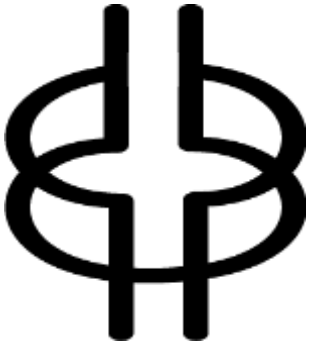
Ghana Journal of Education: Issues and Practice (*GJE*)



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Editorial Comment

The Ghana Journal of Education: Issues and Practice (*GJE*) is a peer reviewed journal which focuses on classroom practice and issues as well as policy issues and practice that affect teaching and learning. In this volume, researchers and authors have contributed a wealth of high quality and informative material to the journal.

Eric Magnus Wilmot argues in his paper that until now, the various conceptualizations of teacher knowledge have been mostly general and not domain specific enough. In addition, researchers who have relied on these earlier conceptualizations have mainly concerned themselves with teacher knowledge qualitatively. In an attempt to shift from these general conceptualizations and the qualitative measures of teacher knowledge, he draws on the Knowledge of Algebra for Teaching (KAT) project's conceptualization of teacher knowledge for teaching algebra to investigate teacher knowledge quantitatively in domain specific terms using 209 research participants. He makes an insightful proposal on an elaboration of the KAT project's domain specific conceptualization of teacher knowledge that recognizes overlapping packages of knowledge and lends itself to being assessed both qualitatively and quantitatively.

Joshua Adebisi. Omotosho, Stephen Doh Fia, Kwasi Otopa Antiri and Caroline Oye Otuei employ Holland's classification of work environments to investigate the preferred careers of senior high school (S.H.S) students in Ghana, using 364 SHS students from four senior high schools in Koforidua in the Eastern Region of Ghana. They provide a number of interesting findings, notable among them is the fact that Social careers are the most preferred among the research participants. The researchers have given a number useful recommendations and implications for counselling in schools.

Ernest Kofi Davis and Wee Tiong Seah draw on theories relating to the local aspects of mathematical knowledge and mathematics pedagogy to explore how the teaching and learning activities carried out in mathematics classrooms in Ghana deal with these aspects, using measurement of money as an example. They have provided a number of interesting findings and recommend an alternative approach to the teaching of measurement of money in context, based on a three-tier teaching strategy.

Eric Nyarko-Sampson and Kyeremeh Tawiah Dabone investigate the counselling needs of 207 students on sandwich programmes of the Institute of Education, University of Cape Coast, using Counselling Needs Inventory designed by the investigators. They make a number of interesting findings and provide recommendation and implications of their finding for counselling.

Joshua Adebisi Omotosho, Janet. Anyetey, Kwasi Otopa. Antiri and Caroline Oye Otuei investigate the sources of stress and management strategies that are common to ministers of the gospel, using a total of 250 ministers of the gospel serving in the Orthodox, Pentecostal and Charismatic churches in the Cape Coast Metropolis in the Central Region of Ghana. They present a number important findings and recommendations for counselling and the church.

Prosper Deku investigates the moderating role of teachers' demographic characteristics on the attitude and technology usage in predicting successful inclusive education, using a cross-sectional survey, 124 participants from 15 inclusive schools in the southern part of Ghana. He makes an interesting observation about the relation between teachers' biographic data and their attitude and technology usage in inclusive education and provides some useful recommendations to providers of education in Ghana.

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Reconceptualising Teacher Knowledge in Domain Specific Terms

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Abstract

Literature is replete with different conceptualizations of teacher knowledge, each with their implications on teaching practices. Pivotal among these are conceptualizations of content knowledge, curriculum knowledge, pedagogical knowledge and pedagogical content knowledge. The paper argues that until now, the various conceptualizations of teacher knowledge have been mostly general and not domain specific enough. In addition, researchers who have relied on these earlier conceptualizations have mainly concerned themselves with teacher knowledge qualitatively. In an attempt to shift from these general conceptualizations and the qualitative measures of teacher knowledge, the study on which this paper is based relied on the Knowledge of Algebra for Teaching (KAT) project's conceptualization of teacher knowledge for teaching algebra and an adaptation of one of the instruments. Two hundred and nine participants comprising 189 prospective and 20 in-service high school mathematics teachers in Ghana took part in the study. From the findings of the study, this paper argues that effective mathematics teachers do not only use the individual conceptualized knowledge but sometimes also blend these types of knowledge into somewhat new forms of knowledge. Consequently, the paper proposes an elaboration of the KAT project's domain specific conceptualization of teacher knowledge that recognizes overlapping packages of knowledge and lends itself to being assessed both qualitatively and quantitatively.

Key words: Knowledge for teaching algebra, pedagogical content knowledge in algebra, advanced algebra teaching knowledge, school algebra teaching knowledge.

Introduction

For many years, researchers in the field of education have expressed divergent opinions about which school factors influence

student achievement. According to Duthilleul and Allen (2005), this debate was started in the US after Coleman et al., (1966) analyzed data from about 600,000 students and 60,000 teachers in more than 4,000 schools and, in their report entitled Equality of Educational Opportunity, concluded that only about 10 percent of the variance in student achievement could be explained by school factors. In that report, they stated "that family background characteristics and community level variables accounted for more variance in student achievement than school resource variables like . . . teacher characteristics" (p.3). This finding led many people to even question whether schools matter at all in student learning.

In the intense debate that ensued thereafter, viewpoints emerged that questioned whether schools matter in student learning. Wilmot (2008) has argued that, "such negative findings and views about schools and teachers in particular could be the impetus of early attempts at conceptualizing the knowledge base for teaching that was spearheaded by Shulman (1986a, 1986b, and 1987)" (p. 33). The point needs to be made that initial attempts at conceptualizing the knowledge for teaching were not only aimed at debunking the aforementioned conclusion made by the Coleman committee but also aimed at establishing the idea that a specialized type of knowledge is needed to become a successful teacher, thereby improving the value and image of teachers. This was the issue Strom (1991) aptly made when he said, "at one level, concern about the knowledge base focuses on improving the respect and status accorded teaching, thereby making it a more rewarding career" (p. 1). Strom (1991) was indirectly arguing that making a case that teaching involved a wise application of a specialized body of knowledge was necessary to also emphasize the point it (teaching) influences learning outcomes.

It can be argued that the idea of *pedagogical content knowledge* (PCK) introduced by Shulman (1986b) was quite pivotal in the wave of research into teacher knowledge. Not only that, the conceptualizations by Shulman and his colleagues of *content knowledge* and *pedagogical content knowledge* and the distinction between them threw the brightest light on how teacher knowledge could influence teaching and brought the attention of researchers in several content domains to issues involving the type of knowledge teachers need about content for teaching, different from what an ordinary adult may have (see for

example, Ball, 1988; Wilson & Winneburg, 1988; Grossman, 1990). It can even be argued that the conceptualization of *technology pedagogical content knowledge* (TPACK) (see Koehler & Mishra, 2008 Mishra, Koehler, & Henriksen, 2011) is partly influenced by the PCK conceptualization earlier formulated by Shulman and his colleagues.

Though the work by Shulman and his colleagues threw the brightest light on issues of teacher knowledge, prior to their conceptualization earlier researchers had proposed several other conceptualizations (see reviews done by Doyle, 1977; Gage, 1978; Brophy & Good, 1986, as well as studies such as, Berliner, 1979; Peterson & Swing, 1982; Leinhardt & Smith, 1985). For instance, Leinhardt and Smith (1985) proposed *lesson structure knowledge* (LSK) and *subject matter knowledge* (SMK) as two types of teacher knowledge. According to them, LSK comprises smooth planning and organizing of lessons and providing clear explanations, while SMK consists of concepts, algorithmic operations, connections among different algorithms and knowledge of the types of errors students make.

The point also needs to be made that another effect of the 1966 Equality of Educational Opportunity report by Coleman and his colleagues was the interest it generated, and rightly so on investigations into the effects of instruction on student learning. By the mid 1980s enough studies had established the fact that schools in general and teachers in particular matter in student learning. Presently there is agreement, among a number of researchers that one of the most important factors affecting student learning outcomes is the teacher (see for example, Jordan, Sanders & Rivers, 1996; Mendro, & Weerasinghe, 1997; Wright, Horn, & Sanders, 1997; Wilmot, 2009). Wright and his colleagues, for instance, concluded that "Effective teachers appear to be effective with students of all achievement levels, regardless of the level of heterogeneity in their classrooms. If the teacher is ineffective, students under the teacher's tutelage will show inadequate progress academically despite how similar or different they are regarding their academic achievement (Wright et al., 1997, p. 63). And as if to tie such efforts up together, Brophy and Good (1986) reviewed a number of studies conducted since the 1970s and concluded that, "The myth that teachers do not make a difference in student learning has been refuted" (p. 370).

In spite of the refutation of this myth, researchers have continued on investigations towards re-conceptualization of the knowledge base for teaching different from Shulman's framework in more domain specific terms. Notable among these is the work by Liping Ma. Ma (1991) undertook a study in which she interviewed 95 elementary schoolteachers, 72 from China and 23 from the U.S. In *Knowing and Teaching Elementary Mathematics: Teachers' Understanding of Fundamental Mathematics in China and the United States*, Ma (1999) discusses the outcomes of this study from which she introduced a different kind of conceptualization of the knowledge base for teaching, which she termed *Profound Understanding of Fundamental Mathematics* (PUFM). It can be argued that Ma's conceptualization is different from that of Shulman in that while Shulman's (1986b) conceptualization is a generalized form of knowledge that is essentially not domain specific, Ma's (1999) conceptualization is limited to mathematics (i.e., Ma's is more domain specific than Shulman's). However, the two conceptualizations show some semblance in the sense that both involve a complex combination of some form of content and pedagogical knowledge except, as already pointed out, that whereas Ma's conceptualization is restricted to the subject matter of mathematics, Shulman's seem to be related to a generalized content, not necessarily mathematics.

All the aforementioned studies produced mostly qualitative information about teachers' knowledge and its influence on their teaching practice. In a subject, such as mathematics, though such qualitative information are worthy, quantitative measures are also necessary to ensure that mathematics teachers have a good knowledge of the mathematics students are required to learn in school. As a result, a number of proxy measures have been used to measure teachers' knowledge of the content of school mathematics, as well as issues related to pedagogy. In the US, for instance, to be certified to teach mathematics, various states have taken steps in this direction by requiring pre-service teachers to pass a mathematics test prior to being certified to teach. An example of this type of test is PRAXIS, a widely used teachers' licensing examination developed by Educational Testing Service (ETS). In spite of these steps, the quality of achievement of K-12 students in mathematics continues to be of national concern. Consequently, the RAND Mathematics Study Panel (2003) made a

number of recommendations for improving teachers' mathematical knowledge for teaching. These include the need for further clarification of the knowledge demands of teaching mathematics, and a deeper understanding of ways to provide opportunities for prospective and practicing teachers to acquire this kind of knowledge. In addition, the RAND Mathematics Study Panel (2003) recommended the development of instruments for assessing the mathematical knowledge for teaching across grade levels and mathematical domains. The RAND panel also singled out algebra as an important area of focus in all these efforts.

As if to respond to the recommendations by the RAND panel, within the last one and half to two decades two major studies have focused not only on reconceptualizing the knowledge base for teaching mathematics in the U.S. but also developed instruments to measure it. These are the works by Deborah Ball and her colleagues at the elementary school level (Ball & Bass, 2000; Hill, Schilling & Ball, 2004; Hill, Rowan & Ball, 2005) and Ferrini-Mundy and her colleagues on the Knowledge of Algebra for Teaching (KAT) project at the high school level (see for instance, Ferrini-Mundy, Burrill, Floden, & Sandow, 2003; Ferrini-Mundy, Senk, & McCrory, 2005; Ferrini-Mundy, Senk, McCrory, & Marcus, 2005).

At the elementary school level Deborah Ball and her colleagues' work on elementary school mathematics teachers' knowledge introduced the idea of mathematical knowledge for teaching. Ball and her colleagues relied on existing theories about teacher knowledge and developed survey-based questions based on teaching mathematics at the elementary school level. Through factor analyses of the data they obtained from the administration of their questions, they proposed, among other things, the idea of "specialized knowledge of content" (SKC). As they put it,

> In addition to a general factor, specific factors representing knowledge of content in number and operations, knowledge of students. . . [there is also] a specialized knowledge of content (SKC) made up of several items: representing numbers and operations, analyzing unusual procedures or algorithms and providing explanations for rules. (Hill, Schilling & Ball, 2004, pp 27-28).

At the high school level, the work by Ferrini-Mundy and her colleagues on the KAT project was not only aimed at reconceptualizing teacher knowledge in a domain specific manner but also as a measurable construct. As earlier mentioned to the extent that this project focused on Algebra among all the domains of mathematics the KAT project could be said to have been influenced by the recommendations from the RAND Mathematics Study Panel (2003). Their work also appears to be groundbreaking at the high school level as it did not only end with reconceptualization of knowledge of mathematics for teaching algebra but also developed measures of it.

It is necessary to state that the work by Ferrini-Mundy and her colleagues on the KAT project is not only important in reconceptualization and measurement of teacher knowledge in algebra, it can also be applied to answer the question of which aspects of teacher knowledge best relates to student performance for researchers interested in linking teacher knowledge with student performance. When earlier attempts were made to link teacher knowledge to student performance it was mostly limited to teacher actions design (see for example, Berliner, 1979; Peterson & Swing, 1982). For instance, Berliner and his colleagues in the Beginning Teacher Evaluation Study (BTES) introduced a variable, which they called *Academic Learning Time* (ALT) in their modification of the process-product research design and insisted among other things that this variable serves as the link between teacher behaviour and student achievement. Unfortunately, by restricting the focus on teacher actions the BTES program failed to show what type of knowledge teachers use in judging the difficulty level of the tasks they give to their students, especially in heterogeneous situations where students come with varied backgrounds. In addition, their program could not show which aspect of teacher knowledge affects student performance.

The reconceptualization by the KAT project and the development of instruments to measure teacher knowledge attempts to fill this gap in that it opens the door, as it were, for researchers to rely on analyses such as multiple linear regression and structural equation modeling to determine which aspect of teacher knowledge affects student performance in any circumstances. It is hoped that successful validation or expansion of the conceptualization of the KAT hypotheses could lay the foundation for studies aimed at answering the question as

to which aspect of teacher knowledge best relates to student performance. This is because such a validated framework or new conceptualization would lend itself to being assessed both qualitatively and quantitatively and on a large scale and this way have implications for teacher educators. It is in the light of this that this study was conducted to attempt to validate the KAT framework, where possible, or improve it to make it more applicable to other domains of learning.

Conceptual Framework

Through analyses of research literature, recommendations by professional organizations and videos of teaching, researchers in the Knowledge of Algebra for Teaching (KAT) have hypothesized that the knowledge used by teachers in teaching school algebra consists of three types. These are *knowledge of school algebra* (referred to in short as *school knowledge*), *advanced knowledge of mathematics* (also referred to as *advanced knowledge*), and *teaching knowledge*. These three types of knowledge, discussed in turn below, constitute the theoretical frame of algebra knowledge for teaching that guided this study.

Knowledge of School Algebra/School Knowledge

According to researchers of the Knowledge of Algebra for Teaching project, the first category of knowledge, *Knowledge of School Algebra* (or simply *School Knowledge*), is the knowledge of mathematics in the intended curriculum up to the high school level. It is this content of school algebra that teachers are expected to help students discover or learn in their algebra classes. In their work, researchers in the KAT project set the limits of this type of knowledge by reviewing content standards of ten different states in the US. At the Senior High School level in Ghana, the content of this type of knowledge, as at the time of this study, is included in both the Core and Elective Mathematics Syllabuses. The Kat project considers this type of knowledge as vital because in their view algebra teachers would find it difficult to influence student learning unless they comprehend the grade-level algebra content they are to teach. Since students are expected to learn their school algebra, it sounds reasonable to hypothesize that for teachers to influence students learning, they (teachers) need to understand the content of school algebra themselves.

Advanced Knowledge of Mathematics

The second type of knowledge hypothesized by the KAT project is the *Advanced Knowledge of Mathematics* (or simply "Advanced Knowledge"). This type of knowledge "includes other mathematical knowledge, in particular college level mathematics, which gives a teacher perspective on the trajectory and growth of mathematical ideas beyond school algebra" (Ferrini-Mundy, Senk and McCrory, 2005, p.1). To clarify the delimitation of this type of knowledge, the KAT project lists areas like calculus, linear algebra, number theory, abstract algebra, complex numbers and mathematical modeling as some of these general areas. In addition, in the conceptualization of advanced knowledge, members of the KAT project acknowledge that "knowing alternate definitions, extensions and generalizations of familiar theorems, and a wide variety of applications of high school mathematics are also characteristics of an advanced perspective of mathematics" (Ferrini-Mundy, Senk and McCrory, 2005, p.1). Thus, in simple terms, this type of knowledge includes school content that precedes algebra (such as sets of numbers, operations on numbers etc.), as well as content that proceeds algebra.

The KAT project considers possession of Advanced Knowledge as important because it could afford teachers with a deep or profound understanding of school algebra. This is a result of a number of reasons. First, with this type of knowledge teachers could make connections across topics while unpacking the complexity of any mathematics content to make that content more understandable by students. Second, in class, the KAT project hypothesizes that a teacher's task, may also involve unpacking content preceding the content of focus; and the possession of Advanced Knowledge makes this possible. Third, the KAT project identifies the three major processes that could be vital to effective teaching. These are bridging, trimming and decompressing of the content of school algebra to students. The project defines bridging as making connections across topics, trimming as removing complexity while retaining integrity and decompressing as unpacking complexity to make content more comprehensible. It is hoped that since teachers who possess Advanced Knowledge have a deep or profound understanding of school algebra (from having a good knowledge of the trajectory of the content of school mathematics), such teachers would teach effectively since they can succeed in helping their students

through the processes of bridging, trimming and decompressing. In other words, according to members of the KAT project, possession of Advanced Knowledge could make one teach effectively because of the ability to fluidly engage students to make connections across topics (i.e., bridging), remove complexity while retaining integrity of the algebra they teach (i.e., trimming) and be able to unpack complexity to make content of school algebra more comprehensible (i.e., decompressing) to students.

Teaching Knowledge

The third category of knowledge in the KAT framework is the Teaching Knowledge. According to the KAT researchers, "the knowledge referred to here may fall into the category of pedagogical content knowledge or it may be pure mathematical content applied to teaching" (Ferrini-Mundy, Senk & McCrory, 2005, p.1). The KAT project members throw further light on this by saying that, this knowledge is described as

> "knowledge specific to teaching algebra that may not be taught in advanced mathematics courses. It includes such things as what makes a particular concept difficult to learn and what misconceptions lead to specific mathematical errors. It also includes mathematics needed to identify mathematical goals, within and across lessons, to choose among algebraic tasks or texts, to select what to emphasize with curricular trajectories in mind and to enact other tasks of teaching" (Ferrini-Mundy, McCrory, Senk & Marcus, 2005, p.2).

From this, the point can be made that since this type of knowledge may not be taught in advanced mathematics courses, it may not necessarily be available to mathematicians. Consequently, this is the knowledge that could differentiate an engineer or a mathematician from an algebra teacher. It is as if to say that this type of knowledge is the unique type of knowledge teachers have and which they use in the teaching the subject matter of school algebra better than anybody with only good content knowledge, whether school or advanced knowledge.

The Relationship among the three hypothesized knowledge types

As already indicated, these three types of knowledge, discussed above, constitute the theoretical frame of algebra knowledge for teaching that guided this study. The KAT project conceptualizes these hypothesized knowledge types are not hierarchical in nature. In addition, they do not exist in a continuum with well-definable boundaries. Instead, their boundaries are blurry in the sense that they are interwoven in many ways. A schematic diagram of this conceptualization is presented in Figure 1 below.

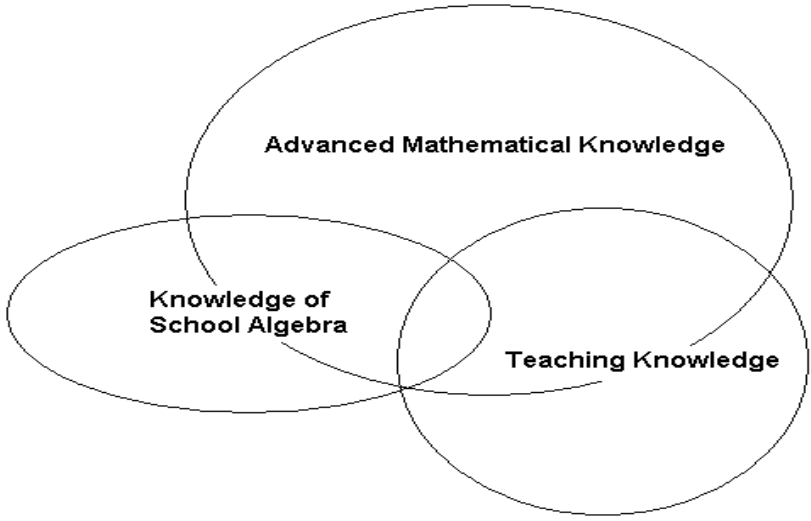

Figure 1: Conceptual Representation of the KAT project's Three Types of Knowledge

Instrumentation

Two instruments, Form 1 and Form 2 were developed by the Knowledge of Algebra for Teaching (KAT) project team in their validation study. Each of these forms comprised 20 items in all; 17 multiple choice items and 3 open-ended items. The difficulty levels of the two forms have been shown to be comparable in an earlier study (see Wilmot, 2008). In this study, therefore, only one of the two forms, Form 1, was adapted and used for data collection. The adaptations involved changing the US context in the original instrument into Ghanaian contexts. For instance, not only was the US currency changed into the Ghanaian currency, the prices of the items were also changed

to reflect market values in Ghana at the time of the study. In addition, variations in names commonly used for the commodities used in the item were also changed to reflect the right contexts in Ghana. The instrument did not require the use of any identifiers like names, gender, school, identity numbers or anything that could be traced to participants.

Procedures

Participants of this study comprised prospective senior high school mathematics teachers (i.e., final year students majoring in mathematics and mathematics education) from two universities in Ghana, as well as in-service teachers in Senior High Schools in four regional capitals in Southern Ghana. The study lasted for four weeks. Within the first two weeks, visits were made to the two universities and the senior high schools within the four cities. In the Universities, meetings were held with the Heads and lecturers of the Departments in which Mathematics Education and Mathematics were housed. In the Senior High Schools, similar meetings were held with the Heads of Institutions, Head of Mathematics Departments and Mathematics teachers of both Core Mathematics and Elective Mathematics. Dates for these study site visits and meetings had earlier been fixed through prior telephone calls made to the Heads of Departments in the Universities and the Heads of the Senior High Schools. The telephone calls provided opportunities for a timeline to be agreed upon for initial visits to meet with participants of the study and the Heads of Departments and Schools.

During the initial visits and meetings, the rationale of the study was discussed and approvals were obtained to use the institutions as sites for the study. Consent was also obtained from the university students and in-service teachers to participate in the study. At each site, two copies of consent forms were signed by the Head and students or teachers as the case may be. One copy of the signed form was collected back while the other was meant for their records. This provided opportunities to know how to plan for the administrations of instruments and how many of the instruments to be printed. In addition, the meeting also provided opportunities for timeline for the data collection to be completed.

As already discussed, this study involved administering the instrument adapted from the KAT project to final year mathematics and mathematics education students in two universities, as well as mathematics teachers in eight senior high schools in Ghana. Administration of instruments in the senior high schools was conducted during the last two weeks of the school year. In each senior high school, the instrument was administered after the normal school hours so as not to disrupt classes. Also, in each senior high school, the in-service mathematics teachers who agreed to participate were brought together to complete the instruments at a sitting lasting no more than 60 minutes. From the eight senior high schools, 20 in-service mathematics teachers participated in the study.

Administration of the instruments in the universities was done in a slightly different manner. The universities were writing their end-of-semester examinations during the period of data collection. These examinations notwithstanding, the heads of the participating departments had agreed with the participating students to incorporate the administration of the instruments with the examinations. Consequently, opportunity was provided during the examination weeks, for students who agreed to participate to come together to complete the instruments on the days that they did not have any examination to write. This made it possible for participants in each department of the two universities to complete the instrument at a sitting lasting no more than 60 minutes. In the two participating universities, 189 prospective senior high school mathematics teachers in Ghana took part in the study Thus, altogether 209 participants completed the instrument used in the study.

Scoring of Content Items

Responses to the multiple choice items were scored as right (1 mark) or wrong (0 mark) while the open-ended items were scored on a four-point scale. The following is ae summary of the main features of the rubrics used for scoring the open-ended items since the exact scoring rubrics could not be presented in this publication:

Score of 4: All steps of the solution have carefully been laid. A reason for each step does not necessarily have to be given but each step follows reasonably from the one before. The solution can be shown as a model solution to any audience.

Score of 3: All steps of the solution have carefully been laid but there are minor errors.

Score of 2: There is an evidence of a chain of reasoning but some major conceptual mistake was made or there is an evidence of a chain of reasoning but the solution is not complete.

Score of 1: There is at least one correct statement.

Score of 0: Something mathematical is said but is not valuable for the question.

Score 777: Nothing mathematical is said (e.g. "no clue", "I don't Know")

Score 999: Blank

Mode of Data Analysis

The research question that guided this study was,

"To what extent does Ghanaian pre-service and in-service secondary mathematics teachers' knowledge for teaching algebra corroborate the three categories of knowledge hypothesized in the KAT framework?"

To answer this question, data from the university students and in-service teachers were used. Altogether, 209 participants completed the instrument. In theory, the number of variables or factors needed to explain the variation in the data could have been modeled by using structural equation modeling (SEM) and factor analysis could have been incorporated in SEM to confirm these variables. However, SEM could not be used in this analysis because of the following reasons.

To use SEM, Pedhazur (1997) has argued that the subject to variable ratio must be at least 30:1. Comfrey and Lee (1992) have also suggested that to use SEM, "the adequacy of sample size might be evaluated very roughly on the following scale: 50 – very poor; 100 – poor; 200 – fair; 300 – good; 500 – very good; 1000 or more – excellent" (p. 217). On the other hand according to Gorsuch (1983) and Hatcher (1994), in Exploratory Factor Analysis, a subject to item ratio of at least 5:1 is recommended while Nunnally (1978) argues for a ratio of 10:1.

Since 209 subjects participated in this study and there were 20 items, only the Gorsuch (1983) and Hatcher (1994), as well as the Nunnally (1978) criteria were met (see also, Nunnally & Bernstein,

1994). Therefore a decision was taken that Factor Analysis, as a stand-alone test, was the best for the study.

Exploratory factor analysis was performed on the data collected. Factor analysis was chosen because it helps, among other things, to examine the number of variables, called factors, which could be used to either completely or to a large extent explain the variation in scores in the data collected. In the conceptual framework, three types of knowledge had been hypothesized. However, in this study, no prior assumption was made about the truth or otherwise of this hypothesis. In other words, no specific decision was made earlier in this study about the exact number and nature of the underlying factor structure (i.e., of the type of knowledge measured by the instrument). Consequently, Exploratory Factor Analysis was used. The idea was to allow as many factors as items on each of the instruments to be extracted so that a decision could be made, based on the factor loadings, as to the number of factors that could be retained to explain the pattern of relationship among scores in the data. It helped to answer the question of whether there is enough evidence to conclude that three factors could be distinguished, a number corresponding to the types of knowledge hypothesized in the theoretical framework. In addition, exploratory factor analysis helped to determine whether the factors that emerged could be described, using the three types of knowledge hypothesized in the framework. The extraction method used was principal component analysis and the rotation method used was *Oblimin* with Kaiser Normalization. Oblimin rotation was used because of its ability to allow the factors extracted to be correlated. In the next sub-section, results of the factor analysis are presented and discussed.

Analyses and Findings

The first step in the factor analysis was the examination of the number of factors needed to explain the variation in scores on the various items on Form 1. Table 1 below, shows how items loaded on various factors and the variance explained by all possible factor loadings when Factor Analysis was done to retain three factors. This table, Table 1, shows results of the number of possible factors that could be extracted from the data to explain the variation among the scores and their corresponding eigenvalues. The eigenvalues give an indication of the strength level of each of the extracted factors. Consequently, the

eigenvalues could be used to decide on the required number of factors needed to represent the relationships in the data.

Table 1 Total Variance Explained by Each of the Factors

Factor	Initial Eigenvalues		
	Total	% of Variance	Cum. %
1	2.526	12.628	12.628
2	2.346	8.244	20.872
3	2.159	7.342	28.214
4	1.849	6.838	35.052
5	1.668	6.520	41.573
6	1.468	5.978	47.551
7	1.126	5.686	53.236
8	1.056	5.281	58.517
9	0.992	4.962	63.479
10	0.94	4.700	68.179
11	0.882	4.412	72.591
12	0.795	3.924	76.516
13	0.755	3.523	80.039
14	0.699	3.495	83.534
15	0.638	3.192	86.726
16	0.61	3.048	89.774
17	0.569	2.981	92.755
18	0.498	2.492	95.248
19	0.482	2.409	97.656
20	0.469	2.344	100.000

In Table 1, a low eigenvalue for a given factor implies that factor's contribution to the explanation of variances in the variables is small and may be ignored. Consequently, in this analysis, the Kaiser-criterion (also referred to as the K-1 rule) of retaining only the factors with eigenvalues greater than 1.0 was initially considered. Based on these initial eigenvalues (see the second column of Table 1), it is could have been concluded, according to the K-1 rule, that eight main factors could be retained. Together these eight would have explained about 58.5% of the variance. However, since the theoretical framework guiding this study hypothesizes three main knowledge types, the eight factors revealed by the Kaiser criterion was initially held tentative and the scree-test plot used for further check.

Essentially, scree-test plots are graphs of the factors (as shown in Table 1 above) on the horizontal axis against the corresponding eigenvalues on the vertical axis. On this graph, as the number of factors increases (i.e., as one moves from left to right along the horizontal axis), the eigenvalues decrease (refer to this also from Table 1). However, the change in slope of the graph resulting from these variations is usually not constant but decreases as the number of factors increases. Conventionally, the steepness of the slope of various sections of the graph is examined and the x-coordinate of the point beyond which the variation in slope begins to be somewhat uniform (i.e., the elbow of the graph) is chosen as the needed number of factors. The graph below, Figure 2, shows the scree-test graph obtained from the factor analysis.

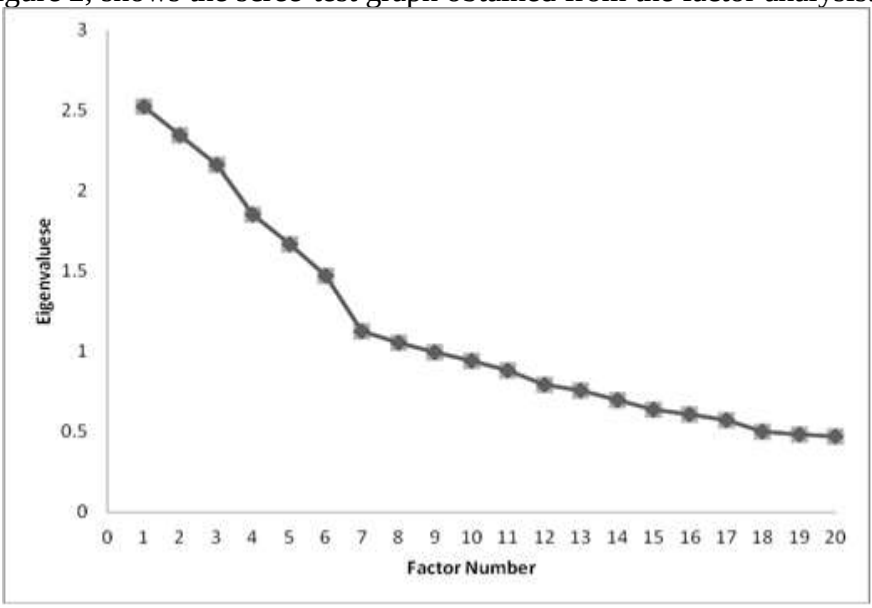

Figure 2: Scree plot of the factor loadings

From Figure 2, it will be observed that a moving from left to right on the graph, the variation in the steepness of the graph reduces relatively more beyond factor 7. In other words, the elbow of the graph can be seen to exist at factor number 7. Hence, it was concluded from the scree-test that seven factors can be said to be retained for further analysis. Thus, whereas the factor analysis extracted 20 factors for examination (because of the 20 content items on the research instrument), it was inferred from the scree plot that the number of factors needed to explain the variation in scores in the data was seven.

It can be seen from Table 1 that these seven factors together explain about 53.2% percent of the variation in scores.

Consequently, the factor loadings were examined using seven factors. To interpret the factor loadings, loadings of absolute value above 0.30 were considered strong enough to be indicative of the nature of the factor. Also, since cross loading (i.e., loading of 0.30 or above on more than one factor) is indicative that an item cannot be uniquely assigned to any of the factors, such items were removed and not used to determine the nature of that factor (see Guadagnoli & Velicer, 1988).

Table 2: Item Loadings on the Seven Retained Factors

	Factors						
Item	1	2	3	4	5	6	7
1**	0.62	-0.01	-0.14	0.33	-0.18	0.07	0.22
2	0.28	-0.04	-0.10	0.05	-0.12	0.10	0.71
3	0.17	0.16	0.24	-0.06	0.04	0.17	-0.72
4	0.09	0.28	0.15	0.60	0.07	-0.29	0.17
5**	0.39	0.42	-0.10	-0.25	-0.23	-0.07	-0.08
6**	0.32	-0.10	0.05	0.05	-0.49	0.54	0.17
7	0.10	0.10	0.76	-0.12	-0.06	0.10	-0.01
8	0.10	0.08	0.19	0.07	-0.82	0.06	0.06
9	-0.13	-0.17	0.14	0.60	-0.25	0.01	-0.27
10	0.05	0.61	0.04	-0.08	-0.05	0.01	0.07
11	0.25	0.60	0.17	0.08	0.09	0.19	0.28
12	-0.03	-0.07	0.19	0.70	0.13	0.16	0.19
13	0.03	0.02	0.65	0.26	-0.07	-0.13	0.10
14	-0.11	0.12	0.00	0.00	0.02	0.79	0.01
15**	0.38	-0.01	-0.17	0.05	-0.01	0.02	-0.61
16	0.72	0.10	0.19	-0.06	0.00	0.01	0.11
17**	0.39	0.11	0.38	0.13	0.46	0.32	-0.06
18**	-0.25	0.05	0.02	-0.03	0.65	-0.04	-0.35
19	0.70	0.02	0.06	0.07	-0.06	0.07	0.04
20**	0.18	-0.13	-0.12	0.58	0.07	0.35	0.07

** Items with cross loadings

Next it was necessary to examine the manner of loadings of the items on the seven factors. The rationale was to determine whether such

factor loadings could help name or describe each of the seven factors. To simplify the discussion with these seven factors, the strongly loaded items on each of the factors have been extracted and presented with the way the way categorized by the KAT project members in Table 3 below. On this Table (i.e., Table 3), items that had cross loadings (i.e., those that loaded strongly on more than one factor) have been excluded.

Table 3: Item loadings and categorization on the seven factors

Factors	Number of Items	Item ID and Categorization (in parenthesis)		
1	2	16 (Adv. Kn)	19 (Sch. Kn)	
2	3	5 (Tchg. Kn.)	10 (Tchg. Kn)	11 (Tchg. Kn)
3	2	7 (Tchg Kn)	13 (Adv. Kn)	
4	3	4 (Adv Kn)	9 (Adv. Kn)	12 (Adv. Kn)
5	1	8 (Tchg Kn)		
6	2	3 (Sch. Kn)	14 (Sch. Kn.)	
7	1	2 (Tchg. Kn)		

As shown in Table 3, two factors, Factors 5, and 7 had only one item each loading strongly on them. In addition, three factors, Factor 1, 3 and 6 had only two items each strongly loading on each of them respectively. The remaining two factors, Factor 5 and 7 had only one item loading strongly on them. Again, one or two item loadings were considered too small to be indicative of the nature of these factors. As a result, five of the seven retained factors (i.e., Factors 1, 3, 5, 6, and 7) were considered too unstable to be correctly interpreted in this study. The only factors on which the minimum of three items loaded were Factors 2 and 4. On Factor 2 all the three items that loaded strongly (i.e., items 5, 10, and 11) were previously categorized by the KAT project as Teaching Knowledge items while the other three that loaded on Factor 4 (i.e., items 4, 9 and 12) were all Advanced Knowledge items. Thus, only two of the seven retained factors could be labeled, if necessary in terms of two of the types of knowledge hypothesized in the KAT framework, which guided this study. These are the *Teaching Knowledge* and the *Advanced Knowledge* sub-categories of knowledge.

Discussions and Conclusions

In this section, the findings of the study are discussed alongside their corresponding conclusion. Two of these that are quite general are presented first and the major conclusion, an expansion in the KAT framework, is separated and presented under separated subheading. This is because, it is the study's most significant contribution to the literature on conceptualization of teacher knowledge. It is hoped that presenting this would make it stand out more conspicuously.

Generally, the KAT project's conceptualization of teacher knowledge is important on two counts. It attempts to focus on the idea of teacher knowledge especially at the high school level in domain specific terms. In addition, the conceptualization lends itself to the idea of being able to develop instruments to assess the hypothesized knowledge types.

However, the results of this study only partially but not completely corroborate the KAT framework that guided the present study. In spite of this, the findings point to the following issues that need to be considered when discussing teacher knowledge in domain specific terms.

The fact that Factors 2 and 4 had only *Teaching Knowledge* and *Advanced Knowledge* items loading respectively on them point to the fact that these two Factors could be named *Teaching Knowledge* and *Advanced Knowledge* respectively. In addition, it is worth noting that on Factor 6 the only two items that loaded were all *School Knowledge* items. Factor 6 was however not labelled as the *School Knowledge factor* because of the suggestion by Costello and Osborne (2005) that factors with fewer than three items are considered to be unstable and should not be labeled. Thus, this study partially corroborates the hypothesized knowledge types in the KAT framework. This notwithstanding, data from this study can be said to somehow point to the possible existence of these three hypothesized knowledge types in the KAT framework. This study confirms the existence of two of the KAT project's hypothesized knowledge types but not all three. Further studies are therefore needed to fully confirm the KAT framework.

Also, in the face of the fact that 6 out of the 20 items on the KAT instrument adapted in this study had cross loadings, leaving only 14 items to load on the seven extracted factors, it is obvious that there are not enough items on the instrument. That explains why some items

had only one items loading on them. Gorsuch (1983) prefers six variables per factor and suggests a minimum of four variables per factor only in situations where the factors have been exceptionally defined in previous research. Using this criterion means that running a factor analysis using seven factors would need an instrument of at least 42 items, even when there are no multiple loadings. The implication is that further studies in this direction needs to develop more items to add to the KAT items for use. When this is done, it is hoped that the single and two item loadings on some of the factors could be eliminated. Consequently, the factor loading may be able to reveal the true nature of all the factors and possibly corroborate the expanded framework suggested in the proceeding paragraphs.

The expanded KAT framework

The KAT project team members have earlier conjectured that their three hypothesized knowledge types did not exist in a continuum and that they are interwoven in many ways. Consequently, according to them, the intersections are blurry. This is what led to the schematic diagram of three concentric circles (refer to *Figure 1*). The blurry nature of their intersection points to the fact that their intersections are unclear and possibly not significant to be focused on or not necessary to be defined. However, the findings of this study point to the possibility that the boundaries of the three hypothesized knowledge may not blurry as initially conjectured in the KAT framework. This is because results of the current study have revealed that an Advanced Knowledge item and a School Knowledge item have loaded together on one of the extracted factors (i.e., Factor 1) while a Teaching Knowledge item and an Advanced Knowledge item have also loaded on another factor (i.e., Factor 3).

This warrants the need for an expansion to be made in the KAT framework in a way that permits the intersections of the original three KAT project's hypothesis not to be regarded as blurry but as well defined complex interactions of the three types of knowledge by teachers. This is an important contribution to the discussion of teacher knowledge in domain specific terms that has implications for future research in this direction. It is a view consistent with what Putnam (1987) calls curriculum scripts made up of interrelated set of organized actions. The argument here in this recommended expanded framework

is that the notion of how teachers transform their knowledge into pedagogical representations could be seen in a multifaceted combination of the knowledge they possess. A schematic diagram of this expanded conceptualization suggested from the findings of the study is as shown in Figure 3.

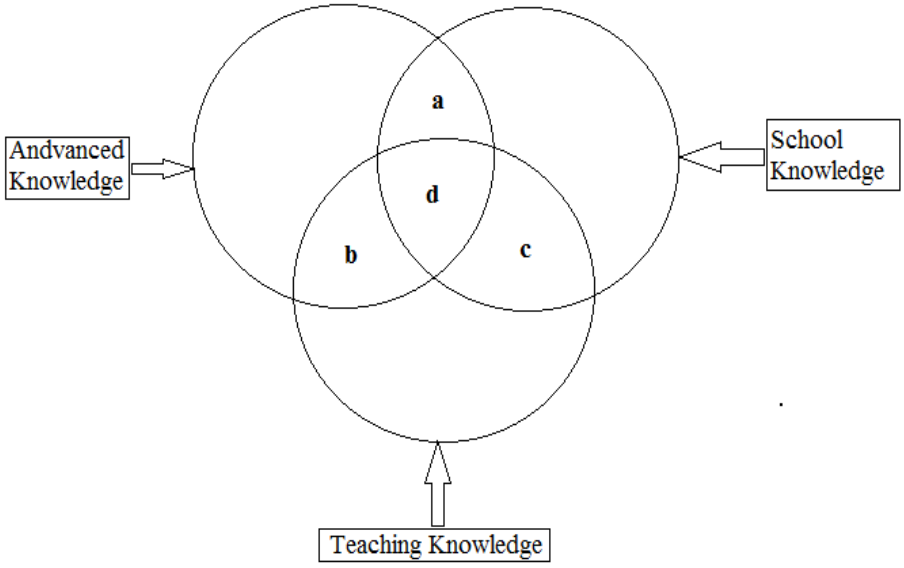

Figure 3: Schematic suggested expanded framework from the findings of the study

In this suggested expansion in the KAT framework, due to the fact that the findings of this study could not directly reveal the nature of the the intersections of the KAT project's hypothesized knowledge types or caused them to be properly defined, they have been labeled as ***a, b, c*** and ***d.*** They can be hypothesized based on their position relative to the three original knowledge types as shown in *Figure 4.*

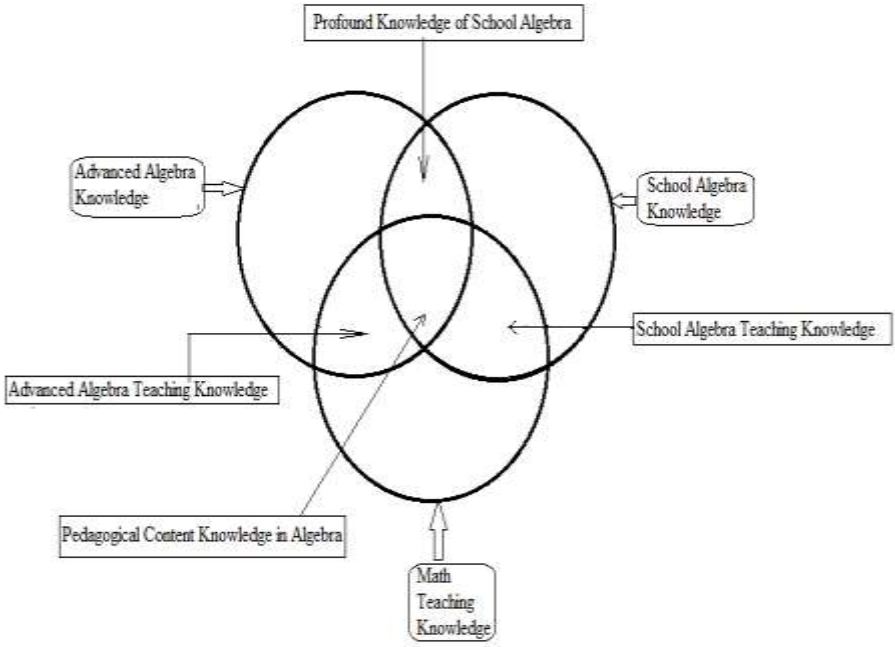

Figure 4: Expanded framework for reconceptualization of domain specific teacher knowledge

The main categories of knowledge, School Algebra Knowledge, Advanced Algebra Knowledge and the Algebra Teaching Knowledge are the same categories of knowledge hypothesized respectively in the KAT framework as, Knowledge of School Algebra/School Knowledge, Advanced Knowledge of Mathematics and Teaching Knowledge except for two main considerations. First, in the present conceptualization they are renamed to make them domain specific (i.e., specific to algebra on which the instruments were developed). Second, some of the exceptions recommended for re-categorization of the KAT framework is what have been used to define the intersected categories to make the intersections distinct in the sub-sections. The various categorized knowledge types formed as a result of the intersections in the schematic diagram, Figure 4, are discussed in the subsections that follow.

Profound Knowledge of School Algebra

As the name implies teacher who possess this type of knowledge can be said to have a deep understanding of school algebra. This may

include possession of alternate definitions, extensions and generalizations of familiar theorems, and a wide variety of applications of high school algebra. Content that precedes school algebra, as well as those that proceeds it are part of this category of knowledge.

School Algebra Teaching Knowledge

A teacher who possesses this type of knowledge have a good knowledge of the trajectory of school algebra. Having this type of knowledge is crucial because it allows teachers to teach algebra in a fluid manner to enhance understanding of diverse groups of learners. It is this is type of knowledge that enables teachers to engage in bridging (make connections across topics in school algebra), trimming (removing complexity while maintaining integrity) and decomposition (unpacking complexity to make content more comprehensible) while teaching school algebra.

Advanced Algebra Teaching knowledge

Teachers who possess this type of knowledge, do not only have a good understanding of advanced algebra, but also how to teach it effectively. Similar to the conceptualization of the School Algebra Teaching Knowledge category, the Advanced Algebra Teaching Knowledge is this type of knowledge that enables teachers to engage in bridging (make connections across topics in advanced algebra courses). Teachers who possess this type of knowledge are also able to engage in trimming and decomposition when it becomes necessary for them to teach advanced algebra courses.

Pedagogical Content Knowledge in Algebra

This is the type of knowledge initially conceptualized by Shulman (1986b) as involving a complex combination of some form of content and pedagogical knowledge except that unlike Shulman's conceptualization is a generalized one, the conceptualization in this expanded framework is a domain specific type of knowledge (i.e., specifically connected with algebra).

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Preferred Careers of Senior High School Students in Ghana: A Revisit of Holland's Career Development Theory

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Abstract

The study investigated the preferred careers of senior high school (S.H.S) students in Ghana using Holland's classification of work environments. The participants comprised 364 SHS students who were selected from four senior high schools in Koforidua through the use of multi-stage sampling technique. Data were analysed with the use of frequencies, percentages and rank order. The findings of the study showed that Social careers prevailed as the most preferred among SHS students in Ghana. Artistic careers were ranked second, followed by Conventional and Enterprising careers respectively. Investigative careers were the least in rank order. The implications for counselling for these findings were emphasised.

Key words: Counselling, career, career preference, career counselling, adolescents, Holland's theory.

Introduction

Choosing a career is one of the most important decisions in life. Many people usually make this decision during the adolescent period because this is the time they choose their secondary and tertiary educational programmes to conform to their future careers. The process of career choice is a universal phenomenon because career serves as a major avenue through which people express themselves, offer services to humanity, and get financial rewards to sustain themselves and their families.

Scholars have defined career in many ways. According to Oladede (2007), career is a chosen pursuit, life work and one's profession. It is also the sequence of major positions occupied by a person throughout his or her lifetime. Arnold (1997) has indicated that a career is the sequence of employment-related positions, roles, activities and experiences encountered by a person. A career is the unfolding sequence of a person's work experiences over time (Arthur, Hall, & Lawrence, 1989).

The various definitions of career point to the fact that it is a "sequence" ─ it is a long process rather than a simple incident. In other words, career interest and choices do not appear all of a sudden during a particular period in life but as a result of developmental process. Career also, goes a long way to boost the economy of nations. A vocational choice is in itself a process of growth, reflecting other phases of development. It requires sufficient maturity since its influence on adulthood is significant, if the future of the individual would be bright (Kochhlar, 2006).

Omotosho (2004) has called attention to the need for guidance in career choice. He argued that the rapid changes going on in the adolescent's private world as well as in the world of work around him call for careful planning and guidance so that the chances of making errors will be reduced to the barest minimum. Furthermore, Omotosho (2014) has posited that an enormous cost in time and energy through floundering, hit-or-miss method and indecision are economically and psychologically too expensive and should not be allowed to plague any youth any longer. He, therefore, advocated that school counsellors as well as guidance and counselling coordinators should plan the career development programmes of schools and design the activities and services that would facilitate the meeting of the career needs of students. According to him, the counsellor should conduct student assessment in the areas of their abilities, interests and personalities.

A lot of factors contribute to the career decision of an individual. These factors include the family, socio-economic status of parents, societal influence, ones' mental ability and physique, and other personality characteristics. Basing his theory of career development on personality, Holland (1997) expounded his theory on how an individual can fit in the right career. He believes that there are six basic personality types, namely realistic, investigative, artistic, social, enterprising and

conventional. He represented these by their initial letters thereby coming up with the acronym RIASEC respectively. Each individual resembles any one of the given six basic personality types. The more the individual resembles a personality type the more that person exhibits the traits of that personality type.

He further explained that the six personality types are also synonymous respectively with six types of work environments which are realistic, investigative, artistic, social, enterprising and conventional (RIASEC). According to Holland, an individual performs best when he finds himself in a work environment that is the same as his personality type. For instance, if a person who has a social personality type finds himself in a social work environment, the person is most likely to perform well in that environment.

Some studies in Africa (Kankam & Onivehu, 2000; Okeke, 2000; Okon, 2001; & Mburza, 2002) and some in other parts of the world (Aghamechi, 1998; Kochhlar, 2006; Shakya & Singh, 2013; National Society of high School Scholars, 2015; & Singh & Singh, 2015) have identified certain factors that influence the career preferences of youths. The factors so identified include the family, socio-economic status of parents, mental ability and physique.

The family is the primary agent of socialisation that an individual encounters in a lifetime. As young individuals grow up, they are exposed to the careers of their immediate family. This initial exposure may influence the individual in later life. Kochhlar (2006) is of the view that in a family in which aesthetic values play part in their daily lives, children may have preference for artistic careers. On the other hand, individuals from families in which intellectual activities and achievement are valued have probable tendencies to veer into intellectual pursuits in adulthood. Studies conducted by Okeke (2000) and Aghamehi (1998), on parental influence on children's career choice revealed that as much as 60% of children aspire to be in their father's career whereas only 25% want to be in their mother's career.

Mburza (2002) opines that career choice among youths is also affected by **socio-economic status of their parents**. When parents are financially sound they can sponsor and support their children with all the resources they need in pursuing their desired careers. The reverse is true when parents are not economically sound. Where parents belong to aristocracy or nobility stratum, their children could hardly aspire to

be garbage collectors, labourers, shop attenders or be in any career that society does not have high regard for.

Mental ability, to a large extent, also determines the type and the level a person can reach in the pursuit of a particular career. Kankam and Onivehu (2000) and Okon (2001) indicate that intellectual ability exert a considerable influence on career preference. Hence, it is often seen that, while bright students choose science-oriented careers, mediocre students opt for careers within humanities, while weaker children aspire for arts-biased and technical vocations. Okon (2001) posits that the **physique** of an individual sanctions entry into certain fields of endeavour. He further stated that no matter how talented a child may be, career in the military and paramilitary may be outside his/her range if he/she failed to attain some predetermined height or weight.

Several studies in the areas of career preference have identified the choice of careers of students. In 2015, the National Society of High School Scholars in US conducted a study on career trajectories that students want to pursue. The researchers sampled 18,000 high achieving students, within the ages of 15-29, from eight states: Texas, California, Florida, New York, Georgia, Pennsylvania, North Carolina and Maryland. The findings of the study revealed that 40% of respondents prefer medicine or health-related careers, 21% and 28% respectively prefer careers in Technology/ Engineering and Science. The remaining 11% of the respondents were interested in careers in areas like Arts/ Entertainment/Media and Business/Administration/Corporate.

In India, Shakya and Singh (2013) researched into Career Preferences among Degree College Adolescents in Kanpur City. Three hundred adolescents (137 boys and 163 girls) were randomly selected from 6 degree colleges to assess their career preferences in the areas of science and technology, commerce and management, tourism and hospitality, mass media and journalism, art and designing, medical, agriculture, defense, law and order, and education using a standardized career test. Data on career preferences revealed that education and science and technology were the most preferred career of adolescents and agriculture as the least.

A more recent study conducted by Singh and Singh (2015) in India explored the career preference of secondary level students in

Bareilly, U.P. India. The study used the survey method to measure the career preference of secondary level students. The results indicated the following order of students' career preference: 31% Science and Technology, 19% Law and Order, 16% Education, 10% Artistic and Designing, 9% Mass media and Journalism, 7% Defense, 6% Medical, 1% Tourism and Hospitality, 1% Commerce and 0% Agriculture.

Abiri (1977) also confirmed the craving for science-based careers in his research that randomly sampled 1,254 third, fourth and fifth years grammar boys and girls in Ibadan to identify, among other things, their occupational aspirations. The students were made to respond to a self-developed questionnaire, the Prophetic Ability Questionnaire (PAQ), which was divided into 3 parts. The first part required information on parental background, as well as contemporary circumstances and feeling. The second part required supplying information on future aspiration about themselves, while the third section required essay writing on one's future life with special references to education, occupational achievement, possessions, family life and his or her eventual demise. With the use of the simple percentage for the data analysis, the findings showed that medicine, pharmacy were the students' most aspired occupations with 47.3% score. These were followed by engineering scoring 20%, police force was seen to be least aspired by them with just a score 0.01%. Although more junior students preferred medical to judiciary profession, more of the senior boys preferred engineering, university teaching, scientific occupation and military.

On the basis of Holland's categorization of personality traits and work environments, the current researchers sought to discover the career preferences of a selected sample of school-going adolescents in the Eastern Region of Ghana.

Research Question

The research question that directed this study was:

What are the career preferences of senior high school students in Koforidua Municipality, Ghana?

Methodology

Research Design

The research design that was used for this study was the descriptive research design. Creswell (2009) opines that descriptive design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of the population. Descriptive design was, therefore, chosen for this study because it sought to find the opinions of senior high school students on their career preferences hence it lends itself to descriptive design.

Population, Sample and Sampling Procedure

All SHS in Koforidua Municipality formed the population for the study. From this population, students in four public senior high schools formed a target population of 7,157. A sample of 364 students was drawn out of the target population of 7,157 using a multi-stage sampling technique. The sample size of 364 respondents was arrived at by the use of Krejcie and Morgan's (1970) table for selecting sample size.

Stage 1: Cluster sampling was employed to group senior high schools into, option 1, option 2 and option 3. Option 1 schools are schools with students who have below average academic performance, Option 2 schools are schools with students who have average academic performance and Option 3 schools are schools with students who have above average academic performance (Ghana Education Service, 2015). The researchers considered students from the various options because the academic abilities of students from the various options vary.

Stage 2: Purposive sampling was used to select the only single-sex school from the municipality. Without purposely selecting this school (the only male students' school in the municipality), single sex school students would have been excluded from the study.

Stage 3: One school was randomly selected from each cluster using the lottery method.

Stage 4: The researchers selected approximately equal numbers of students from sampled schools on the basis of gender, programme and class. This procedure led to a sample size of 364 students.

Instrument

A questionnaire titled "Career Preference Questionnaire" (CPQ) was used for data gathering. It was structured based on Holland's (1997) categorization of careers. In other words, the various careers were grouped under the following categories of careers: Realistic, Investigative, Artistic, Social, Enterprising and Conventional. Out of these six, the respondents were requested to indicate only their most preferred career category.

Validity

According to Gall, Borg and Gall (1996), instrument validation is improved through expert judgment. The items were therefore handed over to three experts in guidance and counselling for scrutiny and vetting. The recommendations from the experts were the basis for its validation.

Reliability

The reliability of a research instrument concerns the extent to which the instrument yields the same results on repeated trials (Carmines & Zeller, 1979). The instrument was pilot tested in New Juaben Senior High School, in New Juaben District, Koforidua. The choice for the piloting was due to the similarities borne by the selected school and the other schools that were used for the main study. A sample of 40 students was randomly selected from New Juaben S.H.S. in New Juaben District, Koforidua to take part in the pilot study. According to Hill (1998), 10-30 participants are ideal for feasibility studies. The Cronbach's alpha coefficient of reliability obtained from the study was 0.87.

Data Analysis

Completed copies of the questionnaire were sorted, coded, and entered on a computer-assisted programme (Statistical Package for solutions and Services, version 22.0) for analysis. Responses to items addressing the research question were analyzed using, frequencies counts, percentages and rank order. These statistical tools were used because they gave indication of the students' preferred careers from the most preferred to the least preferred.

Results

Research Question: *What are the preferred careers of S.H.S. students in Koforidua Municipality, Ghana?*

Table 1: Preferred Careers of S.H.S. Students (n=364)

Career Preference	Frequency	Percentage (%)	Rank
Social	90	24.7	1st
Artistic	66	18.1	2nd
Conventional	63	17.3	3rd
Enterprising	60	16.5	4th
Realistic	44	12.1	5th
Investigative	41	11.3	6th
Total	**364**	**100.0**	

Source: Field Data, 2016.

Table 1 displays the preferred careers of S.H.S. students in Koforidua Municipality. Social careers came first in the ranking with 90 (24.7%) students out of 364. This gave the picture that almost a quarter of the respondents (or in more practical terms, one in every four senior high school students) would like to be engaged in careers like teaching, nursing, counselling, human resource management, social work and other careers that put them in a position to render services to people.

Artistic careers were the second in rank order with 66 students representing 18.1% of the total number of respondents. Hence, in this study, next to Social careers, students were most likely to consider careers in acting, architecture, book editing, clothes designing, graphic designing, interior designing, singing and painting, which are all found in the arts category. The least preferred careers were Investigative types which had 41 (11.3%) of the students preferring it. Investigative careers encompass careers in engineering, medicine, law, optometry, mathematic, surveying, and so on. Realistic careers were placed second least preferred careers with a frequency of 44 (12.1%) students. Realistic careers include piloting, firefighting, mining, policing, truck driving and farming.

A research conducted by Huern, Khairuddin, Ismail and De (2015) is supported by the findings of the current study which has demonstrated that the majority of students are interested in Social and Arts types of careers while a minimal number have interest in

Investigative careers which were more science-based careers. The study of Huern, Khairuddin, Ismail and De (2015) on Career Preference indicated that 65% of the students opted for careers in the area of Arts, In the Arts stream, 59% of the students chose Arts and Communication. About a third, or 33% of the students in the Science stream chose Health and Medicine as their preferred careers.

Again, the findings of the current research corroborate that of Shakya and Singh (2013) which revealed students' strong desire for taking careers in education in addition to science-based careers. In their study, data on career preferences revealed that education and science and technology were the most preferred careers of adolescents and agriculture was the least preferred. However, the findings in the current study did not support the findings of the study of the National Society of High School Scholars (2015) in the US which demonstrated a strong preference of students for science oriented careers. In their findings, 40% of respondents prefer medicine or health-related careers, 21% and 28% respectively prefer careers in Technology/Engineering and Science. The rest of the respondents were interested in careers in areas like Arts/Entertainment/Media and Business/Administration/ Corporate.

In sum, and in answer to the main question of this study, S.H.S. students' career preference demonstrated that students are more interested in social and artistic careers than investigative and realistic careers. The order of their career preference is as follows: Social, Artistic, Conventional, Enterprising, Realistic and Investigative.

Implications for Counselling

1. School guidance coordinators should make efforts in assisting students in their career decision-making and offer adequate career information.
2. As part of the career guidance and counselling process, counsellors should use psychometric assessments such as Bakere's (1977) *Motivation for Occupational Preference Scale* (MOPS). They should also use adapted versions of such widely used career assessment instruments like the *Strong Interest Inventory* (SII, Harman, Hansen, Borgen, & Hammer, 1994), the *Career Decision Scale* (SDS, Osipow, 1987), and the *Career Development Inventory* (CDI, Super, Thompson,

Lindeman, Jordaan, & Myers, 1988). These should be used to assist students in identifying their interests and to ascertain that their majors correspond with their interests (Corkin, Arbona, Coleman & Ramirez, 2008). In this regard, students can chart career paths that suit their personalities because job success and satisfaction are as a result of a congruent match between a person's abilities and interests on the one hand, and a position's requirements and rewards on the other (Holland, 1997).

3. School counsellors should have more of one-on-one counselling sessions with students in order to give them the confidence to be able to communicate all their career related challenges. Norris (as cited in Ruan, 2009) states that individual counselling is an ideal means of reducing career indecision that students experience.
4. Counsellors should come up with career development programmes which would enable them to assist individuals to identify and learn the skills by which they can be more effective in planning for and in choosing careers. Consequently, students can make effective transitions and adjustments to work and in managing their own careers.

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Socio-Cultural Factors: A Missing Variable in Mathematics Pedagogy in Ghana

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Abstract

This study draws on theories relating to the local aspects of mathematical knowledge and to mathematics pedagogy to explore how the teaching and learning activities carried out in mathematics classrooms in Ghana deal with these aspects. It focussed on the teaching of measurement of money at the primary school level. The primary school level was considered in this study because it is during this period of time that pupils develop the foundation for learning mathematics at higher grade levels. The current Ghanaian primary school mathematics curriculum, three of the popular primary school mathematics textbooks, and lessons from two experienced primary school teachers constituted the main sources of data for the study. The data collected were analysed qualitatively and presented as narrative description with some illustrative examples. The study revealed amongst others that the approaches used by teachers in the lessons observed reflected those suggested in mathematics curriculum and the textbooks, and these approaches pay very little attention to the social and cultural contexts of the pupils. By way of recommendation the authors provide an alternative approach to the teaching of measurement of money in context, based on a three-tier teaching strategy.

Key words: Pedagogy, mathematics, primary, socio-cultural, Ghana.

Background to the Study

> "They [pupils] know the home one [everyday mathematics] so if they bring it up you teach them what the syllabus says or what has been prepared to be followed." (Teacher C, Davis, 2010, p.186)

In the view of Teacher C, a Primary Four teacher with 15 years of teaching experience in different government (Public) schools, everyday mathematical conceptions and practices of students have no place in mathematics pedagogy. This view may reflect the views of many teachers who work in the contexts where school mathematics and everyday mathematics are seen as being mutually exclusive. However, these views are not tenable. Literature points to the local/cultural aspects of mathematical knowledge and mathematics pedagogy. Bishop (1988) argues that "mathematics must be understood as a kind of cultural knowledge, which all cultures generate but which need not necessarily 'look' the same from one cultural group to another" (p180). Figure 1, shows how local mathematical knowledge could be. The Figure shows estimate prepared by an accountant of a restaurant for food that would be served at the end of a board meeting. The unit of measure of quantity of items would not make sense to anybody who is foreign to the local culture. For example, unit of measure of "black eye beans", butter and crab would not make sense to anybody who does not share in the culture that produced these mathematical representations. In some cases, no quantities were given but the prices were given, for example, salted fish and grinding. Once again this would not make sense to somebody who is foreign to the local culture but for the local it makes sense because the price gives the idea of the quantities involved. All these show the local aspect of mathematical knowledge and mathematical representation.

CHALETS/RESTAURANT

LIST OF ITEMS TO BE PURCHASED FOR SPECIAL PROFESSIONAL

ITEM	QTY	UNIT PRICE	AMOUNT GH¢
BAL B/D			3249.00
Dawadawa	5 pcs		10.00
Potatoe chips	5 satchets		110.00
Butter	2 cakes		31.00
Salted fish			50.00
Salt	1 bag		65.00
Ga kenkey	200 wholes		200.00
Avocado	10 wholes		20.00
Macaroni	10 satchets		35.00
Crab	lot		20.00
Palmnut	3 tins		10.00
Cooked beans	lot		10.00
Black eye beans	5 olonka		75.00
Hausa koko	lot		30.00
Eggs	7 crate		112.00
Grinding			20.00
Corn flour (brown / white)	4 olonka		70.00
Gas			411.00
TOTAL			4528.00

Figure 1: Local aspect of mathematical knowledge exemplified in the units of measurement

Researchers in mathematics education have also distinguished between the mathematics students encounter in their everyday social and cultural practices (m) and the mathematics they encounter in school (M) (Bishop 1988; D' Ambrosio, 1985). Vygotsky (1987) distinguishes two kinds of concepts, one being everyday concepts and the other, scientific concepts. From Vygotsky's perspectives, an everyday concept is acquired through the child's participation in social activities within the child's culture. Their (everyday concepts) development occurs in out-of-school settings, they are experience-based, situated and often spontaneous. Scientific concepts on the other hand are systematic. They are acquired through a system of formal instruction. The discussion so far shows that different sociocultural activities students engage in even within the same geographic settings such as school and out of school produce different kinds of mathematics. As long as the societal practices that generate these different mathematical practices and therefore different mathematical representations continue to be

carried out in the society, students would have to grapple with the onerous task being proficient in both practices in order to fit into the society in which they find themselves. For example, the information in Figure 1 requires proficiency in both everyday mathematics and the school mathematics in order to make sense of the whole document. One needs local knowledge in order to understand the quantities and school mathematical knowledge in order to follow the amount column. However, everyday mathematical representations and practices are often devalued or ignored, especially in contexts where teachers and in some cases curriculum developers see the two as being mutually exclusive (Abreu & Duveen, 1995; Davis, 2010).

Redenomination of the Ghanaian local currency the Cedi

In 2007 the government of Ghana, through the Bank of Ghana redenominated the local currency, the Cedi. Some of the main reasons why the local currency was redenominated included "general inconvenience and high risks of carrying loads of currency" and "difficulties in maintaining book keeping and statistical records" (BOG, 2007, p.1). The redenominated currency was named the Ghana Cedi. One new Ghana Cedi was equivalent to ten thousand old cedi, implying that four zeros were slashed. The redenomination did not affect the basket of goods and services the old currency could buy. For example, if an item cost C200,000 the same item could be purchased at GH¢20. The redenomination brought with it the need to review the Ghanaian mathematics curriculum at all levels. Topics such as measurement of money, for example, at the primary school level had to be redesigned to reflect the change. Teachers had to adjust to the use of the new currency in the teaching of measurement of money.

A decade after the implementation of the new currency, many ordinary Ghanaians, especially those in the deprived, rural communities still communicate prices of goods and services in the old currency, even though the old currency is no longer in circulation. Some educated people even communicate money in both the new and the old currency as shown in Figure 2. The figure depicts a receipt the first author was given by a restaurant attendant (Comfort) who claimed she had finished Senior High School (Grade 12) in Accra, the capital town of Ghana. It could be seen from Figure 2 that the sum should have been 86 but Comfort wrote 860, which is the usual way of communicating 860,000

among the locals. Although Comfort had been taught measurement of money in school, she could not calculate the total cost of the items bought in the new currency correctly. Comfort identified the cost of each of the items using the new currency as names signifying the old currency but not numbers. For example, she treated C20 as 200, 000. Being a local, Comfort's arithmetic made sense to the first author but this receipt will definitely confuse anybody who is foreign to the Ghanaian societal and cultural practices. While Comfort's example shows the local aspect of mathematical knowledge, it also raises question about how measurement of money is taught in Ghanaian schools. One does not expect Comfort to go through the difficulty she experienced communicating money in the new currency, after she had gone through lessons on measurement of money in school. Studies in Ghana have shown that primary school pupils, especially those from rural school settings treat numbers written on currency notes as names but not numbers (Davis & Sullivan, 2011). The study found that pupils used the new currency to communicate the old currency, for example, "Twenty pesewas (20p)" was named "two thousand" (Davis & Sullivan, 2011, p.57). This often made operation on money difficult for some pupils. Some of these pupils, like Comfort, would end up completing secondary education without being proficient in operation on money.

Figure 2: Example of the use of new Ghanaian currency to communicate the old currency

Purpose of Study

Our main objective in this paper was to investigate how the teaching and learning of mathematics take on board some of the social and cultural practices of students to help them understand school mathematics generally, and measurement in particular. The study therefore sought to explore how socioculturally-related the teaching and learning activities carried out in Ghanaian primary school mathematics classrooms are; focusing on the teaching of measurement of money. The authors focused on the teaching of measurement of money because of the encompassing transitions (Abreu, Bishop & Presmeg, 2002) Ghanaian pupils find themselves in as a result of redenomination of the local currency in 2007. This has resulted in the general societal practice whereby some people communicate old currency using the new currency notes. This study is important and necessary because the different ways in which the currency is communicated is not just a source of confusion, but also potentially the reason for someone to scam the public. For example, it is common for fuel attendants to lose income because some driver customers would mention the amount of fuel they want to buy and later say they had meant to communicate the amount in the old currency.

The Research Question

The main research question that guided the study was: "How socioculturally-related are the pedagogical activities used in teaching measurement of money in primary schools in Ghana?"

Method

Two average achieving public primary schools, one each from a rural area (School R) and an urban area (School U) were randomly selected from a list of average primary schools in the Cape Coast Metropolis of Ghana. In each of the schools, primary four pupils were purposely selected because they had just entered primary four and the teachers were revising some primary three topics, including measurement of money with them. In all, 60 pupils comprising 38 from School R and 22 from School U participated in the study. One lesson each on measurement of money was observed from each of the teachers. The lessons were observed in September, 2016 by the first author, with the help of a trained research assistant. For the purpose of triangulation, the results from the lesson observation, the suggested teaching approaches used in the teaching of measurement of money in the Ghanaian primary school mathematics curriculum, and the approaches used in the development of measurement of money in three popular government approved textbooks used by schools in the Cape Coast Metropolis of Ghana were studied to ascertain how they reflect the social and cultural practices of the pupils. Triangulation in educational research is recommended for the purpose of ensuring concurrent, convergent and construct validity (Torrance, Gorard & Taylor, 2004). This was therefore done to enhance the validity of the findings from the study. The data collected were analysed qualitatively and presented as narrative description with illustrative examples. For the purpose of analysis, pupil participants from School R were coded SR1, SR2, SR3, …, SR38 and those from School U were coded SU1, SU2, SU3, …, SU22. The teacher participant from School R was coded TR whereas the teacher participant from School U was coded TU. The first author explained the whole research project to the research participants and their consent were sought before the start of the project. Permission was sought from heads of the two schools as well.

Results and Discussion

Lesson Observation

The lessons were delivered mainly in the English Language, which is the official language of instruction from Primary Four onwards in Ghana. Pupils, at this level often struggle to understand lessons delivered in English language because this is the level where they begin to experience the use of English language as medium of instruction. Classroom discussions and interactions were mainly vertical in the form of teacher posing questions and pupils responding to the teacher's questions. In each of the lessons, the teacher introduced the pupils to the current Ghanaian currency in circulation (i.e. Ghana Cedis) and took them through identification of the coins and the notes after which they went through operation on money.

In School R, for example, the lesson proceeded as shown in the excerpts below:

TR: [writes the topic "Money" on the board]
TR: What is money?
SR17: Sika
TR: Every country has its own currency, what currency do we use?
SR5: Cedis and Pesewas
TR: Ghana Cedis and Pesewas
SR: [mention the denominations in Pesewas in chorus, referring to their text book]
TR: [writes each of the denominations on the board as students mention them]
SR: [mention the denominations in Ghana Cedis in chorus]
TR: [writes each of the denominations on the board as student mention them]

Although a growing body of literature points to the importance of the recognition of the culture and history of pupils in the development of lessons (Hedegaard & Chaiklin, 2005), the use of pupils' everyday social and cultural practices relating to measurement of money was not evident in the development of each of the lessons, as shown in the excerpts below. The teachers rejected the use of everyday conceptions and practices involving measurement of money.

TU: We go to the notes. We start from the smallest to the biggest.

TU: What is the smallest notes?
SU4: One Ghana Cedi.
TU: What is the next?
SU17: Two Ghana Cedis
TU: What is the next?
SU16: ***Five hundred thousand***
TU: ***You are taking us to the olden days. We are not using it any more.***

TU knew the source of SU16's problem; "I know that some of you are using the old currency because you sell" (TU). However, she did not see the need to help the pupils to appreciate the need to operate in the new currency by engaging them in cultural negotiation (Abreu, Bishop & Presmeg, 2002). TU rather accused SU16 for taking the class back to the olden days; meanwhile the pupils know that communicating prices of commodities in the old currency is a common acceptable practice in the Ghanaian society. This constitutes cultural conflict because the practice of communicating measurement of money in the old currency is accepted in the out of school setting but is prohibited in the classroom. It also shows how Ghanaian primary school children, especially those who are deeply involved in the socio-cultural practices such as buying and selling have to manage to experience two worlds within the same country. Such deliberate attempts to avoid the mention of everyday mathematical practices within the sociocultural practices of pupils often results in situations where the pupils end up seeing the two sets of mathematical practices as being mutually exclusive. They also end up not being proficient in both mathematical practices (as was seen in Figure 2) because the everyday mathematical conceptions and practices which should support the development of school mathematics (Vygotsky, 1978), is ignored. Pupils therefore end up learning many school mathematical concepts in abstract.

The exposure of pupils to rules appeared to be the main aim of the teachers, "when we write we bring the Ghana Cedis first but when we are calling it, mention the number before the Cedi" (TU), "the Pesewas is coin and Cedi is notes" (TR). By just concentrating on rules, teacher TR, for example, taught the pupils the wrong concept and ended up confusing them because the teacher forgot that the new one Ghana Cedi consists of both coins and notes. Telling them that pesewas are the coins and Cedis are the notes was therefore incorrect because there is a

Cedi coin and the pupils knew but were very careful not to question the teacher's knowledge (see Appendix B).

Primary School Mathematics Curriculum

Measurement of money is covered in primary one, primary two and primary three (i.e. the first three years in the primary curriculum). The curriculum highlights teaching of only the new currency notes and coins and the use of currency notes and coins in a play shop (Ministry of Education, 2012). By Primary 3, pupils are expected to use notes and coins up to GhC50.00 in a play shop. They are expected to find the total cost of two or more items from a corner shop or school canteen (Ministry of Education, 2012, p.58). The suggested teaching approaches do not mention the old currency and how to help pupils to make transition from the old currency to the new currency, perhaps because the curriculum developers assumed that all Primary 1 to Primary 3 pupils were born after the introduction of the new currency notes. Using the old currency to communicate the prices of goods and services was not envisaged. However, the social practices involving buying and selling still equip pupils with the knowledge of the value of goods and services using the old currency as unit of measurement even though the old currency is no longer legal tender.

The Primary Textbook

Three government approved pupils' mathematics textbooks 1-3 namely, "mathematics for primary schools" by Ofantseh and Ayernor (2012), "new mathematics for primary schools" by Ashworth and Wilmot (2012), and "Practical mathematics for primary schools" by Nkani and Homiah (2012) were studied to ascertain how they approached the teaching of measurement of money. The results from the analysis of the approaches used by each of the textbooks showed that they introduced pupils to the local currency (the Ghana, Cedi), Ghana Pesewas and Ghana Cedi notes, the various denominations for the Ghana Cedi notes and coins (see Appendices A and B), and the use of currency notes and coins in a play shop (see Appendix C). As with the curriculum, the textbook did not mention the old currency and how they relate to the new currency, by drawing on the history of the new currency to help pupils appreciate the relationship between the past and the present and the need to communicate prices of goods and services

in the new currency. The play shops shown in the textbooks did not reflect the sociocultural practices of all students, especially those from the rural and very deprived communities (see Appendix C, for example). The unit of measurement of beans in Appendix C, for example, does not reflect the usual societal practice of measuring the volume of the beans rather than the weight (see Figure 1 for example). The examples presented in the play shop do not therefore reflect some of the major sociocultural practices pupils engage in their society.

The concepts relating to currency, buying and selling taught in the lesson may rather confuse pupils, especially those who are deeply engaged in buying and selling. Children know that exchange of goods and services does not always involve money. It may also involve exchange of one good for another or service. Their notion of total cost may not involve only the use of money/currency. Pupils also know that if a ball of "Kenkey" (a staple food made from corn dough, common in Ghana and some West African countries) is One Cedi and you buy GH¢ 5.00 worth of "Kenkey", you will not always take 5 balls of "Kenkey"; you will sometimes take more than 5 balls, (usually 6 balls of "Kenkey") (see Figure 3). In Figure 3, there are five balls of "Kenkey" in the black polythene bag and one extra ball, which is added to the five once a customer buys GH¢ 5.00 worth of "Kenkey". However, some of these everyday mathematical representations and practices did not have any place in the development of concepts. In the attempt to immerse pupils in school mathematical representation and practices by ignoring some of the everyday mathematical representations and practices some of them end up being inefficient in both sets of mathematical practices, as was seen in the case of Comfort in Figure 2.

Figure 3: Pupils everyday mathematical practices involving buying and selling

Conclusion and recommendation

The approaches used by the teachers in the teaching of the measurement of money as well as those suggested in the mathematics curriculum and the textbook in Ghana have not reflected the social and cultural practices of pupils, especially those living in the rural area. The development of concepts appeared to have taken place without considering the background of the learners. As a result, school mathematics lessons did not promote in-depth understanding of the measurement of money and the need to communicate measurement in the new currency, since they did not draw on pupils' prior knowledge on buying and selling from their communities. Furthermore, teachers would often simply follow what is included in the curriculum and textbooks, which in this case, involve introduction of new currency coins and notes followed by operation on money in a play shop, using only the new currency. Although pupils had been already introduced to the use of only the new currency in the measurement of money, that did not prevent some of them from still using the old currency. This shows that, the fact that the curriculum is deliberately designed and delivered to avoid the use of students' everyday mathematical practices and representation involving measurement of money did not stop students from using their everyday mathematical representation and practices in the school mathematics classroom.

It might seem logical for one to argue that the version of the new currency only should be represented in the textbooks, which is to 'force' pupils to operate and think in terms of the new currency only, and thus 'training' to be independent of the old currency, or the societal way of buying and selling as it is the case presently. However, this study has shown that forcing pupils to operate in only the new currency might not be the best way to help pupils who are engaged in social and cultural practices that still use the old currency to learn measurement of money meaningfully. The practice of 'forcing' pupils to learn the new currency without reference to the old currency might end up producing more of the likes of Comfort who are not efficient in communicating measurement of money in neither the old nor the new currency. This shows the need to respect all cultures of mathematics present in the classroom and to resolve all cultural conflict in mathematics classroom by engaging pupils in cultural negotiation (Abreu, Bishop & Presmerg, 2002) to enable them learn mathematics meaningfully. As long as sociocultural issues continue to remain a missing factor in mathematics pedagogy, the school system would continue to produce people like Comfort who are neither proficient in the school mathematics nor the everyday mathematics.

Although this study was done on a small scale, the findings nevertheless suggest the need for curriculum developers in Ghana to reconsider what counts as mathematics to be included in the school curriculum and eventually taught in the classroom. Authors of mathematics textbook are unlikely to include everyday mathematical conceptions and representations in their textbooks because their books will not be recommended for use in schools if they contain contents that are not prescribed in the school curriculum. Teachers are also likely not to include everyday mathematical representations and practices in their teaching because they have to focus on what is in the curriculum/syllabus and textbooks. At the end of it all it is the pupils who lose because they have to struggle to make sense of school mathematics. Meanwhile there are several culturally relevant approaches to teaching mathematics in context to pupils (Davis, 2010; Presmeg, 2007).

There is the need to create the space for the everyday mathematical representation and practices to support the development of school mathematics in school since at the end of the day the student

would need to learn school concept meaningfully and at the same time engage in the everyday mathematical practices efficiently. As long as the societal activities that produce everyday mathematical representations and practices persist, the student would have to be proficient in both mathematical practices in other to fit into the society. There is therefore the need for teachers to adopt culturally relevant approaches to teach mathematics meaningfully to pupils (Gay, 2000). We shall draw on the work of Davis (2010) to exemplify the use of a three-tier model for teaching mathematics in contexts like Ghana where in-school and out-of-school mathematics are often perceived as being mutually exclusive.

A three-tier approach to the teaching measurement of money in context

Stage One (Enculturation Stage): Draw on pupils' everyday experiences involving buying and selling by involving them in activities on buying and selling which will draw on their everyday mathematical representations and practices.

Here tasks involving both the use of goods as medium of exchange for other goods as well as money as medium of exchange would have to be carried out by the pupils.

At this stage pupils are free to communicate measurement of money in either old or new currency, since that reflects their societal practice.

Stage Two (**Transition Stage**): Draw pupils' attention to the local aspect of their everyday mathematical representation and practices involving buying and selling. For example, difficulty people who are foreign to the Ghanaian culture would have using new Ghana Cedi to communicate measurement of money in the old currency (i.e. identifying Gh¢ 5.00 as fifty thousand).

Here, teachers may draw on Ghana's relationship with the world through trade to justify why foreigners' perspectives should be taken into consideration when communicating measurement of money. Pupils may be given a project to look at how different countries communicate measurement of money.

Stage Three (**Acculturation stage**): Guide pupils to understand the school (and official) notion of the measurement of money and related concepts, such as cost price, selling price and change. This would be achieved by drawing on their understanding of these concepts in stages one and two. At this stage, pupils are guided to the understanding of

money as the main medium of exchange of goods and services and the Ghana Cedi as the official unit of measurement of money in Ghana. This will help change the how teachers such as TC's perceive mathematics and mathematics teaching and learning. This enculturated understanding of not just the difference between the two systems of measuring money, but also of the rationale and advantages of the change, should promote students' effective communication of money using the new unit of currency, the Ghana Cedis.

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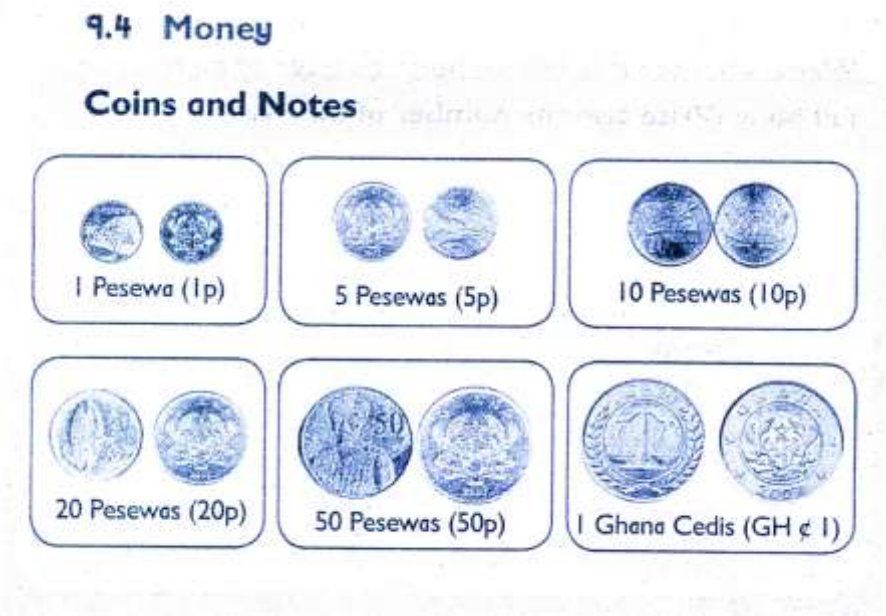
Appendix A: The New Ghana Cedi Notes

Appendix B: The New Ghana Cedi Coins



Appendix C: Play Shop

UNIT 10 Using shopping prices

Here are some items with prices. Make a list of these. Find out how much they cost now.

Pen  50 Gp	Exercise book  GH¢ 3	Pencil  30 Gp
Banana  20 Gp	Ball  GH¢ 10	Yam  GH¢ 4
Milk  GH¢ 2	Towel  GH¢ 10	Pineapple  GH¢ 5
Bucket  GH¢ 20	Orange  30 Gp	Mathematics text book  GH¢ 10
Bread  GH¢ 8	$\frac{1}{2}$ kg sugar  GH¢ 5	One egg  50 Gp
Small bar of soap  GH¢ 5	Toilet roll  GH¢ 1	Toothpaste  GH¢ 2
One mango  GH¢ 1	Tomato  20 Gp	$\frac{1}{4}$ kg beans  GH¢ 5

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Assessing the Counselling needs of Undergraduate Students on Multiple-Site Sandwich Programmes of Institute of Education, University of Cape Coast

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Abstract

The study assessed the counselling needs of students on sandwich programmes of the Institute of Education, University of Cape Coast. Two research questions and four hypotheses were answered and tested respectively. A descriptive study in which 207 respondents were selected from four sandwich centres of the Institute of Education, using various sampling techniques and procedures. The Counselling Needs Inventory designed by the investigators were used to collect data. The predominant counselling need of the students was "I need help on how to get along with extrovert spouse", whilst a majority of them preferred to talk to a counsellor. Statistically significant differences were found to exist between counselling needs by gender, and age with regards to their psychological needs. No statistically significant differences were found among the ages of the respondents and counselling needs such as Financial needs, Marital needs and Educational needs, and among marital status and number of years taught by the respondents and their counselling needs. It was therefore concluded that sandwich students of the Institute of Education, University of Cape have counselling needs. Among recommendations were that authorities/agencies should ensure that professional counselling services are rendered by universities that run programmes in the non-conventional mode. Implications of the study for counselling included the fact that professional counsellors should be attached to multiple sites of sandwich programmes. Again, students on sandwich programmes should be offered similar counselling services as those in the conventional mode.

Key words: Sandwich students, counselling needs, financial needs, educational needs, psychological needs, marital needs.

Introduction

Guidance and counselling as a movement was started in America at the beginning of 20th Century as a reaction to change process in an industrialized society (Oyieyo, 2012). Guidance and counselling programme is one of the most important components of the school curricular activities (Ndung'u, 2008). The wide range of behavioural problems in schools has amplified its vitality. Counselling is a process of helping individuals or group of people to gain self-understanding in order to be themselves (Oyieyo, 2012). Burks and Steffler (1979) see counselling as a professional relationship between a trained counsellor and a client. Olayinka (1972) defined it to be a process whereby a person is helped in a face-to-face relationship while Makinde (1983) explained counselling as an enlightened process whereby people help others by encouraging their growth. Counselling is the skilled and principled use of relationship to facilitate self-knowledge, emotional acceptance and growth and the optimal development of personal resources (The British Association for Counselling & Psychotherapy, 2013). Counselling is a process aimed at assisting clients understand and clarify personal views of their living, and to learn to attain their goals through the provision of meaningful data, and making informed choices to resolve problems that are emotional, vocational and educational.

A need is any lack or deficit of something within an individual, either acquired or physiological, whose fulfilment would tend to promote the welfare of the individual. (Biswas & Aggarwal, 1971). Counselling needs are needs of a student that are required to resolve his/her problems which he/she confronts in day to day life situations and also to enrich his personal development.

DuCharme-Hansen and Dupin-Bryant (2005) opined that the main purpose of student needs assessment is to give the instructor the tools and information necessary to make solid decisions about how to best facilitate the educational experience from start to finish. Anderson (2004) suggests that "developing quality education systems requires that educators have a deep understanding of how individuals and groups of students learn" (p. 239).

The Cambridge Dictionary (2016) defines sandwich programme as a college course consisting of periods of study with periods of work between them so that students get practical experience. Sandwich candidates are majorly primary and secondary school teachers who prefer to use their holidays for further studies. Imakpokpomwan and Adeyemi (2016) posited that sandwich programmes were part-time teacher education programmes often designed for upgrading the qualification of teachers and other education workers. The programmes operate during the school holiday periods.

The relevance of the sandwich programmes in teaching is manifested in the high manpower production, especially teachers. Enrolment in the sandwich programmes is investment since it raises teachers' productive and earning capacities. Sandwich students invest time, money and energy so that at the end they could be better and current teachers. They could also earn better income and possibly improve their social and economic rating in the society. On the macro level, the society benefits by having more intelligent with productive teachers.

The introduction of the sandwich programme by the Institute of Education, University of Cape Coast, was in line with the mission of University of Cape Coast which was constantly seeking alternative ways to respond to changing needs to make university education accessible to a large number of qualified students who cannot be admitted into the conventional systems due to lack of space at UCC or the demands of their jobs.

The programme is run during vacation and is intended to eliminate the perception about teacher absenteeism which had been erroneously linked with teachers enrolling on programmes of study while schools are in session. Another reason for the introduction of the programme in July 2011 was to give an opportunity to teachers outside Cape Coast and its environs, who due to distance, could not enroll in the evening classes, to acquire a degree. Early Childhood education was added to the programme in 2013 to provide an opportunity for those who hold diplomas in early childhood from colleges of education to upgrade themselves. The programme, which was initially held at five centres, had now been extended to 10 centers across the country and constantly monitored by Faculty members from the university as well as officials from the National Council of Tertiary Education (NCTE) and the Teacher Education Division of the Ghana Education Service.

Durosaro (1998) did a comparative study of the internal rate of returns to the full time and the sandwich programmes in Nigerian universities. He found higher rate of return to the sandwich than the full-time programmes. He suggested that 'there is need to encourage states to aid teachers to take advantages of the sandwich programmes in universities around them'. Apart from gaining new skills, degree qualifications boost their potentials to be promoted up the organizational hierarchy. According to Adesoye and Amusa (2011), the information needs of the respondents are diverse, it varies from information on their course of study, and career development, to information on current affairs and politics. Dada, Agbana and Adetayo (2010) studied the counselling needs of sandwich students of University of Ado-Ekiti, College of Education, Oro campus, Kwara State, Nigeria. The major findings showed that the most pressing need of the respondents was "transportation" while the least need was "personal". They found, no significant differences in respondents' counselling needs based on religion and marital status while significant differences were noted based on gender, age and year of study. They recommended that professional counsellors should intensify efforts in organizing intensive counselling programmes which will meet the counselling needs of the sandwich students and that government at all levels should take urgent steps in finding lasting solutions to the psychological, social and academic problems of sandwich students. *Results of a study by Mabizela (2014) showed that*

> *first year students need counselling on adaptation to studying at an Open Distance Learning (ODL) institution, knowing career opportunities, improving study skills, preparing for examinations, identifying further study opportunities, compiling career portfolios, preparing for job interviews, and dealing with exam failure. Counselling needs which are considered less important to students were issues relating to accepting others and dealing with peer pressure (p.).*

Counselling services are provided to mainstream students of the University of Cape Coast. The Institute of Education sandwich programme is run by the same university. However, students in this bracket are not offered counselling services.

Of late there has been a growing concern on the quality of students turned out by some universities through their non-traditional

approaches such as sandwich programmes and distance learning. Could it be that the non-traditional students do not get the same kind of services available to the mainstream students? The study therefore sought to assess the counselling needs of undergraduate students on multiple-site sandwich programmes of Institute of Education, University of Cape Coast

Objectives of the study

The study was conducted in order to

1. Ascertain the prevalent counselling needs of undergraduate students on sandwich programme of Institute of Education, University of Cape Coast.
2. Examine the extent to which undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast, prefer to talk to a counselor when faced with problems.
3. Explore the effects of demographic variables (gender, age, marital status, and number of years taught) on undergraduate students on sandwich programme of Institute of Education, University of Cape Coast.

Research Questions

The study sought to answer the following questions;

1. What are the prevalent counselling needs of undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast?
2. What is the extent to which undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast, prefer to talk to a counsellor when faced with problems?

Research Hypotheses

The study tested the following hypotheses:

1. There is statistically significant difference between the counselling needs of male and female undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast.
2. There is statistically significant difference in the counselling needs of undergraduate students on sandwich programmes of

Institute of Education, University of Cape Coast in terms of ages.

3. There is statistically significant difference in the counselling needs of undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast in terms of their marital status.
4. There is statistically significant difference in the counselling needs of undergraduate students on the sandwich programmes of Institute of Education, University of Cape Coast in terms of years taught.

Methodology

The descriptive research design was employed in this mainly because it was to ascertain the current counselling needs of undergraduate sandwich students of the Institute of Education, University of Cape Coast.

Population

The population for the study was 2,340 comprising all students in the B.Ed. (Basic education) and B. Ed. (Early Childhood Education) in the eight study centres (Outreach Section, Institute of Education, UCC, 2016/2017). These study centres are located in eight Colleges of Education across the country.

Sample and Sampling Procedures

Sampling is the act, process or technique of selecting a suitable smaller size of a population or a representative part of a population for the purpose of determining parameters or characteristics of the whole population (Kombo & Tromp, 2006). Two hundred and seven (207) respondents were selected from four sandwich study centres of the Institute of Education, University of Cape Coast as sample for the study. The lottery method was used to select four study centres out of seven (because Holy Child College of Education; the eighth study centre was used for the internal consistency of the instrument). Quota sampling was used to select initial samples from these centres, whilst the stratified sampling technique was used to group the initial samples into programme and gender. The final respondents for each group were randomly selected using a table of random numbers.

Materials

Data were collected using a Counselling Needs Inventory consisting of 31 items constructed by the investigators. There were five questions on the demographic characteristics of the respondents and 26 items covering four areas (financial, educational, psychological and marital) of counselling needs of the respondents. The questionnaire was a Likert-type scale for rating the 26 items.

Content validity and internal consistency were established for the instrument. The content validity was established by given the instrument to some colleagues to go through while 20 sandwich students at the Holy Child College of Education were purposively sampled to answered the instrument. This was done to establish the internal consistency of the instrument. After consent had been sought from the respondents, they were given copies of the questionnaires to be completed after which they were collected by researchers on the same day.

Results and Discussions

This section presents the results of the analyses of the research questions and hypotheses raised, for the study and situate them to trends in available literature.

Analyses of Research Questions

1. **What are the prevalent counselling needs of undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast?**

This question sought to determine the prevalent counselling needs of the undergraduate students on sandwich programmes. The results are present in a ranking order in Table 1.

Table 1: Prevalent Counselling Needs of the Undergraduate Students on Sandwich Programmes

SN	Items	N	Mean	Std. Deviation	Rank
1	I need help on how to use my money judiciously.	207	3.8068	.39579	6th
2	I need assistance on how to cultivate the habit of savings.	207	1.1256	.93667	26th
3	I need help on how to broaden my income base.	207	3.7903	1.07482	11th
4	I need help to enable me invest my money	207	3.9034	.94527	2nd
5	I need help to learn about the available investment opportunities	207	3.6039	.79902	23rd

6	I need help on how to critically analyse issues before contracting loans.	207	3.7874	.93125	12th
7	I need help on how to identify symptoms of stress.	207	3.7295	.85574	16th
8	I need help on how to improve my physical well-being.	207	3.7488	.87283	15th
9	I need help on how to improve my psychological well-being.	207	3.8744	.87226	4th
10	I need help on how to improve my emotional well-being.	207	3.7729	1.56467	13th
11	I need help on how do away with some negative attitudes that add to my stress at workplace.	207	3.6961	.80830	18th
12	I need help on how to manage job related stress.	207	3.8019	.82697	7th
13	I need help to be well informed about causes of workplace stress.	207	3.8261	.90773	5th
14	I need help on how to express affection to my spouse.	207	3.8889	.78346	3rd
15	I need help on how get along with extrovert spouse.	207	3.9469	.83728	1st
16	I need help on how to achieve effective communication in my marriage.	207	2.0000	1.03342	25th
17	I need help on how to make my spouse a companion.	207	2.1353	1.00052	24th
18	I need help on how to encourage honesty in my marriage.	207	3.7150	.91954	17th
19	I need help to know when to further my education.	207	3.7923	.95039	10th
20	I need help to enable me choose educational programme.	207	3.7971	.93860	9th
21	I need help to know the various job opportunities available for every programme of study.	207	3.7585	.83003	14th
22	I need help to know the requirement when applying for a particular academic programme.	207	3.8011	.88059	8th
23	I need help in getting information about the right institution to choose for further studies.	207	3.6667	.80049	20th
24	I need help to enable me have full concentration when studying.	207	3.6860	.77142	19th
25	I need help to enable me know much about study leave issues.	207	3.6087	.72843	22nd
26	I need help in getting information on available scholarships in connection with my programme.	207	3.6329	.85359	21st

The finding of the study revealed that the most predominant counselling need of the respondents “I need help on how to get along

with extrovert spouse" (M = 3.9469, SD = .83728). This was followed by "I need help to enable me invest my money" (M = 3. 3.9034, SD = .94527).

Dealing with an extrovert spouse is considered as a psychological issue while seeking help on how to invest is also a financial issue. Hence the finding of this study is consistent with Appiah (2014) who found that the predominant counselling need of students in the Atebubu District was psychological. He indicated that even though finances was also a major concern for 69% of the respondents, that also culminated into a psychological effect thereby making psychological need the most dominant.

2. **What is the extent to which undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast, prefer to talk to a counsellor when faced with problems?**

Research question 2 sought to determine who students preferred to talk in times they faced problems. The results are presented in Table 2.

Table 2: Distribution of Respondents' Preferred Confidant in times of Problems

Confidant	Frequency	Percent
Form Tutor	21	10.1
Any Tutor	16	7.7
Counsellor	146	70.5
Centre Coordinator	24	11.7
Total	**207**	**100.0**

It was revealed from the results in Table 2 that majority 146 (70.5%) of the respondents preferred to talk to a counsellor than other helpers around. This finding is consistent with the finding of Brempong (2014) who found among students that about 84% out 127 respondents indicated they preferred to discuss their issues with professional counsellors than their friends.

Counsellors are considered to play major roles in the growth of a people. They assist and guide individuals to understand themselves and their situations. In the case of sandwich students, they are saddled with courses to be taken within a relatively short space of time. As teaching and learning draw from their wellbeing so are other pressing issues such as how to finance their education, marital and relationship issues among others. Most of these students may have been exposed to

the importance of counsellors and counselling in their colleges of education (Ampofo-Agyare, 2013). It is therefore not surprising that about 71% indicated that they preferred to talk to a counsellor when they faced challenges.

Analyses of Research Hypotheses

1. There is statistically significant difference between the counselling needs of male and female undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast.

Hypothesis One was to find if there is a statistically significant difference in counselling needs of the students in the study on basis of gender. The results are presented in Table 3.

Table 3: Results of t-test distribution of the Difference in Counselling Needs of Sandwich Students in terms of Gender

Gender	N	X	SD	df	t-value	P
Male	86	2.8274	.35034	205	3.193*	.015
Female	121	3.1464	.30221			

*Significant, $p < .05$

Hypothesis 1 was tested at statistical significance level of 0.05 and the results showed that at df = 205, p = 0.015 which is less than 0.05. This implies there is statistically significant difference between the counselling needs of male and female undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast. Therefore, we fail to reject Hypothesis One; t (205df) = 3.193, $p < 0.05$.

2. There is statistically significant difference among the ages of undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast with respect to their counselling needs.

Hypothesis Two was to find if a statistically significant difference in counselling needs of the students concerning their ages. Table 4 presents the results.

Table 4: ANOVA Distribution of Age Difference and Counselling Needs of Undergraduate Students on Sandwich Programmes

		Sum of Squares	df	Mean Square	F	Sig.
ALL Mean	Between Groups	.894	4	.223	.936	.444
	Within Groups	48.216	202	.239		
	Total	49.110	206			

A One – Way Analysis of Variance was conducted to determine the differences in counselling needs of undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast with respect to their age. No statistically significant difference was found among the ages of the respondents and counselling needs at the significant level $\alpha = .05$. We therefore reject the hypothesis and conclude that there is, no statistically significant difference in the counselling needs undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast with respect to their ages ($\alpha = .05$).

The study is consistent with the findings of Randolf (2015) who found no difference in counselling of civil servants in Malaysia with respect to their ages. He espoused that the work demands are no different in terms of ages but with ranks. In schools the curriculum is not structured differently for different ages within the same level or class. This notwithstanding, people of different ages have different preferences and approach to issues. Though students may be at the same level in education, especially at the tertiary level, while a group is thinking of how to choose spouses, others may be thinking of how to approach their retirements.

3. There is statistically significant difference in the counselling needs of undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast in terms of their marital status.

Hypothesis Three was tested to determine whether a statistically significant difference in counselling needs of the students concerning their marital status. The results are presented in Table 5.

Table 5: ANOVA Distribution of Difference in Counselling Needs and Marital Status

		Sum of Squares	df	Mean Square	F	Sig.
ALL Mean	Between Groups	.178	2	.089	.371	.691
	Within Groups	48.933	204	.240		
	Total	49.111	206			

A One – Way Analysis of Variance was conducted to determine the differences in counselling needs of undergraduate students on sandwich programmes with respect to their marital status. There was a no statistically significant difference at $\alpha = .05$ among the marital status of the respondents and their counselling needs. We therefore reject the hypothesis and conclude that there is no statistically significant difference among the marital status of undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast in terms of their counselling needs ($\alpha = .05$).

The finding of the study is at variance with the finding Mbali (2014) who found among students of University of Kwazulu-Natal in South Africa that differences existed between married and unmarried students with respect to their counselling needs. Mbali (2014), explained that married students had more counselling needs than those unmarried, and that the married group of students had better ways of handling their counselling needs than unmarried students.

Most of the students on this programme are married, since, the mode is different from the conventional type of university education so students could afford being spouses and students concurrently.

4. There is statistically significant difference in the counselling needs of undergraduate students on the sandwich programmes of Institute of Education, University of Cape Coast in terms of years taught.

Hypothesis Four sought to determine whether a statistically significant difference in counselling needs of the students in terms of years taught. The results are presented in Table 6.

Table 6: ANOVA Analysis Distribution of Difference in Counselling Needs and Duration of Teaching

		Sum of Squares	df	Mean Square	F	Sig.
ALL Mean	Between Groups	1.524	4	.381	1.618	.171
	Within Groups	47.586	202	.236		
	Total	49.110	206			

The One – Way Analysis of Variance distribution presented in Table 7 indicated no statistically significant difference among the number of years taught by the respondents and their counselling needs ($\alpha = .05$). The hypothesis is rejected, and it can therefore be concluded that there is no statistically significant difference in undergraduate students on sandwich programmes of Institute of Education, University of Cape Coast with respect to their counselling needs in terms of the number of years taught ($p>.05$).

It is believed that years of work equip individuals with experience and that issues that bother them with time may reduce in effect. It was therefore expected that the counselling needs of workers such as the sandwich students should be at variance in terms of those who have worked for relatively shorter period of time and those who have worked for a relatively longer period of time. This was not the case of the finding of the current study.

Conclusion

It was therefore concluded that sandwich students of the Institute of Education of the University of Cape have counselling needs, with Psychological needs being the most prevalent.

Recommendations

The following recommendations are considered relevant to the study:

1. Authorities/Agencies (such as Ministry of Education and National Council for Tertiary Education (NCTE)) should ensure that professional counselling services are rendered by universities that run academic programmes in the non-conventional mode.
2. Clear lines should be drawn between faculty members (teaching staff of the sandwich programmes) who offer academic counselling and services offered by professional counsellors.
3. Counselling should be made easily accessible to all students on sandwich programme of the Institute of Education, especially to assist students to satisfy their psychological needs.

Counselling Implications

The findings of this study have the following implications for counselling:

1. Professional counsellors should be attached to multiple sites of sandwich programmes.
2. Student on sandwich programmes should be offered similar counselling services as enjoyed by their counterparts on mainstream programmes.
3. Counsellors should employ effective counselling techniques in order to ensure that the counselling needs of students are addressed to a greater extent.
4. Course Tutors of Institute of Education's sandwich programmes should be taught to be more receptive and understand the value of enhancing teacher-student relationship. This can be achieved through training and use of counselling skills such as attending, listening, reframing and challenging.

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Sources of Stress and Management Strategies among Ministers in the Cape Coast Metropolis: Implications for Counselling and Gospel Ministry

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Abstract
Stress can be destructive if not well managed. It also has a direct bearing on the individual's performance at work and productivity. The main purpose of the study was to investigate the sources of stress and management strategies that are common to ministers of the gospel. A descriptive research design was used for this study. A total of 250 ministers of the gospel serving in the Orthodox, Pentecostal and Charismatic churches in the Cape Coast Metropolis in the Central Region of Ghana were sampled for the study. Mean scores, standard deviations and rank order were used to analyse the data collected from the study. The most predominant source of stress among ministers of the gospel was "Inadequate financial support from the congregation." The second was "Organising church programmes." In the 3rd place was "Not getting support from church leaders." The most important stress management strategy was "Delegating duties to others". It was recommended that the general working conditions of ministers of the gospel should be improved by church governing councils. The implications of the findings for counselling and the church were also highlighted.

Key words: Counselling, stress, stress management, ministers of the gospel, pastors, churches.

Introduction

Stress, with its exacting influence on modern man in all spheres of life, is no respecter of persons. According to Melgosa (2013), very

few people escape from stress; it is part of our daily routine. Time and work pressures, relationship problems, noise, pollution, finances and insecurity have been identified as some of the sources of stress.

Stress has been defined in several ways. It is derived from the Latin word "*stringere*", which was used in the 17th century to describe hardships or afflictions and up to the present, its meaning remains as "forces, pressure, strain or strong effort" (Cartwright & Cooper, 1997).

Lazarus and Folkman (1984) viewed stress from a psychological perspective and asserted that the stress process is "a particular relationship between the person and the environment that is appraised by the person as taking or exceeding his or her resources and endangering his or her well-being". Keil (2004) built on this definition, asserting that "stress involves a set of circumstances with which the individual is attempting to cope".

Stress is the emotional and physical strain caused by people's response to pressure from the outside world. Common stress reactions include tension, irritability, inability to concentrate, frustration and a variety of physical symptoms that include headache and a fast heartbeat. According to Ho (2009), the types of stress are eustress, distress, and hyper stress, while the signs of stress include sickness or absence, accident or incident, disciplinary action or compliance, seeking help from fellow employees or counselling, low attitude and esteem for the job, frustration, irritability, and anger.

Selye (1956), an expert on stress, explained that stress is not inherently deleterious. Each individual's cognitive appraisal, their perceptions and interpretations, give meaning to events and determine whether events are viewed as threatening or positive. Personality traits also influence the stress equation because what may be overtaxing to one person may be exhilarating to another. Nevertheless, stress has been regarded as an occupational hazard since the mid-1950s. In fact, occupational stress has been cited as a significant health problem.

Freudenberger (1974) coined the term "burnout" to describe workers' reactions to the chronic stress common in occupations involving numerous direct interactions with people. Burnout is typically conceptualized as a syndrome characterized by emotional exhaustion, depersonalization, and reduced personal accomplishment. Work life, however, is not independent from family life: these domains may even be in conflict. Stress may result from the combined responsibilities of work, marriage, and children.

Ministers of the gospel are faced with a variety of demands laid upon them by their churches. Many ministers grow bone-weary satisfying the requirements of others, with no compensating chance to meet personal demands. Ministerial work is characterized by helping people in crises at all times. The question that comes to mind as one begins to think about the stress condition ministers face is, "where do pastors turn when they need help"? Where does a pastor go when he or she is discouraged, burned out, or when faced with challenges in the congregation? If he/she turns to the church leaders he/she risks sharing information that is very personal and perhaps hurtful. If he or she tells people in the congregation, it may be misunderstood or even used as a weapon against him/her. As a result, many ministers have become victims to stress-related diseases such as hypertension, stroke, and ulcers (WGBH Educational Foundation and Vulcan Productions, Inc., (2009). Some, however, become victims of dying prematurely. Pastors have a huge task before them while ministering, not only to the spiritual and psychological needs of their congregants, but also to the external needs of members, both socially and economically. This, in most cases, poses a conflicting role as far as their pastoral work is concerned, which leads to more stress.

Although stress is an inevitable feature of work and personal life, it still can be managed. In order to manage stress, one needs to start with identifying the source of stress in one's life. It is not as easy as it sounds because one's true source of stress is not always obvious, and it is all too easy to overlook one's own stress – including thoughts, feelings and behaviours. Definitely, people may know that they are constantly worried about work deadlines, but maybe it is their procrastination, rather than the actual job demands that leads to deadline stress (Smith & Segal, 2012).

Whetten and Cameron (1998) have posited that eliminating or minimizing stressors at the beginning is important. They believe also that this is the best way to manage stress. This may be called proactive stress management. According to Whetten and Cameron, the second important thing is to increase individuals' capacity to remove stress by increasing their resiliency. Although stress management is an organizational philosophy, individual resiliencies are also important to cope with stress. Effective coping with stress requires first an appraisal of the event, then a mobilization of the "personal and social coping

resources" and eventually the use of actual coping strategies (Shipton, 2002). Ineffective coping methods may lead to prolonged stress, feeling of powerlessness and eventual burnout and attrition.

Purpose of the study

On the basis of the above, this study investigated the sources of stress and stress management strategies among ministers of the gospel in Orthodox, Pentecostal and Charismatic churches in the Cape Coast metropolis.

Research Questions

Two research questions that guided the conduct of this research were:

1. What are the sources of stress among ministers of the gospel in Orthodox, Pentecostal and Charismatic churches in the Cape Coast metropolis?
2. What are the stress management strategies used by ministers of the gospel in Orthodox, Pentecostal and Charismatic churches in the Cape Coast metropolis?

Method

Research Design

The research design adopted for this study was the descriptive survey method. According to Creswell (2012), descriptive design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of the population. The design was considered appropriate because the purpose of this study was to solicit opinions from ministers of the gospel on the sources and management strategies of stress without influencing their thoughts in any way.

Population

According to Cohen, Manion, and Morrison (2011), population is a group of elements or cases, whether individuals, objects or events that conform to specific criteria and to whom the researcher intends to generalize the study. In simple terms and for this study, population refers to a group of humans for a study (Creswell, 2012). The target population for this study comprised all ministers of the gospel in the Cape Coast Metropolis. Efforts to get their exact number failed, but a

rough estimate given by some ministers in the metropolis puts their number at between 700 and 800 ministers of all shades of Christian denominations. These include those from mainline churches of Orthodox, Pentecostal and Charismatic breeds. Included also are denominations such as the Seventh-day Adventists, Jehovah Witnesses, Mormons, Roman Catholic, etc. The accessible population for this study was 500 pastors serving in the Orthodox, Pentecostal and Charismatic churches in the Cape Coast Metropolis in the Central Region of Ghana.

Sample and Sampling Procedure

According to Cohen, Swerdlick and Sturman (2013), a sample is a portion of universe of people deemed to be representative of the whole population. The size of the sample, according to them, could be as small as one person, through samples that approach the size of the population to reduce the possible sources of error arising from insufficient sample size. On account of this fact, a sample size of 250 was considered to be adequate for the study, since it is 50% of the accessible population.

In selecting the sample for this study, the multi-stage sampling technique was used. Firstly, stratified sampling technique was employed to ensure that pastors from the three strata of church type – Orthodox, Pentecostal and Charismatic were earmarked for inclusion with equal proportion of approximately 33.3% each.

Secondly, purposive sampling was used to select only pastors who attend the monthly meetings of their various denominations, viz: Orthodox pastors attending Ghana Evangelism Committee meetings, Pentecostal pastors attending Pentecostal Council Conferences, as well as Charismatic pastors in independent Charismatic churches in their localities.

Thirdly, and lastly, incidental or convenience sampling was used at each of the location of the meeting places just mentioned to select the numbers of ministers available and ready to participate in the study. At the end of these exercises 72 of the Orthodox pastors, 62 of the Pentecostal ministers, and 83 of the Charismatic ministers returned usable copies of the questionnaire, making a total of 217 out of the 250 giving a return rate of 86.8% (Table 1).

Table 1: Distribution of Respondents Based on Ministerial Type (n=217)

Ministerial Type	Frequency	Percentage
Orthodox	72	33.2
Pentecostal	68	28.6
Charismatic	83	38.2
Total	**217**	**100.0**

Source: Field Data, 2016.

Instrument

A questionnaire titled "Sources of Stress and Management Strategies Questionnaire" (SOSMASQ) was used to collect the data. The SOSMASQ, designed by the researchers, was given to two experts in guidance and counselling from the University of Cape Coast for vetting. Section A was used to collect respondents' demographic data on gender, age, and denomination. Sections B, with 22 items, was on sources of stress, while Section C, with 16 items elicited responses on management strategies for stress. Sections B and C were structured in the four-point, Likert-type scale format. Options on the scale ranged from 1= Strongly Disagree (SD), 2=Disagree (D), 3=Agree (A) to 4=Strongly Agree (SA).

According to Cohen, Swerdlick and Sturman (2013), in the language of psychometrics, reliability refers to consistency in measurement. It is a synonym for dependability of the instrument. To obtain the reliability of the instrument (SOSMASG), copies of it were administered to 40 pastors once in the Greater Accra Region. Data from these were collated and used to compute the internal consistency reliability of SOSMASG, using the Cronbach alpha, developed by Cronbach (1951). The coefficient alpha obtained was 0.76, which falls above the 7.0 level and this means, therefore, that the instrument is quite reliable, according to Kline (1999).

Method of data analysis

The research questions were analysed using standard deviations, means and rank order.

Results

Research Question One: *What are the sources of stress among Ministers of the Gospel in the Cape Coast Metropolis*?

The results of Table 2 revealed that the most predominant source of stress among ministers of the gospel was *"Inadequate financial support from the congregation"* (Mean = 3.101, SD= 2.123).This result is in line with that of Croucher's (1982) study on stress and burnout in ministers. In his study, he identified *"anxiety over financial problems"* as a major source of stress among ministers of the gospel. The result also agrees with the research finding of Price (2001) which stated that clergy salaries are a significant source of emotional and somatic (bodily) stress. He added that, as at the time of the study, pastors' salaries had been relatively flat for two decades. Low salaries, as we all know, represent a large decrease in purchasing power.

The special reference made to support from the congregation suggests that most of the pastors' salaries and other remunerations are determined by the congregation. This may mean that the same resource that is supposed to be used for running the administration and the church project is used to pay salaries and the other benefits of the minister. Beebe (2007) identifies the professional engagement theory as the main cause of burnout; the imbalance between what individuals give to their job and what they receive in return. If ministerial career is characterized by a 24-hour engagement, then one may expect them to receive a return that matches their input in ministering, and if that is not forth-coming it could result in very serious stress.

Table 2: Rank order of sources of stress among Ministers (n=217)

Item No.	Sources of Stress	Mean	SD	Rank
16	Inadequate financial support from the congregation	3.101	2.123	1st
2	Organizing church programmes	3.097	0.802	2nd
4	Not getting required Support from church Leaders	2.975	0.985	3rd
9	Insufficient resources	2.947	0.910	4th
11	Meeting expectations of the congregation	2.903	0.829	5th
7	Managing church projects	2.894	0.878	6th
12	Congregation not growing	2.889	0.843	7th

15	Financial demand from the head office	2.880	0.969	8th
3	Meetings schedules	2.830	0.683	9th
8	Conflict between home and work demands	2.803	0.954	10th
1	Preparing for sermons	2.733	0.992	11th
5	Having only little support from congregation	2.730	0.909	12th
13	Inflexible work schedule of the church	2.677	0.880	13th
10	Little or no performance feedback	2.659	0.889	14th
14	Size of the congregation	2.622	0.998	15th
21	Life crises puts stress on me	2.618	0.946	16th
18	Inappropriate workload	2.604	0.876	17th
6	Managing church finances	2.599	0.958	18th
19	Unclear job expectations by superiors	2.535	0.918	19th
17	Ill-health	2.410	1.033	20th
22	Problems with spouse	2.217	1.103	21st
20	My gender puts stress on me	1.949	0.987	22nd

Source: Field data, 2016.

Furthermore, in the current study, "*Inadequate financial support from the congregation"* was closely followed by "*Organizing church programmes*" (Mean =3.097, SD =0.802). This finding is consistent with that of Roberts, Flannelly, Weaver and Figley (2003) which revealed that one major source of pastors' stress was "*be-at-the-church syndrome*". Pastors who over-burdened themselves with organizing numerous church programmes experienced a lot of stress. Why pastors will have to overburden themselves with numerous church programmes without resorting to delegating some of their duties to church officers raises a lot of questions in the mind of the current researchers. Not only would such arrangement have resulted in relieving ministers from too much stress, it would have also afforded the church officers opportunities for acquiring leadership skills in church management. Such delegation of duties may also mean a strategy to stem the tide of their members' flocking to various prayer programmes organized by other so-called prophets across the length and the breath of the country, a situation that becomes an unwarranted source of stress for pastors.

The source of stress ranked third was "*Not getting required support from church leaders*" (Mean =2.975, SD=0.985). This finding is consistent with that of Morelli (2005) who stated that an aspect of the work environment that may pose stress is a lack of support from

supervisors or immediate line managers. The result also confirmed that of Le Blanc, Hox, Schaufeli and Taris (2000) which found that lack of social relations at work accounted for job related stressors. These researchers further opined that low social support and low participation could be stressful. Furthermore, in the current study respondents indicated that "*insufficient resources*" ($\text{Mean} = 2.947, \text{SD} = 0.910$) was another major sources of stress. This result is the probable reason why Halbeslesben (2006) contended that major environmental resources can reduce stress and burnout as well as enhancing positive well-being.

The least ranked sources of stress among ministers of the gospel included the following: "*My gender puts stress on me*" (Mean 1.949, SD=0.987), which ranked last or 22nd. "*Problems with my spouse*" (Mean =2.217, SD=1.103), ranked 21st and, "*My ill-health*" (Mean=2.410, SD=1.033), ranked 20th. That "*My gender puts stress on me*" was the least source of stress for ministers of the gospel suggests that gender is not a significant source of stress for ministers in the Cape Coast metropolis. In other words, it is heartening to find that for ministers of the gospel in the Cape Coast metropolis, being male or female is not a serious source of stress. The current researchers feel further investigation would be needed to settle the question of whether there will be any significant differences in the sources of stress encountered by male and female ministers of the gospel in Cape Coast metropolis.

Research Question Two: *What are the stress management strategies among Ministers of the gospel in the Cape Coast Metropolis*?

The results in Table 3 revealed that the most used stress management strategy among ministers of the gospel in the Cape Coast metropolis was "*Delegating duties to others*" (Mean= 3.188, SD= .749 ranked 1st). This may probably mean that the ministry can be less burdensome when many people accept the challenge to help. No wonder the Lord Jesus sent His disciples to go in twos. This stress management strategy was closely followed by "*Employing good time management strategies*" (Mean= 3.147, SD=0.711) which ranked 2nd. With regard to time management skills, Turkel and Leblebici (2001) demonstrated that time management is the most efficient method to balance activities.

Table 3: Stress Management Strategies among Ministers of the Gospel (n=217)

Item No.	Stress Management Strategy	Mean	SD	Rank
5	Delegating duties to others	3.189	0.749	1st
14	Employing good time management strategies	3.147	0.711	2nd
6	Reading the Bible	3.142	0.796	3rd
3	Having quality sleep everyday	3.092	0.739	4th
4	Exercising Regularly	3.069	0.732	5th
11	Good Leadership skills	3.027	0.827	6th
9	Praying	3.009	0.855	7th
15	Seeking counselling from professional counsellors	3.009	0.822	7th
1	Taking annual leave	2.959	1.006	9th
7	Singing songs of praise	2.926	0.830	10th
13	Stress Management Seminars	2.922	0.870	11th
2	Reducing daily schedules of work	2.908	0.845	12th
12	Adequate resources available	2.908	0.733	13th
16	Confiding in spouse	2.820	0.913	14th
8	Dancing	2.668	0.887	15th
10	Confiding in friends	2.309	0.834	16th

Source: Field data, 2016.

Time management skills can help employees make the most effective and efficient use of time. According to Morelli (2005), learning to say "No" or "Wait" are valuable ways to manage time, and this can go a long way in reducing stress. The third ranked management strategy, was "*Reading the Bible*" (Mean=3.142, SD=796). Tan (2007) illustrated how prayer and scripture reading can explicitly be used in Christian cognitive–behavioral therapy (CBT) in reducing stress which agrees with the findings of this study. Although in Tan's study prayer ranked 7th it still gives a strong indication that it is a very effective means by which individuals who lean on its support can have a real relief from stress. This finding agrees with the position of Ackummey (2003) who stressed that intercessory prayer and scripture reading have the strongest effects on the cognitive symptoms of depression. Increased intimacy with God is also one of the major stress

management strategies. "*Having quality sleep everyday*" ranked 4th (Mean = 3.09, SD=.0.74). This finding is also in line with the findings of Ackummey (2003), which identified sleep and relaxation as very effective way to reduce stress. "*Exercising regularly*" ranked 5th (M= 3.07, SD=.0.73). Exercise has been indicated by many research findings as providing a way of discharging tension, resulting in heightened feeling of well-being (Ackummey, 2003). Croucher (1982) also pointed out that three-to-four-times-a-week exercising by walking, swimming, playing tennis, preparing and regularly breathing deeply, will prevent acute stress. Exercise and sleep help reduce adrenal arousal.

The management strategy that was ranked last among ministers of the gospel was "*Confiding in friends*" (Mean = 2.319, SD=.834). This implies that ministers of the gospel resort least to confiding in friends for the purpose of managing their stress. This finding somehow contradicts the position of Kowalski (2000) which focuses more on social resiliency, especially for seeking input from others. He believes that a trusted person may see new ways to deal with situations because, in his view, no one can deal with all life's stresses alone. He emphasised more on the establishment of unions and social support groups to help decrease stress levels.

"*Confiding in friends*" was ranked last (16th) among the stress management strategies used by Ministers. This finding seems to be out of tune with the popular belief that confiding in friends is one of the most frequently used strategies people resort to when they are facing stress. The current finding suggests that the Ministers may not have built or developed enough friendship with either the members of their congregation, people in the community or their colleagues because of unfamiliarity with people around them. It also points to the rather strange possibility that the ministers do not practice what they teach and encourage their church members to do, viz: to make friends and share their challenges with them in order to pray over such challenges.

Implications for Counselling and Gospel Ministry

The findings of this study hold the following implications for counselling:

1. Churches should engage the services of professional counsellors who can help ministers to manage their occupational stress.

2. Counsellors in churches should be able to furnish their ministers with comprehensive counselling on effective time management skills geared towards helping the pastors in particular and the congregation in general.
3. Church counsellors can adopt counselling techniques such as cognitive restructuring to disabuse the minds of ministers of wrong thought patterns which result in the prevalence of stress.
4. Counsellors in churches should reach out to both young and old minsters of the gospel to offer them effective ways of managing stress.

Recommendations

Based on the findings drawn from the study, the following recommendations are made to key stakeholders:

1. The general working conditions of ministers of the gospel should be improved by church governing councils.
2. Seminars, conferences, workshops and symposia should be organised by church leaders, to expose ministers of the gospel to the sources of stress and also to sharpen their management skills for stress.

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Moderating Role of Teachers' Demographic Variables on Attitudes and Technology Usage in Predicting Successful Inclusive Education in Ghana

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Abstract
The purpose of this study was to explore the moderating role of teachers' demographic characteristics on the attitude and technology usage in predicting successful inclusive education. Using a cross-sectional survey, 124 participants were randomly selected from 15 inclusive schools in the southern part of Ghana. The research instrument was an adapted questionnaire used in previous researches. A conceptual model was constructed and the Partial Least Square (PLS) Structural Equation Modelling (SEM) statistical approach in data analysis was utilized to test the model for the path coefficient results. The results indicated that teachers' gender, age, experience and qualification did not significantly moderate the teachers' attitude and technology usage in the prediction of successful inclusive education. It was recommended that teachers require a change of attitude through re-orientation, awareness creation, and active information dissemination through workshops, forums, seminars, television and radio programmes. The Government acting through the MOE, the GES and NGOs should make the provision of equipment to the schools a top priority. Equipment such as computers and their accessories should be supplied to the schools.
Key words: Attitudes, technology, inclusive education, demographic variables

Introduction

Education of students with special needs has been and continues to be a focus of educational reforms in many countries. At the heart of this issue is the movement of students with special needs from a segregated setting, through integration paradigm to a more inclusive setting where the discourse is central to contemporary times. Nations

across the globe have reacted differently to calls for improved special needs education and services for children with special education needs, specifically, children with disabilities. Many countries have followed the United Nations statements such as the "World Program of Action Concerning Disabled Persons", and created national policies that required education options for people with disabilities (Garbo, 1999; Hegarty, 1998). Again, many other countries and organizations also were compelled to invest significantly to making inclusive education as part of regular education system. Realizing the need for a new focus in education in the global arena, the Ghana government and other non-governmental organisations, continue to invest in making the achievement of the aims and objectives of UNESCO's Salamanca Declaration; on inclusive education, a reality. Of such significant investments are teacher preparation and the supply of educational technological equipment to aid teaching and learning.

Despite these huge investments and its undisputable importance, it is not clear how teachers' attitudes influence the use of educational technology in teaching in the inclusive education classrooms. Inclusive education philosophy proposes that it is an underlying belief of academic access and social success for all students in the general education (Dieker, 2006). Inclusive education places emphasis on the needs of all children rather than their disabilities and shortcomings. This viewpoint suggests that diversity is valued. It is therefore, believed that holding a positive attitude to technology usage can substantially impact positively in the participation of children with special needs in academic activities in inclusive classrooms.

Successful inclusive education may have different interpretations; however, in this context it is when children with special needs in the regular classrooms or school achieve positive outcomes in their academic, social and psychological development through full time participation in academic and social activities of the school. Successful inclusive practices allow all children learning opportunities through the use of technology, accommodations and alternate teaching strategies. The implication is that a meaningful change to teaching and learning describes as student centred must replace the old teacher centred pedagogy. This new forms of pedagogic reforms suggests that teachers must employ contemporary educational technological resources in their classrooms in order to bring about the desired change and outcomes.

They also need to develop positive attitudes to the use of technology in the inclusive education setting. Realizing the impact of the teacher factor and their perceptual behaviours in achieving successful inclusive education, the assumption carried by this study is that teachers' attitudes and technology usage in inclusive education classrooms can significantly influence successful inclusive education. Understanding the impact of teachers' demographic factors and how they moderate attitude and technology usage is crucial for policy makers and special education administrators who are seeking to improve the outcomes of inclusive education.

Theoretical Framework

In this study the theory of planned behaviour (TPB) is useful in exploring the moderating role of teachers', gender, age, teaching experiences and qualification on teachers attitude and technology usage in the prediction of successful inclusive education. Ajzen (1991) theorized that the TPB constructs of attitude behaviour (AB), subjective norm (SN), and perceived behavioural control (PBC) are directly linked to behaviour and that relationship is causal and unidirectional. The theory further postulated that these direct factors (AB, SN, and PBC), in turn, are functions of the sum of their respective salient beliefs or indirect factors. Salient beliefs refer to the primary or immediate determinants of an individual's attitude and perceptions. TPB asserts that behaviour; in this case attitude, is a direct function of intention to use technology.

In a study, using the theory of planned behaviour to examine teachers' attitudes, knowledge and principals' expectations as predicting effective teaching in inclusive education, Kuyini and Desai (2007) concluded that attitudes and knowledge were predictive of effective teaching. Lumpe and Chambers (2001) demonstrated the use of this model in the area of educational technology and reported that teacher context beliefs (which they maintained to be similar to Ajzen's (1991) perceived behavioural control construct and self-efficacy beliefs) were significant predictors of teachers' reported use of technology in teaching. This conclusion suggests that context beliefs or perceived behavioural control are important factors for explaining teachers' technology usage. The above studies of technology usage provide the evidence for the appropriateness of implementing a unique

model for explaining the moderation role of these specific teacher characteristics of use of technology in inclusive education.

Model constructs/Literature review

Attitudes

Van Reusen, Shoho, and Barker (2000) investigated whether background characteristic variables affected the attitudes of teachers toward inclusive education. The assessed variables include years of experience, professional responsibility, gender, type of teacher preparation (general versus special), and content area taught. The participants were selected teachers from a large suburban school in San Antonio, Texas. The results revealed some interesting correlations relating to the amount of special education training. No significant relationship was noted between the teachers' attitudes and other characteristic variables in this study. A significant difference was however, noted between those teachers who reported high levels of special education training and those that reported no or little special education training. The teachers with more special education training, displayed overall positive attitudes toward the teaching of children with disabilities. A significant difference was noted between two of the four domains, and the teachers' level of special education training. The teachers with high levels of special education training had a more positive attitudinal response toward academic content/ teacher effectiveness and teacher preparation. The teachers with higher levels of special education training had significantly better attitudes toward inclusion than those with no or minimal special education training. This study emphasizes the importance of providing teachers with adequate special education experience and qualification if they are to make inclusive education successful.

Technology

Research shows that the influence of attitudes on person's desire to use technology varies. Venkatesh, Morris, Davis and Davis (2003) found out that attitudes associated with intrinsic motivation influence ones intention to use technology. Considerable research has been done to determine moderating factors that are critical in successful learning (Eom, Wen & Ashill, 2006; Wang, 2003). A meta-analysis (Bernard, Abrami, Lou, Borokhovski, Wade & Wozney 2004) showed that

technology provides a medium of delivering learning materials and the use of technology by itself cannot guarantee greater learning effectiveness as compared to conventional, classroom based learning. The implication is that there are other factors that mediate or moderate technology assisted learning on students' outcome Hu and Hui (n.d.) as cited in (Bernard et al., 2004). A review of literature shows that there is lack of agreement regarding the effects of these moderators on technology assisted learning. The inconsistencies in the results might have come from methodological limitations.

Gender

Neuhauser (2002) researched into gender as a moderating factor while Taylor and Nikolova (2004) used age as a moderator. Gender, age and experience have been found to influence technology usage (Morris & Venkatesh, 2000), and these variables moderate and influence behavioural intention in order to predict the actual behaviour. It is evident from literature that some studies used demographic characteristics as predictors or factors and also used these variables as moderators (Durrington, Repmam & Valente, 2000); however, this depends on the type of activities investigated. There are inconsistencies that were noted in this approach. Kripamont (2007) was of the view that all these characteristics such as gender, age, experience and qualification, were usually examined as moderators and they were found to influence behaviour. Therefore, gender was investigated as a moderator as it was expected that it would moderate attitude and technology usage in the classroom in order to predict successful inclusive education.

In literature, gender has been found to have an influence on attitude, subjective norm, and behavioural control (Venkatesh, Morris & Ackerman, 2000). Research suggested that feminine individuals tend to be more tentative, socially oriented and concerned about others' feelings, whereas masculine individuals are more categorical independent in nature and concerned about their own feeling rather than others (Gefen & Straub, 1997). Additionally, differences in biological traits suggest that women compared with men are found to be more expressive in nature and easily motivated by social pressure and affiliation needs (Venkatesh & Morris, 2000), whereas men are more oriented toward interpersonal goals, achievement needs and have high

independent characteristics; moreover, men compared with women rarely rely on others' opinions (Venkatesh & Morris, 2000). Minton and Schneider (1980) found out that gender has an effect on performance of jobs that are predominantly task oriented. In the present study it is presumed that teaching in an inclusive classroom is predominantly task oriented where technological equipment are expected to be used to aid understanding of the content. Therefore, men could be more motivated with task and to have stronger performance expectancy (Kirchmeyer, 2002).

Age

Age was found to affect the influence of attitude, subjective norm and perceived behavioural control. Despite the fact that age has proven to be an important demographic predictor in organisational settings, it has very little attention in technology usage (Morris & Venkatesh, 2000). As a result, few studies recently started to examine its effect on individual's acceptance of technology and usage behaviour (Morris & Venkatesh, 2000). Prior research on age difference reported that increasing age correlated with higher computer anxiety and lower attitude toward usage. The implication of this is that younger teachers tend to have positive attitudes and are more motivated to use technology than the older teachers. For younger teachers, it is easier to learn new technology than the older ones (Morris & Venkatesh, 2000).

Experience

In today's world of business, commerce, and political governance, employers place high premium on experience as an added advantage to qualification. This is even more critical when it comes to teaching. According to Ajzen and Fishbein (1980), past experience has been found to be an important determinant of behaviour. Empirical evidence has demonstrated that experience moderates the relationship between subjective norm and behavioural intention, so subjective norm becomes less important with increasing experience (Venkatesh et al., 2003). Experience can be explained as the individual's involvement or action in something over a period of time. Clough and Lindsay (1991) observed that younger teachers and those with fewer years of experience have been found to be more supportive to inclusive education. They further found out that there was no significant

difference in attitude to inclusion among teachers whose teaching experience was between one and four years although younger teachers and those with fewer years of experience were more supportive of inclusion. Other researchers have concluded that teaching experience was not significantly related to teachers' attitudes (Avramidis et al., 2000). The results of these studies are mixed and therefore inconclusive.

Qualification

The issue of qualification and professionalism in teaching has been discussed extensively by educational authorities for decades. Scholars argued the necessity of skilled teachers for effective teaching and learning. Fajonyomi (2007) emphasized that the success or failure of any educational programme rests on the adequate availability of qualified teachers. This is because the trained teachers have been taught the technical know-how for effective learning to take place in the learners. The effects of teacher qualification usually expressed in terms of formal qualifications such as Bachelor in Education, Diploma in Education, and Certificate in Education are qualifications that mandate teachers to teach in a specific field and level in Ghana. Goldhaber and Brewer (2000) noted that certified teachers were better than those of the teachers who were not formally qualified or were alternatively qualified. Darling-Hammond (2000) used a finer scale of teacher qualification distinguishing between (i) teachers with full certification and major in their field, (ii) teachers with full certification, (iii) teachers less than fully certified and (iv) uncertified teachers. She found substantial positive effects for certified teachers and substantial negative effects for uncertified teachers.

In sum, the relationships among the constructs attitude and technology usage may be moderated to varying degrees by gender, age, teaching experience, and qualification. A moderator is a characteristic of the individual that affects the relationship between the independent variable and the dependent variable (Wu & Zumbo, 2009). In other words, moderating effects are evoked by variables whose variation influences the strength of the direction of the relationship between an exogenous and endogenous variable (Baron & Kenny, 1986). The relationships among the variables have been encapsulated in the

research model and from these relationships the hypotheses were formulated.

In Ghana, many researches have been carried out in special and inclusive education on factors that are likely to improve successful inclusive education (Gyimah 2011; Ocloo & Subbey 2008; Agbenyegah 2007; Kuyini & Desai 2007; Ackah 2006). However, none of these studies have explained the moderating values of the demographic characteristics of teachers and their influences on inclusive education. Again, the research methodologies used for these studies differ from the present study. This study adopts the Partial Least Square (PLS) - Structural Equation Modelling (SEM) approach hence it is expected that this study fills this knowledge gap.

Purpose of the study

The purpose of this study was to investigate the moderating role of teachers' demographic variables on attitudes, and technology usage in predicting successful inclusive education.

Hypotheses

1. Teachers' gender, age, qualification experience, will significantly moderate attitudes in predicting successful inclusive education.
2. Teachers' gender, age, qualification and experience will significantly moderate technology usage in predicting successful inclusive education.

Methods

This study is part of a larger research that employed a cross-sectional survey to explore the moderating effects of teachers' demographic variables on attitudes and technology usage in predicting successful inclusive education. The population from which the sample was drawn was 550. Using a multistage sampling technique the sample size for the study was 124 classroom teachers. These teachers were selected from 15 inclusive schools located in southern Ghana. In selecting the sample size, the researcher was guided by Partial Least Square (PLS) Structural Equation Modelling (SEM) for sample size and power requirements. PLS is a second generation statistical technique for conducting SEM based analysis. According to PLS (SEM), a large

sample size is not as demanding and that this method is amenable to smaller numbers (Chin & Newsted, 1999). Reinhartz, Haenlein and Henseler (2009) showed that PLS (SEM) achieves high levels of statistical power in comparison to covariance- based counterparts, even if the sample size is small (i.e., less than 100 observations). The PLS can be adapted to complex models and is useful for exploratory research where the focus is on prediction (Neufeld, Dong & Higgins, 2007). The primary goal of PLS is to produce determine values for latent variables and therefore, PLS is suitable for this study.

Instrument

The survey instrument in a questionnaire format was based on constructs validated in previous researches (Mahat 2008; Davis 1989; Moses, Wong, Abu-Bakar, & Mahmud 2011; Walton, Nel, Hugo & Muller, 2009) and adapted in this study. The questionnaire was structured into two main parts. The first part solicited information on the demographic variables of the teachers and the second part dealt with the attitudes, technology usage, and successful inclusive education.

Attitude questionnaire

This study adapted the Multidimensional Attitudes toward Inclusive Education Scale (MATIES) developed by Mahat (2008). It is an 18 item questionnaire developed in a Likert Scale format with 6 items in each subscale. The participants were asked to rate each item on a 5 point range such as: strongly agree, agree, uncertain, disagree, and strongly disagree, with scores ranging from 5-1 respectively. The Cronbach reliability for each subscale for measuring cognitive dimension of attitude was 0.77, affective dimension of attitude was 0.78, and behavioural dimension of attitude was 0.91. The inter-subscale correlations were significant at 0.05 cognitive/affective 0.48 cognitive/ behavioural 0.61 and affective/ behavioural 0.62. These correlations showed a medium to a high positive correlation between the variables.

Technology usage questionnaire

This scale was adapted from Davis (1989); Moses, Wong, Abu-Bakar, and Mahmud (2011). Respondents were asked to strongly agree,

agree, disagree or strongly disagree with the statements. For example, "I like using educational technology in inclusive classroom".

Successful inclusion questionnaire

The scale required the teachers to strongly agree, agree, disagree or strongly disagree with the statements. There were five items in this scale which were adapted and modified from Walton, Nel, Hugo and Muller (2009). For example, "the needs of all students are met".

Validity and Reliability

In determining the validity and the reliability of the scales, the convergent and the discriminant validity were assessed. In assessing the convergent validity the value of the constructs under consideration were found to be greater than 0.05 and the composite reliability measures were greater than 0.7 (Chin, 1999). The loadings of the constructs in the model matrix also met the recommended value of 0.5. The Chronbach Alpha for each dimension of attitude, technology usage and successful inclusive education were all above 0.7 benchmark. The discriminant validity also demonstrated that each square root of the Average Variance Extracted (AVE) was larger than its correlation with each construct in the matrix (Chin & Newsted, 1999). This indicated that the latent variables in the proposed model were both conceptually and empirically distinct from each other indicating a good fit.

Data collection procedure

The researcher having satisfied the ethical requirements made the instrument available to the participants in their various schools. Participants were assured of anonymity and were given two weeks to complete the questionnaire. An agreement was reached with the various head teachers in the schools to collect the completed survey questionnaire for onward submission to the researcher.

Data Analysis

Testing moderating effect

According to Baron and Kenny (1986), a moderator can be a qualitative or quantitative variable that affects the direction and or the strength of a relation between an independent and a dependent or criterion variable. In this study, the moderator variables were teachers'

demographic characteristics; gender, age, qualification and experience, attitudes and technology usage were the independent variables while successful inclusive education served as the dependent variable. These variables were modelled in a reflective form. Reflective constructs are latent variables which are observed first before their effects are seen (Bollen & Lennox, 1991). In a reflective model, the indicators reflect the underlying construct hence all the indicators are expected to be correlated. Jarvis, MacKenzie, and Podsakoff (2003), posited that the indicators are interchangeable hence eliminating an indicator should not change the conceptual meaning of a latent variable.

The current study used the PLS-SEM analytic approach to examine the moderating effects of the demographic variables on the attitudes and technology usage in predicting successful inclusive education. The researcher observed the interactions between these variables to find out whether the moderating hypotheses were confirmed, that is, if the path coefficient of the moderating variables and the predictor variables was significant. Again, the effect size was also evaluated in order to determine the magnitude of the moderation effect similar to the strength of the path coefficients. The effect size was calculated as follows (Chin, Marcolin & Newsted, 2003):

$$F^2 = \frac{R^2 \text{ model with moderator} - R^2 \text{ model without moderator}}{1 - R^2 \text{ model without moderator}}$$

According to Henseler and Chin (2010), the effect size of 0.02, 0.15, and 0.35 are regarded as small, medium and large respectively. The significance of these moderating effects was tested at 0.05 with bootstrapping using 500 samples in each case. The bootstrapping is a re-sampling technique used to give information on the validity of the parameter estimates and their significance (Temme, Kreis, & Hilderbrandt, 2006). These are values of *t*-statistics that show the strength of the indicators of the outer model. A feature of SmartPLS is the ability to test the obtained relationships for the possible moderator effect (Ringle, 2006).

The statistics that described the moderating effect included the path weights, the *t* statistics, the p- value and the effect size. With respect to the properties of interaction constructs, the relationships were measured by the path values, which represented the strength of the relationships. The path for the interaction of the moderators with the construct provided the information regarding the interaction effect. The

path coefficient represented the standardized regression coefficient. The path coefficients indicated the impact of the interaction between the moderator and the constructs.

Results

Table 1: Demographic characteristics of respondents

		N	%
Gender	Male	51	41.1
	Female	73	58.9
	Total	**124**	**100**
	Age in years	**N**	**%**
	18 – 25	3	2.4
	26 – 30	12	9.7
Age	31 – 35	31	25.0
	36 – 40	43	34.7
	41 – 45	25	20.1
	Above 45	10	8.1
	Total	**124**	**100**
	Experience in years	**N**	**%**
	Below 1 year	11	8.9
Teaching	2 – 5	23	18.5
Experience	6 – 10	42	33.9
	11 – 15	38	30.6
	Above 15	10	8.1
	Total	**124**	**100**
	Qualification	**N**	**%**
	Masters	7	5.6
Qualification	B.Ed/BA/BSC	62	50
	Diploma	47	38
	Certificate	8	6.4
	Total	**124**	**100**

The results in Table 1 showed that 51 (41.1%) were males while 73 (58.9%) were the females. It is apparent that there were more females than males. In terms of age, 3(2.4%) were aged between 18 – 25 years while 12(9.7%) were in the ages 26- 30 years. It can also be seen from the results that a total of 31(25.0%) teachers were aged 31-

35 years. Teachers who were aged 36- 40 years were 43(34.7%). Again, 25(20.1%) were aged 41 – 45 years while teachers who were aged above 45 years were 10(10%). The age distribution shows that the teachers were moderately young with the majority below 40 years of age. Eleven respondents representing 9.9% had taught for only 1 year and below. The teachers who taught between 2-5 years were 23(21.6%). The results further revealed that 42(33.9%) had taught for 6- 10 years. Again, teachers who had teaching experience between 11- 15 years were made up of 38(30.7) while a total of 24(19.4%) teachers had taught for 15 years and above. Thus, majority of the respondents had teaching experience less than 10 years. Teachers, who qualified with Master's Degree, were 7(6.6%). Half of the respondents 62(50%) qualified with BED/BA/BSC degrees. A good number of the teachers 47(37.9%) possessed Diploma in Education. Very few teachers 5(4%) had the teachers' certificate. Thus, a good number of the respondents were qualified professionals.

Table 2 presents the model and the results of the demographic variables on attitudes.

Table 2: Model summary of results of demographic characteristics on attitude

Model	path coefficient	t	p-value	F^2	Decision
GEN-ATT-SUC	-0.425	0.556	0.289	0.005	not supported
AGE-ATT-SUC	1.187	1.728	0.043	0.037	supported
QUA-ATT-SUC	0.278	0.0342	0.366	0.001	not supported
EXP-ATT-SUC	0.215	1.4939	0.068	0.033	not supported

Key: GEN-Gender; ATT- Attitude; SUC-Successful Inclusion; QUA-Qualification; AGE- Age of Teacher; EXP- Teaching Experience;

Gender on attitude

Table 2 shows that gender did not have any significant moderating effects on attitude in predicting successful inclusive education (Beta = -0.425, t = 0.556 p < 0.289). The effect size of F^2 0,005 according to Cohen (1987) is negligible and therefore was not a good predictor.

Age on attitude

The inclusion of age resulted in a significant moderation which predicted successful inclusive education. The path coefficients of (Beta = 1.187, t = 1.728 p < 0.043) was significant. The statistical significant moderating influence of the relations between attitude and successful

inclusive education showed that the teachers' age had a moderating effect on the teachers' attitude toward inclusive education. The effect size of F^2 0.037 was small and therefore, weak.

Qualification on attitudes

The performance of qualification as moderator when taken into account, was not significant. The path coefficient of (Beta = 0.278, t = 0.0342, p < 0.366) did not support any positive main effect on successful inclusive education. The effect size of F^2=0.001 showed no effective interaction. This means that the teachers' qualification was not a strong factor in influencing the predictive power of attitude on successful inclusion.

Experience on attitudes

With respect to teaching experiences, the results indicated that its moderating effect was not significant. The path coefficient between attitude and successful inclusion showed no significant relationship (Beta = 0.215, t = 1.4939, p < 0.068). This means that there were no significant interactions between the moderator defined as teaching experience, and the independent variable. The effect size of F^2=0.033 indicated a small moderating effect though it was not significant.

In sum, with the exception of age, all the other demographic variables failed to moderate the relationship between the variables and attitudes in predicting successful inclusive education. Figure 1 shows the path results of the moderating role of gender age, qualification and experience on attitude predicting successful inclusive education.

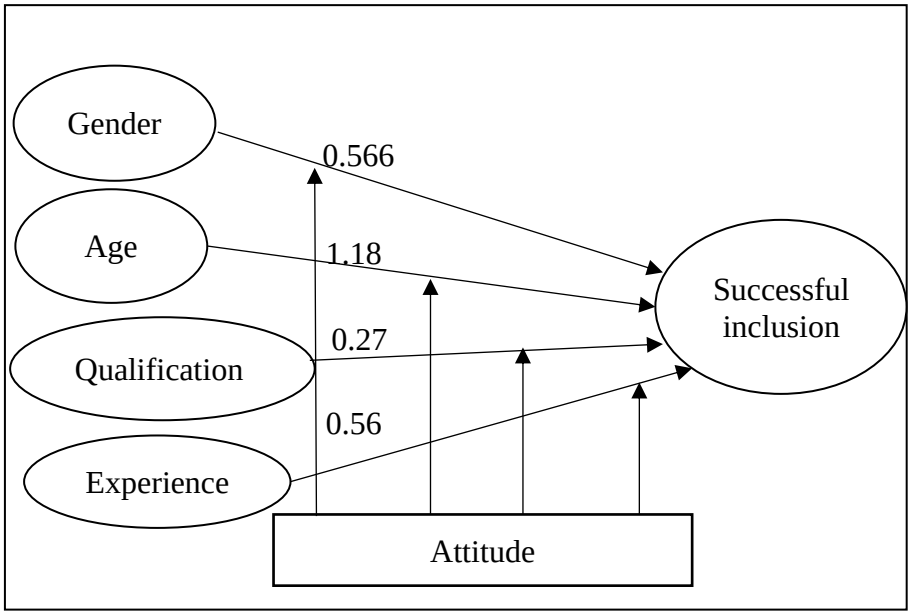

Figure 1. Path results of gender, age, experience and qualification on attitude in predicting successful inclusive education

Table 3 presents the model and the results of the demographic variables on technology usage.

Table 3: Model summary of results of demographic characteristics on technology

Model	path coefficient	T	p-value	F^2	Decision
GEN-TEC-SUC	-0.506	0.5747	0.283	0.007	not supported
AGE-TEC-SUC	0.715	0.7687	0.221	0.014	not supported
QUA-TEC-SUC	0.157	0.710	0.239	0.000	not supported
EXP-TEC-SUC	0.569	0.319	0.3751	0.013	not supported

Key: GEN-Gender; SUC-Successful Inclusion; QUA- Qualification; AGE- Age of Teacher; EXP- Teaching Experience; TEC- Technology USAGE

Gender on technology usage

The results as shown in Table 3 indicated that the path coefficient (Beta = -0.506, t = 0.5747 p < 0.283) was not significant. The effect size of F^2 0.007 was negligible therefore, the hypothesis was not supported. This means that gender was not significant in moderating the relationship between technology and hence weak predictor of successful inclusion.

Age on technology usage

The age of teachers did not show any significant moderation effect in moderating teachers' technology usage and successful inclusive education (Beta = 0.715, t = 0.7687= < 0.221). The effect size of F^2= 0.014 was partially small.

Qualification on technology usage

In the model, qualification was introduced in order to see its effect on the relationship between technology usage. In Table 3, the results indicated that qualification did not significantly moderate the relationship between technology and successful inclusive education (Beta = 0.157, t = 0.710, p < 0.239) hence its non-predictive value with effect size F^2 = 000.

Experience on technology usage

Finally, teaching experience was found to have no significant moderating effect in predicting teachers' technology usage and successful inclusion (Beta = 0.569, t = 0.319 p < 0.3751). The calculated effect size was partially small (F^2 = 0.013).

All in all, the results indicated that there were no significant moderating effects of gender, age, qualification, and teaching experience in predicting successful inclusive education. Figure 2 shows the path results of the moderating role of gender age, qualification and experience on technology in predicting successful inclusive education.

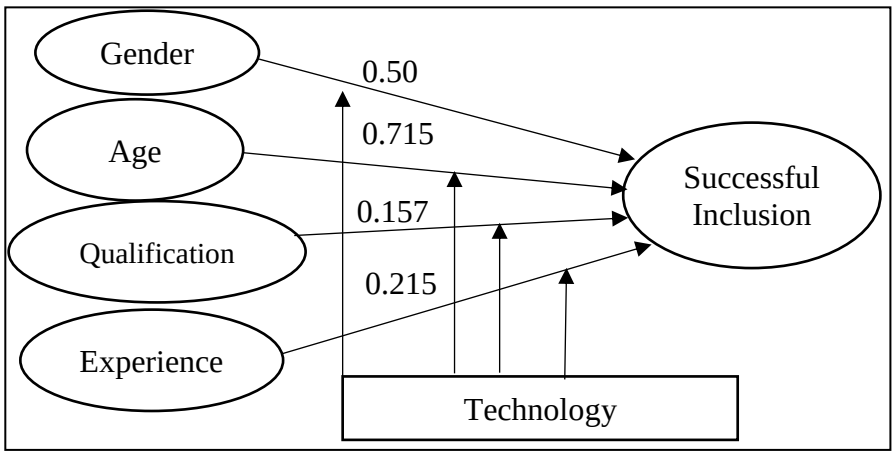

Figure 2: The path results of gender, age, experience and qualification on technology in predicting successful inclusive education

Discussion

The majority of the background variables on which the information was collected and analysed in this study, were the variables that were modelled to moderate the relationship between the dependent and the independent variables. The overall purpose of this study was to develop an understanding of the moderating role gender, age teaching experience and teachers' qualification played in the teachers' attitudes and the use of technology in the classroom to foster successful inclusive education for children with special needs. This study extended the TPB by adding teachers' demographic variables as moderators which adds to the few studies that take into account the critical role these factors play in the teaching and learning enterprise.

As can be seen, the role of the moderators was not perfectly fitted as proposed in this research. The teachers' demographic characteristics did not moderate attitudes and technology usage in predicting successful inclusive education. This is because there were less likely interaction effects or, the model might lack enough statistical power (Henseler & Chin, 2010). Several of the moderators did result in a weak or, no effect on the relationship between the independent variables (teachers' demographic characteristics) and the dependent variable (successful inclusion). Chin et al. (2003) suggested that researchers often reported moderators with a small effect size; beta weights averaging 0.10, suggesting that the moderating terms play only a small part in the understanding of the issues involved in the relationship between the variables. For example, Bontis, Booker and Serenko (2007) found no interaction effects of management policies and other constructs in terms of moderator analysis. They concluded that measurement error may have occurred because the survey instrument that was used such as the Likert scales might not be suitable for every sub group of the sample.

In this study, while the relationships were not significant, however, the method used to identify the amount of variance extracted and the beta values were reliable. The absence of statistical significant effects of moderators on the relationships between the independent and the dependent variables suggests that a further research is needed.

Although, gender has received some recent attention as a key moderating influence in accordance with such findings, (Venkketesh et al., 2003) and consistent with the findings in sociology and social

psychology literature (Levy, 1988), surprisingly, gender was not found as a key moderator in this research. In similar finding Wang et al. (2009) did not find a moderating effect of gender on the relationship between the independent and the dependent variables. The non-significant interaction was due to the attitudes of both the male and the female teachers as far as inclusive education is concerned. In this current study, it was found out that attitudes were not significantly different when gender was compared. The link between gender and attitudes in studies reviewed by Avramidis and Norwich (2002) was inconclusive and subsequent findings have also been somewhat unclear. However, within the inclusive education context, males and females do not differ in terms of emphasis they place on task completion (Tarhini, Hone & Lui, 2014). Contrary to the prediction of this study, attitude and technology usage did not appear to be a more salient factor in inclusive education. This is more surprising given that gender plays an important role in predicting technology usage behaviour (He & Freeman 2010; Wang et al., 2009; Venkatesh et al., 2003).

The findings indicated that age was significant in moderating attitudes and successful inclusion. This result was expected as previous studies showed that age plays an important role in in moderating the relationship among predictor variable and behavioural intention (Venkatesh et al., 2003; Wang et al., 2009). For most part, the teachers were moderately young with 79.7% falling within the ages of 31-45 years. The positive moderating effect on attitudes and successful inclusion suggests that there is a relationship between age and attitudes. This means that, when younger teachers have positive attitude, it would have an influence on the success of inclusive education. This finding did not support other findings that suggested that age of the teacher did not have any significant relationship with attitude (Williamson, 2000). Given that, the majority of teachers were moderately young, the introduction of the inclusive practices could have benefited them. This finding can be interpreted within the context of the previous literature. Venkatesh et al. (2003) and Wang et al. (2009) found that increase in age showed an association with difficulty processing complete stimuli and allocating attention to task.

The implication is that not only would the younger teachers' benefit from a more positive attitudes toward inclusive educational

system, but they could also serve as a source of reference to other older teachers. In this study, age was found to contribute slightly to the moderating role in the prediction of successful inclusive education. On the other hand, no significant moderating effect of age on the relationship between technology usage and successful inclusive education was found. The failure to find a significant effect here may have some possible explanations. It is possible that if the variance between the ages of the sample had been greater a moderating effect might have been observed. It was also likely to be due to inadequate training in the usage of technology in the classroom.

The findings indicated that educational qualification was found to have no significant relationship between attitudes on successful inclusion. In other words, qualification had no moderating effect on the relationship between attitudes and technology usage on successful inclusion. This finding contradicted Goldhaber and Brewer (2000) who noted that certified teachers were better than those of the teachers who were not formally qualified or were alternatively qualified. It should be noted that the respondent teachers came with different levels of educational qualifications. The largest number of the teachers had first Degree in Education and Diploma in Basic Education; however, the results established that educational qualification or lack of it thereof was not a factor affecting the moderation of teachers' attitudes and technology usage for predicting successful inclusive education.

The moderating effect of teaching experience on the relationship between attitude and technology usage was not significant. This finding is contrary to other studies that teachers with less than a year of teaching experience were significantly more positive than teachers with more teaching experience (Glaubman & Lifshitz, 2001). Avramidis and Norwich (2002) found a clear difference in attitudes between teachers with and without teaching experience with inclusive education. They concluded that teachers with inclusive education experience showed significantly more positive attitudes than teachers with less or no experience in inclusive education.

Moreover, the theory about the formation of attitudes which states that attitudes are formed by direct and indirect experience (Eagly & Chaiken, 1993) was so relevant to the teachers since they had direct experience with inclusive education. In other words, the teaching experience was expected to significantly moderate the independent

variables. This is because teachers had experience with inclusive education facilitates and were more likely to develop positive attitudes. It should be pointed out that other confounding variables were likely to influence the strength of the relationship. Experience, however was found to play no important role in this study, since it had no significant effect in the model. The overall trend of the performance of the teachers' demographic characteristics as seen in the path model suggests that these variables were not effective moderators in the model.

Conclusion

This current study found that gender, teaching experiences and qualification as moderating variables failed to moderate attitude and technology usage in predicting successful inclusive education. The implication is that the key constructs in the model were not moderated therefore, the relationships among the constructs were weak. Only one demographic variable (age) was found important which moderated attitude, however, the strength of the moderation was weak and its effect on the prediction was not significant in the model. The overall findings therefore, did not support the hypotheses. It can be noted that one possible causal explanation is the elusive link between the teachers' demographic characteristics and their moderating role on attitude and technology usage in the classroom for predicting successful inclusive education. In effect, the finding did not improve the understanding of the moderating role of these demographic variables, since the evidence from the study did not support the hypotheses. There are other external factors that are likely to affect the results.

Limitations

The survey scales, although their validity and reliability properties were satisfactory in the study, they might not fully capture all the facets of the underlying constructs. It is therefore not known how these findings will generalize beyond this population. Second, data were collected through self-reports and a single method of data collection might have had a reflection on the accuracy of the data. However, the current study depended on the teachers' openness and sincerity when responding to the questionnaires.

Recommendations

Again, teachers should develop a positive attitude toward the education of children with special needs. To achieve this, requires a change of attitude through re-orientation, awareness creation, and active information dissemination through workshops, forums, seminars, and conferences. The non-significance of these factors implies that the educational authorities should pay particular attention to those factors in order to ensure that success is achieved.

In addition, the government acting through the Ministry of Education (MOE), the Ghana Education Service (GES) and Non-governmental Organizations (NGOs) should make the provision of equipment to the schools a top priority. Equipment such as computers and their accessories should be supplied to the schools. Adequate training facilities must be provided for the teachers in order to build their capacity for the use of educational technological equipment.

Finally, the GES and MOE must organize in- service education for all teachers while pre-service programmes should be upgraded through the existing courses to include the practical components of technology usage in inclusive schools. Increasing the level of training for all teachers in inclusive education would appear to be advantageous but, perhaps, equally important, is to ensure that all teachers have basic knowledge in inclusive education and technology usage.

Suggestion for further research

The absence of statistical significant effects of gender, qualification, and experience as moderating factors on the relationships between attitude and successful inclusion suggests that a further research is needed.

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