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Physics Teacher Mastery of Subject Matter and Students Attitudes Towards Physics in Secondary Schools in South West Region of Cameroon

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ABSTRACT
The main of this study was to investigate how students' negative attitudes towards physics can be changed by teacher mastery of subject matter. That is, the study was based on the framework that, teacher effectiveness can change physics students' negative attitudes to positive. The sample of the study was made up of 1800 from a population of 4220 physics students of form three. This study was carried out in sixteen secondary schools in the South West Region of Cameroon. To select schools for this study, stratified random sampling technique was employed. Simple random sampling technique was used to select the students. A questionnaire was designed and the reliability verified using statistical package for social sciences (SPSS). The reliability coefficient of the questionnaire for student evaluation of teacher effectiveness had a cronbach alpha of 0.84. The quantitative data collected were subjected to both descriptive and inferential statistics. The data collected were analyzed descriptively using frequencies and percentages. Inferentially, the data were analyzed using chi squared test of independence. The main finding of this study was that teacher in-depth understanding of subject matter can change students' negative attitude towards physics to positive. The conclusion was that, effective teacher mastery of the content can change students' negative attitudes towards physics to positive.

Key Words: *negative attitudes, effective teacher, teacher mastery of subject matter*

INTRODUCTION
If anything is to be regarded as specific preparation for teaching, priority must be given to a thorough grounding in something to teach, (Peter, 1977). Problems associated with learner's interest in learning process cannot be effectively addressed without assessing the role of the teacher. The educational process cannot be what it should be without the teacher. At the same time, the teacher cannot be effective without possessing certain characteristics. This is to say that certain characteristics of the teacher are indispensible for the learners' interest towards an effective learning. One of such characteristics is the competence in subject matter (Esu, 2001; Isangedighi,2007; Mezieobi, Fubara and Mezieobi,2008; and Yenilmez and Çemrek, 2008; Akintayo and Onabanjo,2008). Scholars such as Akpan, Essien and Obot (2008); Yenilmez and Çemrek (2008) are also of the opinion that teachers' characteristics are related to students' attitude to learning and performance. Teachers' competence in subject matter and students' interest in learning Akpan, Essien and Obot (2008) asserted that one of the most important teacher variables that enhance their effectiveness is the mastery of the subject matter. Teachers should sufficiently familiarize themselves with the subject matter to be taught. According to Rena (2000), good knowledge of the subject matter helps the teacher to teach the learners correctly. This in turn leads to the achievement of set objectives and the consequent interest of the learners' to continue in the learning process. This scholar adds that it has been established that there is a high correlation between what teachers know and what they teach. Ehindero and Ajibade (2000) confirmed that a teachers' performance is influenced by the level of his pedagogical knowledge, as different from his knowledge of subject matter. It is to be noted that pedagogical knowledge is not exactly the same thing as knowledge of subject matter.

However they are nevertheless intimately linked. This is because teachers' mastery and use of pedagogical knowledge in the classroom will indicate the depth of their competence in the use of his knowledge of subject matter. The competence in the subject matter is an indispensible foundation for the display of good and effective pedagogical skills. Teacher's level of knowledge on the subject matter has much influence on the process of achieving the lesson's objectives. Teachers without good grasp of subject matter, if he can succeed in bluffing the students, he has only succeeded in impacting incorrect information. This is likely to bring difficulties to the learners and subsequently to other teachers. Rice (2003) made his contribution that teachers must possess sufficient knowledge in their area of teaching.

Any teacher that does not possess the required knowledge of subject matter in his area of teaching cannot be effective. Rice (2003) added that it is not difficult for students to perceive teachers' insufficient knowledge of subject matter in his teaching area. This leads to students' loss of respect for and confidence in the teacher. Consequently, it leads to learners' poor academic performance. Still on this, Ehindero and Ajibade (2000) showed that the average academic performance of students in five selected subjects correlate and depend significantly on students' perception of teachers' knowledge of subject matter. This result is consistent with previous findings of other scholars such as Akpan, Essien and Obot (2008) and Adediwura and Tayo(2007). Adediwura and Tayo(2007) carried out a related study on senior secondary three (SS.III) students in schools in the South West zone of Nigeria. The study sample consisted of 1600 purposively selected SSS III students from 15 selected secondary schools in the area of study. A questionnaire with four sections was developed and administered on the subjects. The instrument consisted of a test-retest reliability of 0.64 over a period of two weeks (n = 40, r = 0.64, = < .05) an internal consistency (K -R20) reliability of 0.72 (< .05) and a Cronbach coefficient alpha 0.70. Using simple percentages, Pearson Product Moment Correlation and chi-square statistics to test the three hypotheses generated in the study, the obtained data were analyzed. The result showed that students' perception of teachers' knowledge of subject matter had a significant relationship on students' academic performance. In another instance, Aboderin (2001) wrote that teaching is a profession and intending teachers should have mastery of the subject in which they specialize in. In line with this, Esu (2001) saw basic knowledge of related subject matter as a required condition for effective teaching. Thus she continued that effective teaching implies teacher's ingenuity, sound knowledge of the subject matter, professional commitment, imaginative and sound knowledge of the underlying psychology, the history, the sociology and philosophy of the subject matter.

According to Buchman, (1984:32) "it would be odd to expect a teacher to plan a lesson on, for instance, writing reports in Science and to evaluate related student assignments, if that teacher is ignorant of writing about Science, and does not understand what student progress in writing Science reports might mean". Helping students learn subject matter involves more than the delivery of facts and information (Debora Ball, 1986).The goal of teaching is to assist students in developing intellectual resources to enable them to participate in, not merely to know about, the major domains of human thought and enquiry. These include the past and its relation to the present; the natural world, the ideas, beliefs and values of our own and other peoples; the dimensions of space and quality; aesthetics and representation and so on. Philosophical argument as well as "common sense" supports the conviction that teachers' own subjects matter influences their efforts to help students learn subject matter. This strongly suggests that if a teacher is largely ignorant of the subject content he can do much harm. When teachers possess inaccurate information or conceive of knowledge in narrow ways, they may pass on these ideas to their students. They may fail to challenge students' misconceptions; they may use texts uncritically or may alter them inappropriately.

Subtly, teachers' conceptions of the knowledge shape their practice the kinds of questions they ask, the ideas they reinforce, the sorts of tasks they design. Although early attempts to validate these ideas, to demonstrate empirically, the role of teachers' subject matter knowledge, were unsuccessful (Begle, 1979), various research on teaching and on teacher knowledge has revealed ways in which teachers' understanding affect their students' opportunities to learn (Lampert, 1986; Lienhartdt and Smith, 1985, Winebura and Wilson, 1988). What teachers need to know about the subject matter they teach extends beyond the specific topics of their curriculum. Scheffler (1973) writes that this kind of subject matter understanding "strengthens teachers' powers and

heightens the Possibilities of his art. When teachers are capable of explaining their lessons well, the likelihood of students to understand their lesson is high. Secondly teachers must not only be capable of defining for students the accepted truths in a domain. They must also be able to explain why a particular proposition is deemed warranted, why it is worth knowing and how it relates to other concepts and related disciplines. Teachers' subject matter knowledge underlies their power and strength as pedagogues. A conceptual mastery of subject matter and capacity to be critical of knowledge itself can empower students to be effective actors in their environment. In addition, teachers' subject matter knowledge influences their capacity to help students learn subject matter. The knowledge of a teacher about a subject matter influences his/her ability to teach it, set questions on it and give work to students' base on it.

Knowledge of teachers about a subject matter should exceed the limits of the curriculum they teach. When teachers possess knowledge about it in this way the likelihood of them to explain it for students to understand is high. This kind of understanding encompasses an understanding of the intellectual fabric and essence of the subject matter itself. For example, teachers need to know about interpretation. A Physics teacher needs to know how to solve problems on motion and interprete but must also understand the importance of motion to daily life. Moreover, History teacher needs detailed knowledge about events and people of the past but must also understand what history is the nature of historical knowledge and what it means to find out or know something about the past. Concretely, this means that the knowledge of the teachers about a particular subject matter enables them to teach it by using different teaching methodologies. When teachers fully understand the subject matter they teach, they will know which pedagogy is best for them to help students learn subject matter. Sometimes, dedicated students challenge teachers to simplify subject matter for them to understand. The extent to which a teacher can do this depends on his/her personal understanding of the subject matter. Finally, for a teacher to give varied and alternative answers to students questions about a subject matter depends on the strength a teacher possesses over it.

STATEMENT OF THE PROBLEM

This author carried out a research on students' attitudes towards physics and its effects on their academic achievements in 2009. This study examined Students' Attitudes towards physics in the South West Region of Cameroon. A Likert survey questionnaire was used. The simple random sampling technique was used to obtain the sample of the study which consisted of 1167 students in all the co-educational high schools offering Advanced Level Physics. Data collected were analyzed using the Chi-square test of independence and the major finding was that most students have negative attitudes towards physics and this affects their academic achievement. Consequently, many of the students developed negative attitudes towards the subject and drop it within the first three years of secondary school. This study will therefore examine whether teacher mastery of subject matter can change this negative attitudes to positive.

THEORETICAL FRAMEWORK

This study was guided by Vygotsky's (1928) social constructivism, Bandura's (1986) social cognitive and Maslow (1954) motivational theories. Probably no theorist has influenced social learning and constructivist theories more than Vygotsky (1928). His primary hypothesis is that much learning occurs in social contexts. One of his main contributions to cognitive and social learning has been his emphasis on "socially meaningful activity" as an important influence on learning. He considers the social environment critical for learning. With the integration of a person's cognitive and personal factors within the social context, learning can most optimally occur. The social environment influences cognition through its "tools," namely, its cultural objects (cars, machines, and computers, etc).

Vygotsky has become known for his concept, the zone of proximal development or ZPD (Vgotsky, 1928). The ZPD defines the distance between a student's current level of learning and the level he/she can reach with the help of tools, people, and powerful artifacts. In the ZPD, the teacher and learner work together on tasks that the learner could not perform independently because of the difficulty level. This process captures the idea of collaborative and mentoring processes, requiring the teacher, who has and knows more skills, to share that knowledge in a culturally mediated interaction (Bruner, 1984) with a student or a group of students working together.

Applications of teaching strategies from Vygotsky's socio-cultural theory are many. A major application involves the concept of instructional scaffolding (Santrock, 2004). This is a process in which the teacher determines and controls the number of tasks (elements) to be learned, and based on the progress of the learner, includes the next set of concepts based on the learner's progress. This term is analogous to scaffolding used in construction projects and contains five main functions: provide support, function as a tool, extend the range of the learner, permit the attainment of tasks not otherwise possible, and use selectively only as needed (Bruner, 1984). A more recognized application of Vgotsky's theory is reciprocal teaching. It involves an interactive learning process in which the teacher models behaviors (questioning, posing a problem, modeling a strategy or teaching a skill) that create dialogue about information presented. As the process continues, the students begin to take turns being the teacher. This concept of ZPD is a vehicle for pushing learners to heightened levels of learning competencies.\

Bandura's social cognitive theory (1986) consists of two important concepts of self-efficacy and self-regulated learning. Self-efficacy refers to one's perceived beliefs and judgments about one's capability to complete a given task or activity necessary to attain designated levels of performance (Bandura, 1977a, 1977b, 1986). Learning consists of developing self-efficacious behaviors through mastery learning, imitation, modeling and social persuasion techniques. According to Bandura (1995), human learning occurs when individuals observe the behaviors of others, abstract information from those behaviors, make decisions as to which ones to adopt, and later, enact those selected behaviors. While the meta-cognitive skills are essential, the affective factors such as beliefs, expectations, introspections (forethought), and even persistence play major roles in learning.

In the social cognitive view, personal and social change relies extensively on the empowerment of the individual. People can effect change in themselves through their own efforts. Change is dependent on one's perceived belief about their ability to exercise control. Evaluations of one's performances, resulting in consequences, play a critical role in changing behavior. Successful consequences tend to be repeated and retained; failure consequences are discarded (Bruner, 1984). A social-cognitive perspective views learners as having the same basic skills to perform a given task. Poor, adequate, and exceptional performances are the result of social and cognitive factors, such as the choices made in the process, the amount of effort exerted, the degree of persistence, expectations made, and the goals set. The higher the goals and expectations people set for themselves, the firmer the commitment, and the more self-directed and regulated are they in their endeavors (Zimmerman, 1994). Setting challenging and attainable goals by students have been found to be a very effective classroom strategy that enhances both self-efficacy and learning achievement (Bruner,1984). Therefore, social cognitive theory, as was seen in the constructivist view, places the teacher once more in the role of a facilitator, guide and model of specific domains of learning. Students can become more efficacious learners in several ways. The most effective way of developing a strong sense of self-efficacy is through successfully learned and mastered experiences (Bandura, 1986). Learning is best accomplished when the steps are small, paced, and successfully mastered before going on to the next step.

Modeling of behavior takes a second place to mastery learning. Observational learning through modeling expands the learning rate, as well as the amount of knowledge acquired. Simply observing a model, be it a teacher or peer, does not guarantee learning, but it can set the scene for further learning. Observing similar peers improving their skills have instilled a sense of self-efficacy in students for learning, whereas observed failures have casted doubts on students' capabilities to success (Bandura, 1986). Thus, it is essential that learners with lower levels of self-efficacy in specific domains learn from those who can model skills and tasks with success.

According to Abraham Maslow’s theory of needs, everyone is motivated by what satisfies his needs. Maslow (1954) articulates that individuals are motivated to produce better results when their needs are adequately satisfied at appropriate time and place. This theory of Maslow (1954) is based on some assumptions that: There are intrinsic needs that motivate behaviour in order to attain specific goals. Lower needs are powerful and most be satisfied before higher needs. This is shared by Strauss & Sayles (1980). Satisfaction of learners’ need can influence their interest in learning. Teachers’ competence in subject matter involves the ability of the teacher to satisfy his learners’ needs with the

subject matter of his lesson. This satisfaction can lead to the students developing positive attitude towards the subject (physics).

REVIEW OF RELATED LITERATURE

The fact that subject matter is an essential component of teacher knowledge is neither a new nor a controversial assertion. After all, if teaching entails helping others learn, then understanding what is to be taught is a central requirement of teaching. The myriad tasks of teaching, such as selecting worthwhile learning activities, giving helpful explanations, asking productive questions, and evaluating students' learning, all depend on the teacher's understanding of what it is that students are to learn. As Buchmann (1984) points out,

It would be odd to expect a teacher to plan a lesson on, for instance, writing reports in science and to evaluate related student assignments, if that teacher is ignorant about writing and about science, and does not understand what student progress in writing science reports might mean. (p. 32)

Although subject matter knowledge is widely acknowledged as a central component of what teachers need to know, research on teacher education has not, in the main, focused on the development of teachers' subject matter knowledge. Researchers are specifically interested in how teachers develop and change. For example, changes in teachers' role conceptions, their beliefs about their work, their knowledge of students and curriculum, or of teaching strategies. Yet to ignore the development of teachers' subject matter knowledge seems to belie its importance in teaching and in learning to teach. What subject matter preparation entails, where and when it occurs, and with what outcomes.

Helping students learn subject matter involves more than the delivery of facts and information. The goal of teaching is to assist students in developing intellectual resources to enable them to participate in, not merely to know about, the major domains of human thought and inquiry. These include the past and its relation to the present; the natural world; the ideas, beliefs, and values of our own and other peoples; the dimensions of space and quantity; aesthetics and representation; and so on. Understanding entails being able to use intellectual ideas and skills as tools to gain control over every day, real-world problems. Students should see themselves, either alone or in cooperation with others, as capable of figuring things out--of using physics to natural phenomena; for example what causes gravity? Why does gravitational force vary from place to place?

Conant (1963) wrote that "if a teacher is largely ignorant or uniformed he can do much harm" (p.93). When teachers possess inaccurate information or conceive of knowledge in narrow ways, they may pass on these ideas to their students. They may fail to challenge students' misconceptions; they may use texts uncritically or may alter them inappropriately. Subtly, teachers' conceptions of knowledge shape their practice--the kinds of questions they ask, the ideas they reinforce, the sorts of tasks they assign and students attitudes towards the subject. Although early attempts to validate these ideas, to demonstrate empirically the role of teachers' subject matter knowledge, were unsuccessful (Begle, 1979), recent research on teaching and on teacher knowledge is revealing ways in which teachers' understandings affect their students' opportunities to learn (Ball, 1979; Grossman, 1988; Lampert, 1986; Leinhardt & Smith, 1985; Wineburg and Wilson, 1988). This research is proving fruitful, in part, because of the researchers' conceptual work on dimensions of subject matter knowledge, work that is moving the field beyond the counting of course credits as a measure of teacher knowledge. Shulman's (1986) three categories of content knowledge--subject matter content knowledge, pedagogical content knowledge, and curricular content knowledge--are at the heart of much of the current inquiry. This study focuses on the first, on what Shulman (1986) calls subject matter content knowledge. Study intends to find out the effect of subject matter content knowledge on students attitudes towards physics.

Secondary schools teachers usually major in a discipline, what students actually learn about subject matter from their college and university courses are both an open and a critical question. To limit the exploration of prospective teachers' subject matter preparation to their university education would be to miss the point. Teachers usually spend 13 years in school prior to entering college of education. During this period, they take English, mathematics, French and other subjects. What is the contribution of this pre-collegiate experience to teachers' subject matter understanding? A central premise of this study is that teachers' understandings are shaped significantly through their experiences both in and outside of

school and that a major portion of teachers' subject matter learning occurs prior to entering the teacher training college. Teachers also learn on the job. For example, because of a student's question, a particular textbook activity, or an intense class discussion, teachers often report that, for the first time, they came to really understand an idea, a theme, or a problem that before they just knew as information. How does this learning from practice contribute to the subject matter preparation of teachers?

What is learned through studying a subject, whether at the elementary, secondary, or college level? On one hand, this may seem an obvious question. Math classes teach students to add and subtract fractions, factor equations, construct deductive proofs, and solve story problems; social studies classes provide them with information about our nation's past, cultures different from their own, and world geography. In English, students learn to write the five-paragraph essay, to construct grammatical sentences, and to spell and punctuate correctly; in physics they learn about mechanics, electricity, heat, magnetism etc. An abundance of evidence belies these easy assumptions about what students learn from subject matter study.

On the other hand, what is learned from studying a subject entails much more than what can be inferred from examining course syllabi or curriculum goals and objectives. Paradoxically, while students seem to learn less of the substance of the subject matter--the facts, concepts, procedures, information, and skills--than we often assume, they also learn more than the substance. Seldom the focus of research on student learning, these other outcomes contribute to students' ideas about the nature of the subject, their dispositions toward the subject, and their assumptions about the teaching and learning of the subject. Three dimensions of what students learn from subject matter study--substantive knowledge of the subject, knowledge about the subject, and dispositions toward the subject--are discussed below.

The first dimension is what is conventionally thought of as subject matter knowledge. Every subject matter field, although continually changing and growing, includes specific information, ideas, and topics to be known. This information and these ideas and topics may be subject to disagreement and different interpretation based on competing perspectives within the field. Knowledge can exclude attention to substantive knowledge. The very stuff of the subject, its components and the terms used to classify it differ from one subject to another. Knowledge of mathematics includes specific concepts, definitions, conventions, and procedures (e.g., what a rectangle is, how to find the maximum value of a function). Historical knowledge focuses on differing accounts of people, societies, and events, and on explanations of factors that influence the course, sequence, and relationship of events (e.g., what contributed to the Great Depression or to the suffrage movement in the United States and in other countries). Biology includes knowledge of organisms, their functions and relationships (e.g., respiration and photosynthesis), and the nomenclature that signifies systemic differences. Knowledge of writing includes conceptual, propositional, and procedural knowledge about language, syntax, grammar, audience, and text genres (e.g., constructing a persuasive argument or a compelling narrative).Similarly, Knowledge of physics includes specific concepts, definitions, conventions, and procedures (e.g., what causes gravity, why do some object attract other? etc).

Substantive knowledge - is knowledge of the ideas, facts, and theories of a subject are but one aspect of subject matter knowledge. Subject matter knowledge also includes a host of understandings *about* the subject for example, the relative validity and centrality of different ideas or perspectives, the major disagreements within the field (in the past as well as current, for example, what are the limitations of Newton laws of motion from the perspective of the theory of special relativity?), how claims are justified and validated, what is entailed in doing and engaging in the discourse of the field. Whether or not such understandings are explicit goals of instruction, students develop ideas about the subjects they study.

In addition to understandings of the substance and nature of the subjects they study, students also develop dispositions toward those subjects. They acquire tastes and distastes for particular topics and activities, propensities to pursue certain questions and kinds of study and to avoid others this enable them to develop either positive or negative attitudes toward the subject (physics). Their pre-teacher training education forms a much bigger chunk of their formal education than does the relatively brief period that they stay in teacher training college. Not only is the Precollege phase of subject matter study longer than the teacher training period, but the content studied in elementary and high school classes is also often closer

to that which prospective teachers will actually teach. The subject matter preparation of physics teachers reveals perhaps the closest correspondence between what is studied in college and what teachers teach in secondary and high school.

Whether prospective teachers' pre - teacher training college learning has a greater influence on their subject matter understandings than do their subsequent formal college studies is an open and empirical question. Some evidence suggests that the formal period of pre-service teacher education is a relatively weak influence on what teachers know and believe. While this has often been explained in terms of the powerful effect of the school culture once teachers begin teaching the powerful effect of the school and wider cultures on prospective teachers before they enter a university seems an equally plausible explanation (Ball, 1988).

As we have seen, most prospective teachers have few, if any, opportunities in school, college, or the wider culture to come to understand the substance and nature of their subject matter or to develop dispositions that would enable them to teach in ways that their students, in turn, can understand in meaningful, connected ways and develop positive attitudes towards the subject(physics). Another potential source of subject matter knowledge is the experience of teaching in the classroom. The experience that can enable one to explain or give reasons why anything through up must fall down while actually teaching is probably fairly common, neither teachers themselves nor those who study teaching appear to have written enough about such subject matter epiphanies to help us understand the conditions that produce them.

Not surprisingly, teachers' capacity to increase, deepen, or change their understanding of their subject matter for teaching depends on the personal understandings of the subject matter they bring with them to the classroom (Wilson &Wineburg,1988).While teachers' knowledge about learners, the curriculum, pedagogy, and the context seems to increase from their practice, that they will learn enough about their subject matter from their teaching to shore up inadequate knowledge and understanding is unclear. Although there is some research that has contributed to our understanding of what teachers can learn about their subject matter from practice, this has not been a focus of most research on the development of experienced teachers' knowledge. We need to understand more about the conditions that contribute to teachers learning subject matter from teaching it.

A second issue worthy of consideration has to do with what teachers learn from subject matter study. Subject matter classes usually aim to help students acquire substantive knowledge--specific information, ideas, and topics of the subject. Yet there is a hidden curriculum in subject matter classes, a curriculum especially important for the education of teachers. Students, spending thousands of hours in subject matter classrooms, also develop ideas about teaching and learning particular subjects. Watching their teachers, they acquire specific scripts for teaching particular topics (Putnam, 1987) and develop views about what the teachers should and should not do, beliefs about what contributes to academic success, and notions about what makes a good class. They also form ideas about testing and evaluation as well as about how to interest students in the subject. That is, to make them develop positive attitudes towards the subject (physics).

RESEARCH METHODOLOGY

In this study the research design, was survey in which both qualitative and quantitative research approaches were used. The Population of this study consisted of all the form three students in all the secondary schools in the South Region of Cameroon. The target population of this study was made up of all the form three secondary school students offering physics in all the six Divisional Head Quarters in the South West Region of Cameroon. The sampled population was made up of all the form three Physics students in sixteen secondary schools. These schools consist of eight government colleges, twelve denominational colleges and four lay-private colleges. A sample of one thousand eight hundred (1,800) students was drawn from the total of four thousand, two hundred and twenty (4,220) students in secondary schools in the six Divisional Head Quarters in the South West Region of Cameroon. The simple random sampling technique was used to select the schools for the research. The instruments utilized for the study was students' questionnaire. The questionnaire sought information on the teachers' effectiveness in the areas of subject mastery.

These questionnaire consisted of five option Likert Scale type of statements in which the students had to

indicate their degree of agreement by choosing either strongly agreed (SA), agree(A), Undecided(UD), disagree(D) or strongly disagree(SD) for each of the statements by ticking his/her chosen option corresponding to each statement. Despite the fact that these classroom environment instruments were developed for European perspective, they have been found to be suitable for use in a variety of cultural settings including Africa. The response format and weightings was used to score the responses on the questionnaire, convert the scores on sum of 100, before categorizing the respondents. The scores below 49 was considered low, between 50 and 69 was considered as moderate while those equal to 70 and above was considered as high.

The instrument was trial-tested to establish the reliability of the instrument in the school not used for the main study. Cronbach Alpha was used to obtain the reliability coefficient of the instrument. The instrument had an internal consistency of 0.84. The data collected were analyzed using both descriptive and inferential statistics. In this analysis, descriptive statistics (frequency and percentage) were calculate while for inferential statistics the Chi Square test of independence was used to analyze the questionnaire for students' evaluation of teacher effectiveness in mastery of subject matter. This hypothesis was tested at 0.05 level of significant or 95% certainty of prediction.

HYPOTHESIS

The study was based on the null hypothesis which states that there is no significant relationship between teacher's mastery of the subject matter and students' attitudes towards physics while the alternative hypothesis states that there is a relationship between teacher's mastery of the subject matter and students' attitudes towards physics

ANALYSIS AND RESULTS

Table 1: gives an analysis of students' responses to teacher subject matter mastery questionnaire and percentages. The analysis showed that the calculated chi square value (473.02) was greater than the table or critical value (9.49). So the null hypothesis was rejected and the alternative hypothesis upheld. That is, there is a significant relationship between teachers' mastery of subject matter and effectiveness. For the responses given on the last item which says: My teacher's non mastery of the subject matter has enabled me to develop negative attitude towards physics. After analyzing using the response format and weighting, (78%) agreed that their teacher's non mastery of the subject matter has enabled them to develop negative attitude towards physics. This means that the relationship is high.

S/N	SA	A	UD	D	SD
1	300	600	-	900	-
Percentage	16.67	33.33	-	50	-
2	450	330	-	600	420
Percentage	25	18.33	-	33.33	23.33
3	210	540	-	750	300
Percentage	11.67	30	-	41.67	16.67
4	180	720	-	480	420
Percentage	10	40	-	26.67	23.33
5	60	90	-	1050	600
Percentage	3.33	5	-	58.33	33.33
6	540	360	-	750	150
Percentage	30	20	-	41.67	8.33
7	120	30	-	1140	520
Percentage	6.67	1.67	-	63.33	28.89
8	480	420	-	570	330
Percentage	26.67	23.33	-	31.67	18.33
9	150	360	-	690	600
Percentage	8.33	20	-	38.33	33.33
10	420	330	-	570	480
Percentage	23.33	18.33	-	31.67	26.67

11	-	510	-	690	600
Percentage	-	28.33	-	38.33	33.33
12	90	210	-	840	660
Sum of responses	3000	4500	-	9030	5070
Mean of responses	250	375	-	752.5	422.5
Percentages	13.89	20.83	-	45.81	23.47

df = 4 $x^2 = 9.49$ at 0.05 level of significant

As a result, the null hypothesis was rejected and the alternative hypothesis upheld. Influence made lead to the conclusion that these is a significant relationship between teacher's mastery of the subject matter and students' attitude towards physics. In a related study Ogunleye (1993) reports that many students developed negative attitudes to science learning, probably due to the fact that teachers are unable to satisfy their aspiration or goals, Alao (1990) showed that there is positive correlation between attitudes and performance in the science subjects. Conant (1963) wrote that "if a teacher is largely ignorant or uninformed he can do much harm" (p.93). When teachers possess inaccurate information or conceive of knowledge in narrow ways, they may pass on these ideas to their students. They may fail to challenge students' misconceptions; they may use texts uncritically or may alter them inappropriately. Subtly, teachers' conceptions of knowledge shape their practice--the kinds of questions they ask, the ideas they reinforce, the sorts of tasks they assign and students attitudes towards the subject. Although early attempts to validate these ideas, to demonstrate empirically the role of teachers' subject matter knowledge, were unsuccessful (Begle, 1979), recent research on teaching and on teacher knowledge is revealing ways in which teachers' understandings affect their students' opportunities to learn (Ball, 1988; Grossman, 1988; Lampert, 1986; Leinhardt &Smith, 1985; Wilson, 1988; Wineburg & Wilson, 1988). Shulman's (1986) three categories of content knowledge--subject matter content knowledge, pedagogical content knowledge, and curricular content knowledge--are at the heart of much of the current inquiry. This study focuses on the first, on what Shulman (1986) calls subject matter content knowledge.

What teachers need to know about the subject matter they teach extends beyond the specific topics of their curriculum. Shulman (1986, p. 9) argues that "teachers must not only be capable of defining for students the accepted truths in a domain. They must also be able to explain why, a particular proposition is deemed warranted, why it is worth knowing and how it relates to other propositions". This kind of understanding encompasses an understanding of the intellectual fabric and essence of the subject matter itself. For example, while English teachers need to know about particular authors and their works, about literary genres and styles, they also need to know about interpretation and criticism. A history teacher needs detailed knowledge about events and people of the past but must also understand what history is: the nature of historical knowledge and what it means to find out or know something about the past. Likewise, a physics teacher must also be able to master the concepts, facts, principles and interrelationships between the various sections of the syllabus and the link between physics and other science subjects. Scheffler (1973, p. 89) writes that this kind of subject matter understanding "strengthens the teacher's powers and, in so doing, heightens the possibilities of his art".

CONCLUSION

These results are convicting because advancement in physics and technology has created a greater demand for more people to study physics and this is particularly pertinent in Cameroon which is struggling to become an emerging nation by 2035 but her number of scientists and engineers are very small. To ensure the influx of new scientists, it is important to view how the physics content is mastered by the teacher. One of the primary concerns for educators in the 21st century is effective teaching. As a science, Physics plays an important role in explaining the events that occur in the universe. In all events that around us can be found physical laws and principles. Although physics is in every area in our life and facilitate our lives, national and international studies show that success in physics education is lower than other disciplines (Gok & Silay 2008; Dieck, 1997; Rivard & Straw 2000, Mattern & Schau, 2002). According to Hendrickson, attitudes are the best predictor for estimation of students' success (Hendrickson, 1997). Activities must be planned, organized and implemented so that students may

develop more positive attitudes (Pintrich,1996). A well-prepared teacher of physics should have, in addition to a strong command of the subject matter, knowledge of the difficulties it presents to students. Traditional courses in physics do not provide this kind of preparation. They also have another major shortcoming. Teachers tend to teach students as they were taught. If they were taught through lecture, they are likely to lecture, even if this type of instruction is inappropriate for their students. Some even still use the same old notes that they were given by their own teachers. Many teachers cannot, on their own, separate the physics they have learned from the way in which it was presented to them.

The findings of this study have clearly shown that quality teaching matters to student learning. Teacher quality has been consistently identified as the most important school-based factor in student achievement (McCaffrey, Lockwood, Koretz, & Hamilton, 2003; Rivkin, Hanushek, & Kain, 2000; Rowan, Correnti & Miller, 2002; Wright, Horn, & Sanders, 1997), and teacher effects on student learning have been found to be cumulative and long-lasting (Kain, 1998; McCaffrey et al., 2003).

The qualities of effective professional development that have been found to directly affect teaching knowledge and practice include opportunities that are grounded in subject-matter content. It is based on the above findings that teachers are encouraged to design their classroom instructions that will lead to attitude change for students. These types of instructions are proposed below;

Simonson and Maushak (2001) have drawn on findings from a number of studies to create a series of six guidelines for effective design of attitude instruction. These are:

- make the instruction realistic, relevant, and technically stimulating
- present new information
- present persuasive messages in a credible manner
- elicit purposeful emotional involvement
- involve the learner in planning, production or delivery of the message
- provide post-instruction discussion or critique opportunities

Bednar & Levie (1993) make similar recommendations: When designing instruction for attitude change, "three approaches emerge from the theoretical literature: providing a persuasive message; modeling and reinforcing appropriate behavior; and inducing dissonance between the cognitive, affective, and behavioral components of the attitude. These approaches are ideal for students to change their negative attitudes towards physics to positive.

There is, at present, no firm agreement about the optimal order in which to present the various cognitive and affective messages contained in a given unit of instruction. Some researchers have found that "knowledge about a topic was often a necessary prerequisite for a positive attitude position toward the idea" (Simonson & Maushak, 2001, p. 1010). Others suggest that "more educated people are better equipped to counter argue and hence less likely to accept or be persuaded by new information" (Ansolabehere et al., 1993, p.151). The former theory would suggest that learners will experience more attitude change if the cognitive aspects of a lesson are presented before the affective aspects are introduced, while the latter suggests the opposite effect. The ability of a persuasive message to produce attitude change is closely linked to its strength, and "dry statistical information has less effect than vivid and concrete examples" (Zimbardo & Leippe, 1991, p. 337).

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made: Government should endeavor to equip the libraries with more physics text books and provide the essential equipment in the physics laboratories so that the learning experiences of the students can become more meaningful and interesting. Practicing Physics teachers who are not professional should undergo in-service training such as seminars, and workshops, and also provide useful materials and appropriate teaching aids. These are necessary conditions for teachers to effectively discharge their duties. Seminars, workshops and conferences should be organized for physics teachers' content knowledge training on the new innovations in physics. Curriculum planners should develop the curriculum to an extent that teachers will be able to better shape students' cognitive, psychomotor and affective domains on different aspects of physics.

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