural factors on children's development and learning. Vygotsky (1978) believed that planned learning should be learner-centred and oriented towards activities through which they can construct their knowledge as a result of recognition of one's experience. Vygotsky's theory supports that learning must not just be based on classroom theories of teaching, but with learning to learn, developing skills and utilization of indoor and outdoor learning strategies which make learning experiences relevant and meaningful for the benefit of holistic development. Vygotsky argues that enhanced environment, social interactions, and shared outdoor activities assist children attain skills and master various activities, moreover to reason in a meaningful manner. Vygotsky proposes that the nature of development and learning in young children takes place in a social environment. Vygotsky (1978) believed that young children don't develop in isolation, but in a social matrix.

Vygotsky's socio-cultural theory (1978) has an imperative contribution for studying the environments essential for physical activity and learning. Vygotsky's advancement advocates for modification of varied children's contexts. In this case, the outdoor environment should offer children with opportunities to experience phenomena that contribute to their meaning making and skill development. The child's experiences in the outdoor environment give rise to describing things that cannot be experienced indoors (Norling & Sandberg, 2015). During outdoor activities children use their experiences to perform meaning making in social relationships with peers, grown-ups and their immediate environment. Constantly changing outdoor environment expands children's range of experiences and stimulates their activity level and learning.

Proponents of the constructivist theory have pointed out that human beings construct all knowledge while participating in different mental and physical experiences. In constructivism, the learner builds a personal interpretation of the world based on experiences and interactions (Pierucci, O'Brien, McInnis, Gilpin, & Barber, 2014). On the other hand, social constructivism suggests that the curriculum should ultimately produce learners who would be able to deal effectively with the modern world. Therefore, curricula should not be presented as finished abstractions, but should include the child's preconceptions and should incorporate how the

child views his or her own world (Pellis & Pellis, 2007).

The other learning theory that has shaped and influenced the provision of Competency Based Curriculum (CBC) is the visible learning theory as advanced by John Hattie (2012). This theory postulates that fundamental changes in education systems have important implications for curriculum reform. Learners need to be able to think about and solve problems, work in teams, communicate through discussions, take initiatives and bring diverse perspectives to their learning. Learners also need to demonstrate the impact of the achievement of national goals of education. Visible learning means an enhanced role for teachers as they become evaluators of their own teaching. Hattie asserts that visible learning and teaching occurs when teachers see learning through the eyes of students and help them become their own teachers (Wilson & Myers, 2000).

Literature Review

Historical Dimensions of Child Play

There is a considerable body of research which is indicative, relating children's play and aspects of their learning and development. This evidence includes work in evolutionary and developmental psychology, anthropology, neuroscience and educational studies. However, while researchers in these fields have hypothesized about how play might enhance child outcomes, much of this evidence merely establishes associations rather than firm, causal relationships. In fact, there is little or no conclusive evidence regarding possible explanatory mechanisms. From evolutionary psychology, Bruner (1978) argued that as more and more complex animals evolved, the length of immaturity increased facilitating an increased level in learning. (Whitebread, 2017). In the same vein, Pellegrini & Bohn, (2005) in a review of evolutionary play concluded that play contexts allow human beings to engage in exploratory activities.

Much of research on play in developmental psychology has been advanced by Vygotsky (1978). He states that during spontaneous play, learners exercise control over their own activity and set for themselves challenges which lead to their holistic development. A close follower of Vygotsky, Karpov (2005) carried out an analysis of Neo-Vygotskian practices and concluded that play allows children to regulate their own behaviour making it a significant factor in their self-regulation.



Importance of play to children

Much of a child's early years are spent playing, exploring and testing their environment and own personal boundaries. All of this play has significant and proven benefits for a child's early development (Whitebread, 2017). Research has shown that children who regularly engage in play-based learning have better cognitive flexibility, working memory and self-regulation ability (Karpov, 2005). School administrators need to build playgrounds, train teachers in how to guide play-based learning and make their own play materials using natural materials. He recommends the involvement parents in the production of play materials

There is a steadily growing body of research knowledge on the importance of play (Karpov, 2005; Pelligrini & Bohn, 2005; Whitebread, 2017). Children behave better in the classroom when they have had the chance to blow off steam and release energy on the playground during the day. Playing is a known method of stress release that can help with a child's emotional welfare. Play can help young children become more aware of other people's feelings and develop empathy. During play, whether it is inside or outside, children must interact and cooperate with each other, as well as share play equipment which requires good communication skills. Children can build relationships, learn to resolve conflicts, negotiate and regulate their emotions. Play can nurture qualities like self-discipline and attention control, which can be just as vital for school readiness as content knowledge. Children with longer attention spans and self-control can focus more on tasks in the classroom (Wilson & Myers, 2000). This is because when children engage in make-believe play that involves role playing, there are generally rules that they must follow which involves regulating their natural self and behavior (Vygotsky, 1978). By practicing this in a safe, fun environment, their self-control is enhanced, which can then be transferred to a classroom setting.

There is a growing body of research that shows a link between play and the development of cognitive and social skills that are prerequisites for learning more complex concepts as children get older (Oren, 2008). For example, play is linked to growth in memory, self-regulation, oral language, and recognizing symbols (Wilson & Myers, 2000). It has been linked to higher levels of school adjustment and increased social development. Play has also been linked to increased literacy skills and other areas of academic learning (a view held by Piagetian and Vygotskian theories of child development). Children create a pretend scenario by

negotiating and talking to peers and using props in a symbolic way. Children create specific roles and rules for pretend behaviour and adopt multiple themes and multiple roles. When children engage in this kind of play for most of their early years, they learn to delay gratification and to prioritize their goals and actions. They also learn to consider the perspectives and needs of other people. They learn to represent things symbolically and to regulate their behaviours and act in a deliberate, intentional way.

Today, many children do not have enough play opportunities at home because of TV, videos, and the computer (Bodrova & Leong, 2015). They interact with toys that are not conducive to building imagination and interesting dramatic play themes. In many instances, pretend play with siblings and neighbourhood children is not available. There are more adult-organized and directed activities than in the past. They tend to be in groups of children of the same age rather than in mixed-age groups, which would include older children who could act as "play mentors."

Early childhood classrooms provide a unique setting to foster the kind of dramatic play that will lead to cognitive and social maturity. There are other children to play with, a setting that can be organized to accommodate imaginative play, and adults who can encourage the play, guiding children to play effectively with each other.

Location of the Study

The study was carried out in Borabu Sub-County of Nyamira County. Borabu Sub-County is the largest Sub-County in Nyamira with an area of 248.3 kilometres square. The Population Density of Borabu Sub-County is 296 people per square kilometre. According to Monda (2012), Borabu Sub-County has a poverty index of 48.6. This is an indication that many people are poor. In fact, Borabu region is a former white settlement region and even though it is said to be economically stable, pockets of poverty are evident especially among the casual labourers providing labour in the tea plantations and well-to-do homes. Although Early Years of Education is devolved, financing is still low, therefore most financing of ECDE has been left in the hands of communities or parents. Studies also indicate that dropout and repetition rates, especially in lower primary, are high in Nyamira County which influenced the selection of the location. Since the majority of young children spend a significant part of their day at early childhood development and education



centres, it is therefore imperative to find out whether outdoor experiences provided are positive and supportive enough to enhance physical activity and learning.

Methods

The study employed a mixed method approach (Creswell, 2009). This involved the collection, analysis and integration of both quantitative and qualitative research methods within a single research study in order to answer research questions (Creswell & Plano, 2011). The combination of qualitative and quantitative methods occurred at different phases of the research process, such as formulation of research hypothesis and questions, data collection and analysis (Bryman, 2006). Mixed methods approach was suitable because it allowed the researcher to validate or corroborate the results obtained from various sources (questionnaires, interview schedules and document analysis) (Creswell, 2009). This allowed for a wider understanding of a research problem from different angles, therefore clarifying and comparing quantitative and qualitative data so as to uncover and understand the unexpected findings and potential contradictions from various sources. The approach further fostered scholarly interaction and provided methodological flexibility that were adaptable to a variety of data collection, analysis, and interpretation strategies and procedures that elucidated more information than was not possible to obtain through quantitative or quantitative approach alone, therefore offsetting the weaknesses of quantitative and qualitative approaches when used alone (Creswell, 2009).

Within the mixed method approach, the embedded research design was employed. The purpose of the design was to collect both quantitative and qualitative data concurrently, but to have one form of data play a supportive role to the other form of data. The reason for collecting the second form of data was to support the primary form of data. In regard to this study, the qualitative data were collected to support the quantitative data (Creswell, 2009). This approach was appropriate because it enabled the study to gather adequate data that provides a better understanding of the research problem and adequately answers the entire research questions (Creswell & Plano, 2011). This increases the overall strength of a study by enhancing the validity and trustworthiness of data collected (Denscombe, 2010).

The design also had the capacity of collecting data concerning the existing position of the problem in which the researcher had no direct control of the

independent variables because the manifestation had already taken place during the time of data collection (Denscombe, 2008). The design was also more appropriate because it allowed the researcher to gather information from a large number of cases through questionnaires, interviews and document analyses.

The study was carried out in Borabu Sub-County of Nyamira County. Borabu. The study targeted 50 public pre-schools, 50 primary head teachers, and 50 pre-school lead teachers and 1603 final pre-school class pupils. To obtain the required sample the study employed cluster, purposive and simple random sampling design were used to recruit participants. The final sample for the study included 44 primary head teachers, and 44 preschool lead teachers and 309 final pre-school class pupils. The research instruments that were used to collect data consisted of questionnaire, interview schedules and document analysis.

Validity for various research instruments was also determined. Validity is the extent to which the research instrument measures what it purports or intends to measure (Cohen, Manion & Morrison, 2007). The main purpose of ensuring the validity of various research instruments in the current study was to enhance the accuracy and usefulness of the findings by controlling the confounding or intervening variables (Creswell & Miller, 2000). To ensure validity of research instruments in the present study, face, construct and content validities of the questionnaires, interview schedules and document analysis was determined by presenting and discussing the various items in research instruments with two experts in the area of early childhood education. The experts' suggestions, together with the findings from the pilot study were used to modify the items in the research instruments. This ensured that the test items were clear, relevant and well organized. The study further adopted the triangulation approach so as to ensure the validity of the research instruments. In other words, the study used multiple methods of data collection: interviews, questionnaires as well as document analysis. By so doing, an area that was overlooked by one method was strengthened and checked by the other method of data collection.

The study gathered both quantitative and qualitative data. Quantitative data were gathered through questionnaires and document analysis while qualitative data were obtained through the use of interview schedule and document analysis. Both descriptive and inferential statistics were used in analysing quantitative data. Descriptive statistics such as measures of central



tendency and percentages were used to describe data. The descriptive statistics allowed the researcher to meaningfully explain the distribution of scores or measurements using a few indices (Mugenda & Mugenda, 2003). This involved the researcher transforming large groups of data into a more manageable form that was easy to understand and interpret (Mbwesa, 2006). Inferential statistics, including the Pearson's product moment correlation coefficient, simple and multiple regression analysis were used to test hypotheses. All hypothesis testing was done at $\alpha=.05$. All these analyses were done with qualitative data, the principles of thematic analysis as proposed by Braun & Clarke (2006).

Results and Discussion

The results were obtained from 42 primary head teacher, 42 preschool lead teachers and 381 final pre-school class pupils.

Availability of Components of Outdoor Environment

The results on the availability of various outdoor components in ECDE centres are represented in Table 1. The results show that several outdoor environmental components were of interest to the current study. The study establishes in general that in almost half (46.44%) of the ECDE centres, the components of a rich outdoor environment were not available at all while less than a quarter (22.61%) of the ECDE centres had few elements in existence. With a lot of concern, the

results further indicated that only 4.19% of the ECDE centres in which all the elements required for a rich outdoor environment were available. Although the children's outdoor environment should be equipped with standardized structured such as swings, slides, and climbing structures often installed over asphalt.

Outdoor environments should be equipped with standardized structured such as swings, slides, and climbing structures often installed over asphalt (Frost, Wortham, & Reifel, 2001). The current findings indicated that the school outdoor environment was typically a part of schools' playground which had few structures. Contemporary playgrounds lacked structures that provided various means for children to explore and develop various skills. This seems not to be in line with the recommendations of the Competency Based Curriculum which aims at nurturing every learner's potential so that they are fully engaged and empowered in order to develop as ethical citizens. This calls for a paradigm shift in schools to provide play materials that would lead to holistic development of learners.

During the interview with the primary school head teachers and pre-school lead teachers on the availability of various outdoor components, majority (76%) of preschool lead teachers in general expressed their concern about the acute shortage of various outdoor components that makes an ideal outdoor environment that facilitate the children's physical development and

Table 1. Availability of various outdoor environment components in ECDE centres.

Outdoor Components	Availability of the Components of Outdoor Environment					
	A	B	C	D	E	F
Water play area	76.2	14.3	7.1	0	2.4	0
Outdoor environment has benches & table	19.0	28.6	7.1	23.8	16.7	4.8
Physical development equipment (climbers, slides, balancing devices & swings)	42.9	38.1	7.1	4.8	7.1	0
Availability of loose materials (tyres, bean bags, ropes, balls)	4.8	38.1	0	16.7	23.8	16.7
Presence of garden	42.9	19.0	2.4	21.4	9.5	4.8
Availability of sand pit	50.0	19.0	4.8	14.3	7.1	4.8
Availability of construction area	64.3	7.1	11.9	9.5	4.8	2.4
Presence of play house	71.4	16.7	4.8	0	7.1	0
Average	46.4	22.6	6.5	11.3	9.8	4.2

A- Not available at all; B- Very few; C- A few; D- Half available; E- Mostly available; F- All exist



physical skills. For example, one teacher stated, *"In my school, there are no equipment needed for preschool children's physical development like climbers, slides and swings. This makes it difficult for me to conduct outdoor activities, however there is a large playground with space where kids can run and develop their own ideas (T-12)."*

Effectiveness of Outdoor Components

The study established that on average, 64.97% of preschool centres had effective components that made the outdoor environment. This implies that the remaining 35.03% of centres did not provide effective enabling outdoor environment for preschool children to participate in various outdoor activities. On the other hand, 69.1% of centres had effective physically developed equipment that were adaptable to users' needs and catered for children's interests, 66.7% of centres had school gardens that provided an enabling environment for a wide range of stimulating activities, 61.9% had construction areas that were large enough and allowed for a wide variety of activities, and 69.0% had sand pits that enabled children to engage in a variety of stimulating and imaginative activities. This positive finding needs to be emphasized in our Kenyan schools because psychomotor and creative activities at pre-primary level enable learners to develop both fine and gross motor skills which are necessary for the control and co-ordination of different parts of the body. These activities also allow children to explore and develop social skills and personal talents and skills as well as appreciate their cultural heritage.

The results further revealed that 61.9% of the centres did have loose materials (tyres, bean bags, ropes, balls) that were appropriate for the different age level learners, but 73.8% of the centres did not have water play areas that accommodated a variety of learning styles among learners, and 86.2% did not have a play house that provided opportunities for social interactions among children. This finding is not consistent with the literature reviewed that called upon schools to develop play areas to lead to holistic development of learners (Pelligrini & Bohn, 2005; Whitebread, 2017). This calls for transformative education whereby schools should take initiative and involve all the stakeholders in education to provide basic materials to be used by learners in early years. Teachers need to transform their approaches in engagement with parents and community members so that they are actively involved in sourcing materials for learners in pre-school centres.

Assessing the State of Outdoor Environment

The results affect the state of outdoor environment in terms of the condition, adequacy, utilisation, adaptability, design and appropriateness of various outdoor components in various ECDE centres. In this regard, the study established that the conditions of the outdoor components that make a rich outdoor environment were unsatisfactory in 40.48% of the ECDE centres. The data establish that the condition, adequacy, utilisation, adaptability, design and appropriateness of various outdoor components in various ECDE centres is below average. On considering whether the outdoor facilities in various ECDE centres were in good condition, it was found that in majority (47.8%) of the ECDE centres the condition of the outdoor facilities were unsatisfactory. It was further established that in 40.1% of the centre the storage facilities for outdoor equipment were insufficient, 47.8 % of the ECDE centres the equipment in the outdoor environment were not logically well-designed in a manner that accommodated for integrated activity based systems of learning. In more than half (52.5%) of the schools, the appropriate equipment for various age level activities were inadequate. In almost half (48.2%) of the preschool centres the science activities were not provided with sufficient space and equipment with science materials, and in almost half (47.9%) of the preschool centres the overall design of the outdoor environment was not aesthetically pleasing and appropriate for the different age level pupils. In about two thirds (67.0%) of the ECDE centres the outdoor working environment was not sheltered from sun and inclement weather. 54.9% of the ECDE centres the outdoor equipment did not provide an attractive colour and texture, 43.1% of the ECDE centre the location of outdoor facilities did not enhance the learning climate of the pre-school and in 55.2% of the ECDE centre the exterior noise and surrounding environment frequently disrupt outdoor learning. It will be important for teachers and other community members to change their approaches in order to transform the outdoor environment.

This may require paradigm shift in contextualising the value of outdoor environment as a precursor to classroom learning. The findings of the study indicates positive correlation ($p=0.00$) between the overall outdoor environment (availability, adequacy, effectiveness and state outdoor components) and all the three aspects of pre-schoolers' learning experience (children's ability to performing various rhythmic movement activities, children's ability to perform various locomotor



activities, children's general performance in various learned activity areas) and the overall learning experience. Table 2 further indicates that although a positive correlation was established, the magnitude of the correlation was different between various aspects of pre-schoolers' learning experiences and the outdoor environment. For example, preschool children's general performance in various learned activity areas had the highest correlation ($r=.687$), while children's ability to performing various loco-motor activities had the least correlations ($r=.357$) to the outdoor environment. It is also evident that there was a strong positive correlation between pre-schoolers' general performance in various learned activity areas and general outdoor environment. The correlation was moderate between children's ability to perform various rhythmic movement activities and general outdoor environment while there was a weak relationship between preschool children's ability to perform various loco-motor activities and the general outdoor environment in which the children learned.

Regression of Overall Outdoor Environment and Pre-schoolers' Learning

In order to estimate the level of influence of the overall outdoor environment (availability, adequacy, effectiveness and outdoor components) and pre-

schoolers' learning experience, a coefficient of determination was computed using a regression analysis whose results were as shown in Table 3.

The model shows that pre-schoolers' outdoor environment accounted for 35.2% of the variation in the overall pre-schoolers' positive learning experience, as signified by coefficient R^2 of .352. In addition, a linear regression was generated to estimate the actual influence of the overall outdoor environment and pre-schooler's learning experiences, as shown in Table 4.

It is evident from Table 4 that if the overall outdoor environment (availability, adequacy, effectiveness and state outdoor components) was improved by one standard deviation, then perceived scores in the level of preschoolers' overall learning experience (preschool children's ability to performing various rhythmic movement activities, preschool children's ability to performing various loco-motor activities, pre-school children's general performance in various learned activity areas is likely to improve standard deviation units. On the same note, if the overall children's ability to performing various rhythmic movement activities, preschool children's ability to performing various loco-motor activities, pre-school children's general performance in various learned activity areas is likely to improve standard deviation units. On the same note, if the overall outdoor

Table 2. Correlations between the overall outdoor environment and pre-schoolers' learning experiences

Overall outdoor environment		Ability to Perform Rhythmic Movement Activities	Ability to Perform Locomotor Activities	General Performance in Activity Areas	Overall Learning Experiences
	Pearson Correlation	.419**	.357**	.687**	.484**
	p-value (2-tailed)	.000	.000	.000	.000
	N	381	381	381	381

Table 3. Regression of the overall outdoor environment and pre-schoolers' learning experiences.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.593 ^a	.352	.350	29.459

a. Predictors: (Constant), Preschoolers' overall learning experience



Table 4. Coefficient of overall outdoor environment and pre-schoolers' learning experiences.**Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	T	p value
	B	Std. Error	Beta		
1 (Constant)	61.844	6.575		9.406	.000
Overall outdoor environment	3.034	.252	.593	12.025	.000

a. Dependent Variable: Preschoolers' overall learning experience

Regression equation = $61.844 + 3.034X_1 + \varepsilon$ where, Y = Preschoolers' overall learning experience, X_1 = overall outdoor environment.

environment increases by one unit, then the level of the pre-schoolers' overall learning experience would improve by 3.034 units; this is a substantial effect from one independent variable. In addition, the P-value was 0.000, confirming a statistically significant influence of the overall outdoor environment on the overall pre-schoolers' learning experience.

During the interview schedules with the primary school head teachers, the study further established that outdoor environment usually facilitated pre-school children's physical, social, emotional, and mental development in their various ECDE centres. On this note, some of the respondents had this to say:

"Play gives the child with the opportunities to explore with his/her own world where he or she was free of adult values and external realities." (HT-03)

"As the preschool children were interacting through play, they developed the feelings of belonging in peer groups, positive feelings for children like enjoyment, happiness, freedom, relaxation, excitement, and entertainment." (HT-13)

On the development of various skills, 39 (92.86%) of the preschool lead teachers noted that rich outdoor environments enabled children to learn about cooperation and collaboration. It was also observed that children from pre-school centres which had adequate and rich outdoor environment generally worked together sharing space and materials amicably, worked toward the same goal and talked with one another as they played, unlike those centres which did not have adequate rich outdoor environment. *Like in SCH19, the pre-school children were observed sharing experience that required them to listen to others in order to understand how to work together to achieve mutual goals.*

As children interacted in the school, they communicated their needs, ideas, feelings, desires, and knowledge to each other, and to their preschool teacher.

In SCH15, a girl was observed assigning tasks and roles to others, or assumed roles and volunteered for certain tasks which involved inviting other children into their play. In school SCH11 children were observed engaging in collaborative problem-solving and at various times, assuming leader

and follower roles. As they shared space, materials and plans, they learned to take turns, negotiate, and compromise. When there was conflict, they had the opportunity to practice conflict resolution skills.

During the interviews, it was established that a rich outdoor environment facilitated pre-schoolers' development of early mathematics and problem-solving skills. For instance, in SCH06, some boys were observed exploring patterns, the attributes of objects, and shapes. In SCH01, some girls were counting as a way to identify and describe their play using a song. Children also used counting to convey information to others and to solve problems when there was a disagreement among four girls in SCH07.

On the development of science skills, children in SCH24 were observed exploring nature by trying to discover various parts of the flowers and chancing butterflies. This often involved telling others what they knew about flowers and butterflies.

During the researcher's visit to various preschool centres, it was reported by HT18 that the space and nature of the materials in a rich outdoor environment provided many opportunities for children to purposefully move and use their bodies. It was also observed that preschool who were in school that had rich outdoor environment had better balance and confidence abilities as they manipulated various outdoor equipment than those schools which did not have rich outdoor components.

During the observation schedules, it was observed that the space and materials within the outdoor environment were provided multiple opportunities for children to develop construction skills as they engaged in a variety building experiences (evident in more than half 69.05% of the preschool centres). Some of the specific skills that were identified during the observations



included: learning the concept of construction through experimentation; creating enclosures, walls and bridges; emptying and filling, balancing and bracing objects as they experimented with weight and stability.

During the interview schedules, a statement was put to the preschool lead teacher with a view to solicit their views regarding the importance of play in learners' cognitive development. The majority of preschool teachers observed that a rich outdoor environment with adequate and safe playground was important for learners' cognitive development. In elaborating their answers, the teachers had the following to say:

"Play develops the children's sense of reasoning and imagination which also stimulates creativity." (T-02)

"Learners enhance their cognitive skills by thinking while enjoying themselves within the outdoor environment." (T-7)

"Play develops the child's brain to think for themselves and find solutions to the challenges they face as they play." (T-13)

"The ability to think critically and solve problems help in their growth." (T-22)

"Play allows children to think critical and coherent." (T-37)

"Play develops children's fine motor skills, reasoning and thinking." (T-40)

Implications

The findings of the present study are important for the Kenyan education system because improving the outdoor environment and pre-school learning experiences will have a positive impact on the long-persisting challenges facing the pre-school education sector in Kenya. In addition, the results could serve as a basis for developing a hypothetical model for studying the direct and indirect effects of the fore-mentioned factors on improving the education standards in Kenya. In general, these findings could serve as a guideline for teachers, educational practitioners and curriculum developers in developing and utilizing educational policies, methodologies and activities that could help in improving ECDE programmes. The study findings finally fill the existing gap in other research carried out to identify the factors contributing to the existing low enrollment and high rates of grade retention in pre-primary schools in Kenya. This paves way for more comprehensive national and international research.

Conclusion

The study sought to establish the links between utilization of the outdoor environment and pre-school children's learning experiences. It has shown that there is general agreement about a positive relationship between use of rich outdoor environment and pre-school children's positive learning experiences associated with development of various skills and competencies. From the study it can be concluded that the ability of pre-school children to perform various loco-motor and rhythmic movement activities is associated to the adequacy, availability, site and effectiveness outdoor components. Based on the results of this study, it can be concluded that, despite the many challenges that constrain having a rich outdoor environment, children continue to use the playgrounds as a major component of the outdoor environment. This study undoubtedly exemplifies the significance of children spending time in a well-designed, nature-filled outdoor environment under the support of peers and preschool lead teachers. This outdoor environment is crucial in supporting children's success and skill development.

As educators take charge of outdoor activities, they need to be flexible in their expectations of children in nature-based outdoor classrooms. It is through this expanded freedom that children more fully experience the space, materials and environment, adding to their skill development and to the depth of their understanding of the world around them. Lastly, the overarching philosophy of outdoor environments should embrace the value of unstructured play for children, the role of child-initiated activities in learning, and the importance of children spending time outdoors, connecting with nature. All children deserve the rich learning that can occur through opportunities to experience the beauty of nature that spending time in an intentionally designed outdoor classroom can provide.

Recommendations

It is the aim of all educational systems and, indeed, all parents, teachers and all stakeholders in education at all levels, to improve the foundation of their children's education. Based on the findings of this study, the following recommendations are made with the view of improving the state of outdoor environments and pre-school children's learning experiences while within the pre-schools' outdoor environment.



Recommendations for Policy Makers - For the head teachers in the field, regular in-service may be necessary so that they are updated with current trends relevant to pre-school education. This will make them aware of the children's rapidly changing world from which their learning experiences emanate. The government of Kenya should have in place policy guidelines to all pre-schools with regard to the availability, adequacy site and effectiveness of outdoor environment.

Recommendations for Head Teachers - The head teachers should have schools' policies for monitoring outdoor activities. They should regularly assess and monitor children's learning and development.

Recommendations for the ECDE Teachers - The ECDE teachers should participate in outdoor play as well as involving all children in outdoor play. They should also enrich the ECDE learning environment with locally available teaching and learning support materials,

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Authors

¹ **Godfrey Nyaoga Ayaga** (gayaga@mmust.ac.ke) is a Lecturer in the Department of Educational Psychology at Masinde Muliro University of Science and Technology, Kakamega, Kenya.

² **Edward Khasakhala Okaya** (eokaya@mmust.ac.ke) is a Lecturer in the Department of Educational Psychology at Masinde Muliro University of Science & Technology, Kakamega, Kenya.



Effect of Hands-on Science Activities on Ghanaian Student Learning, Attitudes, and Career Interest: A Preliminary Control Study

Heather Beem

Abstract

A quasi-experimental study was carried out with 309 Form 3 students across 9 public Junior High Schools in the Greater Accra Region of Ghana. The effect of Practical Education Network (PEN)'s approach of training STEM teachers to employ hands-on activities using low-cost, locally-available resources was studied in terms of student learning outcomes, attitudes towards learning science, and interest in STEM majors/careers. Over a 2.5-month period, the science teacher at each experimental school received a weekly training on a hands-on activity and lesson observation by the respective PEN Trainer. A survey on attitudes towards science and a previous edition of the national exam (BECE) were administered to all students before and after the intervention. The mean pre-post differences were compared between the experimental and control schools. The intervention caused an average of 10.9% increase in exam scores (difference-in-differences), but the results were mixed at the school-level. Unpaired t-tests and Hedge's g tests were used to determine statistical significance between the two groups. Student engagement increased significantly ($p = 3 \times 10^{-7}$, $g = 0.85$), and student enjoyment of science increased 22% more, on average. The intervention disproportionately affected the females positively, enabling greater learning gains (14.5% vs. 5.3% for the males), greater increase in engagement, and a significant shift in interest towards STEM majors and careers, which their male counterparts did not experience. Results from this study should inform the design of future studies with longer duration and which account for factors such as school infrastructure quality.

Keywords: STEM, Ghana, Hands-on activities, Attitudes

Introduction

In Ghana, students use the phrase "chew and pour, pass and forget" to describe their experience of learning in school. This phrase expressively captures how students are asked to "chew" information, repeating facts over and over again, "pour" (vomit) them out on the exams, attempt to pass the exams, and then promptly move on with their lives (Blench & Dendo, 2006, Quansah & Asamoah, 2019). The dominance of this phrase in the Ghanaian vernacular points to the wide recognition that a shift in pedagogical practice is needed. Ghanaian educationists have pointed out the detrimental effects that "chew and pour" has on students' creativity (Haffar, 2016) and ability to translate theory to useful outcomes (Adomako-Ampofo & Kaufmann, 2018).

The future world of work in Africa is technology-

based (World Economic Forum, 2017). For the growing youth population in Africa to rise to these demands, the education system needs to be able to engage students, drive deep learning, and build their interest in STEM. Ghanaian education stakeholders clearly express that a shift in teaching practice is key to achieving this. The new national curriculum states "Ghana believes that an effective science education needed for sustainable development should be inquiry-based" (Ministry of Education Ghana, 2019). Interventions that can create enduring, transformative change in STEM teaching in Ghana should be developed and tested.

Practical Education Network (PEN) is an NGO seeking to shift the dominant pedagogical mode in West African STEM classrooms from rote to experiential. Survey data collected from a few hundred Ghanaian public Junior High School (JHS) teachers reveals that virtually all teachers see the benefit of using hands-on activities, but 80% cite the lack of resources as the main challenge

Full listing of authors and contacts can be found at the end of this article.



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they face in teaching more experientially. Furthermore, less than 5% reported having attended any relevant training towards this challenge within the last year (Practical Education Network, 2016). With minimal resources and training available, most Ghanaian teachers feel there are no realistic alternatives to the “chew and pour” approach. PEN is tackling this challenge by training science and mathematics teachers to employ low-cost, locally-available materials for the development and deployment of hands-on activities, which are aligned to the national curricula. The aim of this study is to determine the impact of PEN’s approach on students in the Ghanaian classroom. We hypothesize that regular use of these low-cost, hands-on techniques in the science classroom will improve Ghanaian students’ exam scores, attitudes towards learning science, and their interest in pursuing STEM in the future.

Literature Review

Research in science education has established strong positive effects when students are taught using experiential pedagogies. These approaches have been shown to enhance student attitudes (Gormally, Brickman, Hallar, & Armstrong, 2009), improve exam scores (Abdi, 2014), increase scientific process skills (Ergul et al., 2011), and potentially encourage more students to pursue STEM-related careers (van den Hurk, Meelissen, & van Langen, 2019). The body of literature has largely been developed in the Global North, but a recent study (Bando et al., 2019) compiled the results of randomized controlled trials deployed across four Latin American countries, assessing the efficacy of the inquiry-based approach across a total of 17K students. Their results showed a 0.16 standard deviation increase in science test scores after 7 months of practical science learning.

There is a pressing need to understand how to contextualize international best practices for African education, given the low learning outcomes presently being recorded here. In the early 2000’s, Ghana began participating in the Trends in International Mathematics and Science Study (TIMSS). Ghana has continually ranked near or at the bottom of the participating countries (Buabeng, Owusu, & Ntow, 2014). Despite Ghanaian education stakeholders’ recognition that improvements in learning outcomes are needed, only a few studies have been conducted to determine the efficacy of experiential pedagogies in the local science education context. One study at the senior high school level (Aboagye, 2009) compared the effectiveness of a particular constructivist approach (the three-phase

learning cycle) with the traditional approach used in Ghanaian science classrooms. It was used in the context of teaching one specific topic (direct current electricity). In South Africa, Kibirige, Rebecca & Mavhunga (2014) studied 60 high school students, half of which were undergoing three weeks of experimental work (using standard laboratory equipment) and the other half which were undergoing traditional lecture methods. In both cases, they measured improvement on exam scores as a result of the practical sessions. These studies indicate that experiential pedagogies can improve learning outcomes in the African science classroom. More such studies should be done to understand details of implementation, and they should also be carried out at earlier levels of schooling. In Ghana, students in senior high school have already chosen a major of study. In order to understand and impact students’ career prospects, interventions and studies are needed at the primary and junior high school levels.

Even if the efficacy of such pedagogies is established in the African context, the question of how to implement such approaches still remains. In Ghana, less than 10% of public junior high schools contain any laboratory equipment (S. Mohammed, personal communication, March 2015). For hands-on, experiential lessons to be widely deployed, teaching and learning materials must be low-cost. (Davis & Chaiklin, 2015) studied the use of classroom objects, such as tables and chairs, as teaching and learning resources for Ghanaian students to learn measurement. With over 500 hands-on activities made from materials available locally in Ghana (Practical Education Network, 2020), PEN’s content is one of the most extensive and relevant resources currently available to the Ghanaian science teacher. Its alignment with the Ghanaian national curriculum also warranted its infusion into the latest revision of the primary school science curriculum (Ministry of Education Ghana, 2019) and the accompanying Teacher Resource Pack’s list of “Practical Science Lesson Resources” (National Council for Curriculum & Assessment, 2019).

In addition to the content itself, teacher training is a key component in enabling a shift from rote to experiential pedagogies. In Ghana, where teacher-centered approaches tend to dominate science teaching (Buabeng, Ossei-Anto, & Ampiah, 2014), teacher training has been pointed out as a key factor to improving student outcomes (Buabeng, Owusu, & Ntow, 2014). The details of how a teacher implements



practical content also affects the efficacy of the approach (Abrahams & Millar, 2008). Various teacher training interventions have been successfully carried out in Ghana, but they have mostly been focused on literacy and numeracy (Aizenman & Warner, 2018; Johnston & Ksoll, 2017).

The role of gender as it relates to science education in Ghana has been subject to some investigation. (Donkor & Justice, 2016) sought to uncover the reasons behind the gender gap in students pursuing science in the Upper West Region of Ghana. Further research is needed to elicit key mechanisms that can close the gap. The study in South Africa mentioned above (Kibirige et al., 2014) found no difference in results across gender lines.

This study seeks to understand the efficacy of Practical Education Network's approach, which aims to tackle the aforementioned challenges through its STEM teacher training program that equips Ghanaian teachers to leverage local materials and carry out hands-on, experiential pedagogies in their classrooms.

The research questions are as follows:

1. *What effect does PEN's approach have on learning outcomes?*
2. *What effect does PEN's approach have on student attitudes to learning science?*
3. *What effect does PEN's approach have on student interest in STEM majors and careers?*

Finally, any difference in results across gender and geographical (rural vs. urban) lines are to be elicited.

Methodology

Overview

A quasi-experimental, quasi-controlled method was employed to measure the effect of training Ghanaian science teachers to use practical, hands-on activities in their Junior High School classrooms. Three PEN trainers were selected to lead the intervention. All three are public JHS science teachers who had attended PEN's Introduction to Hands-on Science training program in the past and performed well enough to be invited for a second round of training, the completion of which promoted them to PEN Trainer status. Each PEN Trainer was enlisted to train 1-2 science teachers in their respective Circuits- the next geographic division below a District and usually composed of 5-20 schools. Those teachers were, in turn, prepared to deliver at

least one hands-on activity per week in their classroom over a 2.5-month period. The study took place during the 3rd (final) term of the 2016/7 Academic Year at 9 public schools in various locations within the Greater Accra Region. In total, N = 309 students were involved in the study: 135 from the experimental schools and 174 from the control schools. The trainers solicited and received permission from each participating school to include information on their teachers and students in this study. All school, teacher and student names have been kept anonymous, but select pictures are shown to aid in depicting the intervention.

School Selection

The trainers were asked to select their own participating schools- both experimental schools and control schools. They were allowed to choose any schools so long as they were located within their Circuit. In all cases, the selection ended up being driven by 1) those which were most easily accessible for the trainers, in terms of distance to travel, and 2) those at which they were positively received by the headteachers. The author's assumption was that all schools within the same Circuit would be similar socioeconomically and in terms of exam performance. The trainers were briefed on the goals of the study, including the intention that both experimental and control schools be similar. They were asked to use their knowledge of the schools to select those they deemed to be comparable.

All of the schools are located in the Greater Accra Region of Ghana. Two of the Circuits are located in rural areas (Kofi Kwei and Ashalaja - both within the Ga South District) and one Circuit is in an urban area (Kwabanya - within the Ga East District). The total number of experimental schools is five and that of control schools is four. Table 1 provides the code

Table 1. List of participating schools

School Code	Type	Circuit	Location	Number of Students
ES1	Exp	Kwabanya	Urban	71
CS1	Ctrl	Kwabanya	Urban	74
ES2	Exp	Ashalaja	Rural	16
ES3	Exp	Ashalaja	Rural	29
CS2	Ctrl	Ashalaja	Rural	63
ES4	Exp	Kofi Kwei	Rural	9
ES5	Exp	Kofi Kwei	Rural	10
CS3	Ctrl	Kofi Kwei	Rural	25
CS4	Ctrl	Kofi Kwei	Rural	12



used to refer to each school in the course of this study, their type (experimental: “Exp” or control: “Ctrl”), the location of the school (Urban or Rural), and the total number of students engaged in each school. In each case, all of the students in the final year (Form 3) class were engaged in the study. This Form was chosen, as their students would be taking the terminal exam for JHS, Basic Education Certificate Examination (BECE), shortly after the end of the study.

Tools Administered

After permission was solicited from the Ghana Education Service (GES) District Offices and the schools were selected, a pre-test was administered to the students at all 9 schools (experimental and control). This pre-test was used to determine a baseline for the three main outcomes of interest in this study: student exam scores in science, student attitudes towards learning science, and student interest in STEM majors and careers. One tool was used to measure the first outcome and a second tool was used to measure the other two outcomes.

The first tool, which was used to assess the first research question, was the full Integrated Science portion of a previous Basic Education Certification Examination (BECE). Nearly all students write this exam in June, but a second version of the exam is offered in the following February for a small minority of students who require writing it then. The February 2017 version of the BECE is the tool which was administered to the students participating in this study. This was at the suggestion of a former examiner for the West African Examinations Council (WAEC), the body overseeing the national exams, as he believed that few to none of the students in this study would have seen that particular exam. That person also created the marking scheme used for assessment in this study.

The second tool administered was a paper survey, which included the following survey questions (SQ):

- SQ1. Which of the following subjects do you intend to study in Senior High School (SHS)?*
- SQ2. What job are you most interested in working after you leave school?*
- SQ3. How frequently does your science class include hands-on activities?*
- SQ4. How engaged are you in the hands-on activities?*
- SQ5. How easy is it to learn science?*
- SQ6. Do you enjoy learning science?*
- SQ7. If you do, why? If not, why not?*

The second research question (students’ attitudes towards learning science) was measured via SQ4-7. The third research question (students’ interest in pursuing STEM majors and careers) was measured via SQ1-2. Finally, SQ3 was simply used as a check for whether the experimental schools were indeed receiving the intervention.

For SQ1, all potential subjects that students have as options for their SHS “major” were listed. SQ2 and SQ7 were open-ended responses. Options for SQ3 included “Never”, “Once per month”, “Once per week”, and “More than once per week”. SQ4 and SQ5 were answered on a Likert scale from 1 to 7. SQ6 was a yes/no question.

Both the survey and the exam were administered in paper form to the students. PEN staff administered the surveys so as to best enable students to provide honest feedback in the absence of their teacher. The trainers administered the exams.

At the end of this period, similar tools were administered to the students to serve as the endline. The survey was the exact same as that administered at the beginning of the intervention. The exam administered at the end was, however, a different version. The post-test exam was shorter, composing only Part 1 of the two parts composing the BECE. It was created by compiling questions from different years’ versions of Part 1 of the Integrated Science portion of the BECE. Given the short duration of the intervention, only a portion of the syllabus was covered. The selection of past questions ensured that the syllabus topics covered by both sets of teachers would appear on this exam. The selection was done by the research team and checked for fairness by the WAEC examiner mentioned above. Both experimental and control schools completed this endline exam. One intern completed the marking of all exam scripts so as to ensure uniformity.

Intervention (Training + Lesson Observation)

Once the pre-test (survey and exam) had been administered at all 9 participating schools, a 2.5-month period of the intervention commenced at the 5 experimental schools. The intervention consisted of the following steps, was repeated on a weekly basis, and is also depicted schematically in Figure 1.

1. The experimental school teacher notified PEN’s Logistics Officer of the science curriculum topic they would be treating in the next week.
2. PEN’s Logistics Officer procured locally-available materials for a PEN hands-on science activity



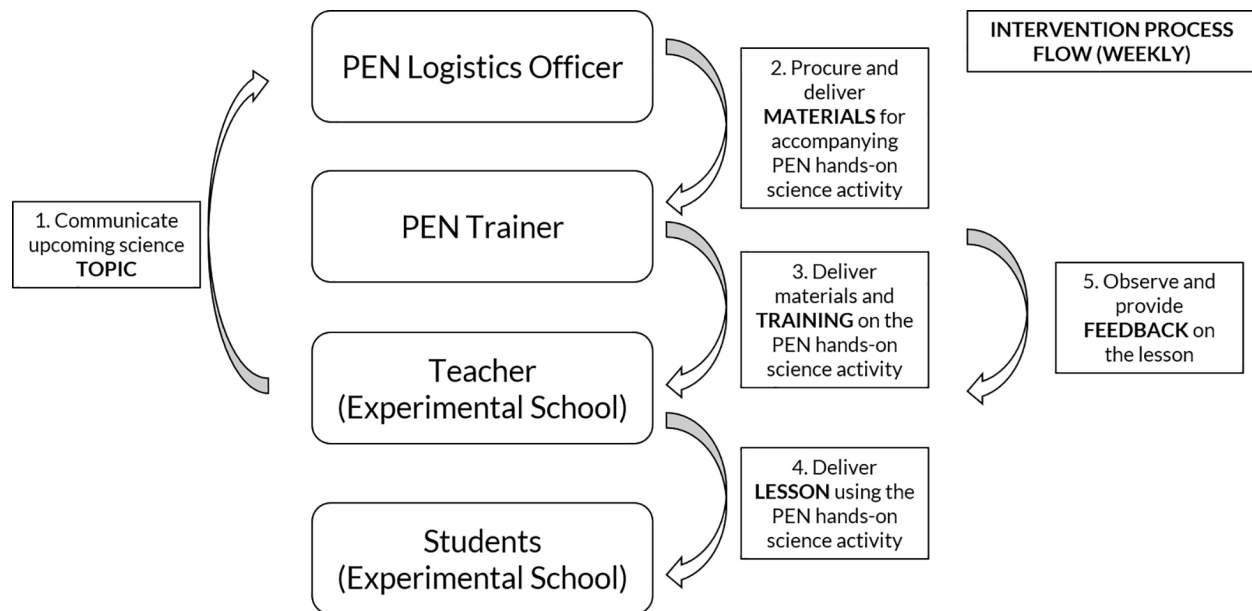


Figure 1. The process flow completed weekly over the course of the intervention.

corresponding to that topic, and he delivered the materials to the PEN trainer.

3. The PEN trainer trained the experimental school teacher on PEN's hands-on science activity for that syllabus topic.
4. The teacher delivered the practical lesson to their Form 3 students, while the PEN trainer observed.
5. The PEN trainer provided feedback to the teacher on their lesson delivery.

The PEN trainer visited the experimental school(s) in their Circuit twice a week- once to train the teacher and once to observe the deployment of the practical lesson. This cycle continued every week in the experimental schools, while the control schools were exempted. Figure 2 shows a picture of one of the teacher training sessions and trainer observation of the lesson on heat energy. Figure 3 shows the PEN activity used to teach the digestive system, as carried out by students at one of the experimental schools after their teacher had been trained on the lesson.

Data Analysis

Research Question 1 – student exam scores:

In order to determine the level of effect that the intervention had on the exam scores, a difference-in-differences analysis was carried out between the means of the experimental and control groups. Pre-test and post-test exam scores are first presented independently.



Figure 2. Teacher training and lesson monitoring of a PEN activity on heat energy transfer through painting of Milo tins.





Figure 3. The PEN model of the digestive system, utilizing locally-available resources, constructed by students at ES2.

The difference in the means over time is presented last, and only includes students who completed both pre-test and post-test exams.

Research Questions 2&3 – student attitudes to learning science; student interest in STEM majors/careers:

Three main methods were used to answer these research questions through comparison of the experimental and control groups: 1) comparison of yes/no responses over time, 2) two-tailed, unpaired t-test to determine the p-value using a 5% significance level, 3) test for effect size using the Hedges' g statistic. Only those students

whose responses were captured in both the pre and post surveys were considered in this analysis. Before carrying out the t-test, an F-test was carried out to determine whether each dataset was of equal or unequal variance. The final method was included as an additional measure of the magnitude of difference between the two groups due to its utility in working with smaller sample sizes. The effect size is considered small if $g \geq 0.2$, medium if $g \geq 0.5$, and large if $g \geq 0.8$.

For Research Question 3, the potential responses to the corresponding survey questions (SQ1 - SHS major and SQ2 - future job interest) were first categorized into STEM or non/STEM responses. For SQ1 (SHS major), STEM responses were considered to be "General Science", "Agric Science" or "Other" if the response included something in the line of "Technical" or "Electricals". For SQ2 (future job interest), STEM responses were ones such as "engineer", "doctor", "nurse", "technician", "accountant", "pharmacist", "architect", etc. The survey results were digitized and analyzed in Excel. For Q6 which has a binary choice of answers, the number of respondents in each category was counted before and after the intervention. The pre-post difference in number of respondents in each category was compared between the experimental and control schools. For the

questions which were answered on a scale (Q3-5), statistical analysis was done to determine the significance of any difference in the means over time. Both the means between the pairs of schools and the means between the experimental and control schools were compared. The schools in the Ashalaja Circuit (ES2, ES3, CS2) were excluded from this analysis due to the logistical challenges of the trainer falling ill and not being able to administer the post-survey at all of his schools.

The same statistical analyses were carried out with the data disaggregated across gender and geography, with the goal of elucidating any effects that may have been felt more strongly within either the female or male subsets and within either the rural or urban subsets.

Confirmation of activity implementation

In addition to information received from the PEN Trainers regarding details of the intervention implementation, the results from Survey Question 3 ("How frequently does your science class include hands-on activities?") were used to determine whether the hands-on science activities had indeed been delivered regularly at the experimental schools. Using the same statistical analyses described for the above (t-test, Hedge's g), the difference in results over the course of the intervention was compared across the combined experimental schools and combined control schools.

Follow-up school visits

After this analysis was done, follow-up visits to the schools were carried out. The results to the study's Research Questions were presented to the teachers and trainers involved, and their interpretation of the findings were elicited. Quotes were collected and key ones are reported here.

Logistical Challenges

The trainer for the Ashalaja Circuit fell severely ill partway through the study. He was therefore unable to carry out the full intervention at his set of experimental schools. He was also unable to be reached after the study, so the exact number of trainings he ran remains unknown. For this reason, the only results included for the Ashalaja Circuit schools (ES2, ES3, CS2) are the pre-test (exam and survey). Those schools were excluded from all analyses involving a comparison over time.



Results

Confirmation of activity implementation

Results from SQ3 “How frequently does your science class include hands-on activities?” (scale of 1 to 4) are shown in Table 2, with sample size (N) included. Overall, the experimental schools reported significantly higher increase (Δ) in frequency of including hands-on activities compared to that of the control schools over the course of the intervention ($p = 0.007$). A small effect size ($g = 0.47$) was also measured. This serves as a confirmation that, on average, the trainings were successfully being translated to classroom implementation in the two Circuits that this analysis was done on.

Table 2. Significance of change in SQ3 (frequency of hands-on activities) results.

Gender	N _{ctrl}	N _{exp}	Δ_{ctrl}	Δ_{exp}	p-value	Hedge's g	Effect Size
All	89	60	0.348	0.885	0.007	0.47	Small
M	46	25	0.217	0.923	0.013	0.62	Medium
F	42	33	0.476	0.909	0.122	0.36	Small

Disaggregation of respondents whose gender was reported shows that both males and females at the experimental schools reported significant increase in frequency of hands-on activities compared to their counterparts at the control schools. The males reported an even higher increase than the females.

Research Question 1 (Exam Scores)

The results of the student scores on the old (February 2017) BECE exam administered before the intervention (Pre-Test) are shown in Figure 4 (left). The scores are presented in the form of box-and-whisker plots to capture the average (marked with an “X”), the range of the 1st to 3rd quartile (the box edges), and the overall range (the whiskers). One box-and-whisker plot is shown for each school, and the results are grouped into the three Circuits. The experimental schools are marked in red and the control schools are marked in blue. Before the intervention, all schools scored between 20 to 39%, on average. On average, the urban schools (Kwabenya Circuit: ES1, CS1) performed slightly higher than the rural schools before the intervention (35% vs. 27%). On average, there was minimal difference in the pre-test results between the experimental schools and their counterparts within their own Circuit. In each Circuit, the experimental schools scored slightly higher on average (Circuit 1 by 8%, Circuit 2 by 1%, Circuit 3 by 2%).

Figure 4 (right) shows the student exam scores after the intervention. All schools improved on the exam, with post-test averages at each school ranging from 45 to 72%. The overall range of results increased for most of the schools, indicating a widening of the gap between the higher- and lower-performing students. The Ashalaja Circuit schools (ES2, ES3, CS2) were excluded from here on.

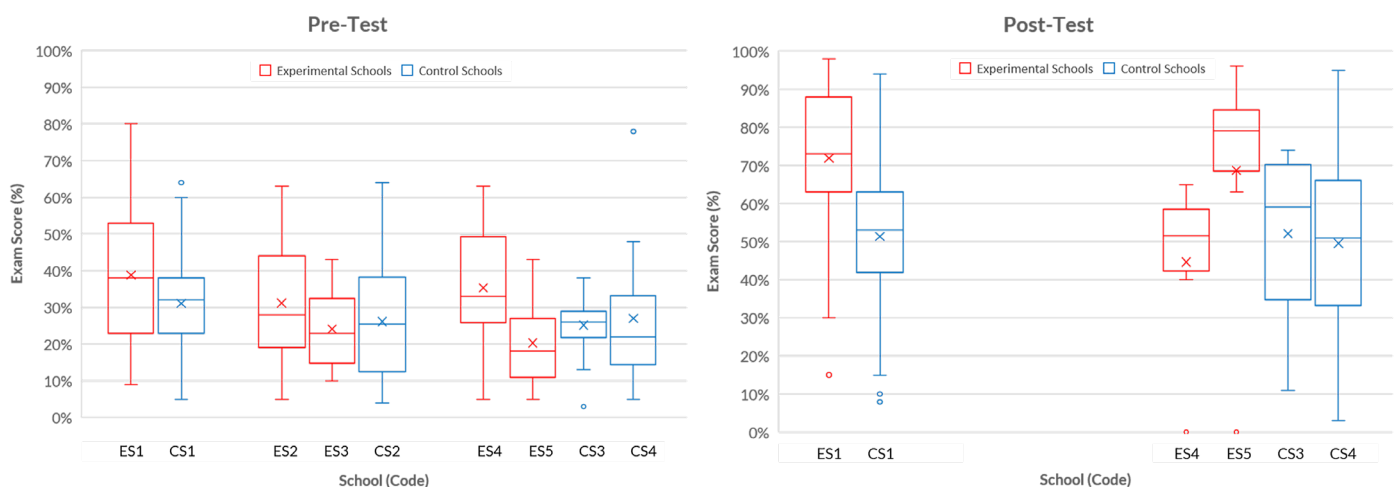


Figure 4. School-level Pre-Test and Post-Test exam scores.



In order to determine the effect of the intervention beyond any learning that occurred in the normal mode of teaching (as observed in the control schools), the difference between the pre- and post-tests was calculated for each school. These results are shown in Figure 5. Each experimental school(s) is best compared to the control school(s) within its own Circuit. In the Kwabenya Circuit, the experimental school (ES1) showed a larger improvement in learning than its control school (CS1): 33% vs. 20%. In the Kofi Kwei Circuit, one experimental school (ES4) showed a smaller improvement than the control schools (CS3, CS4) (9% vs. 25% average) while the second experimental school (ES5) showed a much bigger improvement (48%) than those control schools.

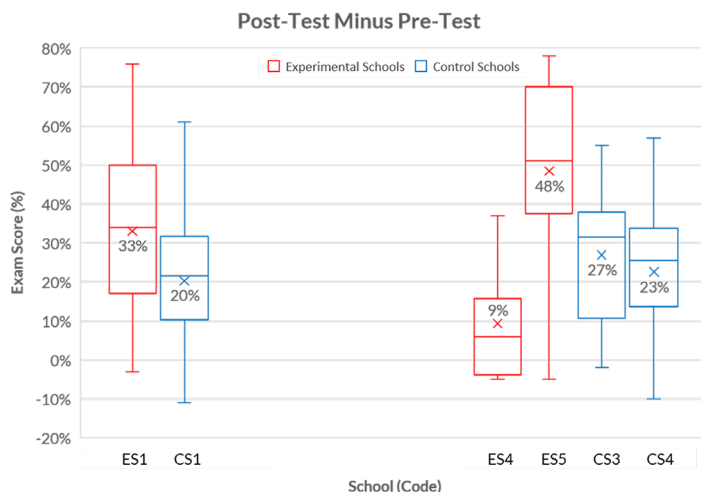


Figure 5. School-level change in exam scores over the course of the intervention.

The overall difference-in-differences of exam scores was +10.9%, with the experimental schools improving more than their counterparts over the course of the year. The difference-in-difference within Circuit 1 alone was +12.8%. Circuit 3 had mixed results across the different schools, resulting in an average difference-in-differences +4.1% in that Circuit. Results from the surveys and follow-up visits reveal reasons for the difference in results within Circuit 3.

Table 3 presents these results, disaggregated across gender. Note that gender information was missing for one student, so there is a discrepancy in sample size (N) between the overall value and the disaggregated ones.

Table 3. Difference-in-differences of exam scores at experimental schools (ES) and control schools (CS).

Sample Set	$\Delta(\overline{ES} - \overline{CS})$	N
All	+10.9%	154
Male	+5.3%	71
Female	+14.5%	82

The female students improved 14.5% more than their counterparts, which is a greater change than the male students experienced (5.3% more than their counterparts).

Research Question 2 (Attitudes to Learning Science) Enjoyment of learning science (SQ 6-7)

The results of the survey question that elicited student enjoyment of science (SQ6) are shown in Figures 6 and 7 (before and after the intervention, respectively). On average, students in both sets of schools reported similar attitudes before the intervention: 89% of experimental school students responded that they "Enjoy Science" as did 84% of the control school students.

In the schools that did not receive PEN's intervention, student interest decreased over the course of the 2.5 months. The opposite trend was recorded in the experimental schools. Those who reported enjoying science in the experimental schools increased by 7% and their counterparts in the control schools decreased by 15%. Therefore, on average, the students who received the intervention experienced a 22% greater increase in enjoyment of science.

The open-ended responses to SQ7 reveal some reasons why students enjoyed learning science. Examples include "The teachers make it interesting," "The practicals make it more fun," "helps me to define things in my own words," "helps me to picture," "helps

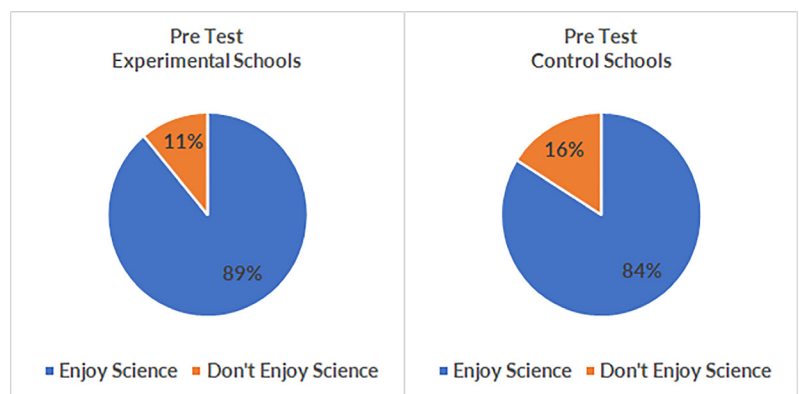


Figure 6. Pre-Test student survey responses on enjoyment of science at the experimental and control schools



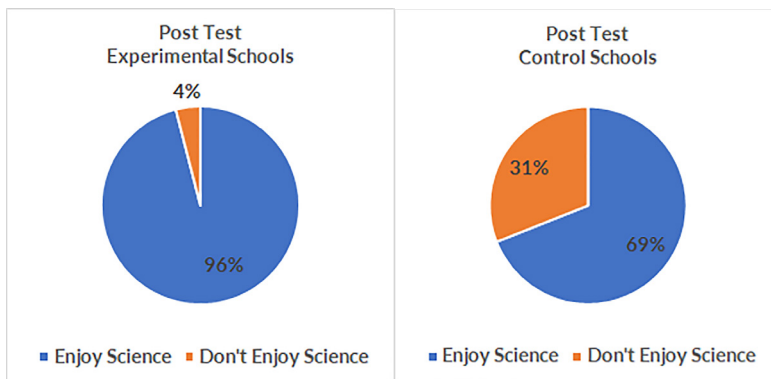


Figure 7. Post-Test student survey responses on enjoyment of science at the experimental and control schools

give me an idea about the topic,” “helps in making learning easier,” “helps me remember well,”

Engagement level, ease of learning science (SQ 4-5)

A summary of the results of changes in student engagement level and ease of learning science are captured in Table 4. Both questions were answered on a scale of 1 to 7. The mean of the change in values (Δ) between all the control schools and experimental schools is shown for each question. The significance of the difference between the two sets is captured through the t-test and Hedge's g test. The sample size (N) of respondents (those from the 2 eligible Circuits and who answered both the pre and post surveys) is listed.

For SQ4 “How engaged are you in the hands-on activities?”, a significant difference and large effect size were measured ($p = 3 \times 10^{-7}$, $g = 0.85$). This reveals that the intervention had a significant impact on the level of engagement that the experimental school students felt, compared to their counterparts. There was, however, no significant difference or effect size in the pre-post

change between the control and experimental schools for SQ5 “How easy is it to learn science?” ($p = 0.672$, $g = 0.07$).

Disaggregation of this data across gender and geography is captured in Table 5. Both genders experienced a change with large effect size for SQ4 (Engagement), but the effect size on the females was even higher, nearly reaching a value of 1 ($g_{\text{female}} = 0.92$, $g_{\text{male}} = 0.77$).

Disaggregation of this data across urban schools (Kwabenya Circuit) and rural schools (Kofi Kwei Circuit) also reveals two differences of note. For SQ4 (Engagement), there was a large effect size for the urban schools ($g = 0.981$) compared to a medium effect size for the rural schools ($g = 0.528$). One of the experimental schools in the rural circuit (ES4) only reported a change of 1.33 points out of 7, on average, on this survey questions. The other experimental schools (ES5 and ES1) had changes of 2.143 and 2.204 points out of 7, respectively. Note that ES4 is the same school whose students experienced less improvement on their exam scores than its counterparts (Figure 5), suggesting that this school may not have implemented the intervention as effectively as the other two experimental schools. For SQ5 (Ease), the urban schools experienced no effect size ($g_{\text{urban}} = 0.059$) but the rural schools did experience a small effect size ($g_{\text{rural}} = 0.284$).

Table 4. Significance of change in SQ4-5 (level of engagement, ease of learning science) results

Question	Topic	N_{ctrl}	N_{exp}	Δ_{ctrl}	Δ_{exp}	p-value	Hedge's g	Effect Size
SQ4	Engagement	89	62	.011	2.113	3×10^{-7}	0.85	Large
SQ5	Ease	90	62	0.656	0.790	0.672	0.07	None

Table 5. Significance of change in SQ4-SQ5 results, disaggregated across gender and geography

Question	Topic	Gender/ Geography	N_{ctrl}	N_{exp}	p-value	Hedge's g	Effect Size
SQ4	Engagement	M	46	25	0.003	0.77	Large
SQ4	Engagement	F	42	35	1×10^{-4}	0.92	Large
SQ4	Engagement	Urban	58	49	1×10^{-6}	0.981	Large
SQ4	Engagement	Rural	31	13	0.111	0.528	Medium
SQ5	Ease	Urban	59	48	0.754	0.059	None
SQ5	Ease	Rural	31	14	0.374	0.284	Small



Research Question 3 (Interest in STEM Majors and Careers)

Results from the final two survey questions are shown in Table 6 and are disaggregated across gender. When asked of the SHS major they intended to study and the career they were interested to pursue, the males at the experimental schools did not shift their response between non-STEM and STEM options with statistical significance or effect size ($g = 0.07$), compared to their counterparts at the control schools. The females at the experimental schools, however, did significantly shift towards both. They shifted towards STEM majors with small effect size ($g = 0.22$) and towards STEM careers with medium effect size ($g = 0.48$), compared to their counterparts at the control schools.

Follow-up visits to the schools

Remarks by the Trainers and Teachers were captured during follow-up visits to each of the sites, except for the schools in Ashalaja Circuit, due to an inability to establish communication with the Trainer. They cited factors that influence the state of the learning

Table 6. Significance of change in SQ1-2 (desired SHS major, career) results, disaggregated across gender

Question	Topic	Gender	N _{ctrl}	N _{exp}	p-value	Hedge's <i>g</i>	Effect Size
SQ1	SHS	M	47	27	0.779	0.07	None
SQ1	SHS	F	43	35	0.340	0.22	Small
SQ2	Career	M	47	27	0.530	0.15	None
SQ2	Career	F	43	33	0.040	0.48	Medium

Table 7. Remarks and observations captured during follow-up visits to the schools

Circuit	School Code	Remarks	Made by
Kwabinya	ES1, CS1	The infrastructure and teacher quality are similar at both schools No major attendance issues	Researcher
Ashalaja	ES2, ES3, CS2	N/A	Trainer
Ashalaja	ES2, ES3, CS2	N/A	Teacher
Ashalaja	ES2, ES3, CS2	N/A	Researcher
Kofi Kwei	ES4, ES5, CS3, CS4	"The rate at which students here understand is very low compared to those in the city"	Trainer
Kofi Kwei	ES4	"We have a language problem in our school"	Teacher
		"We have poor attendance"	
		"We have lack of support from parents and teachers"	
		"We do not come to school when it rains"	
Kofi Kwei	ES4	The students can't read English well The teacher is a National Service personnel, so he has minimal experience The classroom infrastructure is very poor	Researcher
Kofi Kwei	ES5	"Parents do not encourage their wards to study at home"	Teacher
		"After school study groups have been made for students at their various villages"	
Kofi Kwei	ES5	"Students have time between their various periods to read"	
		The teacher has fallen in love with science! He has taken to creating science-based posters to hang around the class The students appear fairly focused in their studies	Researcher

environment in each respective school. These are captured in Table 7 along with observations made by the data collection assistant, which are categorized as that of the Researcher.

From these remarks and observations, it is seen that the pair of schools in the Kwabinya Circuit had comparable key factors in terms of their learning environment. The infrastructure in both schools was similar and both teachers had similar levels of teaching experience. They also did not experience any major attendance issues. Hence, in this pair of schools, the intervention was able to be conducted as intended, and with an accurate comparison.

For the Kofi Kwei Circuit, the Trainer observed that learning gains in his Circuit, which is a rural one, would be harder to come by than those achieved in the urban schools. Visits to the two experimental schools in his Circuit revealed key differences between them. ES4 struggled to get regular attendance, due to the school's poor infrastructure. The infrastructure was of such low quality that the school would not operate during any day in which it rained. Also, the students there were

found to have poor English reading ability. Finally, the teacher being trained through the intervention had been placed at the school through Ghana's mandatory National Service program, meaning that he was a fresh university graduate, with no prior teaching experience. For these reasons, the ES4 students did receive

the intended dosage of the intervention.

Evidence collected in the follow-up visit to ES5 revealed that the intervention's implementation had not only been consistent, but eagerly adopted by the school's Teacher. He appeared to have fallen in love with the science content, as he had gone the extra mile to create science-based



Table 8. Remarks captured during follow-up visits to the schools: suggestions for improving the intervention's efficacy

Circuit	School	Remarks	Made by
Kwabenya	ES1, CS1	"For best performance, practicals must be done at least two times a week"	Trainer
Kofi Kwei	ES4, ES5, CS3, CS4	"The number of practical materials should be increased in order for the number of pupils in a group to reduce"	Trainer
		"The practicals should start earlier (from Form 1-2)"	
		"I should be consulted to select the topics for the experiments"	
Kofi Kwei	ES5	"PEN should organize more workshops for teachers and trainers"	Teacher
		"Practicals should begin in Form 1-2"	

posters to hang around the class. This was not an explicit suggestion in the training provided. The school infrastructure was also of sufficient quality to allow constant attendance during poor weather conditions.

The Trainers and Teachers also made suggestions for improving the intervention next time, and these remarks have been captured in Table 8. All agreed that this intervention was helping their students, but they suggested that if further learning gains are desired, then the approach should be intensified. They suggested commencing the intervention with students in earlier year groups, increasing the frequency of the intervention, and increasing the number of resources used, so as to enable smaller group sizes.

Discussion

Over the course of a short (2.5 month) period, this intervention enabled significant improvements in Ghanaian students' science education experience, as a result of the introduction of hands-on activities into the classroom. Key quantitative results mentioned in the previous section are combined with the qualitative perspectives elicited in the follow-up visits for discussion here.

Research Question 1 (Exam Scores)

Overall, the intervention improved the exam scores for students at the experimental schools 10.9% more than the control schools over the 2.5-month period. The comparison between schools was the cleanest at the Kwabenya Circuit, where both schools are situated in the same cluster and have similar teacher quality. The difference-in-difference of exam scores there was 12.8%.

One experimental school (ES4) did not improve as much as its counterparts, but this can be attributed to their inconsistent implementation of the intervention. The experimental school who recorded the greatest improvement overall (ES5) found the program to be such

a significant benefit that their headteacher made a visit to the District Education Office specifically to thank them for supporting this intervention. Directly after this study was completed, they also announced that they had achieved the highest score ever documented in the school's history on the science portion of the BECE that year.

The female students across all schools improved their exam scores more than their male counterparts (14.5% vs. 5.3%), revealing the significant finding that this hands-on teaching approach can disproportionately enable learning gains for females. Given the widespread theme of males scoring higher than females in science/STEM subjects, this result merits further investigation. Few approaches in Sub-Saharan Africa have been measured to enable significant improvement in exam scores in STEM fields, much less to disproportionately favor learning gains for females.

It is also worth noting that the females reported less increase in frequency of hands-on activities experienced in their classrooms than their male colleagues. Nonetheless, the females managed to improve their learning outcomes more than the males. The reported lower frequency could be a result of teachers engaging the males more than females in the execution of the activities and/or the male students dominating the activities. These phenomena have been documented in Western literature (Jovanovic & King, 1998; Tobin & Garnett, 1987). Further studies in Ghana should include a specific gender lens in the lesson observation to determine the gender dynamics at play in hands-on activity execution.

Research Question 2 (Attitudes to Learning Science)

Another substantial result is that while student enjoyment of science decreased (–15%) in the control schools over the course of the intervention, there was an increase (+7%) in enjoyment of science in the



experimental schools. The inclusion of hands-on activities in the classroom countered the natural loss of enjoyment in science that students experienced in standard classrooms. Gains in interest in science/STEM likely play a role in enabling gains in the aforementioned exam scores.

The level of engagement that the experimental school students reported had a significant increase with large effect size compared to their counterparts. The females reported an even larger increase than the males. This indicates once again that the female students in this study were even more positively affected by this intervention than the males. If the previous explanation for the females' response to "frequency of activities" is accurate, then female students could stand to benefit from even higher engagement level increases if teachers are guided to involve female students more in the activities.

There was no significant improvement in the ease of learning science, either for males or females. Longer interventions should be conducted to determine if the gains in enjoyment and engagement captured here can translate into deeper learning of and comfort with science concepts.

Research Question 3 (Interest in STEM Majors and Careers)

Interestingly, although student enjoyment of science improved at the experimental schools, a universally equivalent shift towards selecting a Science-based program to study in SHS was not measured. The female students did positively shift with a small effect size ($g_{\text{female}} = 0.22$), but their male counterparts did not ($g_{\text{male}} = 0.07$). One teacher in the study offered an interpretation of this: "[The students] think they might not get the required grades to get admission for the Science... They have the zeal, but academically they are not good enough to be taken for Science...The system tries to inhibit them." These comments suggest that the Ghanaian educational system is not structured to support all students with a growing interest in science. The admission requirements to gain entry into a Science program are high, so a student may shut his or her mind to that as a viable option to pursue. It is also interesting to note that females did significantly shift to selecting STEM-based careers over the course of the intervention ($p = 0.04$, $g = 0.48$). The intervention again affected female students disproportionately, this time by opening up their mind to different aspirations for their long-term careers.

Limitations

Implementation Levels

A few inconsistencies in levels of the intervention's implementation across the experimental schools have been identified. These are summarized in Table 9. At the Kwabenya school (ES1), the Trainer and Teacher implemented the intervention thoroughly, as evidenced by the high level of change reported by students in their level of engagement in the lessons (Table 5, SQ4, Urban). Follow-up visit observations confirm that the students regularly attended and therefore had the intended dosage of exposure to the intervention. The implementation at the Ashalaja schools (ES2, ES3) had begun, but was incomplete, due to the trainer falling ill partway through. Finally, the Kofi Kwei schools (ES4, ES5) had different levels of implementation. The ES4 Teacher did not completely implement the intervention, as it was revealed during the follow up visit that students had not regularly attended school during the intervention period. ES5, on the other hand, had no attendance issues. Their teacher not only implemented the intended intervention, but he appeared to amplify his craft as a result. These levels of implementation quality have been kept in focus for interpretation and discussion of the results. Future studies must put stronger measures in place to ensure thorough implementation in all experimental schools.

School Selection Process

The school selection process employed did not compare exam results explicitly, but the trainers were tasked to carry out the school selection based on their knowledge of the schools' general performance. Future studies should include a more thorough list of criteria for school selection. This will help both to ensure the schools' ability to implement the intervention and it will also enable a clearer comparison between the pair of experimental and control schools.

Table 9. Assessment of implementation level at each experimental school

Circuit	School	Implementation Level
Kwabenya	ES1	Complete
Ashalaja	ES2, ES3	Incomplete
Kofi Kwei	ES4	Inconsistent
Kofi Kwei	ES5	Complete



Programmatic & Policy Implications

A few potential implications for PEN's programming and other African teacher training organizations arise from these results. Given the strong correlation between implementation level and learning gains achieved in this study, PEN should develop systems to ensure that the methodologies their teachers are trained on get implemented in the classroom. This will involve working even more closely with key stakeholders, such as District Education Officers, headteachers, and national education bodies to ensure that monitoring activities reinforce the use of hands-on activities and that curriculum standards also encourage teachers to use hands-on activities.

Given the example of the E5 school achieving its historically highest national exam score in science after going through this intervention, and thanks to the teacher there being enthusiastic enough to take up the new approach, PEN should consider identifying motivated teachers and focusing their interventions on them. A focus on intrinsically motivated teachers will likely result in higher learning gains than would be achieved through its current approach of offering training to all available participants. This must, of course, be balanced with the organization's goal of seeing wide-scale adoption of hands-on pedagogies.

PEN and other African STEM organizations should consider pursuing a specific gender focus to their programming, since the gains achieved among the female students are strong in both attitudes and learning outcomes. Furthermore, PEN and other teacher training organizations should consider including a component of its training that guides teachers to reduce any bias they may have in involving male students more than females in the activities.

Ghana's government has a goal of seeing 60% of its university students pursuing STEM majors. A strong STEM pipeline will be achieved by having students first gaining interest in the subject, then electing to study STEM subjects, and then pursuing STEM careers. This short intervention achieved strong gains in building interest and small gains in shifting future career pursuits. Future studies should be carried out to determine the length and type of intervention needed to achieve large gains in shifting career pursuits towards STEM disciplines. Policymakers should consider the admission requirements and societal perceptions around pursuing Science majors/disciplines as they formulate plans to achieve their goal.

Conclusion

A quasi-controlled experimental study was conducted in 2017 with 9 schools in Greater Accra Region to preliminarily assess the impact on Ghanaian students when their teachers are trained to carry out hands-on activities with locally-available materials. On average, students undergoing the intervention improved their exam scores by 10.9% more than their counterparts over the course of the 2.5-month period, but discrepancies existed at the school level. These discrepancies are attributable to challenges that impeded a complete implementation of the intervention at select schools.

In spite of implementation challenges, the students in the experimental schools still experienced significant shifts in their attitudes and interests over the course of the study. Students undergoing the intervention increased in their enjoyment of science 22% more than their counterparts, and their levels of engagement increased significantly ($p = 3 \times 10^{-7}$, $g = 0.85$). Female students experienced greater gains than their male counterparts in terms of exam scores, engagement levels, and interest in pursuing STEM majors and careers. And despite the commonly held belief that learning gains are slower in rural schools than urban ones, the school with the highest exam score gains in this study was in a rural area. They even broke their own school record for national exam scores immediately following this intervention. A longer intervention is likely needed to achieve significant gains in student response to the ease of learning science.

Preliminary evidence for multiple lines of questioning around the role of hands-on activities in the Ghanaian context have been brought to the fore in this study. The findings add to a nascent body of knowledge of the effect of hands-on pedagogies in the West African context. The effect of experiential STEM pedagogies on student attitudes, career interest, and societal barriers have been uncovered, call for deeper investigation, and merit attention from policymakers.

A multitude of factors influence the efficacy of interventions such as this one. In order to accurately assess the role of practical teaching methodologies in the Ghanaian classroom, a greater number of these factors should be considered in the school selection process. In particular, the level of infrastructure should meet a certain level in order for the school to be selected. If poor infrastructure prevents the students from coming to school, it does not matter whether their teacher is equipped to teach with practical activities



that week or not. A refined version of this study was undertaken in the 2017/8 academic year (Babb & Stockero, 2020) to better control for some of these variables. Geographic proximity is no longer being considered as sufficient evidence of school similarity. School infrastructure, teacher background, and students' prior years exam performance are also now being considered. Successful findings must be scaled up nationwide to shift the status quo for STEM teaching and learning in Ghana.

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Author

Heather Beem, Ph.D., (hbeem@ashesi.edu.gh) is an Engineering Lecturer at Ashesi University, Berekuso, Ghana. She is also the CEO and Founder of the Practical Education Network.



Collaborative Teams for Self Publishing - A Model for Creating Locally Relevant Educational Books

Tom J. McConnell¹ and Barbara Giorgio-Booher²

Abstract

Transforming education may mean creating new instructional materials that are culturally relevant to local schools. Producing new high-quality materials may seem out of reach to educators who lack experience in illustration and publishing or have little access to commercial publishers. We share a model used to develop a series of books called *Conservation Tales* in collaboration with university faculty, students, and scientists. The model presents a way for local educators to create books to make education more relevant and accessible for children. The model leverages skills of artists, writers, and content experts to provide a rich learning experience for readers and an affordable option for self-publishing. Using this model, a science educator developed books for grades 3-5 with illustrations and photographs. University students developed images, created page layouts and co-authored the stories to suit the target audience. Scientists collaborated in the development and review of content for accuracy and education students created learning activities. This article describes the collaborative model with examples and shares the processes for self-publishing of print and digital books via online on-demand print services. We discuss sites that allow authors to create books with almost no overhead budget and share information about the quality of graphics, software for creating files, and distribution of books.

Keywords: Self-publishing, Culturally relevant books, Collaborative writing

Introduction

"There is no technological reason why all the educational course books, and indeed most of the supplementary ones, at both primary and secondary level, should not be written, edited, designed, printed, and published in Africa rather than in London, Malta, Paris or Hong Kong." (Nottingham, 1969)

At the first World Conference on Transformative Education (WCTE) in 2018, discussion touched on ways to help nations in Africa and other parts of the world to "decolonialize" their education systems. Literature on the topic has described the role of education in the colonialization of Africa as one of "killing of other knowledge systems" (Hall & Tandon, 2017, p. 6), and the role it can play in rebuilding and reclaiming an indigenous culture to support the decolonization of social and government institutions (Akena, 2012; Mazrui, 2002;

Mbure, 1997).

The literature makes it clear that by controlling educational content, colonial powers molded perceptions among African children about their role in society, the hierarchy of social structure, and even their own intellectual capacity, creativity, and language (Asante-Darko, 2002). Printed materials used in schools present stereotypical characters that portray men and women or people of color with specific roles in communities (Khorana, 1998). They reinforce rules about what languages are acceptable, and relative values placed on cultures from Africa versus those from Europe and North America.

One way in which African schools reflect a colonial mindset was described by Wilfridah Mucherah in the opening plenary session of the 2018 WCTE. She questioned why African schools continue to teach reading using primers written from a European perspective – for example, "A is for Apple." She learned to read using this common approach, yet never saw an apple until she attended graduate school in the United States as an

Full listing of authors and contacts can be found at the end of this article.



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adult. She proposed that African schools should use resources that reflect African contexts, languages and culture (Mucherah & Mbogori, 2019). For instance, in communities where avocados are so common, she suggested that reading books for young children could show that “A is for Avocado,” using an example that is tangible and relevant to the children’s experiences. Pandey and Moorad (2003) refer to the same goal when they emphasize that knowledge gained by pupils is dependent on their experiences, culture and language. Reformers suggest that if educational materials are developed with this assumption in mind, changes to pedagogies and educational structures may follow (Pandey & Moorad, 2003; Wooman, 2001).

Throughout the rest of the WCTE, participants in concurrent sessions mentioned Mucherah’s “A is for Apple” example as evidence that African schools need more control over the content of textbooks and supplemental materials (readers) used in the classroom. These discussions made clear the need for new and different educational materials for African schools, developed by African authors and educators for an African audience to reflect African culture, language and historical context. In this article, we present a structural framework for independent publishing that might offer a model for educators, illustrators, graphic designers and scholars in any region of the world. We present the model with the goal of encouraging collaborative teams to pursue the goals articulated by Mucherah & Mbogori (2019), Akena (2012) and many other academicians who share our goal of transforming education around the globe.

Educational Publishing for the African Continent

The idea of African authors publishing books for an African audience is certainly not new. The quote from Nottingham’s 1969 article about “establishing an African publishing industry” makes it clear that scholars and businessmen alike were considering ways to overcome obstacles to publishing in Africa half a century ago. There is a significant body of literature about efforts to create just such an industry. These efforts take the form of university-based presses (Darko-Ampen, 2004), indigenous and multinational publishing houses (Edwards & Ngwaru, 2012; Rosetti, 2013) and non-profit publishing consortia like the African Book Collective (Shercliff, 2016; Zell, 2016).

Early initiatives to establish an African publishing industry were less successful than Nottingham had hoped. Scholarly journals were usually owned by

American or European interests, and maintained the same “traditions” of content and process as their American and European counterparts (Darko-Ampen, 2004; Zell, 2016), including selecting European-language manuscripts based on profitability and their relevance to large industrialized nations (Darko-Ampen, 2004; Dilevko & Dali, 2006). It seems clear that an industry that continues to operate using the traditional model has stifled transformation by continuing the status quo of the industry. Even so, there may be advantages to publishing books in Africa. The list of titles offered by the non-profit African Book Collective features many titles by and for Africans, including a growing list of titles for children that reflect indigenous culture, language and art.

Frustration with educational publishing controlled by external businesses from non-African countries is not new. The publishing industry in Africa has not entirely erased all of the barriers that make it hard for African authors to publish books, but it continues to evolve. Nottingham said in 1969 that “Indigenous publishing in Africa is at the crossroads” (p. 141). Indigenous publishing in Africa, and around the world, is being transformed by business models that leverage technologies not available in 1969. The doors are open if only a handful of individuals with a vision for indigenous books are willing to step out of the traditional box to take advantage of the opportunities at hand.

New Opportunities in Self-Publishing

The new opportunities of which we speak involve a model of self-publishing that reduces overhead costs of publication to such a degree that small groups of partners can produce and distribute books with minimal initial investments. For authors writing for relatively small audiences, this is a major advantage. In the traditional model, publishing a book required time, expertise, and significant financial backing. The most cost-effective model for publishing a book required “runs” of 500 or 1000 books, or more. The initial expense of a large run drove publishing houses to avoid ventures that might only reach a small group of readers. Independent authors were pushed out of the publishing process altogether unless they could risk spending thousands of dollars for the first (and maybe only) run of a book. Self-publishers now have the option of working with “on-demand” print services that eliminate this barrier to the industry.

Some traditional academics have viewed self-publishing as a less-than-desirable process designed to



by-pass the rigorous scholarly process of editorial review. However, self-publishing has grown because of financial considerations and the desire to control copyrights (Odendaal, 2008). As digital printing technology made it possible for companies to print and bind small runs of books at low costs, on-demand services have emerged as a growing part of the industry (Laquintano, 2016).

Today's technology not only allows publishing from anywhere in the world, but also greater collaboration of individuals in different locations. Authors can now easily work with illustrators, editors, graphic designers and photographers from around the world. Technology also offers new opportunities to create digital books offered as downloadable files for computers, tablets or smartphones. These "ebooks" promise even lower overhead costs, and allow authors to reach a global audience in an instant.

With these opportunities in mind, we share our experiences and offer recommendations for creating collaborative teams to publish high-quality culturally relevant books for learning. The model we present is the result of four years of development for the *Conservation Tales* project, an immersive learning program at Ball State University in Indiana, USA.

A Framework for Collaborative Book Development

The *Conservation Tales* project began as an idea for a children's book about wildlife conservation, a niche that was largely unfilled. The initial idea emerged when Dr. McConnell researched books about wildlife for young children. He noticed that the books did not mention conservation issues or teach children how their actions impact the environment. Readers can find out more about the book series at the [Conservation Tales](#) website. To date, the project has published eleven unique titles, two "Junior" versions revised for younger children, and an education game that teaches skills used by manatee researchers.

As the author began outlining the first story of a series of books, he recognized a need for other partners to help produce the book. He inquired about illustration students at his university's School of Art, and a partnership emerged that became a comprehensive team effort. The first partnership included Barbara Giorgio-Booher, a Teaching Professor in the School of Art, and an animation student, Sami Pfaff, who helped illustrate the first book. Bringing an illustrator into the project was an essential step in creating quality reading material for children.

Graphic design is another key element of a book requiring specialized expertise in graphic design and communications that most authors lack. "Both graphic design and graphic communication incorporate words and images to convey data, concepts, and emotions" ([Shake It Up Creative, 2018](#)). Graphic designers are trained to design work that is effective in projecting ideas and experiences with visual and textual content.

Graphic designers understand typography, the selection of fonts, and work with images, such as drawings and photographs; they help maintain consistency throughout a story and book series. This includes both digital and printed promotional materials and educational resources. They help in designing a visual identity system to define graphic design standards; including fonts, logos, the relative size, proportion, and position of individual elements, and the selection of a color palette. Typography, the selection of fonts, is more important and more complex than most people realize. When writing for young readers, font size and the choice serif versus sans serif font is extremely important, especially when writing for a specific language (Nottingham, 1969). Including a graphic design specialist will ensure continuity, a high standard of quality, and a clear, consistent identity that appears across all media.

Potential authors and publishers should keep in mind that this framework is a flexible model. Collaborations will be most successful if they base their teams on the availability of participants with skill sets that enhance the quality of the book.

The current *Conservation Tales* team consists of the following roles:

- *Lead Author* – author, director, editor of the project.
- *Art Director* – visual artist to supervise and critique illustrations, photographs, and graphic design to meet certain performance expectations.
- *Graphic Designer* – team manager who coordinates the team's progress and sets appropriate deadlines. Responsible for cover design and layout of text and images in the final product.
- *Co-Author* – content or education specialist to assist in researching and writing the story.
- *Two or Three Illustrators* – specialists in illustrating characters, animals, backgrounds and natural environments.
- *Photographer* – expert who documents team site visits, contributes and edits photographs, searches for public domain images, and document permissions for third party images.



Recruiting Team Members

The team leaders are ultimately responsible for the creative concept of the book. The project goals are set by these leaders, with input from other team members. The directors must work to create a cohesive team. Any group planning a self-published book should identify a small group of two or three directors. For the *Conservation Tales* project, a key feature of the pair of directors is a shared vision for the project's goals. Without this, the project may not be sustainable.

Recruiting other team members is a critical factor in the project's success. For the *Conservation Tales*, these books are created by undergraduate students at the directors' university. The choice to recruit students dictates the scope of available team members. Other projects may choose to include other types of professionals. Students were recruited from the major disciplines of visual communication (graphic design), animation, drawing, photography, elementary education, special education, biology and environmental management. This choice affects overhead costs, but the "right team" for your project may include people with extensive experience.

The directors implemented a selective recruiting and application process. They advertised for team members with a request for letters of interest, resumés, and portfolios of the applicants' work. The directors reviewed applications and scheduled interviews. Applicants were asked to explain their interest in the project to reveal each person's motivation to contribute to a children's book about wildlife conservation. Most of the selected team members had strong personal commitments to conservation, animal welfare or education. It is important to first empathize, understand and desire to learn about wildlife conservation. This deep personal connection to project goals influenced the team's commitment to completing a high-quality final product.

It was important to be inclusive and incorporate different perspectives when interviewing team members. We found it valuable to incorporate their perspectives when developing the characters and narratives to better connect with a diverse audience. *Conservation Tales* works to depict women, individuals with disabilities, cultural diversity and underrepresented groups as the scientists and children who learn about science. Promoting inclusivity with team members can bring together unlikely allies and support transformative change (Opportunity Agenda, 2017).

Interviews also revealed areas of overlapping expertise. Co-authors on *Tigers* and *Orangutans* were

science majors who had some art experience. Their contributions extended beyond writing stories. Two graphic designers who worked on eight different books also contributed photography for the project. The illustrator for *Elephants* and *Tigers* used her minor in screen writing to help with proofreading and editing of four different books. Project directors should consider team members with multiple skills as a way to ensure quality content. This cross-skill connection also improves the team's communication. Collaborations that allow individuals to work across disciplines lead to innovative outcomes with an improved understanding of the issues being discussed (Salmons, 2019).

Individuals selected for the project were asked to sign a formal agreement giving "non-exclusive rights" to the project for materials they contributed. Team members in the first year were paid a stipend. Later participants earned course credits for their work instead of receiving a stipend. The agreement reflected these policies. The contract gave the project permission to use photos, illustrations, graphic design (logos and visual identity), and text for promotional and online products as well as books. The students retain full ownership of their creative products, giving artists rights to sell original illustrations and photographs. The agreement stipulated the number of books received by each team member and a policy to purchase copies at cost. Any project creating a similar collaborative team should consider the terms of "employment" for all team members. If possible, legal council should be consulted for such an agreement.

Roles of Team Members

The development of teams for the *Conservation Tales* project taught us that the team's success depends on clear definitions of the roles of each member. The current framework includes a set of job descriptions and project expectations. The directors discussed the roles with an experienced graphic designer who served as a "project manager." Their experience on other books helped them understand potential pitfalls in the production process. We recommend that a graphic designer perform a similar role in other collaborations. The designer is likely the last person to handle the assets created by writers, illustrators and photographers before submitting the manuscript for printing. This important role makes it sensible to include the designer in setting a schedule of deadlines.

The designer and directors set a final deadline and worked backwards to identify tentative deadlines for



Table 1. Team Role Descriptions

Role	Key Activities
Author/Director	Outline story plot; facilitate contact with experts in research process; guide storyboards to reflect project goals; contribute to story text; oversee editing process; budget management
Art Director	Plan purchase of art supplies; supervise illustration work; facilitate critiques of drawings, photographs; review layouts and design features; assist in editing
Graphic Designer	Manage development of text, images; assist in storyboarding; review draft illustrations for consistency; plan and execute layouts; produce final files for printer
Co-Author	Develop character profiles; storyboarding; research content; assess readability for target audience; assist in dialog writing and editing; proofreading
Character Illustrator	Research content; design characters; storyboarding; rough sketch, blackline art, full color illustrations; revision of artwork in editing process
Background Illustrator	Research content; design scenery and backgrounds; storyboarding; rough sketch, blackline art, full color illustrations; revision of artwork in editing process
Photographer	Research content; photography for content; Editing photographs; Identify potential third-party photos; document copyright/license/permissions; revise images in editing process.

finished illustrations, drafts of text, blackline versions of artwork, storyboards, cover art, and content research. As the leadership team created the schedule, roles of each team member became more apparent. Table 1 contains a summary of the key activities performed under each role to complete the books.

The project's goals determined the skills needed to accomplish them and guided the selection of team members. *Conservation Tales* teams include three illustrators, with one dedicated to drawing the animals featured in the story to ensure that animals are drawn with scientific accuracy. The other illustrators focus on human characters and settings for the story based on the research the team conducted. This model fits well for our project because most of the illustrators are animation students who learn to collaborate and work in a similar manner. For publication projects with a different audience or a different type of artist design, a single illustrator may be a better choice. Some projects may have no need for a photographer, while others might need translators to write multiple versions of a manuscript in different languages. Directors need to clearly identify the project's goals and the strategies needed to accomplish those goals before creating a plan for building a team.

Directors also need to consider where to find team

members. Projects to create educational books are likely to be initiated by educators or content experts such as scientists, community health leaders, or historians. Finding artists and designers may begin with an Internet search for freelance illustrators and graphics experts who advertise their services online. Projects that cannot afford to pay professionals may find that universities are a great resource. Students in visual communication (graphic design) and the visual arts are often expected to connect with community partners through internships, course projects, and collaborative assignments. These students might be able to participate for course credit or a small stipend, and will likely be eager to gain professional experience and use the books in portfolios to help with job searches. If the project can provide art supplies, this is an appealing incentive to entice student artists.

The co-authors we selected were also students in disciplines that matched the goals of the project – elementary education, biology and environmental management students. Project leaders can contact university instructors and department chairs to see if they can offer course credits for an internship.

Students in the disciplines we have described are likely to have the skills needed by a publishing project and the desire to gain valuable experience. Since students are expected to meet performance expectations at a high level, we suggest working primarily with upperclassmen – juniors and seniors who have enough coursework to have advanced skills in art, design, and technology such as publication software. If the students can use their work with a publication as course assignments or credit hours in their major programs, the project planners and students all benefit from the relationship.

Team leaders need to beware of creating too large a team. A team with too many people, especially authors and illustrators, will make project management more difficult than with a small team. We recommend that planners streamline the process and select contributors who have skills the team truly needs.

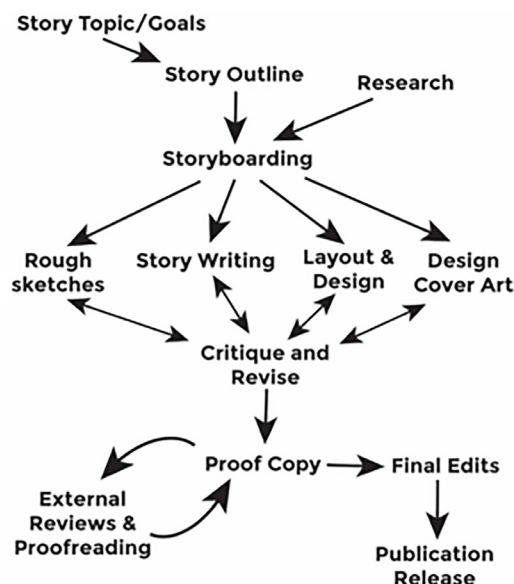
Work Flow for Book Development

The work on the publication begins as team mem



bers are being selected. The process we suggest is based on a review of the successes and challenges we faced in the early iterations of the *Conservation Tales* project. Figure 1 offers a general workflow that emerged from our efforts.

Figure 1. Workflow for Book Development



Team leaders usually begin with an initial concept or topic for the book. The authors can then construct a story outline – a general direction that identifies the types of research needed, characters to be developed, and a general plot for the story. Our team researched the content by shadowing and interviewing scientists, reading articles and websites about the featured species, and learning about diversity issues relevant to the accurate depiction of children in the stories.

Research was a key focus in the first weeks of the project, and continued throughout the development process. Team members observed and interviewed the consulting scientists depicted in the story to ensure the authenticity of the books. The team communicated with the consultants via email to gather additional information. Drafts of the story were shared with the consultants for a review of content accuracy. After returning to campus, the team used on-site sketches, photographs and interviews to create all of the elements of the books. The team's discussions expanded upon their initial ideas and helped to direct the story development.

The entire team used the story outline and research to create storyboards to assist in the design, layout and placement of photographs and illustrations. Storyboarding is the creation of a pictorial sketch of the story

that creates a more detailed roadmap for the team. Storyboards should be revisited regularly to update the plan with details and revised story elements. The storyboard guides authors, illustrators, designers and photographers in their respective roles.

One of the first important tasks for illustrators and designers was the creation of a cover for the book. Our experience suggests that developing the cover creates a sense of direction and a visual theme that drives the rest of the design process. Illustrators used this step to create the first character illustrations and animals as the graphic designer selected fonts and color schemes to establish a theme that was carried throughout the book.

Illustrators created rough sketches of characters, animals, and scenery that they eventually developed as black-line drawings and full color drawings and paintings through a continual review and critique process by the entire team. At the same time, authors wrote more detailed story elements, incorporating the information collected during research, and creating a story that conveys the concepts that address the book's goals. The writers worked closely with illustrators and photographers in the storyboarding process to ensure the story and images complemented each other.

Graphic designers created initial layout examples to test placement of text with initial drawings and photographs. The designers combine the illustrations, photographs and text based on the team's planning for the story. The graphic designers were responsible for ensuring that the book files were ready for print production.

Reiterative cycles of review, critique and revision eventually led teams to a full draft of the book. The team then sent the draft to an on-demand print service to produce a proof copy - a first rough copy that allowed the team to examine layout design, colors, illustrations and photographs. At the same time, the team shared digital drafts with external experts for review. This external review was extremely important to the quality of the final products. The team shared the drafts with the content consultants who served as the models for the scientists in the stories. We also asked practicing teachers to review books and offer suggestions to ensure that the stories were useful for children and teachers. The addition of elements like captions and author notes was guided by early reviews by educators. Team members and external experts also contributed to a detailed proofreading and editing process for the text of the story.



After a thorough review of the proofs, revisions were made to the books. The final step was to submit final versions of the book for printing, followed by the official “release” for public purchase. This process varies depending on the print service used, but the most common processes include online forms to enter titles, authors and illustrators, ISBN numbers, pricing information, and other technical details for the book. The team then uploads separate PDF versions of the cover and book interior. Most print shops then complete a review to ensure that files meet their technical specifications. Once the book is approved by both the printer and the “authors,” the book is almost immediately available for purchase through an online store.

The next section describes some key decisions team leaders need to consider in planning a publishing project. Some of the decisions focus on business plans and legal issues. Others are about artistic style or are more technical in nature. All of these issues are important if the team hopes to create a marketable publication.

Key Decisions for Publication Projects

The workflow (Figure 1) gives a simplified description of the process of a book project. However, there are important decisions the team leaders need to consider before and during the process. As professionals in education and the arts, the decisions were new to our team, so this section is offered to help other authors and self-publishers prepare for the challenges we encountered. Our team chose solutions based on our goals for the project and the resources available to us. Other collaborations may need to choose a different path, but many of the questions that planners will face are the same.

Business Plan

When the team has identified the goal and topic for the project, the next step is to think about a business plan. Even if the project is a not-for-profit endeavor, we recommend that the project establish certain parameters for the project. The choices described here will influence the process and decisions to be made later in the project.

One of the first provisos we offer is that self-publishing is NOT a path to enormous wealth. A self-published book may earn a modest income, but do not expect to get rich with this project. Project goals should address a specific need in schools or in the target communities. Even so, the choices described here can help reduce legal liabilities and unexpected expenses that

could prevent a publication project from reaching its goal.

Print vs. digital – An early decision to make is whether the book will be sold as a print version, as an electronic book, or both. Today’s technology makes it very easy to create e-books that can be accessed through applications for computers, tablets and smart phones. If the books will be digital, the layout and design need to take into consideration the size of the screen and how a reader advances through the pages.

If a print book is the goal, the team will select from a range of book sizes, cover types, color or black-and-white options, and paper quality. Final decisions about these matters are based on the audience, costs of the options and project goals. Hard cover books are ideal for libraries, especially for children, but the cost of binding is about three times higher than a paper back cover. Color printing is better for young children, but slightly more expensive than black-and-white printing. Any on-demand or self-publishing service will allow planners to explore options and adjust settings as the project moves forward.

Copyright ownership – Published materials are the intellectual property of the author and publisher, so protecting the rights to a book is an important initial step. There are many copyright options available to a self-published author. One of the early decisions should be about who will hold the copyrights to the book.

First, planners should ensure that no other author owns the copyrights to the title you are considering. It is important to do some homework, and devote time to a thorough search for books of the same title. The *Conservation Tales* project considered a few titles that were eliminated because other publishers had copyright or trademark protections that made those titles legally impossible.

Project leaders who wish to retain copyrights need to find out how to file or establish copyrights in the country in which the book will be published since laws and required forms vary by country. In some places, forms need to be filed and approvals obtained before the publication is copyrighted. In others, a printed work is copyrighted simply by transmitting the work via mail or electronic communication, but a registered copyright may offer more protections for authors.

Another option is to allow the company that prints, binds and distributes the book to hold the copyright. On-demand and self-publishing services usually offer this option early in the planning stages. The service is most often free or very inexpensive, but the revenue



authors earn will be lower. In this option, the print service assumes the responsibility for marketing the book, but they also retain a larger percentage of the profits and can transfer the copyright without the author's permission.

One way to help establish copyrights is to register an International Standard Book Number (ISBN). This is a unique number registered with government agencies, usually through companies that help you submit the formal registration for a fee. The cost of an individual ISBN number is about \$20 USD. If a project plans to produce multiple books, a more cost-effective option is to create an "imprint" of your own and purchase a "block" of ten ISBN numbers at a reduced cost. An imprint is the name of a publishing company or service to which the copyright is assigned. For *Conservation Tales*, the author had already established his own unincorporated publishing company under a name selected after the same type of search as for the title. This imprint name is used as the "publisher" for the *Conservation Tales* series, and has since incorporated.

Self-publishing and on-demand services offer authors the option to assign one of their registered ISBN numbers to the book they wish to publish. This is a cheaper option than registering one's own ISBN number, but it usually means the authors have assigned copyright ownership to the publishing service. As stated previously, this means a smaller percentage of revenue forwarded to your project. The print service may also offer options for the creation of a barcode on the cover of the book. The print shop may add this, or the author/publisher can insert their own barcodes. Barcodes can be created when the ISBN is registered for a small additional fee. The decisions about how to handle copyright, ISBN registration and barcodes needs to be made with consideration to cost, convenience, and the relative importance of maintaining control of copyrights.

Authorship – Planners need to establish a policy for listing author and co-authors. This may seem like a simple issue, but the order of authors is sometimes important to the parties involved. Putting a policy on paper for how authors are listed helps to avoid personal or legal disputes after publication. Similarly, illustrators should be listed on the cover and on the title page of a book, so a clear policy for this should be included in the plan. If the project team includes other contributors, we strongly recommend each member of the team should be acknowledged, both on the title page of the book and in a later section. *Conservation Tales* books include a

"Meet the Team" page to acknowledge all contributors. While this policy is not a legal requirement for publishing, it is most ethical, and helps to create a strong sense of teamwork and ownership that enhances the quality of the product.

Distribution plan – Project leaders should also develop a plan for how they will distribute the books. Most on-demand and self-publication services offer online sales. However, for projects that retain copyrights, marketing of the books may fall on the author or publisher. The print service markets the books if they hold the copyrights, but the amount royalties paid to authors is reduced. Authors should anticipate the need to advertise, promote and distribute the books on their own.

The developer of a book can usually purchase copies of the title at an "author price," usually the cost of printing and binding plus a small fee for the printer. Shipping and taxes are not included. This offers a way for project planners to purchase copies and sell them directly to customers. Purchasing copies requires an expenditure and a financial risk if the team cannot sell enough books to realize a profit. *Conservation Tales* keeps a minimal number of copies "in stock," but keeps enough to sell books at public outreach events, conferences, and festivals. We also have the ability to provide small orders directly to schools and teachers. All other sales take place online either through the on-demand print service, or via a project website with an electronic store. This reduces the effort by our team to handle sales and shipping.

When determining the price of a book, planners may want to sell copies at a wholesale price for book stores. Booksellers usually double the wholesale price when they sell to retail customers. The retail price should be set high enough to still earn a small profit when selling to retailers at half price. On-demand print services will set the price according to the authors' instructions, and forward the royalties to the author from online sales. Planners need to consider taxes that will be charged for books. In some African countries, tax rates for books may be as high as 14%. Tax rates may influence the willingness of customers to buy the books. If the books will be sold in more than one country, this decision might be more complicated. For some projects, this may not be an issue if they plan to use funds from grants or government agencies to purchase copies and distribute to schools for free.



Selecting a Printing Service

All of the decisions described in the Business Plan section should be made early in any project, in part because the answers will shape the choice of a printer/publisher for the book. There are several different services available. Companies that offer these services in Africa include Printivo, 48hrbooks.com and New Voices Publishing Services. Some services are only available in specific regions, like Digitalprintondemand in South Africa. Kindle Direct Publishing, the printer for *Conservation Tales*, may be best suited for digital books produced in Africa because they currently do not have a print facility in Africa and do not offer affordable shipping to the continent.

Planners should explore these companies and others to find a vendor that provides the right combination of cost, profitability, convenience, technical support and access to customers for the needs of the project. Since one goal of self-publishing is to put more control in the hands of local individuals, planners may wish to look for other local companies that can offer services to suit those needs better than the large corporate printing services.

Project Management

Project management should be flexible, holistic and team-based. An agile approach to project management, like the “scrum” framework (Sliger, 2011), allows for short bursts of activity as team members continually shape the direction of the project. Team leaders begin by articulating goals and outcomes, setting expectations, and providing a means for project evaluation. They introduce teams to important dates and when interactions with scientists will occur. The processes that team leaders need to direct are described in the following sections.

Artistic style – One of the early discussions with team members should address the artistic vision of the project. Team leaders will likely have an idea what type of appearance and artwork they want to include in the book. Choices about artistic style depend on the target audience and the goals of the project, but the aesthetic vision of the team members will also impact the final results. Questions to address should include the following:

- *Will illustrations be realistic or stylized?*
- *Will illustrations reflect a specific art genre?*
- *Will text be in blocks or arranged to flow with the artwork?*

- *What color palettes will be used and what kind of medium will be used to create the illustrations?*

All these choices are important, and ensuring that the team is aware of the themes to guide their work helps to avoid conflicts of style later in the process.

Target audience – Planners should determine who the readers will be. Is the book intended for young children just learning to read? Does the project target older children in intermediate grades, secondary students, or even adult learners in the community? This is an extremely important decision because the writing style will vary dramatically for different readers. For authors who are accustomed to writing scholarly research papers, this adjustment is difficult. The sentence structure, vocabulary, and length of text on each page need to be appropriate for the target audience. Small issues, such as changing passive sentences to active, affect the readability of the text. *Conservation Tales* uses tools in Microsoft Word that provide readability statistics when it checks spelling and grammar. There are many other ways to assess reading level. If the development team does not include age-specific educators, we recommend consulting with a reading specialist for help in assessing and adjusting the reading level of the text to suit the target audience.

Book developers also have opportunities to publish books in different languages. This issue echoes questions we posed in the opening sections of the books about making books culturally relevant. If the goal of a publishing project is to create educational materials for a specific country or region, the world of self-publication gives authors expanded opportunities to write in the language of their choice. Books that teach reading or history in Akan, Kiswahili, Yoruba, Iszulu or any of the many tribal languages are much easier to produce through self-publishing than through large international publishing houses. Accelere!1 (Chemionics, 2020) is an example of a project that produces books for school children in three indigenous languages in the Democratic Republic of Congo. If publishing in an indigenous language is one of the goals of the project, it is important to make sure at least one team member is fluent in both the written and spoken language. The graphic designer should also consult with readers of that language when selecting the best font for the book (Nottingham, 1969).

External reviewers and editors – The need for external review process may seem like a decision that can wait until late in the project. However, we encourage planners to think about this step early in the process



Team leaders should not wait until the story text is finished to begin your search for external reviewers. They should allow plenty of time to communicate with reviewers and editors because these external partners may not be bound to project deadlines. *Conservation Tales* sends drafts to external reviews to assess content accuracy, authentic depiction of diversity issues, and the fit for our target audience. We also ask for help from others in reviewing the cultural context of the book's story and illustrations. It is not uncommon for reviewer feedback to be the last bit of information we receive for the final revisions, so we try to start the process as early as possible to avoid delays in meeting deadlines. Requests to reviewers should include target dates that leave the time for the team to finish the book before the final deadline.

Technical Considerations

Once the team begins work on a book, all members of the team need to be mindful of technical requirements for producing high quality printed material. Some of the requirements are dictated by the printing service selected to produce the books. These specifications are based on either the process of printing and binding a book or on the business plan choices described earlier.

Printing specifications – When a printing service is selected, the company provides a set of specifications for file formats, color standards, and image quality. Most companies will offer templates to help plan page layouts and margins. One of the reasons to include a graphic designer on the team is to ensure that files meet these specifications.

From the beginning of the project, team members need to have a clear understanding of the images needed for printing. Printers require a minimum of 300 dots per inch (dpi) for all images and finished pages. Some printers will require even higher resolutions for black-line graphs and diagrams. Illustrators on the team need to begin their sketches with this standard in mind. They should plan to create drawings and paintings that are larger than the finished images that will appear in the book. All images will need to be transformed into a digital format, even if created using traditional art media like paints, pastels or colored pencils. If an original illustration is too small, and the designer needs to enlarge it, the result is a grainy image that does not reproduce well in print.

Color palettes used for illustrations also need to meet certain specifications. If the book will be in print

format, all colors need to be saved in CMYK format. This format is based on the cyan, magenta, yellow and black inks used in the printing process. If the book will be digital, RGB colors will be needed. These work with the red, green and blue pixels that create color images on a computer monitor. If the correct color palette is not used, the colors on the final product may not match what the artists and designers created.

Printers also set requirements for file types. Most of them require PDF files for the cover and the interior. Others may ask for images as TIFF or EPS files. Some companies ask for single page layouts, while others ask for a side-by-side book page layout.

Templates provided by the printer will show margins, gutters, trim, and bleed lines. All text needs to fall within the margins. The gutter describes the area where pages meet, creating a wider margin on the “inner” edge of the page. Illustrators and designers need to keep in mind that content falling in the gutter may not be visible in the bound book. Trim and bleed lines are features defined by the process of printing, trimming and binding the books. The trim lines show where the pages are expected to be cut. If illustrations and backgrounds will go all the way to the edge, a “bleed” line will be seen outside the trim lines. Images meant to be printed all the way to the edge of the page should extend beyond the trim lines to the bleed lines. Once the book is printed, pages are cut to size, and a small part of the image will be trimmed off in the process. Illustrators and designers need to be aware of this to avoid putting critical information at the edge of the page. This process makes it very important to work with a graphic designer who has been trained to work with these parameters.

Third-party materials – Another requirement is a policy on the use of third-party materials. The most likely example of a third-party resource is an image such as a photograph, illustration, clipart design, a graph or a map. In every case, images from third-parties – any image not created by the team – requires the publisher to get express permission and to properly attribute the image to the source. Incorporating copyrighted images usually involves paying the owner for permission. In some cases, the fee is nominal. However, some sources, especially photographs and images from corporations like movie studios, may charge fees that can be hundreds of dollars (USD).

Fortunately, there are other options. Websites that offer public domain or “Creative Commons” materials are excellent resources for authors and designers.



There are several sources of public domain and Creative Commons images. Links to some of these sites have been provided in the “Resources” list at the end of this article. Public domain images, often from government agencies, are free for use. Legal guidelines do not require attribution of the author (listing the owner and year), but ethical practice suggests including a small caption showing the source on or near the image. Creative Commons status offers a variety of licensing options, usually labeled as “CC.2.0” or some other numbered license. Some materials are free for use with attribution, including a link to the original source. Others prohibit use for commercial products like books. Owners may also stipulate a small fee to use an image. Project planners need to pay close attention the terms and limitations of each type of Creative Commons license. As educators, it is important to practice ethical use of intellectual process, and it is the “publisher’s” legal responsibility to abide by the terms of the licenses.

Technical process for team – Other technical considerations should address how the development team works on the book. This involves identifying the tools the team will use to produce the text and images in the book. Illustrators may wish to paint or draw using traditional media. If the illustrators are paid a stipend, they will often be expected to purchase their own materials. *Conservation Tales* used project funds to provide these materials as one of the benefits of being on the team. The team needs to agree on the software for producing text, images and layouts, including the format of the files they save. The industry standard in publishing is the Adobe suite of software, *Creative Cloud*. This can be expensive, but many graphic designers and artists already use it. The most essential applications in this suite are Photoshop, Illustrator and InDesign. Photoshop is one of the leading tools for digital artists, and can help photographers edit images. Illustrator and InDesign are layout and publishing programs used in the graphic design field.

There are other less expensive programs that can be used to carry out the same tasks, so the team should pick tools that are accessible to members. It is important to ensure that the software can export or save files in the formats required by printers, so the team should refer to the technical specifications provided by the print service selected for the final product.

The team also needs to select a method for sharing files. Each team member will create files for their respective contribution to the book. The graphic designer will eventually need to access these files to place them in

page layouts. Cloud storage is an easy option, but it is important to make sure the project has enough storage space for files. Images and page layouts will use large amounts of storage space. If the team runs out of storage space, backing up files becomes an issue. The choice of a cloud service should be guided by local availability and ease of access for all team members.

Conservation Tales required team members to save all files in Box, with shared folders for each book. Managing the many files created by the team was a challenge, so the team created a guide for naming files and locations for storing them. The graphic designers should be involved in guiding the decisions about file names because the designer will be the last person who needs to find the files.

In an age of technology, project teams might also collaborate from different geographic locations. If the specialists you need live far away, videoconferencing tools like WhatsApp, Skype, Zoom, and other videoconference applications permit collaborations that can be productive. The *Conservation Tales* team was required to complete two books in the spring of 2020 in a virtual environment when the COVID-19 pandemic forced the university to close campus. The *Conservation Tales* team demonstrated that completing a publishing project from a distance is possible, even when team members use laptops, desktop computers, tablets and even smart phones to connect. For similar needs, a project team should select a common videoconferencing tool that allows team members to “share screens” so they can view samples of artwork and layouts as they review and critique the work.

Implications for Potential Authors

The process of creating a book as we have described appears to be very complicated, but with the right membership on the team to help with the different tasks, self-publishing is within reach. As Nottingham (1969) wrote, “There is no technological reason why” educational books for African learners cannot be written, edited, designed and published in Africa.

Odendaal (2008) described the importance of the publisher: “The academic publisher is a gatekeeper of knowledge and thus controls what appears in print” (p. 52). Self-publishing opportunities afforded by current technology and business models have made it easier for indigenous authors to become the “gatekeepers” as they shape the knowledge that appears in print to meet local and regional educational needs. Educators who hope to help decolonialize schools and social



institutions in Africa – or any other part of the world – have the tools and support systems at their fingertips needed to create materials that can help achieve their goals. Authors no longer need to rely on the vision of large publishing companies who are driven by large profit goals and may not share the author's objectives. The availability of these tools makes it easier than ever for local experts to develop books in indigenous languages, with illustrations and photos that are relevant to indigenous learners, and reflect authentic historical and cultural contexts. A leading publishing professional in South Africa, Brian Wafawarowa, describes the need to facilitate such participation in the publishing industry:

"... an ideal publishing sector is one in which people of all races and cultural persuasion have the space to participate in the various aspects of the book sector, a sector where the knowledge pool is enriched by the diversity of the literature that is available and where the population indulges in reading beyond reading for instruction purposes in institutions of learning"
(Wafawarowa, 2004)

The primary barrier to producing locally relevant materials, then, may be a perception by interested individuals that publishing is too difficult or too complex. The leadership team of the *Conservation Tales* project faced these same concerns. We discovered that we needed specialists with specialized skills and the willingness to collaborate. We also found that support and interested partners were not hard to find, especially if we were willing to work with university students. Their technical skills and openness to try new ideas led to a level of quality that would have been impossible without these key team members. More importantly, their creativity drove the rapid growth of our project and the addition of valuable ideas for developing marketing materials, educational activities, and key features of our books that appeal to our target audience.

Conclusion

As educators consider the need to improve curriculum and educational materials for children in Africa, or any other country for that matter, the barriers presented by the control of publishing companies on the available resources is growing less important. We present the example of the *Conservation Tales* series as a model for the development of locally-produced, culturally relevant educational materials.

The time is right for independent authors, educators, illustrators and others to use their expertise to make the materials they know are needed for schools and communities. We present this goal not only as an educational strategy, but also as a tool for decolonization. Self-publishing authors can take a lead role in transforming schools and society by becoming creators, not just consumers, of the information that presents images intended to shape young and malleable minds.

It is clear that building a collaborative team of individual who bring specific skills are helpful to a successful publishing project: authors, illustrators, graphic designers, editors, and educators. Such a team can then use the current on-demand, digital and self-publishing resources to produce quality and relevant educational materials available with very little overhead expense.

Our hope is that the framework for a collaborative team described above can serve as a model that others can adopt, adapt and remold to suit their needs. Perhaps more importantly, we hope to inspire the innovation and entrepreneurial spirit that can help our fellow educators become "knowledge creators" (Zegeye & Vambe, 2006) who produce high-quality, cultural relevant educational resources for schools. As we explained earlier, the doors truly are open if a handful of individuals with a vision for indigenous books are willing to step out of the traditional box to take advantage of the opportunities at hand.

Resources for Self-Publishing

ISBN Registration Services

[Bowker ISBN-US](#)
[ISBN Services](#)

Companies Offering On-Demand Printing in Africa

[Printivo](#)
[48hrbooks.com](#)
[Digitalprintondemand](#)
[New Voices Publishing Services](#)
[Kindle Direct Publishing](#)

Creative Commons & Public Domain Image Sources

[Flickr](#)
[Unsplash](#)
[Pexels](#)
[Pixabay](#)
[Creative Commons Search](#)
[Wikimedia Commons](#)



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Authors

¹ **Tom J. McConnell** (tjmcconnell@bsu.edu) is a Professor in the Department of Biology at Ball State University, Muncie, IN, USA.

² **Barbara Giorgio-Booher** (bggiorgio@bsu.edu) is a Teaching Professor in the School of Art at Ball State University, Muncie, IN, USA.



Classroom Democracy and Learning Outcomes in Primary Schools in Francophone Africa

Aloysius Mom Njong

Abstract

Inspired by the UN Charter on the Rights of the Child, educational policy makers in Africa are requesting schools to implement democratic practices in the classroom. This study attempts to shed light on the effects of classroom democratic practices on cognitive and non-cognitive learning outcomes using cross-sectional data about student performance and indicators of classroom democracy from Francophone African countries. To simultaneously account for the cause and effect of democratic practices on learning achievements and the nested nature of the data, use is made of the error components-two stage least squares estimator. The results confirm the endogenous nature of learning outcomes and indicate that teachers and parents are the most important stakeholders in the process of having children internalize democracy in the classroom. It is recommended that teachers develop skills to assign and supervise pupils' work in small groups in the classroom. Education stakeholders should take measures to preserve and promote indigenous cultural values because they facilitate learning achievements.

Keywords: Classroom democracy, Educational outcomes

Introduction

Francophone Africans are familiar with classrooms where the teacher is the principal actor with all attention focused on them. Francophone Africa includes countries where French is the official language even if not all residents speak French, a result of the influence of historical French colonization. Like in many other countries, teachers transmit textbook knowledge to pupils who are encouraged to memorise the course material, perhaps only to reproduce it on demand, usually to pass an examination. In such traditional and authoritarian schools, textbooks and teachers are the main sources of knowledge, and children are hardly encouraged to participate. There is a growing awareness that such teacher-centred and text-book centred instructional approaches produce future passive citizens who fall short of critical thinking, decision-making and socialisation skills (Barron & Darling-Hammond, 2008; Nagaraju, Madhavaiah, & Peter, 2013). Given this awareness and inspired by the UN Charter on the Rights of the Child, educational policy makers in Africa

are requesting the enhancement of democracy in the classroom which is more likely to promote children's social, moral and academic development (UN General Assembly, 1989). Despite this policy directive, very little attention has been paid to the practice of democratic principles in the classroom and the delivery of education in a transformative manner. Perhaps research in this area has been hampered by the lack of readily available data, and difficulties in quantifying social education variables (Borghans, Duckworth, Heckman, & Ter Weel, 2008). The traditional education production function has centred on conventional schooling input-output variables perhaps because these are more easily measurable. Non-conventional inputs such as democratic practices have been neglected.

As part of classroom democratic practices, I agree with Serpell & Marfo (2014), Bodrova & Leong (2007), and Mucherah & Mbogori (2019) who argue that learning outcomes are influenced by the cultural values and norms of the local setting where children go to school. African countries have cultural values which are specific and diverse and often different from those in developed countries. Yet few attempts are made to explicitly

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factor in African cultural values in the education production processes. Thus, in this study an attempt is made to consider some aspect of African cultural identity as a special dimension of classroom democracy in the modelling, and to show how it contributes to the motivation of children's educational achievements in Francophone Africa. In addition to issues of data availability, the focus of the study on Francophone African countries is to capture the hangovers of French colonialism on the school curriculum of these countries. There may be some aspects of French colonialism and post-colonialism that interact with other factors to shape schooling realities in postcolonial Francophone African countries.

As concerns learning outcomes, focus in the literature has been on literacy and numeracy test scores (Glewwe & Jacoby, 1994; Glewwe, 2002; Glewwe & Kremer, 2006; Wamalwa & Burns, 2018). Non-cognitive outcomes have not been given the attention they deserve, perhaps because they are difficult to measure. The classroom should not only aim to produce individuals who can read and write, but must go beyond to prepare active, sociable, culturally viable and well-behaved citizens of the country.

Another motivation for this study is at the methodological level. From the foregoing, it is apparent that schooling produces several learning outcomes, such as formal cognitive skills and behavioural skills. These educational outcomes are jointly determined in the learning process and any single equation modelling may not capture the entire picture of interrelationships in the educational process. Therefore, I attempt to take into account the simultaneity and interdependence between learning outcomes and inputs, leading to a more realistic formulation of the schooling production function. Another important methodological issue is related to the nested nature of the data. Ignoring clustering in analysing hierarchically structured data will underestimate standard errors due to the decrease in the effective sample size for explanatory variables defined at the cluster level (Baltagi, 2011).

It is against this backdrop that this study seeks to establish the causal relationships between democracy in the classroom and learning outcomes in primary schools in Francophone African countries. Specifically, the study attempts to:

- i. *analyse democratic practices in schools as an approach to classroom management in Francophone African countries.*

- ii. *determine the effects of classroom democracy on learning outcomes in primary schools across Francophone African countries.*

The study is organised as follows: Section 1 explains the context and motivation of the study. Section 2 presents the conceptual framework wherein the concepts of classroom democracy and learning achievements are defined and operationalized. Section 3 dwells on the methodology which describes the data used, model specification and estimation strategies. Section 4 is reserved for results and discussions. Section 5 concludes the study with a summary of the key findings, together with educational policy implications.

Conceptual Framework

In this section, I define the concepts of classroom democracy and learning outputs in the context of this study so as to establish the causal relations between them.

Classroom Democracy

A modern pedagogical approach to classroom democracy focuses on the promotion of self-learning (Fearnley-Sander, Moss, & Harbon, 2001). This means that pupils are actively engaged with their own learning. To be more explicit, I consider classroom democracy as a set of classroom practices that put the children at the centre of the instructional process. This requires that each pupil is accepted as a unique personality and shown respect. It also requires that pupils' opinions be considered in education decision-making. As members of the society make decisions in a democracy, so the pupils who are actual elements in the democratic classroom should actively participate in decision making. For example, the curriculum to be taught and rules to be obeyed at school and in the classroom should be determined together with pupils. Democracy comes along with freedom of thinking and expression. Consequently, pupils should be given the opportunity to express what they feel and think.

The democratic classroom as a way of life is reinforced by the UN Convention on the Rights of the Child (UN General Assembly, 1989) which proposes relationship changes between adults and young children. Both parents and teachers are expected to be agents of change in the learning process of the child. In building a democratic classroom culture, the role of the teacher has to change from an authoritative personality to a facilitator. The teacher is no longer that person dictating a lesson as pupils copy and assimilate, but is expected



to help pupils to cultivate the habit of accessing information by themselves and learning it (Maftoon & Shakouri, 2012). The teacher is expected to guide the pupils in their learning process, and not force them to learn. The parent is expected to promote processes designed to enable and empower children to learn conveniently. Such processes would involve providing children with basic needs such as adequate nutrition, health, and protection against abuse and violence.

Another dimension of classroom democracy is enshrined in the concept of discipline in schools. It is well recognized that if discipline is not taken into consideration, the classroom/school environment will be unsafe and may disrupt the learning process as well as the academic achievement of the children (Mothata & Squelch, 1997; Levin & Nalon, 1991). Teachers and school administrators have a major role to play through guidance and counseling of children in order to instill in them a sense of responsibility and curb incidences of disruptive behaviour in schools. Every school has a code of conduct which every child is supposed to respect. When the rules are broken, it is expected that disciplinary measures be applied according to the educational regulations in force. Therefore, it is important to factor in child discipline as a transformative educational input that will lead to a healthy classroom environment in a democratic manner.

Another dimension of classroom democracy may be borrowed from social cultural theory which holds that culture and social interactions are essential factors in children's acquisition of knowledge (Okonji, 1971; Bodrova & Leong, 2007; Marfo & Biersteker, 2011; Marfo, Pence, Levine, & Levine, 2011; Mucherah & Mbogori, 2019). The African child grows up in a local context where the mother tongue is spoken, traditional music is listened and danced to with formidable dexterity, domestic chores are often distributed among family members, and telling of folk stories are common practices. Furthermore, the extended family system which includes, in addition to nuclear family; uncles, aunties, cousins and grandparents is order of the day (Degbey, 2012). Democracy as a way of living and everyday experiences should not be indifferent to these local contextual factors in which African children are growing. Therefore, African socio-cultural values need to be extended to the classroom setting in order to properly motivate children in the learning process in the context.

Learning Outcomes

Learning outcomes are multidimensional and complex. However, to facilitate understanding I divide learning outputs into cognitive and non-cognitive components.

According to Anderson et al (2001) the cognitive domain involves the acquisition of knowledge and the development of intellectual skills from the educational process. This way of learning encourages pupils to use their brains more effectively, and enables them to think and remember easily. This does not mean that memorisation or repetition is encouraged, it simply ensures that the concepts learnt in class are understood. Outcomes from the cognitive learning process usually involve academic achievement tests in reading, language and mathematics.

The non-cognitive component is made up of self-esteem and sociability outcomes. According to Emler (2001), Olsen, Breckler, & Wiggins (2008) and Harter (2012), self-esteem is considered a child's evaluation of self-worth and acceptance in the classroom. It is a judgment of the self. Research results indicate that there is a correlation between self-esteem and children's development (Papadopoulos, Metsiou, & Agaliotis, 2011). For example, children with high self-esteem show greater motivation and take initiative. They are more prone to express sociable behavior and show more feelings of happiness (Baumeister, Campbell, Krueger, & Vohs, 2003). On the other hand, children who have low self-worth tend to treat themselves badly and are more likely to invite bad treatment from their peers (Saigal, Lambert, Russ, & Hout, 2002). The consequences of low self-worth amongst pupils would include unhappiness, symptoms of depression, and difficulties in forming and sustaining friendly relationships with their peers (Emler, 2001). The social outcome of the education process revolves around the social learning theory (Bandura, 1977). The theory posits that people can acquire new behaviours by observing and imitating the behavioural patterns of other people. The theory further posits that learning would also occur through practices of rewards and punishments. In this way, a behaviour that is often rewarded would persist, while the one that is constantly punished would most likely not be imitated. The classroom is a social setting, and pupils through their interactions with peers and teachers would pick up new patterns of behaviour that are likely to uphold the spirit of team work, cooperation and love for one another.



Methodology

In order to understand the causal relationship between democratic classroom practices and learning achievement, secondary cross-sectional data collected by reviewing PASEC surveys were used. The PASEC survey methodology was a stratified sampling design where schools were first randomly selected, and grade 6 kids were subsequently randomly interviewed from each school. Given the stratified nature of the data collection process, multilevel analytical framework is adopted to better unravel the inter-relationships, but before addressing this, a discussion of the data generation procedure is necessary.

Data

Since 1960 The Conference of Ministers of Education of Francophone countries, better known in French acronym as CONFEMEN¹, has been making enormous attempts to promote the delivery of educational services and professional training (PASEC, 1998). To facilitate this, it pilots a survey called '*Programme d'Analyse des Systèmes Éducatifs de la CONFEMEN*' (PASEC) to collect data that are used to assess the efficiency of the educational systems of its member countries. The data I use in this study come from the PASEC survey conducted across 10 Francophone African countries in 2014 (PASEC 2017). As part of the PASEC survey design information was collected from pupils in grade 6 who are at the end of the primary school curriculum. The information collected from these pupils included reading and numeracy test scores and the pupils' characteristics. Information was also collected from the children's parents, teachers and head teachers of the various schools relating to knowledge, welfare, pedagogic resources and governance issues. The 2014 PASEC design surveyed 31213 pupils in grade 6 nested in 671 schools across 10 countries². The unit of analysis is the pupil.

Measurement of Constructs

Apart from the cognitive skills' construct, the rest of the constructs in the survey data are captured using several items. I subjected the items in each construct to an internal consistency test and retained for analysis only those items with positive inter-items correlations and/or that loaded high on the construct in question. The Cronbach's alpha test was used for 3-4 points Likert scales items, while the Guttman's split lambda coefficient was used for yes/no responses. Retaining

only the items that pass the reliability or internal consistency test in analysis improves measurement of the latent constructs and facilitate the convergence of estimations (Wooldridge, 2009). Based on the retained items in each construct I built composite indicators using multiple correspondence analyses (Njong & Ningaye, 2008). In this sub-section I analyse the measured latent variables/constructs of interest in this study.

Indicators of classroom democracy

The main explanatory variable in this study is classroom democracy. Drawing from the conceptualisation of classroom democracy in section 2, I build and analyse four composite indicators of classroom democracy. The first is the indicator of group work. This composite indicator is captured based on primary items shown on [Table S1 \(see Appendix\)](#). Table S1 indicates that about 38% of the teachers organised the children to work in small groups. About 67% of the teachers reported they lack the techniques to make pupils work as teams, while 56.3% of them complained that the classroom is inappropriate to organise children in smaller groups. The second construct of classroom democracy is an indicator of children's rights. The primary items of children's basic rights retained are displayed on [Table S2](#). It shows that about 26.4% of the children attended nursery school, while 64% of them slept under mosquito nets. As concerns health challenges, 17.7% of the children reported having hearing difficulties, and 23% had sight problems. Children nutrition seems to be a serious problem because about 57.5% of the children reported always feeling hungry in class. The third construct of classroom democracy is an indicator of child discipline. Child discipline was surveyed by getting responses to the statements captured on [Table S3](#). It is observed on Table S3 that about 38% of the teachers punished or shouted at children in class. The method of punishment ranged from asking the pupils to copy exercises (32%), and /or do manual labour (49%). Note that about 5.5% of the teachers did administer corporal punishment although it is prohibited by law in these countries. The fourth construct of classroom democracy is an indicator of cultural identity. The statements that captured cultural identity, and based on which the cultural identity indicator is built, are displayed on [Table S4](#). Table S4 shows that 22.4% of the children did not speak their mother tongue at home, while 69% of them did so occasionally. Only about 18.5% of the teachers used the native language spoken by the children of that

¹CONFEMEN is Conférence des Ministres de l'Éducation des États et Gouvernements de la Francophonie.

²The ten countries are: Benin; Burkina Faso; Burundi; Cameroon; Congo; Cote D'Ivoire; Niger; Senegal; Tchad; and Togo

³In the case of items with mixed scales, I used the Cronbach's alpha test.



locality. Above 70% of the teachers did not allow children talk or sing songs in their mother tongue in class. Table S4 also indicates that 77- 84% of the schools did not have textbooks in the language of the majority of the children.

Dependent variables

The dependent variables are learning outcomes which are cognitive and non-cognitive and are considered endogenous, because they are determined within the system⁴. The cognitive outcomes are standard scores in reading skills and mathematics skills. This is a simple scale of test scores that are continuous from grade 2 through grade 6. The standard scores reported for each of the grade levels ranges from 100 to 400. I compute the mean value of the test scores across the grades for reading and math. These scores indicate that the higher the score, the higher the academic achievement of the child.

The non-cognitive outcomes are self-esteem and sociability. The items used to measure non-cognitive skills include measures of friendliness, happiness, self-worth, cooperation with one another, and feeling of security. Each child was asked to respond to the descriptive statements measuring self-esteem and sociability captured on a 4-point Likert scale as follows: 1) strongly agree, 2) agree, 3) disagree, and 4) strongly disagree. The number of items in the survey that are related to self-esteem and sociability are ten and six respectively. Based on Cronbach's alpha analysis, I selected seven and four items that loaded high on self-esteem and sociability respectively (see Tables S5 and S6). [Table S5](#) shows children's responses to self-esteem items. It shows that over 83% of the children reported performing well in class. Approximately 81% of the children reported hard work to account for their good achievement, while 74% of them attributed the good scores to the fact that class lessons are easy. Children reported having low scores for various reasons, for example about 47% of them don't study enough, and 36% of them consider they are not intelligent enough, while 25% said the teacher insults them. [Table S6](#) shows children's responses to sociability items, where over 80% of them agreed having many friends in school. About 87% of the children were happy being in school because their peers like them.

It is important to note that the learning outcome/endogenous variables are measured in different units. The non-cognitive skills are measured using Likert scales in the survey dataset while the cognitive skills

are mean test scores. Thus, in order to facilitate interpretation of changes on learning outcomes I transformed them into a common unit of measurement using standard z-scores.

Model Specification

To determine the effects of classroom democracy on learning outcomes an econometric model is specified. Since the schooling inputs jointly produce the educational outcomes, a simultaneous equation modelling approach is deemed appropriate for this study. Simultaneous-equation models specify relationships in a system of two or more equations where the dependent variables display an interdependent relationship (Wooldridge, 2009; Greene, 2011; Baltagi, 2011). In a non-recursive model of this nature, the focus is on the relationship among the jointly determined dependent variables in the systems, which are considered endogenous. I argue that these endogenous variables are considered cause and effect in the schooling production process. There is simultaneity or reciprocal causation among the dependent variables. The modelling suggests that certain outcomes could be affected directly by other outcomes of the educational process. What this means is that all the dependent variables are explicitly taken to be endogenous to the system (Baltagi, 2011). That is, the endogenous explanatory variables are dependent variables from other equations in the system. Given the above, I can specify the following non-recursive system of simultaneous equations:

$$MTS_{ijc} = \alpha_0 + \alpha_1 ICD_{ijc} + \alpha_2 RTS_{ijc} + \alpha_3 ISO_{ijc} + \alpha_4 ISE_{ijc} + \gamma X_{ijc} + \varepsilon_{1,ijc} \quad (1)$$

$$RTS_{ijc} = \beta_0 + \beta_1 ICD_{ijc} + \beta_2 MTS_{ijc} + \beta_3 ISO_{ijc} + \beta_4 ISE_{ijc} + \theta W_{ijc} + \varepsilon_{2,ijc} \quad (2)$$

$$ISO_{ijc} = \delta_0 + \delta_1 ICD_{ijc} + \delta_2 MTS_{ijc} + \delta_3 RTS_{ijc} + \delta_4 ISE_{ijc} + \vartheta G_{ijc} + \varepsilon_{3,ijc} \quad (3)$$

$$ISE_{ijc} = \omega_0 + \omega_1 ICD_{ijc} + \omega_2 MTS_{ijc} + \omega_3 RTS_{ijc} + \omega_4 ISO_{ijc} + \pi Z_{ijc} + \varepsilon_{4,ijc} \quad (4)$$

where:

MTS = Math test scores

RTS = Reading test scores

ISO = Indicator of Sociability

ISE = Indicator of Self-esteem

ICD = Indicators of classroom democracy

X, W, G, Z = vector of control (exogenous) variables

$\alpha, \beta, \gamma, \delta, \theta, \pi, \vartheta, \omega$ are structural parameters to be estimated

$\varepsilon_1, \dots, \varepsilon_4$ are disturbance or error terms

i, j, c represent the i^{th} pupil, the j^{th} school,

and c^{th} country respectively

The explanatory endogenous variables are correlated with the error terms in the system of equations. All other explanatory variables are considered exogenous to the system and uncorrelated with the error terms. The exogenous variables are considered as instruments for the endogenous variables.

⁴This is explained in greater detail in Methodology section.



Model Estimation

To estimate a system of simultaneous equations, instrumental variable methods for joint estimation are often proposed. To account for the nested structure of the data due to intra-school correlations that may arise because responses from children in the same school are likely to be similar while those from children in other schools are different, the solution in single equation model is to cluster the errors at the level of the school (Fielding, 2010; Wamalwa & Burns, 2018). To achieve this within a simultaneous equation framework, Baltagi & Chang (2000) and Hsiao (2003) proposed an error components-two stage least squares (ec2sls) estimator to account for the random error component of the system of equations. The ec2sls estimator is implemented on an equation by equation estimation basis (Baltagi, 2008)⁵ to avoid having inconsistent equation estimates for all the equations in the event where any of the equations is mis-specified.

Pair-wise Correlation Results

Table 1 shows the weighted⁶ pair-wise correlations between the classroom democratic indicators and learning outcomes as defined in this study.

Table 1. Correlation matrix of key variables

	MTS	RTS	ISE	ISO	IGW	ICR	ICD	ICI
MTS	1							
RTS	.845	1						
ISE	.154	.201	1					
ISO	.092	.139	.590	1				
IGW	.094	.058	.002	.015	1			
ICR	.058	.067	.006	.004	.030	1		
ICD	.059	.027	.028	.036	.168	-.008	1	
ICI	.035	.043	.001	.017	-.021	-.024	-.002	1

Source: Constructed using 2014 PASEC grade 6 data

Note: MTS=math test score; RTS=reading test score; ISE=indicator of self-esteem; ISO=indicator of sociability; ICR=indicator of child's rights; ICD=indicator of child discipline; ICI=indicator of cultural identity.

Table 1 shows some preliminary partial inter-relationships among learning outcomes and classroom democratic indicators. First observation on Table 1 is that there is a high positive correlation between the cognitive educational outputs. The correlation coefficient between math skills and reading test scores is 0.845 indicating that pupils who read well report high performance in mathematics as well. Second interesting observation is that correlation between non-cognitive outcomes is moderate and positive. For instance, the

correlation coefficient between self-esteem and sociability is 0.59, indicating that that children who have high self-esteem are much likely to be sociable. Third observation of interest is that the correlation between the cognitive and the non-cognitive indicators are positive but much lower. For example, correlation coefficient between self-esteem and reading is 0.201, while it is 0.155 with math. The correlations among the indicators of classroom democracy are very low.

Estimation Results

In this section the regression results of classroom democratic practices on learning outcomes are presented. For convenience, the results for cognitive skills are presented first. Table 2 (see next page) displays the estimation results for cognitive skills.

The results on Table 2 show high positive and significant correlations between both test scores at the 1% level. This result suggests that a child who does well in reading generally will also achieve well in math, and vice versa. The other two endogenous variables; self-esteem and sociability also show significant positive, but much lower correlations with math and reading skills.

As concerns the indicators of classroom democracy, the correlations are positive and insignificant, except for child discipline. The results are interpreted in terms of standard deviations (SDs). The indicator of group work correlates positively with cognitive skills. This means that a one unit increase in the indicator of group work improves math and reading scores by .073 SDs and .065 SDs respectively, but the effects are insignificant. The results indicate that when children's rights increase by one unit, math and reading test scores rise insignificantly by .068 and .052 SDs respectively. The indicator of child discipline associates positively and significantly with cognitive skills (.052 SDs for math and .083 SDs for reading). The indicator of cultural identity indicates that when it increases by one unit, math scores improve by .061 SDs; while reading scores increase by .071 SDs.

Of the control variables, the following are positive and significant at least at the 5% level: household size, teacher experience, teacher's training, community involvement in school management, classroom pedagogic resources, and school infrastructure. The models predict that higher test scores are associated with students who are male, though this finding is insignificant.

⁵Baltagi's (2008) ec2sls can be obtained by specifying the ec2sls option, after *xtivreg* in Stata.

⁶The PASEC survey provides several types of sampling weights, notably child, teacher, or school weights depending on the level of analysis. Since unit of analysis in this study is the child, I use child sampling weights.



Teacher absenteeism has negative significant effects on academic achievements.

The diagnostics statistics on Table 2 show that the variables specified in the models accounted for approximately 27.4% of the total variance of the math scores, and 37.1% of reading test scores, respectively. The between variations

(R-sq=56.8% for math; 59.3% for reading) accounted more than the within variations (R-sq=22.1% for math; 32.7% for reading) in explaining the overall variances of the models, respectively. The F-values are statistically significant at the 1% level. This indicates that the regression models fit the data structure. In other words, the estimates of each model taken together are significant. Table 3 displays the estimation results for non-cognitive skills.

The results on Table 3 show a moderately positive and significant association between self-esteem and sociability. Specifically, a unit increase in self-esteem improves sociability by .051 SDs. This suggests that a child's feeling of self-esteem is affected by their interest in other children and the reactions they receive in return. The other two endogenous variables; math and reading show much lower positive and significant correlations with self-esteem and sociability skills.

As regards the indicators of classroom democracy, the associations are positive and insignificant, except for child discipline. The indicator of group work is shown to associate positively and insignificantly with self-esteem (0.011 SDs) and sociability (.057 SDs). As concerns the indicator of children's rights, Table 3 shows that a one unit increase in children's rights improves self-esteem and sociability insignificantly by .013 and .035 SDs respectively. The indicator of child discipline associates positively and significantly with non-cognitive skills (.022 SDs for self-esteem and .024 SDs for sociability). Table 3 also indicates that when indicator of cultural identity increases by one unit, self-esteem improves by .026 SDs; while sociability ameliorates by .006 SDs, though these improvements are insignificant.

As concerns the other exogenous correlates, the following relate positively and significantly with the non-cognitive outcomes: household size, socio-economic status, teacher experience-squared, community involvement in school management, and classroom pedagogic resources. The models predict school infrastructure, teacher's professional training, and experience associate positively though insignificantly with non-cognitive skill. As expected, teacher absenteeism has negative, though insignificant effect on non-cognitive achievements. Precisely, a unit increase in teacher absenteeism causes self-esteem to change by -.004 SDs, while sociability changes by -.022 SDs.

The diagnostics tests on Table 3 show that the variables specified in the models accounted for approximately 29.1% of the total variance for self-esteem, and

Table 2. Estimation results for cognitive skills

Variable	Math test Score (1)	Reading test Score (2)
Dependent/Endogenous variables		
Math test score	-	.689*** (.115)
Reading test score	.772*** (.028)	-
Self-esteem	.209*** (.007)	.371*** (.068)
Sociability	.083*** (.005)	.119** (.007)
Indicators of classroom democracy		
Indicator of group work	.073 (.065)	.065 (.055)
Indicator of children's rights	.068 (.059)	.052 (.048)
Indicator of child discipline	.052*** (.012)	.083*** (.005)
Indicator of cultural identity	.061 (.079)	.071 (.056)
Control /exogenous covariates		
Pupil characteristics		
Gender (Female=ref)	.005 (.009)	.006 (.003)
Family size	.002** (.001)	.019** (.009)
Socio-economic status	.020** (.009)	.002* (.001)
Teacher characteristics		
Experience	.014* (.007)	.009 (.007)
Experience - squared	.016*** (.001)	.022* (.010)
Teacher training (years)	.002 (.004)	.005 (.020)
Teacher absenteeism	-.005*** (.001)	-.009** (.002)
School /Classroom characteristics		
Community involvement	.004*** (.001)	.019** (.008)
Classroom pedagogic resources	.039*** (.013)	.002* (.001)
School infrastructure	.028 (.038)	.002 (.004)
Constant	.102* (.060)	.434** (.152)
Diagnostic test statistics		
R-sq within	.221	.327
R-sq between	.568	.593
R-sq overall	.274	.371
F-stat	253.04	259.21
	p=.000	p=.000
Number of groups (schools)	665	665
Number of observations	28,543	28,714

Source: Constructed using 2014 PASEC grade 6 data

Notes: *p<.1, **p<.05, ***p<.001

Robust standard errors are reported in parentheses.



Table 3. Estimation results for non-cognitive skills

Variable	Self-esteem (1)	Sociability (2)
Dependent/Endogenous variables		
Math test score	.256*** (.007)	.051*** (.009)
Reading test score	.145*** (.007)	.144** (.005)
Self-esteem	-	.513*** (.005)
Sociability	.039** (.019)	-
Indicators of classroom democracy		
Indicator of group work	.012 (.015)	.057 (.045)
Indicator of children's rights	.013 (.014)	.035 (.022)
Indicator of child discipline	.022** (.008)	.024*** (.008)
Indicator of cultural identity	.027 (.019)	.007 (.006)
Control /exogenous covariates		
Pupil characteristics		
Gender (Female=ref)	.037 (.029)	.005 (.005)
Family size	.006* (.001)	.022* (.011)
Socio-economic status	.039*** (.009)	.002*** (.001)
Teacher characteristics		
Experience	.008 (.007)	.008 (.006)
Experience – squared	.002** (.001)	.007** (.005)
Teacher training (years)	.001 (.004)	.015 (.027)
Teacher absenteeism	-.005 (.006)	-.023 (.018)
School /Classroom characteristics		
Community involvement	.041*** (.008)	.010** (.004)
Classroom pedagogic resources	.003** (.001)	.011** (.003)
School infrastructure	.014 (.010)	.003 (.004)
Constant	.333*** (.054)	.184*** (.058)
Diagnostic test statistics		
R-sq within	.267	.270
R-sq between	.472	.475
R-sq overall	.291	.298
F-stat	765.83	683.15
	p = .000	p = 0.000
Number of groups (schools)	665	665
Number of observations	28,592	28,508

Source: Constructed using 2014 PASEC grade 6 data

Notes: *p<.1, **p<.05, ***p<.001

Robust standard errors are reported in parentheses.

29.9% of sociability, respectively. The between variations (R-sq=47.3% for self-esteem; 47.5% for sociability) accounted more than the within variations (R-sq=26.7% for self-esteem; 27.0% for sociability) in explaining the overall variances of the models, respectively. The F-statistics indicate that the regression models fit the data structure.

Discussion

The estimation results of this study show positive and significant inter-relationships between the learning outcomes of math, reading, self-esteem and sociability. In an attempt to explain these positive correlations, I draw from the theory of self-determination (Deci, Vallerand, Pelletier & Ryan, 1991). According to this theory intrinsically motivated individuals will engage in actions or behaviours because they enjoy doing them. In this case the individual has an internal motivation and feels fully engaged to undertake the action. This contrasts with externally motivated behaviours that individuals may initiate because they expect a reward or want to avoid a punishment. Thus, it is expected that pupils who are intrinsically motivated (have high self-esteem and sociability) exhibit higher conceptual understanding (Deci, Vallerand, Pelletier & Ryan, 1991). Such children are more confident in their capacities and therefore have greater interest for learning. These results corroborate the study by Nofle & Robins (2007) who found positive association between the personality dimensions of students and their math GPA and verbal test scores. Chamorro-Premuzic & Furnham (2003) have also reported positive significant correlation between personality traits and student academic performance.

The estimation results of this study portray positive correlations between all the indicators of classroom democracy and learning outcomes in the context of Francophone African countries. However, only the association between child discipline and the learning outcomes is significant, the correlations of the other indicators of classroom democracy with educational achievements are insignificant. The positive association between indicator of group work and educational outcomes means that when pupils are given the opportunity to work in small groups, they are more likely to have higher test scores. The positive association between indicator of group work and learning outcomes corroborates findings from some earlier studies such as Feinberg & Toress (2001) and Lipton & Oakes (2003) who found that when pupils participate actively in class and work as teams, their educational achievements are much higher. Unfortunately, our positive correlation is insignificant. In the survey about 63.2% of the teachers reported not organising pupils to work in groups. Furthermore, about 67.3% of the teachers lacked the techniques to do so (see Table S1 in the Appendix). Children in the African family setting share responsibilities in carrying out household chores such as cooking, taking



care of babies, fetching firewood and water, and running errands for the elderly. Thus at an early age African children are exposed to a 'team-spirit way' of living which unfortunately is disrupted in the classroom when the teacher fails to organise them to work in groups. Children will learn better in a classroom atmosphere, where children work in smaller groups, feel safe to express their feelings and open discussions are encouraged. Therefore, there is need in African countries to move away from the traditional mode of teaching and learning where children listen and teachers speak and dictate notes.

The estimation results indicate positive but insignificant correlations between indicator of children's rights and learning outcomes. As a follow up of the 1989 UN Convention on children's right, a special session was held on 22 May 2002 on children during which countries committed to invest in children and adopt policies in the best interest of the child. Francophone African countries have several developmental challenges such as low incomes, inadequate access to portable water and sanitation, food insecurity and hunger, and widespread disease that threaten children's livelihoods (Watkins, 2016). Given these challenges it is no surprise that 57.5% of the pupils in the survey reported feeling hungry in class, more than 77- 83% reported having one health impairment or another and 73.6% did not attain nursery school. A further 36% of the children have never slept under a mosquito net (see Table S2). These are basic rights of the child. The inability of the children's families to respect these rights may account for the insignificant nature of the results. It would be a miracle to expect children to achieve significantly when such basic rights are not respected. In tandem with African culture children in poorer families may be required to carry out petty commercial activities, or join their parents in farming so as to help the family survive. In western culture this may be considered child labour or child abuse, but in the African context this is not only a livelihood survival strategy but is often considered a normal activity in line with the household chores distribution plan of the family. Thus, I may further argue that differences of this nature in the conceptualisation of children's rights may also account for the insignificance of the estimation result.

The indicator of child discipline associates positively and significantly with learning outcomes. This result is in line with expectations and agrees with Bodovski, Nahum-Shani, & Walsh (2013), which showed that higher math scores were registered among US students

in a disciplinary school environment. Further, Ning, Van-Damme, Yang, & Gielen, (2013) also obtain a positive and significant correlation between child discipline and reading achievements. Furthermore, Pasternak (2013) and Zhao & Kuo (2015) have reported positive and significant relationships between children's self-discipline and non-cognitive achievements. Some unique features of the African traditional society may account for the significance of the child discipline indicator in this study. The extended family system is a powerful tool in parenting and helps to develop a sense of social responsibility, cooperation, and respect for elders in the child's early years (Nsamenang, 2008). Another feature in the African traditional society aspect is the telling of folktales. This is another form of parenting which inculcates good morals and discipline in children (Degbey, 2012). Given these indigenous cultural values, the African child at an early age is more likely to be disciplined and by extension more likely to respect classroom rules and regulations.

The indicator of cultural identity indicates a positive but insignificant association with learning outcomes. This finding slightly differs from results of earlier studies, like Okonji (1971); Bodrova & Leong (2007); Marfo & Biersteker (2011) which find that cultural values have positive and significant effects on children's academic performance. A close look at the items in the 2014 PASEC survey from which the indicator of cultural identity is constructed may provide some explanation for the insignificance of estimation result. Only about 18.9% of the teachers expressed themselves in the native language of the pupils where the school is located; 70.7% of the teachers did not allow pupils to speak, and sing in class in their native language and worst still only 8.6% of the pupils speak exclusively the mother tongue at home (see Table S4). These attitudes are not of a nature to facilitate learning and ameliorate academic achievements in the African context. Mucherah & Mbogori (2019) argue that African children will learn better if the native language and French/English are used simultaneously as languages of instructions in school. This will facilitate the use of local examples to introduce the alphabet and counting of objects. Unfortunately, Francophone African scholars are still caught in the empty pride of using examples from Paris, France, during lessons in class. African children may not quickly figure out such examples in their local context. Some parents are also still entangled in the web of colonisation, and feel more westernised if their children speak only French/English. African



educationists have to encourage a shift away from these colonial mental enslavement and practices.

Conclusion and Policy Implications

Conclusion

This study attempts to shed light on the effects of classroom democratic practices on cognitive (math and reading) and non-cognitive (self-esteem and sociability) learning outcomes using cross-sectional data from Francophone African countries. To capture the inter-relationships inherent in the education production process, a simultaneous equation modeling approach is proposed. In order to estimate the model parameters, an error component- two stage least squares-instrumental variable method is used to properly account for the multilevel nature of the data structure. The results confirm the endogenous nature of the learning outcome variables; specifically, they indicate positive and significant correlations among the learning outcomes. As regards classroom democratic practices, the results indicate positive and insignificant associations with the dimensions of group work, children's rights, and cultural identity. Only the indicator of child discipline has positive and significant effect on learning outcome skills in this study. The exogenous or control variables included in the model have significant expected signs, notably family size, socio-economic status, teacher experience, community involvement, and classroom pedagogic resources.

Policy Implications

From the findings of this study, it stands out that teachers and parents are some of the most important stakeholders in the process of having children internalize democracy in the classroom. In this regard, the following policy recommendations are made: Teachers should initiate and encourage children to work in small groups in the classroom. Teachers should develop the habit to invite pupils to always see themselves as capable and valuable. This action will bring out the positive traits and potentials that the children have and help to build their self-esteem which is a strong internal motivation to educational achievement. Education stakeholders should take measures to preserve and promote indigenous cultural values because they tend to facilitate learning achievements. Education policy makers should devote more resources to revise the curriculum of professional colleges in order to train teachers to: i) develop skills of assigning and supervision of pupils in team work; ii) be culturally responsive in their teaching practices and accommodate pupils who speak their native language, or display their cultural identity in class. Therefore, the teacher would be acting like a classroom democratic model. Educationists should develop parenting programmes to sensitise parents to speak their native languages with children at home, and how to better prepare children for schooling as regards nutrition, health, and other nurturing issues. The findings also showed that there are variations in achievements within schools and between schools. The implication of this result is that educationists must design multiple teaching strategies. A blind spot in the education system is an attempt to treat all children the same. This certainly is for reasons of equity and fairness, but in reality, children are all different given that they come from diverse backgrounds.



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Author

Aloysius Mom Njong (mom_aloys@yahoo.fr) is a Professor of Development Economics at the University of Bamenda, Cameroon.



Table S1. Weighted frequency distribution of teachers' responses to group work items

Items	Responses (%)	
	Yes	No
Teacher organises pupils to work in small groups in class	36.84	63.16
Teacher organises pupils to work in groups to clean classroom and toilets	38.20	61.80
Teacher has the techniques to make pupils work in groups	32.70	67.30
Teacher gives assignment to class head to lead sub-groups	20.34	79.66
Pupils perform better when they discuss among themselves	73.92	26.08
The classroom is not appropriate to organise pupils in groups	43.77	56.23
Guttman's split Lambda coefficient	0.745	

Table S2. Weighted frequency distribution of pupils' responses to children's rights items

Items	Responses (%)	
	Yes	No
Did you attain nursery school?	26.39	73.61
Do you sleep under mosquito net?	64.10	35.90
Do you have hearing difficulty?	17.65	82.35
Do you have sight problems?	23.00	77.00
Are you afraid, or feel unsecured in class?	22.5	77.5
Do you often feel tired in class?	19.15	80.85
Do you often feel hungry when in class?	57.47	42.53
Guttman's split Lambda coefficient	0.786	

Table S3. Weighted frequency distribution of teachers' responses to child discipline items

Items	Responses (%)			
	Always	Often	Occasionally	Never
Teacher punishes/shouts at children in class	8.28	30.05	56.51	5.16
Teacher punishes pupils to write exercises	3.93	28.53	42.40	25.15
Teacher punishes pupils to cut grass, sweep the yard	11.58	38.00	32.85	17.57
Teacher sends the recalcitrant pupil to the head teacher	3.44	22.17	49.48	24.92
Teacher keeps the pupil standing at corner in classroom	0.95	9.96	22.13	66.96
Teacher administers physical punishment (beats.)	0.37	5.14	31.05	63.44
Teacher punishes or beats when pupils have low test scores	0.49	4.88	32.72	61.91
Cronbach's alpha	0.701			



Table S4. Frequency distribution of teacher/pupils' responses to cultural identity items

Items	Responses (%)			
	Always	Often	Occasional ly	Never
Native language is spoken at the home of the child	8.57	0.00	69.03	22.41
Teacher uses native language spoken by the majority of the children	3.45	15.51	62.63	18.41
Teacher allows children sing songs, express themselves in native language in class	6.75	10.14	12.39	70.73
	Yes		No	
There are text books in native language of the majority of the children	22.30		77.70	
There are text books in native language showing math/classification of figures	15.50		84.50	
Cronbach's alpha	0.595			

Table S5. Weighted frequency distribution of pupils' responses to self-esteem items

Items	Responses (%)			
	Strongly agree	Agree	Disagree	Strongly disagree
I perform well in class	30.27	52.85	11.60	5.27
I have good scores because I work hard	28.16	52.08	13.98	5.78
I have good scores because the lessons in class are very easy	26.52	47.46	18.83	7.19
I have low scores because I don't put in much effort	13.84	28.47	35.39	22.31
I have low scores because the lessons in class are very difficult	12.63	29.09	37.11	21.18
I have low scores because I am not intelligent enough	10.66	25.53	40.94	22.87
I have low scores because the teacher often says that I am lazy and foolish	8.25	16.43	45.14	30.18
Cronbach's alpha	0.712			

Table S6. Weighted frequency distribution of pupils' responses to sociability items

Items	Responses (%)			
	Strongly agree	Agree	Disagree	Strongly disagree
I have many friends in school	34.92	49.41	10.52	5.16
The other children do not play with me	11.94	25.39	38.22	24.45
I am happy being in school, because other kids like me	38.46	48.34	8.43	4.77
Other children want me to be their friend	10.26	21.05	42.07	26.62
Cronbach's alpha	0.516			



Transformative Learning Potentials of Trainee Health Workers in Nsukka, Enugu State, Nigeria

Evelyn N. Nwagu

Abstract

This study investigated transformative learning and the influence of learning experiences and demographic characteristics of the learners on transformative learning of trainee health workers in Nsukka, Enugu state, Nigeria. Descriptive survey design was used for the study. The instrument for data collection was a fixed-choice and open-ended questionnaire. Frequencies and ANOVA were computed. Thematic content analyses for open-ended questions were done. Participants indicated a high degree of transformative learning. Programme type, gender, age and level of study had no significant influence on the transformative learning potentials of the students. The most frequently selected learning components were field trips and presentations. Students' responses to the open-ended questions covered themes such as better understanding of health, illness and health care. The study demonstrated the importance of discussion and debate in developing critical reflection among learners.

Keywords: Transformative learning, Critical reflection, Change, Health workers, Health, Illness, Health care.

Introduction

Worldwide, the transformation and scaling up of health workers' education and training are important issues of concern. A large proportion of health workers in Nigeria and other Sub-Saharan African countries are trained in post-secondary health institutions and they form the major health workforce in health facilities in many communities in Nigeria. While training institutions for health workers in developed nations of the world are undergoing reforms to increase the competencies of health workers trained in such institutions (Stubbs, 2015; World Bank, 2018), there is a scarcity of information and research about health workers training in Sub-Saharan Africa, particularly Nigeria. Albeit, there is a need for all health professionals and health workers in all countries to be educated to mobilise knowledge, engage in critical reasoning, and practice ethical conduct so that they are competent to participate in patient and population-centred health systems as members of

locally responsive and globally connected teams (Frenk, Chen, Bhutta, Cohen, Crisp, Evans, ...Zurayk, 2010). The training of health workers should, therefore, give rise to personal and social transformation which is one of the United Nations Educational, Scientific, and Cultural Organization's (UNESCO) five pillars of learning for sustainable development: Learning to transform oneself and society (UNESCO, 2010).

Literature Review

Transformation is an internal fundamental change in one's beliefs for action (Palinkas, 2013). It is quite different from mere change in behavior. While change uses external influences to modify actions, transformation modifies beliefs so actions become natural and thereby achieve the desired result. Change amends the past while transformation creates the future. Change and transformation could result from the learners' experiences.

Experiential learning has been described as the type of education whereby knowledge and meaning are contextualized in actual experiences (Perry, 2011).

Full listing of authors and contacts can be found at the end of this article.



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Meeting new and challenging experiences could lead to the uncomfortable situation described by Mezirow (1991) and could lead to a learning outcome. Mezirow stated that only through reflection, active learning, and placing ones selves in uncomfortable situations are individuals able to develop their understanding of the world and of themselves, allowing a potential change to their perspectives and frames of reference. Strange & Gibson (2017) noted that by applying the basis of experiential learning to the potential outcomes of transformative learning, it may be possible to further direct educational programming for the better. Experiential and transformative learning are associated with the desired goals of health workers training programmes. It is apt to use them both as frameworks to assess the transformative learning potentials of trainee health workers. Experiential learning can, thus, provide guidance in designing health worker training programmes such that they will include activities that are “more hands on.”

Transformative learning theory (TLT) focuses on the processes involved in changing an individual's frames of reference (Stange & Gibson, 2017). The transformative learning theory was propounded by Jack Mezirow in 1978. Mezirow asserted that adults make meaning of their experiences and that the specific social structures within which the experience takes place enable adult learners to read meaning into their experiences. Where such meanings are found to be dysfunctional they change their meaning of them (Cranton, 2006; Mezirow, 1991; Taylor, 2007). The process of evaluating meaning structures starts with instrumental learning, passes through communicative learning and then transformative learning (Mezirow, 1998, 2003). These three domains though distinct are interrelated (Mezirow, 1981) and they occur through critical reflection and rational discourse (Moyer & Sinclair, 2016). Instrumental learning occurs when the learner manipulates and controls the environment, predicts observable physical and social events, and takes appropriate actions (Cranton & Roy, 2003). The environment in training institution for health workers is a source of instrumental learning. Students admitted into such institutions are capable of manipulating the environment to an extent that can bring about transformative learning. Students can search out information from the Internet, interact with other students, get themselves involve in discussions and debates and also interact with clients during the training programme. Hence this study explored whether or not transformative learning occur in health workers in institutions of training for

health workers. Communicative learning is born out of a need to understand others and make it easier for interlocutors to understand each other by navigating language, values, beliefs, and feelings (Cranton & Roy, 2003; Mezirow, 1997). The learners, their teachers and the clients within such institutions have diverse values, beliefs, feelings and even languages. Interacting with each other in these institutions could bring about reflective reasoning that can trigger transformative learning.

Experiential Learning Theory (ELT) provides direction as to how we can develop the type of action-oriented experience that is likely to induce transformation. Experiential Learning involves concrete experience, reflective observation, abstract conceptualization, and active experimentation. Concrete experience refers to an actual interaction a learner will have with the environment or a particular learning event. Reflective observation provides learners the opportunity to reflect on their experiences from different perspectives. It propels the learners into the abstract conceptualization stage, where the learners integrate their reflections from their experiences into new concepts about their learning experience and make deductions about their experiences. The final stage is active experimentation where the learner takes their newly learned concepts and deductions from the abstract conceptualization phase and applies them in new learning settings. Through touching all of these bases, knowledge is constructed and learning achieved (Kolb & Kolb, 2005). Experiential learning associated with health worker training programmes can make a considerable impact on a student's ability to understand globally complex problems (Kiely, 2004). Montrose (2002) explains that there is little understanding among providers and administrators of what exactly constitutes experiential learning and how it can be applied to improve programme structure.

Transformative learning for health workers in communities in Low- and Middle- Income Countries (LMIC) has the potential of bridging the gap in the formal health services and communities (Black et al.; WHO, 2016). The disparity in the health of individuals living in LMIC particularly rural communities raises questions as to beliefs and practices relating to health, illness and the quality of health care in such communities. Health workers training programmes have been accused of not producing competent professionals who are able to adequately positively impact the health of the people for whom they care. This lack of competence is largely a result of fragmented, outdated, and static curricula



(Frenk et al, 2010). There is a need for a serious shift in the mindsets of health workers for meaningful and sustainable change to occur (Agyepong et al., 2017).

This calls for a re-examination of the health care workers' educational programme, to ensure that the curricula of health workers are able to provide the needed transformation that will help health workers assume and develop their personal, professional, and social roles. Results from such studies are essential in planning effective training methodologies and materials to improve the efficacy of knowledge-sharing of health personnel (Mbuya, Menon, Habicht, Pelto, & Ruel, 2013; McCalman, Jongen, & Bainbridge, 2017).

Health workers in training are adults and upon graduation, their health care job is often with adults. Adult learning involves critical thinking and reflection on what is already known in order to change and adopt a new way of doing things (Gibby, 2013). Sharing of knowledge that will produce positive result requires that health workers should believe and be convinced of the right values and practices. There is a need for health workers to drop unhealthy values and socio-cultural norms that do not allow them to actively participate in effective and health-promoting practices. Hence there is also a need for the training programme of health workers to give them adequate opportunity to reflect on their previous knowledge, values and practices with a view of transforming them positively. Such transformative learning according to Renigere (2014) will stimulate trainee health workers to learn to think independently in order to dispose of the knowledge that has at times been acquired as a result of life experience without ever thinking or asking questions.

This study, therefore, examined how the students' learning experiences have influenced their transformative learning. Transformative learning is a possible outcome of instrumental and communicative learning when modification of premises, assumptions, and deep meaning structures result in a transformation of action and behaviour (Cranton, 2006).

Therefore, presenting appropriate learning experiences to trainee health workers that will enable them to reflect on any value and meaning they may have had prior to the training may bring about transformative learning in health workers. Transformative learning encompasses a life-enhancing change (Mezirow, 2003). When learners experience transformative learning, they often become more inclusive, distinguishing, open, reflective and emotionally able to change, ultimately showing higher connectedness to the global environ-

ment (Mezirow, 2003).

Educators engaged in teaching health workers should be able to identify ways of promoting students' ability to find purpose and meaning from their experiences through a variety of learning components (Bidabadi, Isfahani, Rouhollahi, & Khalili, 2016). If health workers should develop their personal, professional and social roles, they need to develop their reasoning ability. Such reasoning hopefully will give them the opportunity to better understand the lives of other people. For instance, being able to identify the emotional states of their clients and putting themselves in other's shoes. These will help them to understand others' beliefs, feelings, experiences and intentions. Thus, they become able to think about things from others points of view (Lieberman, 2007).

Nigeria, like many other countries in Sub-Saharan Africa, faces infectious diseases, malnutrition, child and maternal mortality, emerging challenges from an increasing prevalence of chronic conditions, mental health disorders, injuries, and health problems related to climate change and environmental degradation (Agyepong, et al., 2017). Life expectancy and public health indicators remain low in Nigeria compared to that of other middle-income countries in other parts of the world. There is need to find a viable and lasting solution to bridge this gap in health status between individuals of diverse socio-economic statuses in many communities in Nigeria.

Many studies on health care services have looked at the type of services provided by health workers in low-resource communities and only a few have looked at the preparation of health workers for such service (O'Rourke, Howard-Grabman, & Seoane, 1998; Laughlin, 2004; Matore, et al., 2015; Lamstein, et al, 2014). If efforts are made in the right directions, Nigeria has the potential to improve the health status of its population if the nation will make effective use of its available human resources (Adeloye et al., 2017). There is a need for health workers to have a change of approach in the way they view certain things and the way they act.

Health workers in most rural health facilities and in urban slums in Nigeria comprise: Community Health Extension Workers (CHEW), Junior Community Health Extension Workers (JCHEW), Nurses, Midwives and Lab Technologists. The World Health Organization (WHO) (2016) advocated that training of health workers should adopt an approach that is people-centred and inspired by progress and adapted to the country's specific needs. The basic training of these cadres of health



workers is largely done at post-secondary training institutions, many of which are hospital based. The contributions of Community Health Workers (CHWs) are globally recognized as capable of closing the gap between formal health services and communities (Black et al., 2017; WHO, 2016). Community Health Workers are among the WHO Global Strategy for Human Resources (Maher & Cometto, 2016) and they are considered an integral component to reach impact and equity goals (Lewin et al., 2010). Nurses and midwives have been identified to be actively involved in both hospital and community health practices (Adib-Hajbager, 2013). The basic laboratory services provided by laboratory technicians are very crucial for improving the potential of the Primary Health Centres (PHC) as centres providing primary health care. Inadequate training of lab technicians has been blamed for the poor laboratory service in PHC (George, 2011). The question then arises; are the training programmes in the various institutions of training of these cadres of health care workers capable of producing transformative learning among students trained in these training institutions?

Purpose of the Study

The purpose of the study was to investigate the transformative learning potentials of different cadres of trainee health personnel in Nsukka, Enugu State, Nigeria. Specifically, this study examined the influence of experiential learning and the influence demographic characteristics of participants on transformative learning outcomes.

Research Questions

1. *Does transformative learning occur in trainee health workers in institutions of training of health workers?*
2. *How have learning experiences influenced transformative learning among students?*
3. *How do the demographic characteristics of age, gender, programme type and level of study influence the transformative learning of trainee health workers?*

Methods

Design

The descriptive survey design was used to measure the degree of transformative learning by trainee health workers. The questionnaire was used to elicit demographic information from the students, their transformative learning as well as the experiential components of their programmes. The primary analysis tools were frequencies, means, standard deviation, percentages,

ANOVA, and thematic content analyses of open-ended questions.

Data Collection

Ethical approval for the study was granted by Bishop Shanahan Hospital ethical review board. Data were collected from students in four training institutions for health workers in the area of study. The researcher made contact with the principal of each school to obtain permission for the study. Informed consents were obtained from the participants. The questionnaire was distributed and collected on the spot to avoid omission.

Participants

The study population consisted of all trainee health workers in health training institutions in Nsukka. The total size of the population was 647 students (Students' class registers for 2017 academic session). A sample of 245 students was drawn from the five health workers' training institutions in Nsukka using the stratified random sampling technique. The stratification was done based on gender, age, level of education and course of study. A random sample proportionate to a stratum's size was taken from each stratum. The demographic characteristics of the respondents are shown in Table 1.

Table 1. Demographic characteristics of respondents

Variables	Frequency	Valid %
<i>Gender</i>		
Male	18	7.3
Female	227	92.7
Total	245	100
<i>Level of education</i>		
Year 1	102	41.6
Year 2	78	31.8
Year 3	65	26.5
Total	245	100
<i>Age in years</i>		
Less than 20	64	26.3
21-30	164	67.5
31-40	15	6.2
Total	243	100
<i>Course of study</i>		
Nursing	19	7.8
Midwifery	30	12.2
JCHEW	52	21.2
CHEW	72	29.4
Lab Technology	72	29.4
Total	245	100



Instrument

The instrument used in this study consisted of a fixed-choice and open-ended response format questionnaire. The questionnaire contained three sections. Section one was used to collect the respondents' demographic information. Section two consist of twelve items on transformative learning adapted from Strange and Gibson (2017) test of transformative learning as shown in Table 2. In order to assess whether transformative learning has occurred, Brock (2010) noted that it is important to question the learners about any change which they may have experienced in their beliefs or values. The response options for items in this section were dichotomous (yes = 1 or no = 0). Section three measured program information and experiential learning (see Table 3). The open-ended questions addressed the students' transformative learning experiences and their experiential learning. The open-ended questions consist of the following questions: 1) During your study in this school did you experience a situation that changed your beliefs or values about patient care? Please explain. 2) Do you think your study in this institution changed your expectations of health care in life? Please explain. 3) What was the most important thing you learned about health, illness and health care? 4) What did you learn about yourself? Please explain. 5) In what ways do you feel the program impacted your life? Please explain. 6) How long is your programme? 6) Do you feel that the length of your program is adequate to meet your goals? Please explain. 7) Did the components in your program impact your learning? How? 8) Are there any program components that were excluded that you feel would have been beneficial?

The reliability of the instrument was established by pre-testing the instrument on 20 trainee health workers in Enugu east senatorial zone who share the same characteristics with the population but are not part of the study. Section two of the instrument yielded a relatively high Cronbach's alpha of $\alpha = .80$. Two instructors from each school served as research assistants. Copies of the questionnaire were distributed to trainee health workers in the selected health training schools and the completed copies of the questionnaire were collected on the spot.

Data Analysis

Data were analyzed using IBM SPSS (Statistical Package for the Social Sciences Version 21.0). Frequencies and percentages were generated for all the variables. Homogeneity of variance was verified using the

Levene's test of homogeneity of variance. The significance of the Levene's test suggested equal variance for the four variables; gender, level of education, age, and course of study (See Table 4). ANOVA was therefore used to analyze differences in transformative learning experiences on all the four variables. Items not responded to by some respondents were treated as missing data and were excluded from the analysis. Thus, some analyses were conducted with smaller sample sizes

Open-ended questions.

The open-ended responses were analyzed to provide an in-depth evaluation of the students' experiences and transformative learning while in their training programme. Thematic analyses of the responses were done. The responses were transferred into a word file and printed out. The printout responses were reviewed and coded to identify initial categories. The open-ended questions were used as a framework for categorizing codes related to each research question. The initial set of codes were expanded and refined to better reflect the common elements that existed across the full data set. Patton (2002) asserted that this iterative style of analysis is a recognized characteristic of the qualitative research method. Patterns were identified inductively by analyzing codes associated with research questions. Further coding refinement occurred when all the codes associated with a particular open-ended question were examined for convergence. The qualitative content analysis was then used to identify themes across the codes. Examination of the response patterns across the data sets ultimately led to the emergence and identification of themes. The data for transformative learning (research question one) and experiential learning (research question two) were organized as separate data sets. Response patterns were used to complement qualitative data on each research question.

Results

The responses of the students to the transformative learning questions are contained in Table 2. "I had an experience that caused me to question my ideas about health and illness behavior and health care received the highest positive responses," 94.7% participants responded yes. Students' responses to the open-ended questions covered the following themes; better understanding of health, illness and health care; values and beliefs about patients' health care and patient's right; and expectations of healthcare roles. Changes occur



Table 2. Students' Responses to Transformative Learning Questions

	Yes		No	
	f	%	f	%
While in this training, I have had an experience that caused me to question the way I normally act.	209	86.7	32	13.3
I had an experience that caused me to question my ideas about health and illness behavior and health care.	232	94.7	13	5.3
As I questioned my ideas, I realized I still agreed with my previous beliefs or role expectations.	108	44.4	135	55.6
As I questioned my ideas, I realized I no longer agreed with my beliefs or role expectations.	130	53.7	112	46.3
I realized that other students also questioned their beliefs.	204	84.0	39	16.0
I thought about acting in a different way from my usual beliefs and roles.	185	75.4	54	22.6
I felt uncomfortable with traditional social expectations.	175	72.0	68	28.0
I tried out new roles so that I would become more comfortable or confident in them.	217	88.9	27	11.1
I tried to figure out a way to adopt these new ways of acting.	217	88.6	28	11.4
I gathered the information I needed to adopt these new ways of acting.	216	88.5	28	11.5
I began to think about reactions and feedback from my new behavior.	205	84.4	38	15.6
I took action and adopted these new ways of acting.	200	82.4	43	17.6

with respect to understanding health, illness and health care. Some students (18 %) expressed that they now realize that health and illness is a continuum and as such health status is not static. A better understanding of disease causation and treatment were also expressed by 47 % of the students. Thirty nine students (16 %) simply answered 'yes' to the question, "During your study in this school did you experience a situation that changed your beliefs or values about patient care?" but did not provide any explanation while seven students (3 %) of the students simply answered 'no' to the question without any explanation. Myths about disease causation and treatment were dropped in 18 % of the students, for instance a second-year JCHEW student stated "before I came into the school, I use to think that stroke can only be caused by evil people not knowing that sickness like high blood pressure can cause it." Thirty-six percent of the students reported that changes occurred in their values and beliefs about patients' health care and patient's rights. For instance,

one student midwife said "I realized that drugs weren't all that the patients needed most times but tender loving care." With respect to patients' rights, a third-year nursing student has this to say "Initially I felt patients have no choice than to abide by the nurses' opinion always but I have come to know that patients also have rights too." Again, a CHEW student stated "...I was thinking that a patient that is under your care should follow all your commands but it is not so." Changes in expectation of healthcare roles were reported by twelve percent of the students. One student midwife said "I think I expected so much from providers (health providers) but now I realize that they are just humans capable of doing what they can at a time."

The second research question asks how learning experiences influenced transformative learning among students. Table 3 provides the data on the learning components that the students experienced in their programmes.



Table 3. Learning components experienced by students

S/N	Learning component	f	%
a.	Essays	164	66.9
b.	Formal quizzes	112	45.7
c.	Field quizzes	65	26.5
d.	Mutiple choice	126	51.4
e.	Short answer exams	72	29.4
f.	Essay exams	163	66.5
g.	Open-book exams	29	11.8
h.	Debates	69	28.2
i.	Group projects	157	64.1
j.	Student led discussions	202	82.4
k.	Field lectures	105	42.9
l.	Field trips	58	23.7
m.	Presentations	200	81.6
n.	Others (specify)	14	5

The students were asked to tick from a list of learning components the ones they experienced during their training programme. The component that received the highest identification was the student-led class discussion (82.4%), followed by the presentation (81.6%) and experiments (71%). Only fewer than half of the students identified the open book exams (11.8%), field trips (23.7%), short answer tests (29.4%), debates (28.2%), field lectures (42.9%) and formal quizzes (45.7%) as learning components in their programme. Fourteen students specified other components such as demonstrations, and ward/clinical postings. The students were also asked to comment on how the components available to their programmes impacted their learning. Their responses to this question fall under the following themes: boldness in communication, increase in understanding, acquisition of practical skills. About half of the students (48%) commented that student-led discussions, presentations and practical experiences in the health centres impacted them the most. One final year nursing student stated *"presentations have made me bold and confident to speak out."* A first-year Community Health Extension Worker has this to say *"group discussion improve student ability ... and make you remember all that the lecturer has taught."* A second-year Junior Community Health Extension Worker believed field trip impacted her the most. She said *"I learnt how to conduct delivery and give injections in my field trip."* A second-year male student lab technician said *"they (presentations and student-led discussions) enabled me to conquer stage fright."* One midwifery student had a contrary view, she said *"I don't really like group things, - discussions and presentations, but I discover that*

group discussions help to cover more (referring to class work)."

In order to expand on the experiential aspects, students were also asked, "Are there any program components that were excluded that you feel would have been beneficial?" Ten students made suggestions that include: use of social media for students' interaction on the topics taught, inclusion of debates to sharpen understanding, and on-the-job supervisions to enhance skill acquisition.

There were no significant influence of gender, level of study, age and course of study on transformative learning at .05 level of significance (Table 4).

Discussion

The result of this study showed that transformative learning does occur in health professionals' study programme (research question one). Items one (While in this training, I have had an experience that caused me to question the way I normally act. 86.7%) and two (I had an experience that caused me to question my ideas about health and illness behavior and health care. 94.7%) were experienced by majority of trainee health workers. Hence their training programmes were able to engender critical reflections in the students that made them aware of their wrong assumptions and beliefs about health and illness thereby producing what Mezirow (1991) defined as perspective transformation. Mezirow (1991) identified 10 phases of perspective transformation beginning with a "disorienting dilemma" and culminating in "a reintegration into one's life on the basis of conditions directed by one's new perspective". Eighty-two point four percent of the students in this study actually took actions and adopted new ways of acting. Students' responses to open-ended questions showed that much of the changes occurred in their understanding of the causation and treatment of diseases. Students acquired new knowledge which made them drop myths and fallacies about disease causation and treatment. Belief systems were also transformed. Many of the students also expressed a change in their expectation of healthcare roles. This finding is consistent with results of similar studies among health workers that have shown different degrees of transformation among health workers with appropriate learning/teaching methods (Altobelli, 2017; Renigere, 2014). It is however important to note that true transformation takes place only when learners are able to actively take steps that acknowledge their new belief (Mezirow, 1997). The study period of three years



Table 4. The influence of the demographic characteristics of gender, level of study, age and course of study on transformative learning (ANOVA)

Variables	Group statistics			Levene's Test	ANOVA	
	N	Mean	SD	P	F	P
Gender				.309		
Male	18	9.67	1.46			
Female	227	9.40	1.90			
Variance between groups					.337	.562
Level of study				.341		
First year	103	9.45	1.90			
Second year	78	9.38	2.05			
Third year	65	9.42	1.60			
Variance between groups					.028	.972
Age in years				.907		
Less than 20	64	9.60	2.13			
21 - 30	164	9.38	1.75			
31 and above	15	9.33	1.88			
40 and above	2	8.50	.71			
Variance between groups					.330	.719
Course of study				.301		
Nursing	19	9.21	1.69			
Midwifery	30	9.73	1.39			
JCHEW	52	9.57	2.42			
CHEW	72	9.15	1.79			
Lab Technology	72	9.50	1.70			
Variance Between groups					.762	.551

may therefore not be enough for transformation to take place.

Worthy of note is the fact that some students have no evidence of having actually experienced a transformation of their worldview and habits. Although the idea of transformation as a major, fundamental change, as opposed to minor, marginal, or incremental change, is widely agreed upon in both research and policy (Kapoor 2007; O'Brien, 2012), there is little consensus regarding the features that make change in human-environment systems "transformational," and different from "non-transformational" shifts. In fact, as some have noted (Berkhout 2013; ISSC and UNESCO, 2013; Mustelin & Handmer 2013), the wider conceptual bases of transformation, notions of its forms, and processes have been the subject of debate. A logical question for trainee health workers educators therefore should be, "What can I do to bring a student into the realm of transformation?" Redefining the experience can make the educators to start thinking of starting the process of change and ramping it up to transformation.

The greater the difference between what came before and what took its place, the closer the individual move toward transformation (Burrus, 2017).

Moving from change to transformation may come from a simple question such as: "How can I offer my students the ability to do what they would want to do if only they knew it was possible?" In other words, rather than merely changing or even improving something, what utterly new service would health workers provide if they were aware of it and what it could do for their clients and the health system? Rather than looking to change something Burrus (2017), advocated that individuals should aim for transformation from the onset.

It is, however, worrisome that health care workers' training programmes are capable of producing transformation yet the quality of care rendered by practicing health care workers in Nigeria has been described by many as very deplorable (Ephraim-Emmanuel, Adigwe, Oyghe, & Ogaji 2018). The reason for this may be found in the assertion made by Mosadeghrad (2014) that factors such as the patient cooperation; leadership and



management styles in health facilities; collaboration; available referral system; job satisfaction of the health care providers are also necessary for improved quality of health care. Addressing the training programmes of health workers alone may not produce the needed result, but rather engaging in a comprehensive restructuring of health system as a whole to improve the health care delivery. Practices such as, discriminatory behaviour and attitudes toward patients with certain forms of diseases by health workers (Reis et al., 2005) should stop.

The findings of this study have shown that trainee health workers learning experiences had influenced transformative learning in different ways (research question two). Learning experiences such as student-led discussions, presentations and practical experiences influenced students the most leading to boldness in presenting their own view and increases in understanding and acquisition of skills. White and Nitkin (2014) observed that for transformative learning to occur, learners need to be actively engaged with experiential learning. Therefore, using appropriate learning components such as student-led discussions and presentations in teaching such contents as food habits, cultural beliefs and practices, stigmatization and discrimination and other local conditions that have negatively influenced the health of individuals and communities in Nigeria (Ojua, Ishor, & Ndom, 2013; Olalekan, Akintunde, & Olatunji, 2014) in teaching trainee health workers is capable of resulting in transformative learning. The trainee health workers will themselves become positively transformed and will also be able to guide others to become equally transformed.

There were no significant influences of gender, level of study, age and course of study on transformative learning. While some previous studies found significant association between some demographic characteristics and transformative learning, some did not find such associations. For instance, Kumi-Yeboah (2014) in a similar study found that there were no significant association between gender, age group and programme of study and transformative learning experiences. Strange and Gibson (2017) also found that there was no statistical difference among program type and the summated transformative learning score. Brock, Florescu, and Teran (2012) however found only age and ethnicity to be the demographic variables to have significant relationship with transformative learning among class standing, semesters completed, age, prior education, gender, and ethnicity. Future studies re-examining the

influence of age, gender, programme type and level of study on transformative learning of trainee health workers is therefore necessary. The present study however shows that all health workers irrespective of profession, gender, age or level of study are capable of transformative learning.

In order to expand on the experiential aspects the researcher also asked "Are there any program components that were excluded that you feel would have been beneficial?" Ten students made suggestions including: use of social media for students' interaction on the topics taught, inclusion of debates to sharpen understanding, and on-the-job supervision to enhance skill acquisition.

The students' request for the use of social media as an instructional component to enable interaction on the topics to which they were exposed in the programme is not surprising. Extending the instructional component to information technology is an innovation that has great promise of success even in the training programme of health workers. Agyepong, et al. (2017) noted that information and communications technologies and social media have been and will continue to be important enablers of Africa's transformation. Frenk et al. (2010) also noted that good professional education programmes mobilise all learning channels to their full potential noting that in many professional schools, students with handheld information technology devices are able to double-check in real time the accuracy of a lecturer's presentation.

Conclusion

This study has shown that transformative learning does occur in trainee health workers in institutions of training. The trainee health workers learning experiences have also been shown to influence their transformative learning in diverse ways. Age, gender, programme type and level of study of trainee health workers had no significant influence on their transformative learning. Therefore, needed reforms in health workers services can be achieved through appropriate learning experiences tailored to enhance critical reflection and necessary adjustment in the needed areas of their services. Discussions and debates on issues pertaining to health should be encouraged in the training programme of health workers. Professional educators are key players since they are the ones that will initiate and guide the students through the desired change. The training and education of health workers should focus less on memorising and transmitting facts and more on



the promotion of the reasoning and communication skills that will enable the health worker to be an effective partner, facilitator, adviser, and advocate (Frenk et al., 2010). However, future studies re-examining the influence of age, gender, programme type and level of study on transformative learning of trainee health workers is suggested. Also, other factors such as patient cooperation; leadership and management styles in health facilities; collaboration; available referral system; job satisfaction of the health care providers should be investigated since these have been identified as capable of impacting the quality of health care (Mosadeghrad, 2014).

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Author

Evelyn N. Nwagu (evelyn.nwagu@unn.edu.ng) is a Senior Lecturer in the Department of Human Kinetics & Health Education at the University of Nigeria Nsukka, Nsukka, Enugu State, Nigeria.



The Impact of School Locale on Pupils' Competencies in Selected Subjects: Does It Matter More for Specific Regions in Ghana?

Maxwell Kwesi Nyatsikor,¹ Winston Kwame Abroampa,² & Kweku Esia-Donkoh³

Abstract

This study examined the impact of rural and urban schools on pupils' competencies in the English language and Mathematics tests. The sample comprised 16,481 Primary 3 and 14,495 Primary 6 pupils from 448 and 426 schools respectively. The schools were selected using the stratified random sampling technique and the data analysed using a multilevel modelling technique. The study found statistically significant differences in achievement between rural and urban school pupils at both the national and regional levels. Compared with urban school children, rural school children on average scored 2 and 4 marks less in primary 3 and 6 English language tests respectively. Similarly, rural school children on average earned 1 mark less in primary 3 and 6 mathematics tests. Rural school children in the Eastern Region were the most disadvantaged by scoring 6 and 8 marks less in the primary 3 and 6 English language tests respectively when compared with their urban peers. The only exception was the Northern Region where the average achievements of rural school children were higher than their urban peers. The findings suggest that it significantly mattered which part of the country a child attends school. This runs counter to the nation's educational policies and the realisation of the United Nation's Sustainable Development Goal 4. Hence, to provide quality and inclusive education for all pupils, resources for schools and communities should be equitably distributed and effectively utilised.

Keywords: School locality, Socioeconomic, Competency, Regions

Introduction

Numerous studies on school and pupils' achievement across different contexts have found significant differences between schools serving the more-advanced urban and the less-advanced rural localities (Çiftçi & Cin, 2018; Bashir, Lockheed, Ninan & Tan, 2018; Ministry of Education [MOE], 2018; United Nations Educational, Scientific and Cultural Organisation [UNESCO], 2018). Between countries, evidence from international examinations such as Trends in International Mathematics and Science Study [TIMSS] and Programme for International Student Assessment [PISA] show significant differences in the achievement of children from low- to middle-income countries and high-income countries (Mullis, Martin & Loveless, 2016; Martin, Mullis, Foy & Hooper, 2016; Meyer & Benavot, 2013). These achievement gaps are linked to the existing disparities in the social, economic, and educational resources in the nations and schools (Bashir, et al.,

2018; Martin et al., 2016; Meyer & Benavot, 2013; MOE, 2016b). Many studies suggest that the effects of the rural-urban dichotomy on academic achievement are evident from the onset of formal schooling (MOE, 2018; UNESCO, 2018; World Development Report, 2018; Hanson et al., 2011). The sustained interest in the achievement outcomes at the primary level of education is reinforced by the fact that the quality of learning at this stage is crucial to later learning proficiencies and life's opportunities (Fredriksen & Kagia, 2013; UNESCO, 2018; Bashir et al., 2018; United Nations [UN], 2015). In the Ghanaian context, evidence from the assessment of early and primary grade-levels in national assessments shows statistically significant differences in children from rural and urban schools (MOE, 2014; MOE, 2016a). Consistently, preschool and primary-level children from rural schools underachieve in national examinations when compared with children from urban schools (MOE, 2016b; MOE, 2018). This study examines the unique impact of the location of schools in rural and urban areas on the achievement levels of Ghanaian primary school children in the national

Full listing of authors and contacts can be found at the end of this article.



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education assessment tests in Mathematics and English language.

School location and pupils' academic achievement

Studies and reports across different contexts have, for the most part, concluded that pupils from urban schools achieved higher grades than those from rural schools (Destin, Hanselman, Buontempo, Tipton, Yeager, 2019; MOE, 2016a; Bashir, et al., 2018; Bofah & Hannula, 2015). Some studies have suggested the differences in the social-economic characteristics of children from rural and urban schools as the main driver of the existing achievement gaps (Ryan, Koczberski, Curry & Germis, 2017; Broer, Bai & Fonseca, 2019). Parents of rural school children are generally unable to provide the educational needs for their children because of poverty. This constraint negatively affects the academic potentials of the child as evidenced by prior studies (Bofah & Hannula, 2017; Bofah & Hannula, 2015). Thus, children from economically disadvantaged households are typically educationally disadvantaged right from the onset of their formal education (Bashir et al., 2018; Kim, Cho & Kim, 2019; Organization for Economic Co-operation and Development [OECD], 2016). Moreover, available data from Ghana suggest that many of the rural dwelling parents are semi-literate, hence, unable to assist their children in school or academic-related tasks (Ghana Statistical Service [GSS], 2014). For instance, 33.1% of the population who had never attended school live in rural areas in contrast to 14.2% in the urban areas (GSS, 2012).

Other studies have suggested that urban schools outperform their rural counterparts because they tend to have higher expectations and are more likely to have parents who participate in school activities (Adeyemi, Adediran & Adewole, 2018; Prasertcharoensuk & Tapkhwa, 2016). The achievement gaps between rural and urban schools have also been linked to the differences in the professional characteristics of teachers serving in rural and urban schools (Nyatsikor, Sosu, Mtika & Robson, 2020; Hill, Charalambous & Chin, 2019; Bhai & Horoi, 2019). Urban schools are often staffed with teachers who are more experienced and possess higher academic and professional qualifications than teachers in rural schools (MOE, 2018; Bashir et al., 2018). Even though there is a plethora of research showing significant differences in achievement between urban and rural schools, in some cases no significant differences were found. For instance, Considine and Zappala (2002) found that geographical location does not

significantly predict outcomes in school performance in Australia. This is because school children in rural Australia have access to an adequate number of educational facilities. Nonetheless, similar studies from equally developed nations, particularly the USA, reveal stark achievement differences between rural and urban communities (Cochran-Smith & Zeichner, 2005; Owens, 2018; Reardon, 2011; Reardon et al., 2019). Though the focus on rural and urban school achievement has caught the attention of researchers and policymakers for decades, this current study extends prior studies by investigating the impact of school location on academic achievement in a methodologically different way. First, an estimation of the unique influence of school location on achievement was done, and secondly, the actual numbers of pupils who achieved or failed to achieve certain levels of competencies using the derived estimates attributed to school location were determined. To achieve this purpose, the following research questions were formulated to guide the study.

Research Questions

1. *To what extent do the inequalities in rural and urban schools account for pupils' achievement in English language and mathematics?*
2. *How much of the variance in pupils' achievement can be attributed to schools in different localities of a geographical region?*

Context of the Study

This study relied on the 2013 wave of the Ghana National Education Assessment [GNEA] data. The GNEA started in 2005 and it is held biennially by the RTI International and the USAID in collaboration with the Ghana Education Service. The purpose of the assessment is to assess primary 3 (in 2016 primary 4 pupils examined) and primary 6 pupils' competence in mathematics and the English language subjects (MOE, 2014; MOE, 2016a). The primary 3 (P3) and 6 (P6) pupils were assessed and scored over a 30-item and 40-item test respectively. Pupils' achievement was assessed at three levels but different cut-off points for the two grade-levels. For the P3 mathematics and English language tests, pupils who answered a maximum of 10 items correctly (i.e. below 35%) performed "below minimum competency". Pupils who correctly answered a minimum of 11 and a maximum of 16 items (i.e. 35% - 54%) attained "minimum competency" while those who correctly answered at least 17 items or better (i.e. $\geq 55\%$) were "competent". In the case of the P6 sample,



Table 1: Performance levels of P3 and P6 pupils by subject and grade

Competency level	Score range (marks)		Subject and Percentage Score							
			P 3				P 6			
	P3	P6	English Language		Mathematics		English Language		Mathematics	
			Number	%	Number	%	Number	%	Number	%
Below minimum competency	0-10	0-13	7,555	41.9 [45.8] ¹	7,558	42.9 [45.9] ¹	4,885	31.3 [33.7] ¹	5,874	39.1 [40.5] ¹
Minimum competency	11-16	14-21	4,837	29.7 [29.4] ¹	5,680	35.0 [34.4] ¹	4,378	29.7 [30.2] ¹	7,117	50.0 [49.1] ¹
Competency	17-30	22-40	4,089	28.4 [24.8] ¹	3,243	22.1 [19.7] ¹	5,232	39.0 [36.1] ¹	1,504	10.9 [10.4] ¹
Total			16,481	100	16,481	100	14,495	100	14,495	100

¹equivalent percentage performance distribution after excluding unclassified localities and class sizes less than 10.

Source: Ghana 2013 National Education Assessment Technical Report, p. x.

pupils who correctly answered up to 13 items (i.e. below 35%) performed “below minimum competency”. Pupils who had 14 up to 21 marks (i.e. 35% - 54%) attained “minimum competency” while those who correctly answered at least 22 items or better (i.e. $\geq 55\%$) were “competent” in a subject (see Table 1 for performance distribution by subject and grade-levels).

The data in Table 2 show considerable differences in the achievement of rural and urban pupils in both subjects at the two grade-levels. The percentage of children from urban schools who were competent in both subjects for the two grade-levels was higher than those from rural schools. On the other hand, the percentage distributions of the performances below minimum competency were higher for pupils from the rural schools for both subjects and grade-levels. The percentage distributions of performance levels show significant connections between school locality and achievement. However, it is impossible to determine the unique effect of school location on the performance of pupils. This is because the influence of the location of schools on achievement is confounded by other factors including the characteristics of the pupils (e.g. age and gender), schools (e.g. type and class size), and districts (e.g. resource levels).

Methodology

Design, Sample, and Sampling

The study employed descriptive cross-sectional survey design. The study population comprised of primary school pupils from all the 10 regions in Ghana (currently there are 16 regions following the re-demarcation of 4 regions). The target population was the P3 and P6 pupils. The P3 sample size was 16,481 pupils [equivalent weighted sample = 93,008] from 448 schools [equivalent weighted sample = 12,734]. The P6 sample

Table 2: Performance levels of P3 and P6 pupils by school location

Competency level	Subject and Percentage Score	
	School Location	
	Urban	Rural
P3 English language (%)		
Below minimum competency	29.6 [29.2] ¹	49.0 [52.0] ¹
Minimum competency	26.7 [26.6] ¹	30.6 [30.4] ¹
Competency	43.7 [44.2] ¹	20.5 [17.6] ¹
P3 Mathematics (%)		
Below minimum competency	33.0 [32.3] ¹	48.7 [50.9] ¹
Minimum competency	34.0 [34.2] ¹	34.8 [34.6] ¹
Competency	33.0 [33.5] ¹	16.5 [14.5] ¹
P6 English language (%)		
Below minimum competency	17.8 [16.1] ¹	39.4 [41.3] ¹
Minimum competency	23.1 [22.2] ¹	33.6 [33.7] ¹
Competency	59.2 [61.7] ¹	27.1 [25.0] ¹
P6 Mathematics (%)		
Below minimum competency	27.7 [25.5] ¹	46.1 [47.0] ¹
Minimum competency	54.5 [55.7] ¹	46.6 [46.2] ¹
Competency	17.7 [18.8] ¹	7.3 [6.8] ¹

¹equivalent percentage performance distribution after excluding unclassified localities and class size less than 10.

Source: Ghana 2013 National Education Assessment Technical Report, p. xi.

comprised 14,495 pupils [equivalent weighted sample = 81,319] from 426 [equivalent weighted sample = 12,393]. The weighted school values are derived by dividing the total number of primary schools (which had a class size of at least ten pupils) in a region by the number of sampled schools from that region. For example, there were 1,821 primary 3 schools in the Eastern region out of which 55 participated in the assessment. The sample weight for schools in the Eastern region is therefore 33.11 (i.e. $1,821 \div 55 = 33.11$). Thus, each school that participated in the assessment from the



Eastern region represented 33.11 schools. The weighted pupils' sample is derived by multiplying the weighted school value for each region by the number of pupils sampled from that region. For instance, the weighted sample (57,312) for the P3 pupils from the Eastern region is derived by multiplying 33.11 by the total number of pupils (1,731) sampled from the 55 schools in the region.

Schools were selected using stratified random sampling. Schools were stratified by regions and sorted by district, locality (urban or rural), school type (public or private) and enrolment size within the regions (MOE, 2014). Schools with less than 10 pupils in the class were excluded. Randomly, 55 schools were sampled with equal probability from each region except Ashanti and Northern regions where 54 schools each were selected because a school from each of these 2 regions was not in session at the time the test was administered. According to the MOE (2014), the reliability of the test was determined using SPSS Kuder-Richardson-20 (KR20) tests. Alpha values of 0.89 and 0.84 were achieved for the P6 mathematics and English language tests respectively. Alpha values of 0.82 and 0.84 were achieved for the P3 mathematics and English language tests respectively. The test questions were developed based on the specified topics in the national curricula. The English language test questions covered listening; reading comprehension; and usage (grammatical structure) domains. The mathematics test covered four domains namely: basic operations; numbers and numerals; measurement, shape and space; and collection and handling of data. The return rate for the answered scripts was 100% (MOE, 2014).

Variables

Independent variable - The independent variable for the study is 'school location' and was designated rural (0) or urban (1). In Ghana, urban localities are those with more than 60% of its residents engaged in non-agricultural activities in addition to having a minimum population size of 5,000. Otherwise, it is not urban (GSS, 2012). Urban schools have relatively better educationally-relevant resources than rural schools in terms of quantity and quality. There are more qualified teachers and better teaching and learning resources in urban than rural schools (MoE, 2014; MoE, 2018). The availability and quality of social amenities like potable water, functional electricity, accessible roads, medical care, and internet connectivity are relatively better in urban communities when compared with rural commu-

nities (Blampied, et al, 2018; United Nations International Cultural Educational Fund [UNICEF] and Centre for Democratic Development [CDD]-Ghana, 2019). Parents of rural school children are predominantly peasant farmers who live in poverty (GSS, 2012; Blampied et al., 2018). Levels of education, incomes and employment opportunities in the rural areas are significantly low and limited compared with those living in urban areas. As a result, rurality in Ghana connotes low socioeconomic status whereas urbanicity is associated with higher socioeconomic status (GSS, 2012; MoE, 2018; Blampied et al., 2018). Hence, in this study context, rural schools are used as a proxy for low SES while urban schools are used as a proxy for high SES. According to the GSS (2012) approximately 37.0% of children from primary grade 1 to 6 live in rural areas compared with 22.2% in urban areas. In this study, 77.9% of the P3 schools were located in rural communities compared with 22.1% in urban communities while 77.7% and 22.3% of the P6 schools were in rural and urban communities respectively.

Covariates - Five variables were controlled to account for their influence on pupils' achievement. These were pupils' gender (coded; male = 0; female = 1) and age, class size, school type (coded; public = 0; private = 1) and district type (coded; deprived = 1; non-deprived = 0).

Dependent variables - The two dependent variables are mathematics and English language achievement scores for the primary 3 and 6 pupils who participated in the 2013 wave of the Ghana National Education Assessment test.

Data Screening and Management

Data were analysed using a multilevel modelling technique. Two exclusion criteria were applied to arrive at the final sample size. The first criterion was the exclusion of all schools not labelled as either rural or urban. The second criterion, which is based on statistical and methodological considerations was the exclusion of all schools which had less than 10 pupils in a class (see Hox, Moerbeek, van de Schoot, 2017; Heck & Thomas, 2015). Applying these two criteria, data on 100 P3 schools (equivalent weighted sample = 2,843) comprising 2,977 pupils (equivalent weighted sample = 80,004) and 122 P6 schools (equivalent weighted sample = 3,468) comprising 2,952 pupils (equivalent weighted sample = 79,990) from the ten regions were excluded from the analysis. All the variable codes for the dichotomous variables were grand mean centred.



Likewise, the continuous and dependent variables were grand mean centred. The grand mean centred achievement score for each pupil is the difference between a pupil's raw score and the grand mean achievement score derived from all pupils involved in the study. Grand mean centering ensured that the variances of the intercept and the slopes in the regression have a clear interpretation when all explanatory variables are equal to zero (Hox et al., 2017).

Data Analysis Procedure

The first stage of the analysis was to partition pupils' achievement as a null or intercept-only model to estimate the Intra-class Correlation Coefficient (ICC). The outcome of this partitioning helped to determine whether multilevel modelling was required to analyse the data (Hox et al., 2017; Heck & Thomas, 2015). At stage two, the five covariates (pupils' gender, age, class size, school, and district types) were introduced into the model to quantify their influence on pupils' achievement. The third and final stage of the analysis was the introduction of the independent variable (school location) into the model to estimate its unique influence on pupils' achievement. From the estimates derived, the numbers of pupils who attained specific levels of proficiencies in both subjects on merit or as a result of the inequalities between rural and urban schools are determined. The second part of the analysis examined the unique influence of the location of schools on the achievement of pupils in each of the ten regions.

Results

Descriptive Analysis

The descriptive information about the school and pupil characteristics is presented in Table 3. The samples from public schools for both grade-levels were at least 5 times more than those from private schools. Similarly, the number of rural schools was more than thrice of urban schools. The mean class size for the P3 sample was bigger for urban schools (62.7) than the rural schools (47.2). The respective class sizes for the P6 urban and rural schools were 64.8 and 43.9. The average ages for the P3 pupils from the rural and urban schools were 10.9 and 10.4 respectively. As well, the average ages for the P6 pupils from the rural and urban schools were 13.8 and 13.3 respectively. The mean mathematics and English language

achievement for the P3 pupils from rural schools was 11.2 and 11.6 while that for urban schools was 14.0 and 15.9 for Mathematics and English Language. The mean mathematics and English language achievement for the P6 pupils from rural schools was 14.3 and 16.8 while that for urban schools was 17.1 and 24.0 for Mathematics and English language. Preliminary analysis of the data using the t-test showed statistically significant (p -value = 0.000) mean differences in achievement between rural and urban schools for both subjects.

In [Supplemental Table 1](#) [use link to view table], the fixed effects estimates show that the P3 pupils who attended rural schools on average, earned 2 marks ($b = -2.085$, $\chi^2 = 16.8$, $-2LL = 21$, $df = 6$, $p = 0.000$) and 1 mark less ($b = -1.498$, $\chi^2 = 16.8$, $-2LL = 16$, $df = 6$, $p = 0.000$) in the English language and mathematics respectively when compared with those who attended urban schools. The unconditional models for the P3 sample revealed that a greater proportion of the achievement variances in the English language (54.8%) and mathematics (63.5%) remained unexplained by the number of variables investigated. School-level inequalities accounted for 29.7% and 28.4% of achievement differences in English language and mathematics respectively. District level differences also influenced achievement variances in the English language (15.5%) and mathematics (8.9%).

In [Supplemental Table 2](#), the fixed effects estimates show that the P6 pupils who attended rural schools were predicted to have attained approximately 4 marks ($b = -3.654$, $\chi^2 = 16.8$, $-2LL = 35$, $df = 6$, $p = 0.000$)

Table 3: Descriptive information about school and pupil characteristics

Variables		Total	Locality	
P 3			Rural	Urban
Sample size		16,481[93,008] ¹	73.0%	27.0%
Gender	Boys	8692	52.3%	51.6%
	Girls	7789	47.7%	48.4%
No of Schools	Public	361	75.4%	24.6%
	Private	87	59.0%	41.0%
Pupil Age ²		10.8	10.9	10.4
Class size ²		51.8	47.2	62.7
Mathematics ²		12.0	11.2	14.0
English language ²		12.7	11.6	15.9
P 6				
Sample size		14,495 [81,319] ¹	69.8(%)	30.2(%)
Gender	Boys	7,431	52.3	48.9
	Girls	7,064	47.7	51.1
No of Schools	Public	351	72.4	27.6
	Private	75	53.9	46.1
Pupil Age ²		13.6	13.8	13.3
Class size ²		50.1	43.9	64.8
Mathematics ²		15.1	14.3	17.1
English language ²		19.0	16.8	24.0

¹equivalent weighted value

² means



and 1 mark less ($b = -1.401$, $\chi^2 = 16.8$, $2LL = 17$, $df = 6$, $p = 0.000$) in the English language and mathematics tests respectively. The unconditional models for the P6 sample indicated that respectively 54.2% and 70.1% of the variances in achievement for English language and mathematics remained unexplained given the number of variables investigated. School-level differences accounted for 29.1% and 20.5% of the achievement variances in English language and mathematics respectively while district-level differences accounted for 16.7% and 9.4% of achievement variances in English language and mathematics respectively.

The next stage of the analysis was to determine the number of pupils who attained or failed to attain specific levels of competency after accounting for the existing inequalities between rural and urban schools. As an example, the estimate derived for P3 English language achievement is used to calculate the number of pupils who attained specific levels of proficiency. From the results, 2 marks are added to the initial scores obtained by each pupil. As a result, pupils who initially scored 0 to 8 mark(s) would now earn between 2 and 10 marks; a performance below minimum competence (see Table 1). Pupils who initially scored 9 and 10 marks (i.e. below minimum competence) would now earn between 11 and 12 marks to attain “minimum competency”. Next, we add 2 marks to the minimum mark (i.e. 11) for attaining minimum competency level to get 13 marks. This means all pupils who initially scored 11 to

13 marks were influenced by the existing inequalities between rural and urban schools. Those who scored 14 marks up to 16 marks attained minimum competency on merit. By the same analogy, all pupils who were competent but had between 17 up to 19 marks attained this level of achievement due to specific factors associated with the location of schools. Consequently, pupils who correctly answered a minimum of 20 out of the total 30 items in the test were those who achieved competency on merit after accounting for the impact of school location. The same procedure is used to estimate the number of pupils who attained or failed to attain specific competencies in the remaining subjects across both grade-levels as presented in Table 4.

The existing inequalities in rural and urban schools had cascading effects on pupils’ achievement at all levels of expected competencies in both subjects. Controlling for the inequalities in school localities, the results indicated that 2,873 (70.3%) out of the 4,089 and 2,256 (69.6%) out of the 3,243 pupils were meritoriously competent in P3 English language and mathematics respectively. The remaining 1,216 (29.7%) and 987 (30.4%) pupils were competent in P3 English language and mathematics respectively as gains derived from the location of the schools they attended. A total of 3,060 (63.3%) of the 4,837 and 2,424 (42.7%) of the 5,680 pupils attained minimum competency in P3 English language and mathematics respectively as a unique contribution from the location of the schools they

attended. Respectively, 1,777 (36.7%) and 3,256 (57.3%) attained minimum competency in English language and mathematics on merit. A total of 4,869 (64.4%) out of the 7,555 and 6,219 (82.3%) out of the 7,558 pupils performed below minimum competency in P3 English language and mathematics tests on merit. The remaining 2,686 (35.6%) and 1,339 (17.7%) pupils performed below minimum competency in English language and mathematics tests respectively as a result of the deficiencies associated with the location of the schools they attended.

In respect of the P6 sample, 3,339 (63.8%) out of the 5,232 and 878 (58.4%) out of the 1,504 pupils were competent in English language and mathematics respectively on

Table 4: Competency levels of students by school location

Subject/ competency level		P3		P6	
		Number of pupils	%	Number of pupils	%
English language	Competent (<i>due to inequalities</i>)	1,216	29.7	1,893	36.2
	Competent (<i>inequalities accounted for</i>)	2,873	70.3	3,339	63.8
	Minimum competency (<i>due to inequalities</i>)	3,060	63.3	3,088	70.5
	Minimum competency (<i>inequalities accounted for</i>)	1,777	36.7	1,290	29.5
	Below minimum competency (<i>due to inequalities</i>)	2,686	35.6	3,104	63.5
	Below minimum competency (<i>inequalities accounted for</i>)	4,869	64.4	1,781	36.5
Mathematics	Competent (<i>due to inequalities</i>)	987	30.4	626	41.6
	Competent (<i>inequalities accounted for</i>)	2,256	69.6	878	58.4
	Minimum competency (<i>due to inequalities</i>)	2,424	42.7	2,417	34.0
	Minimum competency (<i>inequalities accounted for</i>)	3,256	57.3	4,700	66.0
	Below minimum competency (<i>due to inequalities</i>)	1,339	17.7	1,203	20.5
	Below minimum competency (<i>inequalities accounted for</i>)	6,219	82.3	4,671	79.5



merit. The remaining 1,893 (36.2%) and 626 (41.6%) pupils achieved competency level in English language and mathematics respectively as a result of the advantages associated with the location of the schools they attended. Similarly, 3,088 (70.5%) of the 4,378 and 2,417 (34.0%) of the 7,117 pupils attained minimum competency in English language and mathematics respectively as an influence from the location of the schools they attended. Precisely, 1,290 (29.5%) and 4,700 (66.0%) pupils attained minimum competency in English language and mathematics on merit. Likewise, 1,781 (36.5%) of the 4,885 and 4,671 (79.5%) of the 5,874 P6 pupils performed below minimum competency in English language and mathematics respectively on merit. The remaining 3,104 (63.5%) and 1,203 (20.5%) of the P6 pupils performed below minimum competency in English language and mathematics respectively as a result of the deficits associated with the location of the schools they attended.

The second objective of the study was to determine the extent of the influence of school location on pupil's achievement in each of the regions. The results for both subjects and grade-levels are presented in Supplemental Tables 3-6. In [Supplemental Table 3](#), the fixed effects estimates show that the impact of the rural schools on the P3 English language achievement for the Ashante ($b = -1.004$), Upper West ($b = -1.484$), Upper East ($b = -1.968$) and Western ($b = -.254$) regions were less than the national average of 2 marks ($b = -2.085$). The impact for Brong Ahafo ($b = -2.893$), Eastern ($b = -6.477$), Greater Accra ($b = -3.846$), Northern ($b = 3.038$), Central ($b = -2.093$), and Volta ($b = -2.355$) regions were greater than the national average.

With respect to the P3 mathematics achievement, the fixed effects estimates in [Supplemental Table 4](#) show that the Ashante ($b = -.348$), Volta ($b = -.968$), Upper East ($b = -1.191$) and Western ($b = -.481$) regions had average values less than the national average of 1 mark ($b = -1.498$). The remaining regions including Brong Ahafo ($b = -2.259$), Central ($b = -1.838$), Eastern ($b = -5.486$), Greater Accra ($b = -2.908$), Northern ($b = 2.219$), and Upper East ($b = -2.279$) had greater average values than that of the nation.

In respect of the P6 English language achievement the fixed effects estimates in [Supplemental Table 5](#) show that the Ashante ($b = -1.376$), Greater Accra ($b = -2.769$), Northern ($b = .963$), Upper East ($b = -2.970$) and Western ($b = -.989$) regions recorded less average impact than the national average of 4 marks ($b = -3.654$). The Central ($b = -4.544$), Eastern ($b = -8.038$)

and Upper West ($b = -5.952$), Brong Ahafo ($b = -4.474$), and Volta ($b = -4.112$) regions had greater mean values than the national average.

In [Supplemental Table 6](#), the fixed effects estimates show that the estimates for Brong Ahafo ($b = -1.962$), Central ($b = -2.321$), Eastern ($b = -3.534$), Upper West ($b = -2.335$), Volta ($b = -2.623$) were greater than the national average for P6 mathematics ($b = -1.401$). The Ashante ($b = -.243$), Greater Accra ($b = -.220$), Northern ($b = .270$) and Western ($b = .130$) and Upper East ($b = -1.036$) regions recorded lesser impact than the national average. Consistently across grade-levels and subjects, rural schools contributed negatively to pupils' achievement except for the Northern and Western (P6 mathematics achievement only) regions where the average achievement of rural schools was higher than urban schools. The Eastern and Western regions respectively came up as the regions with the most and least variances in achievement attributed to inequalities in rural and urban schools in Ghana. The implications of the results are discussed in the next section.

Discussion of Results

The unconditional models for both grade-levels and subjects indicated significant differences between school and district-level achievements. For the P3 sample, three of the covariates (i.e. pupils' age, district type, and school type) contributed significantly to achievement in both subjects (see [Supplemental Table 1](#)). The average achievement for relatively younger pupils was higher than older pupils while schools in deprived districts performed poorer compared with those in non-deprived districts. The types of schools pupils attend had the greatest impact on achievement. Children from private schools significantly outperformed those from public schools. Gender was significant only for mathematics achievement where boys did better than girls. There was no significant difference in achievement between genders with respect to the English language. The impact of class size on achievement in both subjects was not statistically significant.

For the P6 sample, all the five variables that were controlled made statistically significant impacts on pupils' achievement in both subjects. Children from private schools outperformed their counterparts from public schools, boys performed better than girls while relatively younger children outperformed the relatively older peers. Moreover, children from deprived schools performed poorer than those from non-deprived schools. Relatively smaller class sizes were not



associated with improvement in achievement. The specific degrees of impact for each of the covariates are presented in [Supplemental Table 2](#).

The advantages and disadvantages associated with the location of schools in specific communities produced corresponding gains and deficits in pupils' achievement. The results suggested that if conditions and educational resources in rural schools were improved by 1 unit, 2,686, and 1,339 more pupils would have at least attained minimum competency in the P3 English language and mathematics tests respectively. In same vein, 3,104(63.5%) and 1,203(20.5%) more of the P6 pupils would have at least attained minimum competency in English language and mathematics respectively had they attended schools in urban localities. The advantage of attending schools in certain parts of the country is evidenced by the 1,216(29.7%) and 1,893(36.2%) pupils who were predicted to be competent in the P3 and P6 English language tests respectively solely by attending urban schools. Likewise, 987(30.4%) and 626(41.6%) pupils were competent in P3 and P6 mathematics solely by attending urban schools. The results suggest that pupils from rural schools achieved less than their peers from urban schools as a result of certain unfavourable conditions associated with attending schools in rural localities.

The advantages and disadvantages inherent with urban and rural schools have been explored in many contexts (MOE, 2016a; Bashir, et al. 2018; Çiftçi & Cin, 2018; Cochran-Smith et al., 2012). Unanimously, these studies found that pupils from urban schools achieved higher grades than those from rural schools. Rural and urban communities serve as different psychological environments for children who share different resources, hazards, and opportunity structures. They may also have different life course options, and patterns of social interactions unique to the school catchment area (Bronfenbrenner, 2005; Tudge, Mokrova, Hatfield & Karnik, 2009). As aptly observed by Rogošić and Baranović (2016), the differences in educational success can be attributed to different levels of existing social capital, which is produced in networks and connections of families that the school serves. A significant number of the rural schools in Ghana are disproportionately located in districts deprived of basic social amenities (e.g. electricity, internet), educational resources (e.g. less qualified teachers, teaching and learning materials), and economic opportunities to provide regular incomes for parents. Parents of rural school pupils are primarily peasant farmers and are characterised by high levels

of poverty and illiteracy (GSS, 2015). These constraints significantly affect schools, parents and community-wide abilities to support the pro-academic activities of rural school children.

The current Covid-19 pandemic with its concomitant negative effects on education has further exacerbated the woes of the largely rural communities and schools in Ghana. Children in rural schools are unable to participate in the various remote digital learning initiatives rolled out by the Ghana Education Service. For the most part, internet connectivity is poor in rural communities and, where connectivity is possible parents are unable to afford data for internet use. Unlike urban communities, some rural communities do not have electricity to benefit from the government's strategy of teaching children via national television stations. The differing opportunities for children living in different parts of the country contribute to the widening of the achievement gaps (Nyatsikor et al., 2020; MOE, 2016b).

The second research question explored the impact of school location on the achievement of pupils within specific regions and the results reveal two important educational concerns. First, rural schools in the Northern and Western (for P6 mathematics achievement only) regions positively contributed to achievement in contrast with extant literature which suggests otherwise (Bashir et al., 2018; MOE, 2018). Like the rural localities, many of the urban localities in the Northern Region are equally deprived of basic social, economic and educational amenities that support effective teaching and learning (Blampied et al., 2018; MOE, 2018; UNICEF and CDD-Ghana, 2016). As a result, school locale becomes inconsequential since school children experience similar challenges and opportunities. Though this deprivation is prevalent in many parts of the country, available data suggest it is acute in the Northern region (MOE, 2016a; MOE, 2018, UNICEF and CDD-Ghana, 2016). Thus, the communities in which children attend schools serve as achievement opportunities and in the case of the Northern region, these opportunities are significantly similar for all schools regardless of their status as rural or urban.

In sharp contrast to the Northern region, there was a strikingly wide gap in achievement by pupils from rural and urban schools in the Eastern region, particularly for English language achievement. Consistently, rural children from the Eastern region were significantly disadvantaged. The persistent underachievement of rural schools (except for the Northern region) suggests



inherent handicapping conditions associated with rural schools which create a “deficit model” for children’s inability to receive superior education (Fan & Chen, 2001; Hornby & Lafaele, 2011). The significant gaps in pupils’ achievement linked to school location may confirm the existence of extreme differences in the characteristics of the factors (e.g. socio-economic and educational resources) affecting school attainment in this part of the country. From the study results, it can be concluded that a major part of the generally low academic achievement among primary school children in Ghana is the uneven resources available to rural and urban schools as well as their socioeconomic backgrounds.

Conclusion

The study investigated the impact of school location on primary grades 3 and 6 pupils’ academic achievement and found significant differences in achievement attributable to existing inequalities in rural and urban schools. Rural schools are deficient in many resources needed to facilitate effective teaching and learning leading to improved outcomes. Rural schoolchildren are characterised by high levels of poverty (low SES) relative to their urban counterparts (high SES). The cumulative impact of the disparities in social, economic and educational resources and opportunities for schools and communities is the achievement gaps between rural and urban school children.

The results for the Northern region call for a more comprehensive and robust investigation including the assessment of the threshold of indicators (e.g. economic, social, educational, and infrastructural resources) used to classify localities into rural and urban. The gaps in the achievement due to the location of schools in different parts of the country appear to suggest that children’s present and possibly future educational fortunes depend on which part of the country they live in. This may be a testament to suggest that Ghana may not be achieving the goal of providing an equitable and inclusive education for all children as required by the country’s educational policy and international goals (United Nations, 2015; MOE, 2015). With approximately 37.0% of primary school level children living in rural areas compared with 22.2% in urban areas (GSS, 2012), it presupposes that more children in rural communities may continue to record low achievements in selected school subjects if the disadvantages associated with attending rural schools are not addressed.

Ghana may therefore need to invest more resources per pupil to bridge the achievement gap between the

rural and urban primary school children. It is imperative to suggest that any attempt aimed at closing the rural and urban achievement gaps must not gloss over the more fundamental preschool level. Many studies have found statistically significant connections between the quality of preschools and primary school achievement (Bakken, Brown & Downing, 2017; OECD, 2017).

Implications of the Study

The findings from the study have enduring implications for all stakeholders in education. Some rural school children failed to be competent, attained minimum competency or performed below minimum competency in both subjects because of the inequalities between rural and urban schools. Data from the Ghana Statistical Service provides evidence of the significant differences between the socioeconomic and educational resources and opportunities for urban and rural dwellers. As developing country, majority of the population in the country are characterised by high levels of poverty. However, rural schools and children experience more disadvantages (e.g. educational and economic) and live in higher levels of poverty than their urban counterparts. It is incumbent on stakeholders, therefore, to ensure that the existing disparities between rural and urban parts of the country are bridged to close the achievement gaps between rural and urban school children.

Limitations of the Study

This study examined the influence of school location on primary level achievement in Mathematics and English language subjects and found significant achievement gaps between rural and urban schools. However, the unavailability of certain data to account for (e.g. pupils’ prior achievement, teacher effect, school attendance history, household wealth, and parental support and community resources) may have over- or under-estimated the effects attributed to school location.

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Authors

¹ **Maxwell Kwesi Nyatsikor** (mnyatsikor@uds.edu.gh) is a Lecturer in the Faculty of Education at the University for Developmental Studies, Tamale, Ghana.

² **Winston Kwame Abroampa** (wkabroampa@knust.edu.gh) is a Senior Lecturer in the Faculty of Educational Studies at Kwame Nkrumah University for Science and Technology, Kumasi, Ghana.

³ **Kweku Esia-Donkoh** (ke_donkoh@yahoo.com) is a Senior Lecturer in the Faculty of Educational Studies at University of Education, Winneba, Ghana.



Supplementary Materials

Supplemental Table 1: Fixed effect estimates for P3 sample

Variables /subject	English language			Mathematics		
	Model 0 Null model	Model 1 Covariates	Model 2 Predictor variable	Model 0 Null model	Model 1 Covariates	Model 2 Predictor variable
	Coeff. (SE)	Coeff. (SE)	Coeff. (SE)	Coeff. (SE)	Coeff. (SE)	Coeff. (SE)
Intercept	-.331 (.273)	3.825 (.501)	5.648 (.610)	-.134 (.201)	2.753 (.414)	4.038 (.504)
Controlled variables						
Pupil (male)		.029 (.073)	.029 (.073)		.226 (.068)***	.226 (.068)***
Pupil (age)		-.156 (.023)***	-.156 (.023)***		.073 (.022)***	.086 (.022)***
Class size		.015 (.006)*	.010 (.006)		-.004 (.006)	.003 (.006)
Deprived type		-1.289 (.423)**	.894 (.404)*		.973 (.326)**	.669 (.317)*
Public School		-5.787 (.391)***	-5.722 (.385)***		-4.266 (.341)***	-4.193 (.336)***
Predictor variable						
School location (Rural school)			-2.085 (.441)***			-1.498 (.367)***
Variance component						
Pupil (%)	54.8	67.2	68.9	63.5	72.0	73.0
School (%)	29.7	23.8	24.2	27.6	23.7	23.8
District (%)	15.5	9.0	6.9	8.9	4.3	3.2
-2LL (deviance)	98083	97168	97147	95670	94850	94834
Change in deviance (-2LL)	-	915	21	-	820	16
X ² (.01)	-	15.09	16.81	-	15.09	16.81
df	-	5	6	-	5	6
p-value	-	***	*	-	**	***

Note: *** p<.0001; **p<.01; *p<.05. Coeff = coefficient; SE=standard error

Supplemental Table 2: Fixed effect estimates for P6 sample

Variable / subject	English language			Mathematics		
	Model 0 Null model	Model 1 Covariates	Model 2 Predictor variable	Model 0 Null model	Model 1 Covariates	Model 2 Predictor variable
	Coeff. (SE)	Coeff. (SE)	Coeff. (SE)	Coeff. (SE)	Coeff. (SE)	Coeff. (SE)
Intercept	-1.293 (.373)	3.109 (.721)	6.281 (.857)	-.449 (.180)	.994 (.387)	2.200 (.473)
Controlled variables						
Pupil (male)		.705 (.100)***	.704 (.100)***		.818 (.069)***	.819 (.069)***
Pupils age		-.671 (.037)***	-.670 (.037)***		-.258 (.025)***	-.258 (.025)***
Class size		.052 (.009)***	.040 (.009)***		.205 (.005)***	.016 (.005)***
Public school		-6.346 (.551)	-6.257 (.532)***		-2.655 (.305)	-2.611 (.300)***
Deprived district		-2.156 (.599)***	-1.450 (.569)*		-1.046 (.310)***	-.759 (.308)*
Predictor variable						
Rural school			-3.654 (.606)***			-1.401 (.335)***
Variance component						
Pupil (%)	54.2	65.0	67.4	70.1	76.2	77.2
School (%)	29.1	24.5	24.0	20.5	17.9	17.5
District (%)	16.7	10.5	8.6	9.4	5.9	5.3
-2LL (deviance)	94041	93344	93309	82956	82466	82449
Change in deviance (-2LL)	-	697	35	-	490	17
X ² (.01)	-	15.09	16.81	-	15.09	16.81
df	-	5	6	-	5	6
p-value	-	***	*	-	**	***

Note: *** p<.0001; **p<.01; *p<.05. Coeff = coefficient; SE=standard error



Supplementary Materials

Supplemental Table 3: Regional level achievement for P3 English Language

Region/ Variable	<i>Ashante</i>	<i>Brong Ahafo</i>	<i>Central</i>	<i>Eastern</i>	<i>Greater Accra</i>	<i>Northern</i>	<i>Upper East</i>	<i>Upper West</i>	<i>Volta</i>	<i>Western</i>
	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>
Intercept	6.967 (1.675)	8.073 (1.697)	4.502 (1.610)	12.777 (1.794)	10.809 (.874)	2.181 (1.950)	4.591 (1.279)	6.843 (2.927)	6.991 (1.833)	2.954 (2.498)
Pupils' characteristics										
Gender (male)	-.149 (.267)	-.181 (.228)	.387 (.280)	-.015 (.263)	-.681 (.254) **	.264 (.220)	-.228 (.166)	.698 (.174) ***	.019 (.251)	.307 (.255)
Age	-.372 (.101) ***	-.352 (.087) ***	-.299 (.105)	-.572 (.093) ***	-.402 (.096) ***	.083 (.057)	-.027 (.051)	.118 (.049) *	-.205 (.072) **	-.390 (.090) ***
School characteristics										
Class size	.015 (.023)	.003 (.017)	-.014 (.031)	.057 * (.024)	.062 ** (.023)	.001 (.020)	-.006 (.010)	-.020 (.014)	.046 (.023) *	.019 (.042)
School type (public)	-5.990 (.957) ***	-4.810 (1.375) **	-3.853 (1.136)	-7.367 (1.003) ***	-6.816 (1.146) ***	-8.330 (1.371) ***	-5.510 (.913) ***	-7.978 (3.021) **	-4.899 (1.230) ***	-3.333 (1.311) *
District characteristics										
District type (deprived)	-1.179 (1.422)	-2.020 (1.028)	-	.401 (1.477)	-	4.348 * (1.857)	2.116 ** (.827)	-1.628 (1.321)	-.106 (.965)	-1.190 (1.288)
School location (rural)	-1.004 (.909)	-2.893 (1.271)	-2.093 (1.192)	-6.477 (1.049) ***	-3.846 (1.127) ***	3.038 (1.536) *	-1.968 (1.014)	-1.484 (1.486)	-2.355 (1.277)	-.254 (1.966)
Random part										
Pupil	80.8	75.3	73.9	83.1	75.3	70.0	84.8	71.6	77.7	59.2
School	19.2	24.7	26.1	16.9	24.7	30.0	15.2	28.4	22.3	40.8

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. *Coeff.* = coefficient; *SE* = standard error**Supplemental Table 4: Regional level achievement for P3 Mathematics**

Region/ Variable	<i>Ashante</i>	<i>Brong Ahafo</i>	<i>Central</i>	<i>Eastern</i>	<i>Greater Accra</i>	<i>Northern</i>	<i>Upper East</i>	<i>Upper West</i>	<i>Volta</i>	<i>Western</i>
	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>
Intercept	3.421 (1.435)	6.128 (1.657)	4.573 (1.517)	8.694 (1.671)	7.474 (.801)	1.500 (1.560)	3.882 (.984)	2.850757 (2.452)	4.723 (1.761)	.869 (1.975)
Pupils characteristics										
Gender (male)	.011 (.243)	.349 (.213)	.081 (.249)	-.299 (.081)	-.441 (.236)	.483 (.213) *	.165 (.162)	.799 (.171) ***	.367 (.239)	.413 (.233)
Age	-.079 (.092)	-.073 (.081)	.097 (.093)	-.299 (.081) ***	.138 (.089)	.220 (.055) ***	.216 (.050) ***	.144 (.048) **	.190 (.069) **	-.212 (.082) **
School characteristics										
Class size	.005 (.019)	-.004 (.017)	-.015 (.029)	.036 (.022)	.033 (.021)	-.006 (.016)	-.009 (.007)	-.019 (.012)	.035 (.022)	-.019 (.033)
School type (public)	-3.065 (.821) ***	-3.290 (1.342) *	-4.333 (1.068) ***	-6.452 (.936) ***	-4.667 (1.050) ***	-6.271 (1.092) ***	-3.670 (.707) ***	-3.602 (2.533)	-3.940 (1.182) **	-2.045 (1.040)
District characteristics										
District type (deprived)	-.309 (1.219)	-2.074 (1.004) *	-	2.495 (1.378)	-	2.080 (1.481)	1.809 (.632) **	-.736 (1.103)	-.100 (.927)	.318 (1.020)
School location (rural)	-.348 (.778)	-2.259 (1.241)	-1.838 (1.124)	-5.486 (.978) ***	-2.908 (1.031) **	2.219 (1.229)	-2.279 (.779) **	-1.191 (1.240)	-.968 (1.227)	-.481 (1.555)
Random part										
Pupil	82.9	73.4	71.4	80.8	75.2	78.6	90.8	78.1	77.2	67.0
School	17.1	26.6	28.6	19.2	24.8	21.4	9.2	21.9	22.8	33.0

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. *Coeff.* = coefficient; *SE* = standard error

Supplementary Materials

Supplemental Table 5: Regional level achievement for P6 English Language

Region/ Variable	<i>Ashante</i>	<i>Brong Ahafo</i>	<i>Central</i>	<i>Eastern</i>	<i>Greater Accra</i>	<i>Northern</i>	<i>Upper East</i>	<i>Upper West</i>	<i>Volta</i>	<i>Western</i>
	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>
Intercept	8.713 (3.016)	7.567 (2.048)	5.364 (2.069)	11.029 (2.274)	10.586 (.772)	4.080 (2.679)	7.245 (1.897)	2.904 (4.538)	8.672 (2.321)	3.494 (3.379)
Pupils' characteristics										
Gender (male)	1.001 (.356) ***	1.100 (.317) ***	.750 (.366)*	.066 (.324)	.108 (.292)	.747 (.285) **	.623 (.261) *	.999 (.280)	1.142 (.345) ***	.308 (.372)
Age	-1.281 (.157) ***	-.956 (.129) ***	-1.351 (.161) ***	-1.278 (.135) ***	-1.232 (.130) ***	-.064 (.079)	-.304 (.090) ***	-.224 (.091) **	-.996 (.116) ***	-.946 (.151) ***
School characteristics										
Class size	.065 (.036) **	.054 (.021) **	-.028 (.039)	.125 (.027) ***	.087 (.020) ***	.028 (.020)	-.024 (.014)	-.007 (.022)	.085 (.028) **	.063 (.056)
School type (public)	-6.529 (1.594) ***	-5.225 (1.680) **	-5.777 (1.587) ***	-8.568 (1.282) ***	-3.491 (.975) ***	-10.453 (2.000) ***	-8.853 (1.496) ***	-1.038 (4.680)	-5.278 (1.533) ***	-4.666 (1.753) **
District characteristics										
District type (deprived)	-3.507 (2.536)	-1.897 (1.256)	-	5.500 (1.883) **	-	3.844 (2.193)	-2.038 (.809) **	.387 (2.033)	1.593 (1.245)	-.271 (1.782)
School location (rural)	-1.376 (1.531)	-4.474 (1.501) **	-4.544 (1.606) **	-8.038 (1.353) ***	-2.769 (1.054) **	.963 (1.667)	-2.970* (1.424)	-5.952 (2.322) **	-4.112 (1.579) **	-.989 (2.557)
Random part										
Pupil	70.9	78.2	73.1	80.5	84.1	80.7	85.5	69.8	79.7	61.5
School	29.1	21.8	26.9	19.5	15.9	19.3	15.5	30.2	20.3	38.5

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. *Coeff.* = coefficient; SE = standard error

Supplemental Table 6: Regional level achievement for P6 Mathematics

Region/ Variable	<i>Ashante</i>	<i>Brong Ahafo</i>	<i>Central</i>	<i>Eastern</i>	<i>Greater Accra</i>	<i>Northern</i>	<i>Upper East</i>	<i>Upper West</i>	<i>Volta</i>	<i>Western</i>
	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>	<i>Coeff. (SE)</i>
Intercept	1.823 (1.616)	2.214 (1.229)	1.704 (1.248)	5.005 (1.178)	4.292 (.591)	1.135 (1.930)	3.936 (1.086)	.844 (2.465)	3.045 (1.224)	-.616 (1.934)
Pupils' characteristics										
Gender (male)	.490* (.239)	1.684 (.224) ***	.772 (.236) ***	.382 (.234)	.514 (.226)*	.839 (.194)	.472 (.177) **	.941 (.185) ***	1.205 (.227) ***	.874 (.272) ***
Age	-.492 (.105) ***	-.327 (.091) ***	-.671 (.104) ***	-.576 (.097) ***	-.574 (.100) ***	.097 (.054)	-.136 (.060) *	-.120 (.060) *	-.300 (.076) ***	-.356 (.111) ***
School characteristics										
Class size	.009 (.019)	.024 (.012)	-.024 (.024)	.045 (.014) **	.056 (.016) ***	.020 (.014)	-.011 (.008)	-.007 (.012)	.040 (.015) **	-.003 (.032)
School type (public)	-1.604 (.857)	-.991 (1.006)	-2.199 (.960)*	-4.388 (.666) ***	-2.554 (.745) ***	-4.100 (1.441)	-5.017 (.866) ***	-.189 (2.537)	-1.665 (.799) *	-1.019 (1.012)
District characteristics										
District type (deprived)	-.369 (1.357)	-1.190 (.755)	-	2.365 (.964) *	-	.414 (1.584)	2.124 (.667) **	-.286 (1.099)	1.100 (.655)	.131 (1.027)
School location (rural)	-.243 (.817)	-1.962 (.897) *	-2.321 (.966) *	-3.534 (.699) ***	-.220 (.806)	.270 (1.201)	-1.036 (.813)	-2.335 (1.246)	-2.623 (.831) **	.130 (1.464)
Random part										
Pupil	80.4	84.2	76.0	90.5	84.4	78.2	89.9	78.2	87.2	73.2
School	19.6	15.8	24.0	9.5	15.6	21.8	10.1	21.8	12.8	26.8

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. *Coeff.* = coefficient; SE = standard error

Education for Sustainable Development in Kenya: Rhetoric and Reality in Basic Education

Benard O. Nyatuka

Abstract

Education for sustainable development (ESD) is increasingly being recognized as a critical element of education systems and facilitator of sustainable development. This is because its ultimate goal is to foster ideal teaching, learning, policies and practices needed to enhance social, economic, ecological viability and well-being for the present and future generations. Embracing ESD could therefore, facilitate realization of objectives of the Competency-Based Curriculum (CBC) that Kenya has rolled out. Particularly, the CBC is expected to foster acquisition of core competencies like creativity, problem-solving, and self-efficacy. But, limited understanding, inappropriate pedagogical approaches, and weak collaboration among key stakeholders are some of the challenges that face application of ESD. This research review focuses on the pertinent ESD aspects to successful implementation of the CBC in basic education in Kenya. Specifically illuminated are the underpinning pedagogical theories and their implications, relevant legal and policy frameworks, some success stories, challenges and proposed solutions.

Keywords: Basic education, Competency-Based Curriculum, Constructivism, Education for sustainable development, Pedagogy

Introduction

Given that the world today is experiencing a great level of uncertainty, complexity and rapid change, embracing more sustainable intervention measures, including appropriate education about sustainable development is imperative. According to Sterling (2014) and UNESCO (2011), such global issues as economic instability, climate change, social inequity, loss of biodiversity and migration as well as non-renewable energy sources need to be addressed urgently. It is important to note, however, that sustainability is a highly demanding concept as it calls for changes at the political, social, economic, environmental, educational and decision-making levels, among others. Kondur, Ridei, Mykhailishyn and Katsero (2020) argue that since education for sustainability is evolving on a geospheric, geopolitical and transboundary scale, it can be defined economically, socially, environmentally and educationally. On their part, Lampa, Greculescu and Todorescu

(2013) consider sustainable development to be a continuous search for improving our daily lives, while minimizing the negative impact brought about by humans on the environment. This requires active, creative and cooperative citizens who are able to successfully prevent and solve problems, and be ready to combine theoretical knowledge with innovations and practical ideas.

As a prerequisite for realizing sustainable development, education systems should be restructured to focus on enhancing the development of creative thinking among the population, promoting tolerance and democratic ideals, making informed decisions and participating in the implementation of relevant cross-cutting plans and issues (Kondur, et al, 2020; UNESCO, 2005a). In the European Union, for example, sustainable development is regarded to be the basic principle upon which all policies are anchored. Particularly, education service providers should develop programmes for sustainable education that balance future knowledge with traditional lifestyles. However, it should be borne in mind that such education is not aimed at changing

Full listing of authors and contacts can be found at the end of this article.



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people's lifestyles, but empowering and encouraging them to participate in sustainable development, including reflecting on their actions in this field.

UNESCO (2019) stipulates that by 2030, all learners should acquire the knowledge and skills needed to promote sustainable development. And, this is supposed to be achieved through, among others, education for sustainable development, sustainable lifestyles, human rights and gender equality. Other means are promotion of a culture of peace and nonviolence, global citizenship and appreciation of cultural diversity. Indeed, Lampa, Greculescu and Todorescu (2013) note that education for sustainable development is a broad movement concerned with identifying and advancing the kinds of education, teaching and learning policy and practice to ensure social, economic and ecological viability and welfare, now and into the long-term future. The authors hold that education for sustainable development aims at enhancing consciousness, ensure a coherent way of life with the principles of sustainable development, that is, being more informed, moral and responsible about the ability of future generations to meet their needs.

According to Ganira and Odundo (2018), the overriding theme of education for sustainable development is integration of values inherent in sustainable development into all aspects of curricula to encourage change in behaviour that alloys a just society for all. In addition to moral and ethical values, education for sustainable development has various dimensions, such as peace education, medical education, consumer education, among others (Fosnot, 2013; Armstrong, 2011). The main task of education for sustainable development therefore, is formation of a value-oriented personality directed towards socially, economically and environmentally significant values. Ganira and Odundo (2018) observe that integrating sustainable development strategies such as problem-based, inquiry-based, and reflective learning in teaching and learning should motivate learners to become responsible individuals who will solve challenges, respect cultural diversity and contribute to creating a sustainable society.

Armstrong (2011) contends that skills associated with education for sustainable development are expansive and include collaboration and cooperation, conflict resolution, creativity, imagination, future mindedness, knowledge transfer, meaningful communication and civic engagement. Others include interdisciplinary research skills, adaptive learning, contextualization of issues, personal introspection visioning, systems thinking as well as values focused teaching. To achieve these,

all those involved in the delivery of education for sustainable development must practice what they preach (Fosnot, 2013). Thus, education for sustainable development requires approaches that reflect a paradigm shift from manual training of discipline-specific content to a focus on enhancing quality of life that is rich with intellectual and social capital. Indeed, the education for sustainable development pedagogy initiated by UNESCO (2004) highlights a shift towards active participation and experiential learning that engages the learner in thinking and accords them the ability to act responsibly.

Lampa, Greculescu and Todorescu (2013) note that education for sustainable development is central to preparing learners for lifelong learning, an adaptive quality that makes the learner more malleable in a time when most societies are experiencing dramatic social, environmental and economic transformation. In Armstrong (2011), concepts like deep learning, transformational learning, active learning, service learning and critical emancipatory pedagogy have all been included in pedagogical discussions about education for sustainable development.

With respect to Kenya, Opananda (2013) observes that four main ideas related to education for sustainable development have so far received heightened attention. These are improving access to basic quality education; restructuring of the present educational system; development of public understanding and awareness; and enhancing the quality of the teacher training programmes. In particular, teachers are extremely important drivers of change in the education for sustainable development. Ganira and Odundo (2018) assert that adoption of education for sustainable development pedagogies into the basic education curriculum requires appropriate teaching and learning methods that motivate and empower learners to modify behaviour and take actions for sustainable development. Given that education for sustainable development pedagogies facilitate learning of knowledge, skills, perspectives and values that sustainable societies entail, the researchers emphasize that appropriate pedagogies for sustainable development be used.

Through Sustainable Development Goal 4 (SDG 4), education for sustainable development provides a cross-cutting mechanism for the achievement of all the SDGs in Kenya (Ministry of Education, 2017). This is in line with Agenda 2063 of the African Union which calls for action on catalyzing education and skills revolution to build knowledge, human capital, capabilities and



skills to drive innovations on the African continent. Addressing sustainable development challenges requires provision of quality education that offers competencies, values, knowledge and skills for sustainable living and prosperity. As an integral part of life-long learning, education for sustainable development is central to the delivery of quality education and necessary for capacity building of the Kenyan society for a green economy.

According to Wandabi (2019a), the Competency-Based Curriculum (CBC) provides an opportunity to nurture every learner's potential through quality education. This happens to be the ultimate goal of education for sustainable development. Just like education for sustainable development, the CBC seeks to empower learners to take informed decisions and responsible actions for environmental integrity, economic viability and just society for present and future generations, while respecting cultural diversity. Republic of Kenya (2017) holds that the teaching of values, especially at the basic education level, is expected to facilitate achievement of the curriculum reforms' vision, particularly with respect to developing ethical citizens. Specifically, basic education seeks to build capacities in learners that will enable them to be stewards of the earth, and minimize negative environmental impacts, while learning outcomes are linked to meaningful human, safety, educational, and environmental needs. The CBC endeavours to make learners work on real problems that make academic learning relevant while simultaneously enhancing their social skills, analytical ability, civic and ethical responsibility, self-efficacy, and career development (Wandabi, 2019a)

The CBC incorporates the pertinent and contemporary issues in society, including the related support materials. Education for sustainable development is one of such issues and focuses on environmental education, disaster risk reduction, safety and security education, financial literacy, poverty education, countering terrorism, extreme violence and radicalization, gender issues and animal welfare (Republic of Kenya, 2017). Accordingly, education should include values that support sustainable development such as care, respect, charity, social and economic justice, commitment, cooperation, compassion, self-determination and self-reliance. In the College Student Educators International (2008), change agents should possess such attributes as resilience, optimism, tenacity, commitment, passion, patience and emotional intelligence. Others are assertiveness, persuasiveness, empathy, authenticity, ethical self-awareness, competence and curiosity. The CBC

emphasizes these attributes as well, as they are known to boost students' self-esteem (Republic of Kenya, 2017; Lampa, Greculescu & Todorescu, 2013).

In the spirit of finding solutions to the challenges of sustainability of the biosphere and society in the country, the Ministry of Education has prioritized to focus on emerging gaps in the education sector (Ministry of Education, 2017). These include developing a relevant policy; transforming teaching, learning and training environments; building capacities of educators and trainers; and accelerating youth empowerment. This is in tandem with aspirations of Kenya's Vision 2030 development plan, the Global Action Programme on education for sustainable development and SDGs. Through the implementation of the education for sustainable development policy, the Ministry seeks to integrate such education into sustainable development policies and strategies of learning environments in training and learning institutions. This includes infusion of education for sustainable development into basic education, teacher training programmes and establishment of relevant youth-led initiatives.

Despite the efforts being made by the government, there appears to be a vague understanding of the concept of education for sustainable development among many citizens, use of inappropriate pedagogical methods and materials, and low level of collaboration among key stakeholders. On this basis, this research review examines the major aspects of education for sustainable development with intent to enhance their application. These aspects include the relevant pedagogical theories and their implications, legal and policy provisions and some success cases. Also, discussed are critical challenges and possible remedies.

Theoretical Framework

According to Fosnot (2013) and Armstrong (2011), education for sustainable development may be better understood by exploring constructivism theories which are characterized by high levels of learner engagement, including active, applied, service and experiential learning. Such theories also lay emphasis on social interaction that involves problem-based, inquiry-based, as well as participatory learning. Constructivism theories hold that human beings construct all knowledge while participating in different mental and physical experiences (Kalsoom, 2019; Republic of Kenya, 2017;). Thus, constructivism is a supposition about the nature of knowledge and how individuals acquire it.

In constructivism, the learner builds a personal



interpretation of the world on the basis of experiences and interactions. Among the proponents of constructivism are Dewey's Social Constructivism, Vygotsky's Social-Cultural Development Theory and Gardner's Multiple Intelligence Theory. Others are Piaget's Cognitive Development Theory, Bruner's Cognitive Development Theory and Erikson's Theory of Psychosocial Development (Republic of Kenya, 2017). Tobias (2009) observes that other than extending both behavioural and cognitive theories about learning, constructivism includes contextual issues, like previous knowledge and experience, in the construction of knowledge. In this light, knowledge does not reside only in the mind but is situated in the context of an individual's past experience, beliefs and values, their cognitive process, and their environment (Schunk, 2008).

The core assumptions of constructivism are that learner activities lead to the creation of their own knowledge rather than mere acquisition of the same, and that truth is an evolving premise (Schunk, 2008; Simpson, 2002). Schwartz, Lindgren and Lewis (2009) and Tobias (2009) hold that active engagement leads to a higher understanding that may be applied to new and different situations. Armstrong (2011) asserts that three primary perspectives underpin constructivism, that is, endogenous, exogenous, and dialectical. Endogenous constructivism emphasizes internal cognitive processes, new knowledge being dependent on previously developed mental structures. This perspective connotes a highly active learning environment in which learners are able to explore and experiment through a variety of activities that motivate them to assimilate and accommodate what is learnt. The classroom is active with problem-solving engagements, rather than direct instruction. Teachers are discouraged from interjecting outcomes for the learners before they are able to invent on their own, taking a peripheral role until fundamental discoveries are concretized (Fosnot, 2013; Armstrong, 2011). Thus, the teacher's role is to create an environment suitable for such discovery. Likewise, peer interaction is an important means of discouraging egocentrism among the learners (Piaget, 1970; Tuckman, 1992; Wadsworth, 1978).

On its part, exogenous constructivism emphasizes the influence of the external world on the construction of knowledge, such as instruction, experience and use of models in the learning environment (Kalsoom, 2019; Armstrong, 2011; Shunk, 2008). It seeks to explain behaviour and the learning environment, including emphasizing the use of impressionistic models. The

learner continuously adapts to, as opposed to copying, the structure in the environment and is responsive to contextual issues. The assumptions of the exogenous perspective are that interactions between the learner's cognition and other personal factors like biology, self-efficacy, and self-regulation, their environment as well as behaviour are reciprocal. Also, learning may occur by observing models, live or static, rather than as a result of feedback or behaviour. Bandura (1989) advocated for highly knowledgeable and effectual teachers who are able to motivate while also developing important cognitive abilities among learners.

Dialectical constructivism is positioned centrally between the endogenous and exogenous perspectives, emphasizing the contextual nature of the construction of knowledge. Armstrong (2011) and Simpson (2002) assert that dialectical constructivism is particularly useful in informing the pedagogical implementation of education for sustainable development. This perspective is especially responsive to the complex, uncertain and values-laden nature of sustainability. Both a dialectical perspective of constructivism and education for sustainable development champion for iterative reflection, supporting Vygotsky's (1978) contention that social interaction precedes internal reflective processes, thereby reinforcing cognitive development and learning that happens post-interaction (Bonnett, 2003).

Armstrong (2011) advises that implementing education for sustainable development will remain impossible without the commitment by educators to the new paradigm. Wals (2010) notes that learning strategies that emphasize dialogue and cooperative experiences are quite useful in the delivery of education for sustainable development as they promote pluralism and incorporation of prior perceptions with new meaning. In the provision of education for sustainable development, a teacher or educator is a facilitator, collaborator and fellow learner on the journey towards sustainability. Such a teacher allows the learner to direct their own learning and guide course content, although this does not necessarily indicate relinquished control or authority.

Implications of the constructivism theories on ESD pedagogy.

Apparently, the pedagogical approaches used in education for sustainable development are considerably oriented to a constructivist epistemology. Among others, it is important to design experiences that match the developmental level of the learner, especially those that encourage learning activities that go just beyond



their capacities (Fosnot, 2013; Armstrong, 2011). The lived experiences, community, active engagement and collaboration in education for sustainable development strategies assert the belief that there is magic in social interaction with peers, teachers and industry partners. Accordingly, some of the common strategies for the development of relevant skills are collaborative activities, systems instruction, multigenerational analysis, problem-based assignments, inquiry and action research (Fosnot, 2013). Others are stakeholder analysis, role play, offering multiple perspectives in topics, back-casting and scenario building.

The approach to education for sustainable development, especially with respect to teaching and learning should focus on students, encouraging them to form and develop their own ideas and values. Teachers should consider pupils as being an important and active factor in learning. Lampa, Greculescu and Todorescu (2013) assert that active listening, assuming of responsibilities and solidarity are considered prerequisites to successful relationships based on social cooperation and interaction among pupils and people in general. Hence, it is necessary for teachers to develop these competencies during their didactic activity.

Likewise, educational experiences need to be made interdisciplinary or multidisciplinary with a view to exposing the learner to different social configurations. It should be appreciated that pedagogies like service, participatory and experiential learning are characterized by collective inquiry and problem-solving that require learners to dialogue with others around them, thereby facilitating the discovery of new meanings collectively (Fosnot, 2013; Armstrong, 2011). Capacity building, values development and cooperative relationships are fostered in such an educational environment. Learners should be encouraged to be interdependent upon one another to continuously amend the truth with higher degree of precision, inviting emergent outcomes.

Pedagogical competence should be understood as a synthesis of cognitive, visual, practical and personal experience (Kondur, et al, 2020). It is therefore, important to involve teachers in the relevant management processes in order to constantly improve the organization of decentralization of education. Future educators need to develop general knowledge of the content of sustainable development, ability to combine content of different disciplines in terms of social and cultural context and learn to overcome uncertainty. On their part, students need to think critically; respond to different situations appropriately; resolve conflicts; work as a

team; and, develop responsibility and autonomy. These are all considered to be tools of strategic thinking. Since education for sustainable development issues are controversial and complex, learners should be able to manage them as well as the disagreements among themselves and relevant participants. Sustainable education encourages both teachers and students to use creative thinking, share ideas, cooperate and make decisions. Hence such a school is dynamic, no longer dictated by traditional hierarchical structures. The educational process should be such that even the weakest students are educated in a manner that their actions, present or future, pose no danger to society or even themselves (Lampa, Greculescu & Todorescu, 2013).

There is need to rethink educational policies for sustainable development that aim at developing social, economic and environmental knowledge that will ultimately assist students in tackling challenges of modern life. Also, there is need for partnerships among institutions to provide teachers with efficient training programmes; ensure multicultural contexts to help them understand diversity and practice tolerance towards others, work closely with parents, colleagues and the community; reflect and improve upon their didactic activity as far as education for sustainable development is concerned (Lampa, Greculescu & Todorescu, 2013; Armstrong, 2011).

And, to ensure the quality of didactic activity in sustainable development, teachers should acquire and develop competences and abilities based on not only formal, but also informal and non-formal dimensions, and have them officially recognized. This includes identifying each pupil's specific needs and working towards meeting them by use of a wide range of teaching strategies. It also involves helping pupils to develop professional and cross competences (Lampa, Greculescu & Todorescu, 2013).

Venkataraman (2009) as well as Rode and Michelsen (2008) note that the development of assessment methods in education for sustainable development is a substantial area of opportunity. UNESCO (2005b) makes audible the need for assessments that not only pay attention to knowledge competency, but skills, perceptions, behaviours and values as well. Specifically, standardized testing is dissuaded, while methods that speak to a holistic view of the overall quality of education are encouraged. This is in line with the CBC which among others, advocates for assessment that determines the capability to apply a set of related knowledge, skills, values and abilities required to



successfully perform critical work functions or tasks in a defined setting (Republic of Kenya, 2017).

In addition to the above theoretical implications on ESD pedagogy, the way forward is highlighted later in this piece of work.

Legal and Policy Provisions on ESD in Kenya

Key UN conferences, Acts of Parliament and related policy documents have played an important part in mobilizing both the international and local communities towards sustainable development (Sterling, 2014; Opanda, 2013; UNESCO, 2011; UNESCO, 2010; UNESCO, 2009a). In particular, the United Nations Conference on Environment and Development (UNCED, 1992) called for all countries to develop education for sustainable development strategies and frameworks to reorient education systems and programmes. The major thrusts to foster such education included improving basic education; and to develop public understanding, awareness and training (Opanda, 2013). In 2002, the United Nations Decade of Education for Sustainable Development (DESD) was mooted to facilitate implementation of such education (UNESCO, 2002; UNESCO, 2003).

In 2014, UNESCO launched a roadmap for implementing the Global Action Plan (GAP) on education for sustainable development. Based on this, Kenya's Ministry of Education has made commitment on this initiative through developing an education for sustainable development implementation strategy across all sectors. The strategy is to be guided by three broad objectives, that is, enhance the role of education and learning for equitable, efficient and sustainable utilization of the country's resources; promote quality education through diverse learning and public awareness for improved quality of life and productive livelihood; and promote teaching and learning that inculcates appropriate values, behaviour and lifestyles for good governance and sustainability.

The 2013-2018 National Education Sector Plan presents a strategy for education and training to promote education for sustainable development with reference to the UN GAP programme. This led to the development of education for sustainable development policy for the education sector in 2017 (Wandabi, 2019b). The policy focuses on providing, promoting and coordinating quality lifelong education, training, research and innovation for Kenya's sustainable development. Albeit various hurdles, partnerships, collaborations and networks have been formed to enhance education for sustainable development implementation

(UNESCO, 2009b).

In tandem with the CBC, the education sector policy on education for sustainable development promotes competencies such as critical thinking, creativity and making decisions in a collaborative way. It is indicated that this is to be realized through integrating sustainable development into education and vice versa (Ministry of Education, 2017). Its implementation is particularly to be done in the different education levels that include basic education; higher education; teacher and technical and vocational training institutions and workplace; lifelong learning and non-formal education.

Kenya's Vision 2030 development blueprint proposes policy formulation and curricula reviews to address education for sustainable development (Republic of Kenya, 2007). The national agencies are expected to play a key role in leading as well as supporting learning opportunities for change towards sustainable development across sectors. In Kenya, the education for sustainable development national implementation strategy uses capacity-building, advocacy, vision-building, partnerships and co-ordination as key approaches to achieve this (UNESCO, 2011). The medium-term plan (2008-2012) for Vision 2030 requires that all training institutions' curricula are re-oriented to address sustainable development issues. Already, the development of a life skills curricula has been done by the Ministry of Education while teachers and education officers have been trained and involved in delivering the same syllabus across the country (Wandabi, 2019a).

Among other notable initiatives, the education sector has increased financial support for capacity development activities and strengthened the Kenya Education Management Institute, the agency for building capacities for education managers. Similarly, the Centre for Mathematics, Science and Technology Education in Africa (CEMASTEIA) has been offering pedagogical leadership training to support teachers in implementing effective and innovative classroom practices concerning education for sustainable development (Wandabi, 2019b). Particularly, it has been sensitizing education and quality assurance officers and other stakeholders on effective management of sustainable and institutionalized in-service education and training of teachers.

The Environmental Management and Coordination Act (1999), Cap 387 provides for effective coordination and regulation of all actions that have a direct influence on the environment in Kenya (Wandabi, 2019b). Similarly, Section 69 (2) of the Constitution of Kenya stipulates that every person has a duty to cooperate with the



relevant national organizations and other stakeholders to protect and conserve the environment (Republic of Kenya, 2010). This involves ensuring that an ecologically sustainable development and use of natural resources is promoted. In the National Environment Management Authority (NEMA, 2008), the Kenyan strategy provides status, communication, facilitative and result indicators to monitor the implementation of education for sustainable development at all levels. As a result, awareness on this venture has steadily increased over the years.

On its part, Section 42(4) of the Basic Education Act focuses on the promotion of environmental protection, especially education for sustainable development (Republic of Kenya, 2013). Sessional Paper No.4 of 2012 on Reforming Education and Training in Kenya envisaged a curriculum that is competence-based to foster quality education and enhance the integration of education for sustainable development at all levels of education in the country (Republic of Kenya, 2017). Indeed, Kenya has already rolled out a new competency -based curriculum for primary and secondary schools. The curriculum has sections that deliberately show how education for sustainable development can be integrated into the curriculum as a pertinent and contemporary issue (Wandabi, 2019b).

Furthermore, the government has developed a Green Economy Strategy and Implementation Plan (GESIP, 2016) to address sustainable development challenges to achieve its long-term development goals as defined in Vision 2030 (Ministry of Education, 2017). This policy is to enhance the implementation of education for sustainable development across sectors to enhance the attainment of the SDGs by improving quality of education, building capacity at all levels and enhancing public understanding and awareness of the sustainable development agenda. Accordingly, the 17 SDGs provide the wider context for further up-scaling and mainstreaming education for sustainable development in the country.

As a guide to the implementation of the CBC, the government developed the Basic Education Curriculum Framework (Republic of Kenya, 2017). The framework is anchored on values and provides a comprehensive conceptualization of reforms in basic education, including pre-primary education, primary, secondary and inclusive education. This is important since values influence how we feel, act and make choices in life. This thrust is meant to nurture learners who do the right thing at any given time. In spite of the various

documents focusing on education for sustainable development, its level of implementation is wanting, especially at the basic education level in Kenya. Among others, this research review has made a deliberate attempt to consolidate such works for easy reference and application.

Some Success Cases of ESD in Kenya

A number of measures have been undertaken by various stakeholders to enhance education for sustainable development, especially in the basic education institutions in Kenya. One such initiative is the Eco-schools, an international programme founded in 1994 and run by the Foundation for Environmental Education (Kenya Organization for Environmental Education, 2020). Among others, it sponsors an environmental action-based learning in primary and secondary schools as a tool for development. Learning is project-based and promotes creativity, critical thinking and problem-solving. The Eco-Schools and the foundation are lead partners in UNESCO's Global Plan for education for sustainable development (Andreou, 2016). Implemented in 60 countries worldwide (Kenya Organization for Environmental Education, 2020), its mission is to empower students to be the change a sustainable world needs through fun and action-oriented activities.

According to Andreou (2016), the programme aims at achieving educational goals as well as sustainable development through schools as entry points to communities. This has been implemented in Kenya since 2003, growing from a pilot of 12 schools, to over 1,000 primary and secondary schools across the country as at 2020. The pilot phase was based on five key components of environmental action learning, namely environmental policy; cross-curriculum teaching and learning; micro-projects; school-community partnerships; and networks. Funded by the Danish International Development Agency and implemented in partnership with the Danish Outdoor Council, the main focus themes were water, sanitation and hygiene, energy, healthy eating, sustainable agriculture, climate change, biodiversity and waste management. The cross-cutting themes included HIV/AIDS, global citizenship, entrepreneurship, and disaster preparedness and management (Wandabi, 2019b).

The Kenya Organization for Environmental Education (KOE) has produced relevant theme packs for teachers and learners, developed teacher guides, a teacher training manual and a handbook (Wandabi, 2019b). In UNESCO (2011), the Eco-Schools



programme in Kenya seeks to empower the youth, women and the poor; raising public understanding and awareness of sustainability; and training in education for sustainable development. The relevant projects take place through participation of multiple stakeholders, including government, civil society and private sector. In particular, strategies used by schools to boost sustainable development include advocacy, campaigns and vision building, capacity building, teacher training, monitoring and evaluation, and creation of school-community partnerships for purposes of ownership of such activities.

Andreou (2016) observes that the Eco-Schools programme provides a framework and standards to help educators integrate sustainability principles throughout their schools. These principles are to ensure that participants are: engaged in the learning- teaching process; empowered to take informed decisions and actions on real life sustainability issues; encouraged to work together actively and involve their communities in collaborative solutions; supported to examine their assumptions, knowledge and experiences in order to develop critical thinking; and to be open to change. Other principles are to encourage participants to be aware of cultural practices as an integral part of sustainability issues; encourage sharing inspirational stories of their achievements, failures and values to learn from them, and to support each other; continuously explore, test and share innovative approaches, methodologies and techniques; and ensure continuous improvement through monitoring and evaluation of the programmes. The programmes offer methodological tools for schools and communities to evaluate their own challenges; assess risks and develop the solutions. Most importantly, the schools are guided to re-orient existing curricula around sustainable development themes, and work collaboratively with their local communities to develop practical projects.

The Indian Ocean Programme is a regional framework to integrate themes of sustainable development, climate change and risk reduction into national education systems, and strengthen cooperation to address the unique vulnerabilities of the region (Andreou, 2016). It involves 72 Eco-Schools, with a population of at least 25,000 students. Activities at school include food production, rainwater harvesting, soil stabilization, sanitation and waste management. It is reported that the most successful schools are those that have built strong partnerships between governmental institutions, NGOs, and the private sector. Among others,

this is particularly important in addressing the damaging day-to-day effects of climate change that include rise in sea level, soil erosion, flooding, water shortages and high frequency of natural disasters.

The Eco-schools programme in Kenya particularly responds to the Green Economy Agenda through promotion of green enterprise development in schools and community (Wandabi, 2019b). Initiated by the Kenya Organization for Environmental Education and other partners, the project seeks to transform schools into models of sustainability for communities. Its main objective is to inculcate a greening culture to youth in schools by mentoring and engaging them in hands-on green growth initiatives for sustainability of communities. The project has been implemented in a dozen primary schools from Kwale, Makueni, Embu, Kirinyaga, Bomet and Kisumu Counties. A teacher's guidebook on green enterprise development for schools in Kenya was developed in consultation with teachers from schools participating in the Schools Green Challenge Project, the Ministry of Education and the Royal Danish Embassy in Kenya.

Similarly, the Kenya Organization for Environmental Education has implemented a sustainable Water, Sanitation and Hygiene (WASH) project under the Eco-Schools programme in Vihiga County. The goal is to improve access and reliable safe water in schools and community (Kenya Organization for Environmental Education, 2020). The project entails sinking simple wells to enhance provision of water to ensure accessible safe water in schools; installing water harvesting tanks in the schools to have a water harvesting system; building the capacity of school communities by installing a hand wash point in each of the participating schools; and building capacity of communities to practice sustainable water management, sanitation and hygiene through training.

The Eco-Schools Litter Less Campaign Project aims at reducing waste and foster long-term positive behaviour change among the youth (Kenya Organization for Environmental Education, 2020). Over 45 schools, 3,000 students and 200 teachers have so far been involved in the campaign in Kenya. The main objective is to raise awareness of the effect of litter on the local environment and wider community, increase student knowledge and practical skills in preventing and managing litter. It also seeks to enhance collaboration with other schools to promote education for sustainable development and influence others by communicating with them through multimedia platforms and other



channels. The relevant campaign activities include waste management within and around the schools involved; community action days for schools to showcase their work to the surrounding community; and joint communication campaigns by schools through social media platforms to create awareness on issues of waste management. More recently, the Kenya Organization for Environmental Education has teamed up with other partners to promote plastic recycling through Eco-Schools (Wandabi, 2019b).

Also, the Eco-Schools programme introduced a value-based approach to promoting education for sustainable development, and as a measure to enhance sustainability as a whole (Kenya Organization for Environmental Education, 2020). Among others, it aims at delivering quality education that imparts knowledge, skills, attitudes and values from religious teachings. These are considered as instruments for entrenching faith-based values into education for sustainable development in schools, while promoting action for the environment with faith as the motivation. To date, a total of 50 schools have been involved in the initiative. The project produced a faith-based education for sustainable development teachers' toolkit for schools that illustrated an approach of solving a society's development issues using faith. According to the Republic of Kenya (2017), the country has been putting emphasis on approaches that promote whole institution development of education for sustainable development. The Eco-School programme is considered to be an effective whole institution approach in mainstreaming sustainability into all aspects of the learning environment.

In conjunction with MASHAV, a Hebrew acronym for Israel's Agency for International Development Cooperation, Kenya's Ministry of Education and the Kenya Secondary Schools Heads Association established a joint project directed towards the promotion and implementation of education for sustainable development, to become an integral element in curricula of learning institutions (MASHAV, 2013). The ultimate goal of the joint project is to establish a national network of education for sustainable development in the country, including setting up demonstration centres which will serve as a source of training for the remaining school. One of the principles is 'Think Global, Act Local', meaning that awareness of the global crisis is important but action should be taken at the local level. The model provides schools and the community with the necessary tools for assessing their actual needs and existing resources. This model was launched in August 2013 at the Joel

Omino secondary school in Kisumu County. It includes teaching as well as learning technology, science, history and democracy, among others. This has successfully been applied in water purification; organic agriculture; economics and entrepreneurship, including establishment of an organic bakery; knowledge of building traditional houses; and utilizing recycled materials for art work.

The WWF-Kenya organization has made effort to integrate sustainable development into teaching and learning in basic education institutions by inculcating participatory pedagogical methods (WWF-Kenya, 2020). In particular, the organization's marine programme works with schools in the country's coastal region to promote education for sustainable development. Interactions are through discussions, lectures, presentations and mentorship. The successful projects implemented by schools include establishment of school gardens, tree planting and engagement in community service, for example, beach clean-up exercise on both the World Environment Day and International Coastal Clean-up celebrations. In addition, the organization continues to offer scholarships for girls from poor backgrounds within the islands surrounding Lamu County and its environs.

Furthermore, the Wildlife Clubs of Kenya have published an environmental education resource book for teachers and learners of primary and secondary schools, while Nature Kenya has produced an education for sustainable development resource book for both students and teachers called 'Learning for Sustainable Living in Kenya' (Wandabi, 2019b). Apart from these organizations, many NGOs are involved in offering skills-focused training for community-based innovations involving marketing, product sales and sustainability. The African Fund for Endangered Wildlife in Kenya provides training to school children, teachers and community groups on environmental conservation.

But, given that only a few primary and secondary schools have made laudable efforts with respect to embracing education for sustainable development means that much more requires to be done by the various stakeholders to bring the rest of the institutions on board. Indeed, making such a move is quite crucial in order to achieve the objectives of this pedagogical paradigm shift as well as the Competency-Based Curriculum, especially at the basic cycle of learning in Kenya. In the following section, an elaborate discussion on challenges facing education for sustainable implementation in Kenya, as well as possible solutions is made.



Challenges Facing ESD and Proposed Solutions.

Although sound education for sustainable development serves as a panacea for most of the pedagogical, environmental and socio-economic issues we contend with today, there are many challenges that require to be addressed so as to realize the desired outcomes. Armstrong (2011) opines that education for sustainable development offers a renewed vision for educational policy and practice fully in tune with the needs and issues of the 21st Century. Unfortunately, the concept of education for sustainable development is yet to be fully understood by many stakeholders in Kenya (Wandabi, 2019a), leave alone the few experts in this area to facilitate the appropriate processes of teaching, learning, creating awareness and understanding education for sustainability (UNESCO, 2019). Due to this, the development of adequate and relevant materials still remain a challenge. This calls for the various networks of experts as well as interested groups to enhance and strengthen the capacity-building processes.

According to Sterling (2014), the key role in realizing sustainable development is often ignored, downplayed or under-estimated. Often, it is viewed in isolation from the other instruments of change. In the sustainable development debate therefore, embracing appropriate education should always be emphasized. Despite the success of the international initiatives in this front, there are instances where much sustainable development discourse and policy underplay the role of education, and vice versa. Essentially, sustainable development should be embedded in basic education such that there is both mutual benefit and accelerated positive effect, sufficient to win breakthrough towards an economically secure, ecologically stable and socially just society.

Opanda (2013) asserts that the limited progress in the provision of education for sustainable development is partly due to lack of vision, awareness, policy framework and funding. Notably, there is little effort that has been strategically made to mainstream sustainable development in teacher education programmes, especially at the basic education level. Hence, there is a gap in both the body of knowledge and actual practices of many teacher educators in this area. Yet, the contribution of teacher trainers is key in the delivery of the same. According to Armstrong (2011), pedagogical innovation has been slower to develop. This calls for appropriate intervention measures.

Wandabi (2019b) notes that there is little evidence of attention or investment in the capacity-building of

educators, facilitators or curriculum developers with regard to education for sustainable development. Armstrong (2011) observes that this scenario is worsened by the nature of integration of education for sustainable development that is often complex, while the curricula is examination-oriented and overloaded with content as well as learning outcomes. Thus, the weak integration of education for sustainable development, especially in basic education needs well designed pre-service and in-service teacher training programmes.

Ganira and Odundo (2018) observe that emphasis is often given to the cognitive domain rather than the affective and psychomotor ones, thereby undermining the purpose of education for sustainable development. Additionally, UNESCO (2011) holds that whereas sustainable development has been partially embedded in the formal education institutions, there is little attention being paid to the non-formal and informal curricula. Also, the pedagogical approaches used in the different educational settings are often inappropriate.

The lack of synergy between education for sustainable development activities sometimes leads to duplication of certain initiatives like teacher training and inefficient use and development of relevant resources (UNESCO, 2011). Again, innovations from the community-based organizations and other small groups in society do not always get adequate support for their projects. Partially, this is a result of government bureaucracy and lack of resources in implementing this kind of education. Furthermore, UNESCO (2011) reports that most community-based organizations have not been able to influence policy in the country due to lack of education for sustainable development awareness and commitment. Other challenges are to do with bridging the gap between what happens at home and what is taught in schools; pressure on teachers within the workplace; linking infrastructural change to the mind-set change and strengthening community engagement (Milne, 2019).

In particular, Kenya's Competency-Based Curriculum, which considers education for sustainable development as a critical contemporary issue, has experienced challenges to do with its implementation. These range from inadequate teacher training through poor infrastructure to huge budgetary implications. Worth noting is that some of these challenges revolve around poor governance, corporate irresponsibility, lack of accountability, inefficient and wasteful production systems. Such challenges usually lead to unsustainable utilization of the natural resources, resulting into their



degradation (Wandabi, 2019b). Milne (2019) argues that there is need to have ethos in schools that openly and enthusiastically support education for sustainable development. Clearly, this partly goes down to the curriculum that schools follow, and the interest and effort shown by the senior management in promoting such integration.

Milne (2019) concludes that to attain education for sustainable development, there should be both the physical as well as mindset changes. The physical change involves examining how schools, households and businesses can reduce, say, their waste, conserve water and energy and focus on more sustainable responses in general. On the other hand, the mindset change involves raising environmental understanding, awareness and action programmes through workshops and cross-curricular activities meant to give employees and learners a voice. Indeed, taking such relevant steps will go a long way towards strengthening the provision of ESD in basic education.

The Way Forward

To create a world that is more just, peaceful and sustainable, all individuals and societies must be equipped and empowered by knowledge, skills and values as well as heightened awareness to drive such change. This includes learning to respect others and appreciating the environment, as well as giving back to society. This could be achieved through relevant seminars, workshops, resources and activities, whether at home, school or community. To enhance the success of such initiatives, preparation of carefully designed action plans to facilitate application of ESD, particularly in basic education is paramount.

Since teacher education is a critical aspect to be considered, there is need to bolster inclusion of sustainable development in the teacher education programmes. Such training should include appropriate content, pedagogy as well as development and acquisition of the necessary resources. Milne (2019) emphasizes that with trained and motivated teachers, it is far easier to inspire and motivate learners.

Critical thinking, imagination, learning to learn, communication and collaboration, are among the core competencies emphasized in the basic education curriculum in Kenya. Although the CBC is designed to achieve these, there is need for strong partnerships and more participatory evaluation mechanisms to enhance the quality of education for sustainable development programmes.

Conclusion

Like the rest of the countries in the globe, sustainable development issues in Kenya are complex, dynamic and interlinked. Embracing sustainable development and global citizenship education are considered to be the main solutions to these challenges. The latter entails peace and human rights education, intercultural education and education for international understanding. In particular, these should include the aspects of shaping the quality of training of specialists and humankind, using formal, non-formal, inclusive and democratically oriented models of education and science (Kondur, et al, 2020). Accordingly, countries should promote the availability of educational tools, teaching aids and textbooks for sustainable development to all who need them. But to achieve this, synergy among the initiatives taken as well as greater support from the various stakeholders is paramount.

Indeed, Sterling (2014) advises that unless the various stakeholders, including policy-makers, legislators, businesses, the media and civil society are involved in learning processes, the SDGs cannot be achieved. Education can enhance the effectiveness of each of these instruments through developing informed engagement, agency and empowerment among all the affected stakeholders. It can also build lasting change, because it is owned by the learner and touches both the heart and mind.

Although Kenya has made some milestones in rolling out a competency-based curriculum in the basic education institutions, there are still many challenges that need to be addressed in order to successfully implement it. These include producing the relevant education for sustainable development pedagogical materials, enhancing professional capacities, promotion of research, strengthening cooperation, communication and partnerships and the establishment of monitoring and evaluation processes. Going forward, formulation of action plans for implementation and appropriately training both present and future professionals in all sectors should be based on the basic ideas of education for sustainable development.



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Author

Benard O. Nyatuka (bnyatuka@kisiuniversity.ac.ke) is a Senior Lecturer in the Department of Educational Foundations at Kisii University, Kisii, Kenya.
[ORCID: 000-003-4343-1073](#).



Transformational Leadership and Wealth Creation in Educational Organizations: The Case of Higher Education in Cameroon

Patience P. Teneng

Abstract

Education is a trillion-dollar industry, with a growing population thirsty for knowledge. There has been tremendous influx of graduates in this industry, seeking self-reliance because obtaining a decent job upon graduation remains a nightmare in developing countries. Consequently, the surroundings of state and private universities in Cameroon are overcrowded with educational subsidiary enterprises created by graduates. Most of these enterprises intend to metamorphose into giant self-reliant enterprises while mitigating the problem of graduate unemployment. This rarely happens as most of the enterprises end at ground level, while others close down in less than 5 years. A question arises: What prevents these small and medium-sized education businesses from thriving? This study surveyed 210 small and medium-sized educational firms selected through clustering technique. The SWOT analysis technique was used to determine the strengths, weaknesses, opportunities, and threats to these firms. Results revealed little or no leadership or wealth creation education as a major weakness, that threatens these businesses from thriving. The multiple regression further confirms the absence of transformational leadership education as a statistical predictor to setbacks in these firms. Key recommendations call for mainstreaming pragmatic transformational and strategic leadership education in higher education courses, using the case of the faculty of education of the University of Yaoundé I. Learners should be introduced to the world of business through meaningful partnership with the world of work and quality entrepreneurship courses.

Keywords: Strategic leadership, Transformational leadership, Wealth creation, Educational enterprises

Introduction

Education is more than a trillion-dollar industry which is booming, maybe because of a growing global population with a keen thirst for knowledge. But the question of how well today's universities prepare students for an uncertain future of work constitutes the prime concern for this industry. The nature of the education industry is extremely specific as compared to other tangible and non-tangible commodity markets. This is so because human beings are at the center of every action, constituting the major input, being at the center of the processing, and as end products as well. Thus, a school cannot be managed like a super market. Individuals intending to, or already into the supply of education and training are required to possess relevant entrepreneurial skills in educational leadership. The European Commission (2013) views this type of leadership as educational experts with the ability to conceive,

design, plan and operate an educational project with significant impacts on participants. These experts should be skilled to significantly link education and the economic development of the nation as well. They should hold profiles of teachers, planners, inspectors in education, school curriculum designers, school administrators, managers, educational leaders, to name a few. The success of every business, including educational enterprises, requires the possession of entrepreneurial skills. Among these skills are wealth creation skills which are crucial for a well-grounded and sustained growth of enterprises. In this connection, the rapid rise and fall of small and medium-size enterprises in most countries around the world has been blamed on leadership lapses. This was confirmed in a study by the Canadian government in 2001 cited in Rowe (2001), which revealed that two important reasons why small and medium size firms become bankrupt and close down are poor overall management skills and imperfect capital structures. The poor management skills include lack of

Full listing of authors and contacts can be found at the end of this article.



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knowledge, lack of vision, and poor use of outside advisers. The imperfect capital structures result from either institutional constraints or lack of experience in management. The same study concluded that the way forward is effective leadership skill courses comprising of wealth creation skills, financial training and strategic leadership skills.

A study carried out by the National Institute of Statistics (2019) between 2009 and 2016 showed that the problem is compounded in Cameroon, revealing shocking figures on the premature sinking of small and medium-sized enterprises. According to this report published in March 2019, 96% of sinking enterprises are small and medium-sized as against 04% of huge firms, with a total of 2,316 enterprises that disappeared in this period. However, the report did not extend its reach to capture statistics on specific domains which could perhaps provide information on the state of education enterprises. An important note by this report was that only enterprises formally registered were sampled amidst an explosion of unregistered firms, particularly around the urban cities. Alternatively, this paper investigates private (non-government) formal and non-formal enterprises alike which are specifically involved in education and training activities (general teaching, technical and vocational training, writing, consulting enterprises, those in charge of preparing individuals for competitive entrance exams into public service jobs, study abroad issues, and language proficiency tests). The study by the National Institute of Statistics (2009) also highlighted aspects of human capital (education and training, experience, age and sex), which are of prime interest in this paper. Field statistics in this paper demonstrate high lapses in leadership skills (entrepreneurship, management, wealth creation skills) by those running these small and medium-sized education businesses in Yaoundé. Simply put, a considerable number of CEOs, administrators, and personnel running these small education enterprises confirmed to have acquired university education with no relevant entrepreneurship programs embedded. Graduates with certificates in education revealed that their involvement in educational business does not tie with their initial career objectives to occupy positions in public service, because of the prevailing unemployment situation in the country. According to NGU & Teneng (2020), 4.2% of the active labor force is currently unemployed. The underemployment situation is estimated at 7 on 10 individuals (71.75%). This is more acute in rural areas with 78.8% and 57.4% in urban centers (Cameroon, 2010, 44).

These authors also held that even though the public service has been able to absorb over 500,000 Cameroonians in the past years, the problem of graduate unemployment continues to be a call for concern because of the overwhelming number of unemployed graduate youths. The billion and one-dollar question is: What will become of these ready-to-work graduate youths in the face of limited job opportunities in the country? Most of them resort to the creation of educational enterprises for subsistence with the hope of growing them to bigger firms. Yet their efforts are short lived because their enterprises cannot stand the test of time. As these enterprises close down, their owners complain that their university education did not equip them with graduate skills for wealth creation or finding work in the private sector. The consequences are glaring as these entrepreneurs affirmed that their businesses are limited to the provision of daily bread, and nothing more. Others only operate seasonally when competitive entrance exams into public service jobs are launched. This is a peak period for such businesses when many candidates come seeking for preparatory classes in order to succeed in these exams. During interviews with the owners of these businesses, they revealed that majority of their businesses die off within a year. Based on such a morose situation, non-educational business men with very little or no mastery of the dynamics of the education sector have hijacked the educational enterprise for their capitalist gains. This demonstrates the failure of education faculty in higher education to impart the right skills for their learners to become strategic/transformational leaders in the educational enterprise. This is happening at a time when the future of education seems to be undergoing a paradigm shift into the fourth industrial revolution where technology is transforming how we live, work, play and think, making the problem of lack of skills more serious. According to (World Bank, 2019),

a wide range of occupations will require a high degree of cognitive abilities, such as creativity, logical reasoning and problem sensitivity as part of their core skill set. More than half of these do not yet do so today or only to a much smaller extent.

Today's education systems should equip youths with quality skills to thrive in tomorrow's world. Any continuous failure by today's educational systems to arrest this disastrous situation will permanently allow education into the hands of these capitalists whose



main objective is monetary gains, thereby returning the status of human beings to machines as was the case at the heart of the 18th century industrial revolution. In Cameroon for example, most schools in the private sector are owned by non-educational businessmen, who sometimes employ teachers with tertiary certificates in education to teach in the classrooms, and sometimes serve as administrators for minimal wages. This raises the question of why educators are not leading in the educational enterprise? Why have they simply remained employees and not employers in the educational enterprise? The small and medium sized educational businesses created by some educators such as capacity building training centers, rural education networks, evening schools, multi-education services and consulting firms have remained at ground levels. As a result, the economic condition of this category of persons has remained wanting.

This work set out to investigate the extent to which education and training at the faculty of education in the University of Yaoundé I equips graduates with strategic/transformational leadership skills that can lead to wealth creation and sustainably enhance the growth of the education industry. To do this, the following research questions have been formulated to guide the study:

Research Questions:

1. *To what extent does a university teaching(policy) influence the existence of a well-grounded wealth creation plan in educational enterprises in Cameroon?*
2. *To what extent does university curriculum content influence strategic/transformational leadership of graduates (wealth creation skills) in educational enterprises?*
3. *What is the relationship between teaching-learning models and graduates' strategic/transformational leadership skills (wealth creation) in educational firms?*
4. *What is the impact of mainstreaming modes of entrepreneurial education model in the faculty of education on leadership in educational firms?*

Conceptual literature

Leadership - The concept of leadership has been a crossroad of intellectual and pragmatic flexing among CEOs, researchers, writers, politicians, civil society activists, and the list is inexhaustible. Some experts

believe leadership means making a difference and transforming situations that seemed impossible, (Rowe, 2001). To others like Fonkeng and Tamanjong (2009), it is the ability of a manager to influence subordinates to voluntarily make efforts towards achieving organizational goals. These authors insist on the fact that personal skills and social attributes are crucial for leaders to succeed in an organization.

According to Farant (1980), the use of the concept 'leadership' without tying it to a specific domain or activity seems more confusing. This author explains that leadership skills are quite specific to context, though some common variables can be observed relating to the overall success of the organization. In this light, we can make mention of a religious leader, political leaders, CEO of a car manufacturing industry, the leader of a development and cultural association, the school principal, and the list is long. In relation to the leadership type that concerns this study (strategic/ transformational leadership in education or educational leadership), Bush and Glover (2012) define it as:

"... a process of influence, leading to the achievement of desired purposes. It involves inspiring and supporting others towards the achievement of a vision for the school which is based in clear personal and professional values"

However, the concept of leadership has evolved based on the functions, actions, risk taking, scope of interactions, and the targets they are expected to meet with specified time limits. Based on this, various conceptualizations like strategic leadership, managerial leadership, visionary leadership, transformational leadership, and transactional leadership have taken center stage in this debate. A clearer explanation of these concepts is presented below.

Managerial leadership - These are leaders concerned with the day-to-day running of the organization. To Fonkeng and Tamanjong (2009), managerial leadership simply means getting things satisfactorily done with a tactful use of available resources. This means that managers are more concerned with the manipulation of existing resources (human, material, and financial) so as to meet organizational goals. In the same light, Rowe (2001) asserts that managerial leaders may influence just the actions and decisions of those with whom they work. To him, they possess expertise in the operational and functional areas of the enterprise. However, they may make decisions that are not value-based. This does not mean that they are not



ethical and professional, but that they are rather under pressure to meet performance standards, thus limiting their scope of action. The observation in the past years is that managerial leadership has failed woefully in their tasks, as poor management decisions have rather destroyed organizational resources. This is true for the educational industry in Cameroon as small and medium sized educational firms have hardly survived a five years' infancy span, (National Institutes of Statistics, 2019). This discourse does not imply that this type of leadership is not needed in an enterprise. It is to rather inform readers that competent managerial leaders can only maintain existing wealth in a firm, but can hardly create any.

Visionary Leadership

In recent years, visionary leadership has been touted to be a preferred leadership option for most firms, including educational institutions. It is concerned with future orientations and risk-taking of the firm. In this direction, Rowe (2001) contends that this type of leadership maintains organizational control via socialization and fixed set of norms. It follows that visionary leadership deals with the inspirational component of transformational leadership. This confirms the fact that visionary leadership, though considered by some as mere dreaming for the future, is required for the future viability of the firm. However, an enterprise under such leaderships without strong managerial leadership accompanying it is liable to a down-to-earth failure. In this light, some experts posit that education leaders are not visionary, for they may be unable to provide even a five-year plan for their schools. This means they are limited to managerial leaders. Thus, they may need to consult the expertise of visionary leaders in order to better position themselves for future trends and threats amidst the absence of a grounded strategy to arrive at long-term or future targets. To say that visionary leaders may forecasts the future correctly, but lack a pragmatic realization strategy to meet these future challenges. But a major lapse with these leaders is that they are more disordered in maintaining present financial stability of the firm.

Strategic and Transformational Leadership

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Strategic leadership comes from the Greek word *strategos*, meaning a general in command in the army, which later evolved by 450 BC to include managerial skills, leadership, oratory and power. By 350 BC, it evolved to mean the ability to employ forces to defeat opposing forces, and to develop a unified system for global governance, (Rowe, 2001). This concept is used in this study to have the same meaning as transformational leadership. This author further explains that strategic leadership is the most preferred type by most organizations today, as it has repeatedly resolved the lapses contained in other forms of leaderships including transactional leadership, managerial and visionary leaderships alike. Strategic leadership maintains short-term operations and financial stability, while devising a grounded strategy for success in future bargains. This means that the strategic leader understands the emergent strategy process considered very important in organizational performance as compared to planning. It is also referred to as entrepreneurial leadership in education in this study and is used to describe individuals who have been equipped with relevant skills in the domain of education to be able to initiate, create, and run education businesses with commendable success.

According to Burns (1978), cited in Odumeru & Ifanyi (2013), Transformational leadership has been recently introduced. These authors further maintained that:

“Transformational leadership enhances the motivation, morale, and performance of followers through a variety of mechanisms. These includes connecting the followers’ sense of identity, and self to the project, and collective identity to the organization; being a role model for followers that inspires them, and makes them interested; challenging followers to take greater ownership for their work, and understanding the strengths and weaknesses of followers, so the leader can align followers with task that enhance their performance”. (Odumeru & Ifanyi, 2013, p. 356).

To Robins and Coulter as cited by Odumeru & Ifanyi (2013), a transformative leader is someone who creates positive change in followers, and in the organization. They pay attention to developmental issues of the organization, stimulate and inspire followers to approach old problems in a new way. They have the continuous

appetite to take the organization to another level, and giving it a better look as before (transform). Strategic leadership and transformational leadership have the same goals to meet, to take the organization to another level, and prepare it to overcome future challenges. It is for this reason that both leadership styles aim to perform above expected standards, maintain the present state of the firm, while working for heavy future achievements.

However, transformational leadership slides a bit from strategic style in that it is strongly tied to totally changing both the inner and outer look of the organization, whereas strategic leadership may be satisfied with an internal sustainable growth of the firm. Transformational leadership works more with followers transformed by the leaders themselves to hit defined targets, while strategic leaders better manage existing human resources to hit defined targets. However, the domain of education needs more of transformational leadership, since the inputs, machines, and outputs are human beings. Therefore, significant transformation is required, so to prepare key, and support staff to meet organizational goals more than expected.

Transformational Leadership and Wealth Creation

The concept of wealth creation in enterprises simply means securing sustainable financial resources, quality human and innovative infrastructural resources that will keep the enterprise growing in an upward trend for the present and for the future. Linking this to leadership can better be understood via the paradox of leading and managing *per se*. Rowe (2001) contends that wealth creation is at its best in enterprises with transformational leadership because these leaders make appropriate investments for viable future bargains, while maintaining the present financial state appropriately. These leaders have the skills to influence a critical mass of managers and personnel to make essential decisions that enhance stability in the daily operations of the enterprises, and for future viability as well. On the side of pure visionary leadership, the creation of wealth is faced with much difficulty as there is lack of an emergent strategy, or what is known as a pragmatic plan towards future viability of the firm. This type of leadership is poised with significant disorder in maintaining present stability of the firm. It falls squarely with the logic that *“a vision without transformative strategy makes no sense, unlike a strategy without action is worse than zero.”* Some schools of thought confirm the above, maintaining that enterprises can still flourish



with managerial leadership given they are well trained with transactional and transformational skills. Authors like Bass & Bass Bernard, (1985) and Yuki, (1994), think that transactional leaders manage, while transformational leaders lead. Thus, transaction and transformation are two sides of the same coin: to manage and to lead. In this light, transactional leadership means ensuring the day-to-day running of the enterprise through the motivation, reward and punishment of workers, whereas transformational leadership prepares strong grounds for the enterprise to face future challenges.

However, transformational leadership has evolved a lot in relation to wealth creation since all other forms of leadership or leadership characterizations are inherent. Transformational leadership is thus a contingency model as it encompasses all other forms of leadership as seen above. In the educational domain, as in this study, most of the graduates who own businesses are the ones running their institutions. The sluggish growth, stagnation and probable closure of these enterprises demonstrates lapses in their higher education training, which surely failed to equip them with transformational leadership skills.

Related Literature

Transformational Leadership in Higher Education

Educational institutions have always craved for adaptive changes in order to respond to the demands of the job market. This phenomenon dates back from the industrial revolution, when industries dictated and controlled education and training dynamics to their benefit. It was in this light, Davies & Davies (2004) insisted on the urgent need for transformational educational leaders as they explained in a 9-point memorandum which encompasses organizational abilities and individual abilities as seen below:

1. Strategic leaders have the following abilities:
 - Be strategically oriented
 - Translate strategy into action
 - Align people and organizations
 - Determine strategic intervention points
 - Develop strategic competencies
2. Strategic leaders have the following personal characteristics:
 - Dissatisfaction, restlessness for the present
 - Absorptive capacity
 - Adaptive capacity
 - Wisdom

This author concludes that any other leadership components are incorporated in the scope of strategic leadership, hence making it the ideal type needed by schools to survive and sustain the turbulence of today's environment. Also, Davies & Ellison (1997) explained that the dynamic of the 21st Century knowledge economy poses great fears for an uncertain future, as the world is moving into the fourth industrial revolution. School leaders must anticipate this uncertainty and device strategic action plans to train graduates to face the future volatile labor market. In relation to this study, starters and administrators of small education businesses need such skills so as to think and act big for a sustained growth of their enterprises. This will significantly step up livelihoods, employment, and the economy.

Theoretical considerations

A multitude of leadership theories have animated the discourse about which is the best to be used in what type of organization? Also, the debate of how to train in higher education for graduates to be equipped with specific leadership skills has been central as well. Theories like bureaucracy, administrative management, the concept of team spirit, systems and structural views, behavioral approach, motivational approach and management by objectives have been center stage in the debate. Henry Fayol (1951); Frederick Taylor (1911); MacGregor (1960); Elton Mayo (1946); Bernard and Simon (1940); Kreitner, (1995); as cited by Fonkeng and Tamajong (2009), believe that educational leaders are required to be cultured on various theoretical foundations of leadership to be able to influence leaders to graduate with the same skills. In addition to the above theoretical foundations of leadership, Burn's theory of transformational leadership has been considered as an overhaul of traditional approaches to current trends. This theory states that the leadership process is based on the mutual help of the leader and the subordinates for motivation and to increase their morale. His theory is believed to be consistent with present democratic norms, and most essentially as it emphasizes on the moral and educative nature of relationships between the leaders and the followers. Burn described transforming leaders as those who work to positively change followers to become leaders for the growth of the organization. To him, transforming leaders strive for cultural change in an organization, which is not the case with transactional leaders. Thus, transforming leaders are exemplary models who work for the team/group,



organization and for the community (Burns, 1978). Burn's transformational leadership is based on three themes, which are:

- **Power and motive:** this calls for the control of power since they are dealing with humans. To Burns, the purpose of power should be to uplift subordinates and customers, and not crushing them.
- **Leadership as mutual purpose:** transformational leaders are required: power should be used for a clear human purpose, and not for an individual purpose or to resolve self-interest.
- **Transformational leadership as a moral attempt:** these leaders are required to demonstrate the following qualities: humbleness, morality, excellent communication skills, positive attitude, forgiveness, peace-oriented, powerful presence, clear vision, focus, determination, patience, hopeful, inspirational... (Egli, 2019).

Burns also contends that Transformational leaders are of various types which are:

- **Reformists:** transforming a huge number of subordinates for high moral values.
- **Intellectualists:** using intellectual values to transform people.
- **Revolutionists:** leaders who sacrifice, and transform the whole aspect of a society.
- **Charismatic or charming:** role models.

The work of Burns was extended by Bernard M. Bass (1995), who explained the psychological mechanisms that underlie transformational and transactional leaderships. To him, transformational leadership could be measured based on the influence on and motivation of followers to perform in attaining organizational goals. He asserts that when followers feel trust, admiration, loyalty and respect for such leaders, they work harder than expected. Bass (1995) presents the qualities of a transformational leader as follows:

- **Individualized considerations:** responding to followers' personal needs via coaching, motivation, mentoring, empathy, support, and push for self-development and intrinsic motivation for task realization.
- **Intellectual stimulation:** considering follower's ideas in decision-making. This encourages creativity, learning and some degree of self-confidence by followers. It is however a high-level risk for the leader.

- **Inspirational motivation:** the extent to which the leaders communicate the vision and mission of the organization to followers determines their engagement. Transformational leaders communicate missions, and tasks with absolute optimism, and offers something more than just conventional gains to followers.
- **Idealized influence:** works as a role model, instills pride, high ethical behavior, respect and trust.

However, this theory was criticized for being more an idea than pragmatic. Some schools of thought slammed the theory for not being well suited for complex and emergency situations. (Bass & Avolio, 1994a & 1994b).

Implications of the theory

Leaders of small and medium sized educational enterprises are required to subscribe to this trend of action. This is justified by the fact that wealth creation can be a success only if transforming skills are possessed and demonstrated. Such leaders must have a sense of power and purpose, leadership and moral values which give high credibility and reputation to an enterprise, thereby attracting wealth in other forms such as finances, more clients, partnership with big organizations, and individual donors, and experts. Leaders of these businesses are required to use their power with human purpose: skilled development, education and training of leaders. Using this power to intimidate others will yield no fruits. Nelson Mandela is a perfect example as he used his power for the growth of the South African society. And finally, these leaders are required to harness humility, patience, hopefulness, positive attitudes, so as to attract responsible partners, more clients, and subsequently wealth creation in terms of reputation, values, finances, human relations, and logistics. But if these leadership skills are not demonstrated by higher education leaders in terms of administrative and teaching staff, graduates will not be able to have and use these skills for self-reliance in their private start-ups for wealth creation when employment with the government cannot be found.

Methodology

Study Design and Instruments

The study used a survey design which permitted the perfect management of a heavy population (210 respondents), and the use of an exhaustive 15-item



carefully designed SWOT work sheet to collect data on the strength, weaknesses, opportunities and threats to these firms. This data also permitted us to ascertain the Link between transformational leadership skills and wealth creation, using the case of the Faculty of Education (the University of Yaoundé I). Secondary data was obtained through documentary reviews, with most documents accessed online.

Population: The population under study constitutes cohort graduates of between 2014-2019, of the Faculty of Education, The University of Yaoundé I, who own and run, or are former owners of small and medium-sized educational firms in and around university campuses in the city of Yaoundé.

Sampling methodology: these graduates were traced through the snowball technique, then grouped into clusters for easy data collection.

Data analysis technique: the data was analyzed with SWOT Analysis and Multiple Regression Analysis techniques.

Results

The SWOT analysis was used to analyze data collected and is written in full as:

SWOT: **S** = strength, **W** = weaknesses, **O** = Opportunities, **T** = Threats.

The objectives for using SWOT analysis in this study was firstly to verify the SWOT of the enterprises and secondly to find out if leadership is conscious, and has the capacity of carrying out a SWOT for their firms, so as to prepare a strategic plan of action for the growth of their firms. The SWOT Matrix (Table 1) presents a report on some 10 small and medium sized educational firms.

The SWOT matrix in Table 1 summarizes the responses provided by some enterprises in relation to

leadership and wealth creation. Looking at this table, we realized that these enterprises possess very little strengths with regards to wealth creation and sustainable growth. These firms demonstrate heavy weaknesses, which are strongly tied to leadership issues, organization, and management. However, the enterprises are surrounded by golden opportunities, which strong leadership can transform to wealth. Added to these weaknesses are threats which can cause the firms to short down if leadership is not improved.

Table 1. SWOT Matrix

Internal	External
Strengths. - Enumerate leadership strengths that could enhance sustainable wealth creation in your firm.	Weaknesses. - Given the context in which you operate, can you bring out the leadership weaknesses of your firm in relation to wealth creation?
- Most of our students who attended preparatory classes have often succeeded in competitive entrances into elite schools. - We have well-skilled teaching staff. - We are objective focused, to prepare learners for a particular purpose. - My firm is an adult evening school and has obtained above 50% at the GCE O/A levels exams for three years.	- Limited use of social media. - Poor infrastructures. - Limited finances. - Lack of a strategic plan - seasonal (only when competitive entrances are launched). - Absence of e-marketing. - No partnerships. - No ICT integration in the teaching learning process. - Lack of smart fund-raising schemes. - Lack of operating license - Insecurity/ and lack of confidence.
Opportunities. - What opportunities do your firm have based on leadership and wealth creation?	Threats. - What are the factors you consider as threats to wealth creation and the growth of your firm, given the leadership status-quo?
- Existence multiple funding opportunities by non-governmental organizations, government initiatives such as the recent presidential funding for graduates' start-ups. - Leadership workshops organized by British Council & business organizations. - Strategic location of firm around university campus. - A heavy population thirsty for knowledge. - Existence of trained teaching staff.	- Lack of operation license - Illegal location. - An increase in e-marketing - Increase in ICT integration in the teaching-learning process. - Poor organization. - No strategic business plan. - Weak leadership. - Emergence of well-organized educational start-ups with e-strategies(marketing & teaching).



Descriptive Statistics

Table 2 shows the codes and gradients as to the Likert scale used on the questionnaires. The number 1 represents strong denial to the statement, whereas the number 2 represents normal denial. The number 3 represents normal acceptance, whereas the number 4 represents strongest acceptance.

Table 2. Likert scale Key

KEY		Gradient
SDA	Strongly Disagree	1
DA	Disagree	2
A	Agree	3
SA	Strongly Agree	4

Item 1 on Table 3 reveals more respondents' strong denial for the fact that higher education policy reforms established significant orientations towards entrepreneurship education and wealth creation, rated at 61.0%. this adds to 22.4% who agreed as well, thus amounting total disagreement to 83.4% as against 16.6% who adhered. Item 2 equally scores strong denial for the statement that higher education policy has specific targets on the educational industry, rated 66.2%, and supported by 21.9% simply agree, amounting to 88.1%, as against 11.9% agreeing. The same is true for for Item 3, as the denials have 71.9% and 13.8% strongly, and simply agreeing respectively. All three items demonstrate statistical weakness of higher education reforms to hone relevant skills towards wealth creation.

Table 3. University teaching policy & wealth creation plans in educational firms.

NO	Item		SDA	DA	A	SA
1	The higher education policy reforms in Cameroon has established strong orientations towards entrepreneurship education and wealth creation in enterprises.	<i>f</i>	128	47	26	9
		%	61.0	22.4	12.4	4.2
2	Higher education reforms targets are quite specific with regards to various domains. This has specifically taken care of the realities of the educational industry.	<i>f</i>	139	46	24	0.5
		%	66.2	21.9	11.4	0.5
3	Implementation of these reforms are practiced in faculty teachings	<i>f</i>	151	29	21	9
		%	71.9	13.8	10.0	4.3

Table 4. Curriculum and transformational leadership.

NO	Item		SDA	DA	A	SA
1	Content design in terms of conception guarantees prospects for transformational leadership skills in education.	<i>f</i>	202	8	0	0
		%	96.2	3.8	0	0
2	Content design in terms of programs specialty is tailored towards developing wealth creations skills in learners.	<i>f</i>	186	24	0	0
		%	88.6	11.4	0	0
3	Content is more practical than theoretical and strongly rooted in leadership theories and practices.	<i>f</i>	180	22	8	0
		%	85.7	10.5	3.8	0

Item 1 of table 4 indicates that a larger percentage of respondents making 96.2% strongly disagree on the fact that content conception guarantees prospects for transformational leadership skills. The rest 3.8% disagreed as well, whereas no respondent simply agreed or strongly agreed to this item as shown in columns A and SA. On its part, item 2 scored 88.6% and 11.4% strongly and simply disagreeing on the statement that content specialty is tailored to develop wealth creation skills. however, no respondent agreed or disagreed on this item as shown in columns A and SA. In item 3 of the same table, 85.7% of respondents and 10.5% strongly disagreed and agreed respectively on the statement that the content is rooted in leadership theories and practice, whereas only 3.8% simply agreed on. The tendency illustrated by these statistics explains the predicted pattern that content dynamics in higher education are weak regarding transformational leadership and wealth creation.



Table 5. Teaching-learning models and wealth creation.

N0	Item		SDA	DA	A	SA
1	Teaching-learning model is an apprentice model or significantly internship based	<i>f</i>	186	21	3	0
		%	88.6	10.0	1.4	0
2	Industrial stakeholders significantly participate in career orientation workshops, and leadership motivational discourses during the degree program	<i>f</i>	199	11	0	0
		%	94.8	5.2	0	0
3	Industrial stakeholders significantly participate in faculty program delivery through meaningful internship training.	<i>f</i>	112	18	53	27
		%	53.3	8.6	25.2	12.9

Table 6. The importance of entrepreneurial education.

N0	Item		SDA	DA	A	SA
1	Entrepreneurship courses are obligatory in all the departmental curricula.	<i>f</i>	210	0	0	0
		%	100.0	0	0	0
2	The dose of entrepreneurship courses are significant in terms of start-ups, organizational leadership, wealth creation, and business management.	<i>f</i>	193	17	0	0
		%	91.9	8.1	0	0
3	Volunteerism education is being mainstreamed in the curriculum. This is a push factor for learners to acquire relevant field experiences in general, and leadership skills in particular.	<i>f</i>	210	0	0	0
		%	100.0	0	0	0

Item 1 of table 5 indicates that the teaching models used in higher education are not apprenticeship-based as strongly disagreed by 88.6% of the respondents. 10% equally disagreed, whereas only 1.4% agreed. 94.8% of respondents strongly disagreed with the statement that industrial stakeholders significantly participate in career orientation workshops, and leadership motivational discourses during the degree program. The survey revealed that 5.2% disagreed as well, while no respondents agreed or strongly agreed. Looking at item 3, we noted that 53.3% and 8.6% of the respondents strongly agreed and agreed respectively on the university–industry partnership in teaching. However, 25.2% agreed, while only 12.9% strongly agreed. Judging from the observation, we infer that the bulk of the respondents have underscored that teaching methods are not geared towards developing skills for transformational leadership and wealth creation. This has a strong link with the problem under investigation as entrepreneurship skills are required to be transmit

ted via hands-on approaches to familiarize learners with real world circumstances.

Item 1 on table 6 shows that all respondents strongly disagree with the fact that entrepreneurship courses are transversal in all departments. Unlike in item 1, item 2 indicates a high percentage (91.9) of respondents who disagree with the statement that the dose of entrepreneurship courses is significant in terms of start-ups, organizational leadership, wealth creation, and business management. The remaining 8.1% simply disagreed as well, whereas, no respondent agreed or strongly agreed as indicated by the “0” in the two columns in the right. For item 3 all respondents disagree that volunteerism education is being mainstreamed in the curriculum. However, the observation from these statistics explains the inference that entrepreneurship education is offered the least important place in the education and training of higher education graduates. This may explain why they lack skills to successfully run their businesses.



Table 7. Distribution of respondents based on wealth creation skills.

NO	Item		SDA	DA	A	SA
1	My firm has a strategic business plan which permits us to obtain significant funding from donors.	<i>f</i>	124	47	20	19
		%	59.9	22.4	9.5	9.0
2	My firm has entered into meaningful partnerships that allows essential interactions involving financial exchange, training exchange, scholarships, policy issues, leadership expertise and growth tactics.	<i>f</i>	175	32	3	0
		%	83.3	15.2	1.4	0
3	Our enterprise is growing sustainably in terms of reputation and credibility, candidates, human resources, logistics, and financial capital	<i>f</i>	174	26	10	0
		%	82.9	12.4	4.8	0

Item 1 on table 7 probes into the availability of strategic business plan which permits businesses to obtain significant funding from donors. Field statistics show that 59.9% and 22.4% of respondents strongly disagree and disagree respectively. However, 9.5% agreed, whereas 9.0% strongly agreed. Looking at statistics from item 2, we noted that 83.3% of the respondents strongly disagreed that their firm has entered into meaningful partnerships that allows essential interactions involving financial exchange, training exchange, scholarships, policy issues, leadership expertise and growth tactics. The data also show that 15.2% adhered to this statement, while only 1.4% agreed. Data in item 3 indicates that 82.9% of the sample strongly disagreed that their firms were growing sustainably, while 12.4% disagreed. On the other hand, an extremely small portion 4.8% simple agreed, whereas no respondent strongly disagreed. The meaning that can be made out of these data may explain the struggling circumstance which these firms experience. They struggle to thrive, as most even closed down before 5 years.

Inferential Statistics

To test the hypotheses, the data were analyzed using a multiple regression analysis to confirm a correlation between several variables captured in the survey data. The data were then analyzed using ANOVA methods to identify the relationship between the variables.

Multiple regression Analysis.

Table 8 suggests that there is an extremely high correlation $R (0.996)$ between transformational leadership and wealth creation in educational enterprises by graduates. This high correlation coefficient signifies that transformational leadership skill is highly significant for any good performance in educational firms. Otherwise, the mal-performances observed in educational enterprises around the city of Yaoundé is strongly linked to poor leadership skills by its owners. This finding is reinforced by another key statistics on the same table 8, R-square or R^2 (0.992) shows indicating that 99.2% of poor wealth creation in educational firms can be explained by lapses in transformational leadership skills, whereas, the remaining 0.8% is explained by factors out of the model. On a more specific level, table 8 equally suggests that R-adjusted ($.992$) indicates a very good variable-fit of all sub variables. Hence, higher education policy, transformational leadership curriculum, wealth creation teaching-learning models, modes of mainstreaming entrepreneurship education in faculty teaching significantly fit and strongly predicts wealth creation in educational firms by graduates. This means that worrying lapses exist at specific variable levels of university training (see tables 3, 4, 5, and 6).

Table 8. Model summary

Model	R	R-square	Adjusted R-square	Std. Error of Estimate
1	.996a	.992	.992	.16640

a. Predictors: (Constant), higher education policy model towards wealth creation plans, transformational leadership curriculum, wealth creation teaching-learning models, modes of mainstreaming entrepreneurship education in faculty teaching.



Table 9: ANOVA.

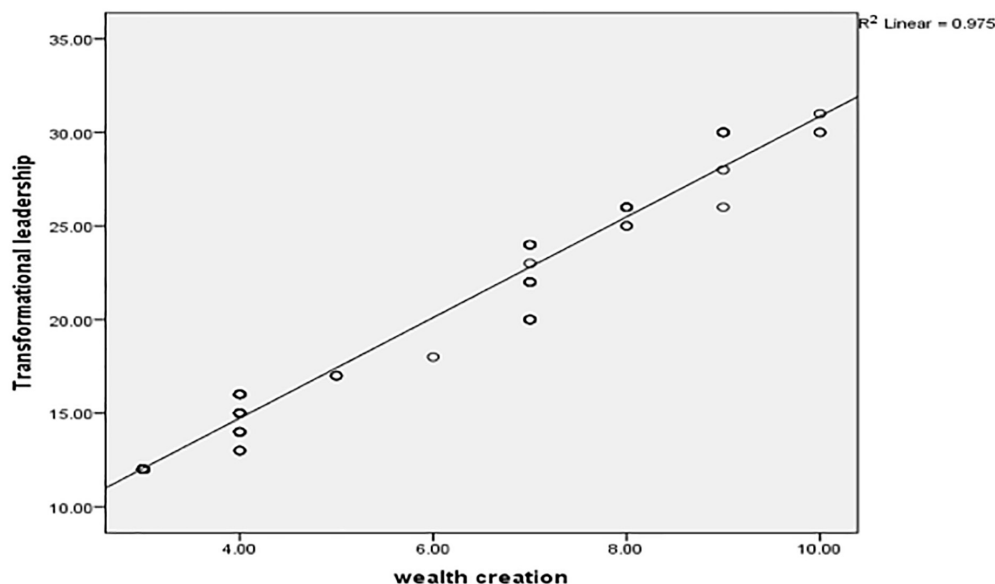
	Model	Sum of squares	Df	Mean square	F	Sig.
1	Regression	694.781	4	173.695	6273.073	.000b
	Residual	5.676	205	.028		
	Total	700.457	209			

a. Dependent Variable: wealth creation in educational firms by graduates.

b. Predictors: (Constant), higher education policy model towards wealth creation plans, transformational leadership curriculum, wealth creation teaching-learning models, mainstreaming entrepreneurship education in faculty teaching.

Table 9 shows that the overall regression model is a good fit for the data. This table indicates that transformational leadership skills statistically significantly predicts wealth creation in educational firms by graduates. ($F_{(4,205)} = 6,273.073$, $p < 0.0005$). This means that the poor wealth creation situation in educational firms by graduates is highly explained by the lapses in transformational leadership skills embed by faculty teachings.

The scatter-plot graph (Figure 1) demonstrates a significant concentration points around the straight line. This indicates a significant relationship between transformational leadership skills and wealth creation. The correlation coefficient is 0.957, approaches 1, therefore strongly supports the hypothesis.

Figure 1. Relationship between transformational leadership and wealth creation.

Discussion of Results

Graduate unemployment has reached preoccupying levels in Cameroon, thus appealing for every bit of reflection on measures to tackle the problem. It is for this reason that the surroundings of educational milieus are filled with graduates operating small and medium sized enterprises. This study initially set out to investigate the extent to which graduates of the Faculty of education are equipped with transformational leaderships skills, for them to thrive in these enterprises. In this light, 210 firms were sampled for questioning, whereas some went through a SWOT analysis. This permitted the researcher to bring out the strengths and weaknesses of these enterprises, and to determine the degree of prediction on wealth creation by transformational leadership lapses in the enterprises.

This was demonstrated by the results obtained after running the multiple regression test ($F_{(4,205)} = 6,273.073$, $p < 0.0005$, $R^2 = 0.992$). This test permitted us to confirm all four predictors: higher education policy model towards wealth creation plans, transformational leadership curriculum, wealth creation teaching-learning models, modes of mainstreaming entrepreneurship education in faculty teaching as statistically significant towards wealth creation. This is justified by descriptive statistics, where respondents strongly disagreed with

the fact that higher education policy reforms in Cameroon have established strong orientations towards entrepreneurship education and wealth creation in enterprises. As a matter of fact, 61% strongly disagree, while 22.4% also disagreed, thus aligning to this thesis. The 2016 report by the National Institute of Statistics held that a key strategy to fight the premature collapsing of small and medium sized enterprises is establishing strong human capital training policies. To Rowe (ibid), the leadership of enterprises must receive essential skills for the task at hand.



Moreover, 66.2% and 21.9% strongly disagreed and disagreed to the statement that education reforms targets are quite specific with regards to various domains. This has specifically taken care of the realities of the educational industry. The observation in the Faculty of Education indicates the absence of transformational leadership courses as obligatory teaching units, as well as the absence of a specific entrepreneurship content. Statistics indicates a 100% of respondents strongly disagreeing to the presence of domain specialization in leadership courses, and the presence and an obligatory leadership and entrepreneurship education. This position is supported by the European document on entrepreneurship leadership in education recommends high level mainstreaming of this type of education in educational policy, curriculum and teaching approaches.

The world document for 2019 on leadership which makes mention of the need for intellectual skills as critical to the success of educational leaders. In this light, Bass & Bass (2009) talk of intellectual stimulation as a key quality of transformational leaders. These authors explained that transforming leaders is a great deal of having the intellectual capacity to get followers into creativity and innovation. However, this cannot be done without having acquired relevant leadership skills. Things become more serious as 91.9% of respondents strongly disagreed that the dose of entrepreneurship courses are significant in terms of start-ups, organizational leadership, wealth creation, and business management. This is followed by 100% of respondents disagreeing that voluntarism is being encouraged during training. The European entrepreneurship leadership in education posits that strong educational leaders cannot be produced when field acquaintances are excluded during training. The document upholds key modes like meaningful partnerships between faculty and industry in curriculum design and delivery, and a significant mainstreaming of volunteerism culture in our system.

The degree of weaknesses presented by these enterprises is a vivid indicator of the absence of transformational leadership skills in these firms. These weaknesses range from limited infrastructure to no partnerships, lack of a strategic plan, but to name a few. In addition to this, a close look at the threats such as Lack of operation license, Illegal location, an increase in e-marketing, increase in ICT integration in the teaching-learning process, poor organization, no strategic business plan, weak leadership strongly justify the premature shoot-down of these businesses. These weaknesses are visible in wealth creation statistics as

82.9% of respondents strongly disagree their enterprises are growing sustainably in terms of reputation and credibility, candidates, human resources, logistics, and financial capital. This falls squarely with the re-formist and idealized qualities of a transformational leader by Bass (1995), who thinks that wealth creation means transforming every aspect of the organization.

However, when we look at the unexploited opportunities which could help sustain these firms, we conclude that there is need for strong transformational leadership skill for these owners of the businesses. Some opportunities include: existence of multiple funding opportunities by non-governmental organizations, and some government initiatives such as the recent presidential funding for graduates' start-ups, leadership workshops organized by the British council, and business organizations, strategic location of the businesses around the university campus, a heavy population thirsty for knowledge, and existence of trained teaching staff. This means that the need for transformational leadership is imperative so as to transform these opportunities into strength towards wealth creation in these firms.

Conclusion

This study set out to investigate the bearing of transformational leadership education in universities on graduates' wealth creation. The wealth creation skills acquired by graduates will be a signal as to whether their business start-ups succeed or fail. Possession and use of these skills in small and medium sized enterprises opened by graduates of the university of Yaoundé I are therefore determinants of the lifespan, growth and profitability of these businesses. Based on SWOT and regression tests, findings revealed lapses in programs, government policy and teachings methods. Given the grim picture of employment in the country, it will be high time transformational leadership skills are embedded in higher education curricula as a whole to equip graduates with skills that can enable them have a smooth transition to the volatile labor market and to keep afloat in the tense competition therein.

Another concluding note in this paper is in this paraphrase by Victor Hugo in Axford (1969), that nothing is truer than the power of an idea when its time has come. But that idea must be borne by people with vision, leadership and moral fortitude to recognize the validity of the idea and institutionalize it. It is therefore time transformational leadership education



gained its place among the professions, especially within the profession of education in Cameroon. It has too long been peripheral and marginal. Government and other education stakeholders must start thinking of how this can be woven into the educational fabric of our country, so that it can play its own role; that of providing sustainable self-employment to graduates when government fails to.

Recommendations

The following recommendations could greatly lead to improvements in the quality of education and catalyze wealth creation for graduates.

There should be reinforcement of policy implementation in higher education through commensurate quality control measures by putting in place a higher education planning team who should seek to understand the needs of all stakeholders in the higher education domain. This team will be in charge of carrying out a need analyses of all stakeholders in higher education periodically in order to inform curriculum designers. The team will advise the minister of higher education on issues of curriculum reforms by producing periodic reports on evolving global trends in the higher education arena, so as to address quality and respond to the demands of the 21st century knowledge economy. This will partly solve Cameroon's pressing need of producing more market ready graduates who will not fall into the unemployment trap.

Secondly, promotion of entrepreneurship education should be one of the topmost education reforms in the country so as to encourage the creation of enterprises which can absorb the growing number of unemployed graduates. Final year students should be placed in enterprises for internships or volunteerism to develop work experience as required prerequisites for finding first graduate employment or creating one. Finally, with regards to government policy, there is need for an increase in public spending on higher education in terms of updating dilapidated infrastructure such as laboratories, and installing modern technological and ICT gadgets in order to professionalize teaching and evaluation in a bid to enhance practical knowledge acquisition which is indispensable in wealth creation.

Suggestions for further research

The following suggestions for further research are made based on the belief that no research work can be all encompassing and that research is continuous. It will therefore be proper to open up and cast a glance into future research interests which could emanate from this one or build on it. The same research topic could be carried out with a larger population and sample, covering more African countries selected for comparability and best practice. Other research interest could focus on the comparability of private and public universities in terms of graduate employability in Cameroon. Another study could also focus on the demand and supply of entrepreneurship education and the effects on economic growth. Finally, these suggested areas of research could be carried out for longer periods of experimentation and with larger sample sizes to enhance the degree of reliability.



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Author

Patience P. Teneng (patience.bame@yahoo.com) is a Lecturer in the Department of Curriculum & Evaluation at University of Yaoundé, Yaoundé, Cameroon.



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