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Perspectives on Developing, Enhancing and Sustaining Interests in the Teaching and Learning of Mathematics in Secondary Schools in the South West Region of Cameroon

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ABSTRACT

Mathematics is the beauty of sciences and the foundation of modern human society. Consequently, the influence of mathematics pervades the entire gamut of our everyday human endeavour. Mathematical knowledge and skills are necessary in almost every field of human endeavour. It now becomes obvious that mathematics as a discipline is an indispensable element in man's quest for better living. Advancements in science and technology being very vital for man's survival will certainly not be possible without mathematics. Mathematics finds useful applications to varying degrees albeit to various aspects of life; in the industry, music, agriculture, commerce, medicine, tailoring, building and construction, carpentry, engineering, etc. This is the raison d'être why mathematics has continued to attract considerable attention in our educational systems round the globe.

The findings of this study show that this phenomenon of our students shying away from mathematics more than any other single factor is the spring board for the poor state of mathematics teaching and learning in our secondary schools in Cameroon. When once a student is afraid of any mathematical task, the one does everything to avoid the task. But where the student must face the task, the one does so with lack of interest –mathematics phobia. In spite of government's effort to make mathematics instruction in our secondary schools in Cameroon compulsory, studies show that performance in mathematics still remains appallingly poor.

This study investigated perspectives on developing, enhancing and sustaining interests in the teaching and learning of mathematics in secondary schools in the South West Region of Cameroon. Methodologically, the study employed a "Mixed Method" research design which incorporated the quasi-experimental and survey research designs. The target population of the study was 40,866 for students, for teachers 1,032 and for schools 183. Two secondary schools were selected per division, making a total of 12 secondary schools from the six divisions were randomly selected for the study. The sample size was 432 which comprised; 24 mathematics teachers and 408 mathematics students. 24 secondary schools randomly selected for the study from six divisions of the South West region.

Specifically, the study assessed the extent at which availability and appropriateness in use, of instructional resources affect students' academic performance in mathematics in secondary schools. Two research questions were answered and two hypotheses were tested. A questionnaire and a mathematics achievement test (MAT) were used for data collection. Three experts validated the mathematics achievement test (MAT).The data were analysed descriptively using percentages, mean, standard deviation and inferentially using the Pearson product moment correlation coefficient, R, at P<5 and the means compared for the quasi-experiments. The findings revealed that there was a significant influence of availability of instructional resources on students mathematics performance (R=0.303, P=0.05); there was a weak influence of appropriate use of instructional resources on students mathematics performance (R=0.201, P=0.05). There was significant difference in the mean score of students taught using instructional resources than those taught using conventional methods (without instructional resources). Results revealed that students taught using instructional resources performed better than students taught using conventional methods by quasi-experimental. Based on the findings, it was recommended that the ministry of secondary education in Cameroon and other education stakeholders should collaborate to encourage teachers' adoption and successful integration of diverse instructional resources in the teaching/learning process.

In aggregate, students were mostly not satisfied with the use of print media as the highest weight response of 45.8%, highlighted that print media were not available. 27.4% to a low extent satisfied with the use of print media while 26.7% of them were highly satisfied. Instructional resources are first not available in our secondary schools in Cameroon and mathematics teachers do not make use of them in mathematics instruction.

KEYWORDS:

PERSPECTIVES: The position or view or a way of regarding situations or topics.
DEVELOPING: Gradually unfolding or growing (scaffolding).
ENHANCING: To advance, to increase, to augment, to heighten, to make more costly or attractive.
SUSTAINING: Self- sufficient; being able to provide for your own needs without help from others.

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INTRODUCTION

The general opinion held by many-a people is that mathematics by its very nature is very difficult. More so, a generally held notion also by many people is that mathematics is highly structured and so abstract. Many people feel that studying mathematics requires special intellectual capabilities and skills, which is erroneous. There is the distorted view and belief that mathematicians are "mad" persons in society. The society consequently regards mathematics as something esoteric which is to be dreaded. Emenalo (2010) asserts rightly the situation when he asserted in his articulation of the matter that " the inherent notion held by many Africans that mathematics is a very difficult subject capable of making one "mad" is at the centre of the fear students show for mathematics". He admits that this fear "has claimed many casualties over the years". What comes to mind immediately is, how then would any person in fairness expect our tender age, immature and unequipped school goers to be as courageous as to face something which is "capable of making even an adult "mad"? The students would rather choose to do something else however difficult than listening to the mathematics teacher. This is the reason why we find some students developing fever whenever it is time for mathematics lessons or when they are about to take a mathematics examination.

BACKGROUND

Most often than not, teachers adopt incongruent, sterile and uninspiring approaches in the teaching of mathematics. The non- use of appropriate approaches in the teaching of mathematics is a potent phobia factor in the teaching and learning of mathematics. Usually instruction is didactic and often pitched at an abstract level. There is little or no consideration given to the psychology of the learners. From what we know about intellectual development in humans, leaners of mathematics may still be dependent on concrete realities. Instructional resources which actually are meant to concertize concepts taught are often not used in mathematics teaching and learning. The attempt is hardly made of relating mathematics instruction to real life situations. The aforementioned reasons combine to shape students' perception; inadvertently rendering mathematics instruction difficult, uninteresting and abstract.

Many teachers at the secondary school level pose a hindrance and most often are actually handicapped in their lesson dispensation in mathematics. What do we expect will be the students' disposition towards mathematics if their own teachers are nonchalant in the teaching and learning of mathematics?

Aims of the Study

Studies show that there is general apathy on the part of students to study mathematics from secondary schools and to eventually end up in the university as it is done easily with other school subjects (Emenalo, 2010). However, it is deplorably pathetic to note that the state of mathematics on which almost all of our hope for a better life rests and which demands considerable attention from us is rather poor and unimpressive. The performance of students in mathematics in internal and public examinations is far from being satisfactory as evidence from studies show. For the most part, there is low interest in the study of mathematics and mathematics related fields and disciplines. If given the option to choose, many a student will prefer not to have anything to do with the study of mathematics. Evidence shows that after secondary school studies in mathematics in the South West region of Cameroon, many students with A grades in mathematics in advanced level General Certificate of Examination rather than read mathematics in the university will prefer other fields of studies such as engineering, medicine, agriculture, forestry, architecture, and so on. It would appear there is general hatred for the subject which ought to be loved. Reason why this study is carried out to shed light on the aforementioned worries.

Specific Research Questions

- To what extent does the availability of instructional resources in the teaching and learning of mathematics affect students' performance in the South West Region of Cameroon?
- To what extent does appropriateness in use of instructional resources in the teaching and learning of mathematics affect students' performance in the South West Region of Cameroon?

Specific Hypotheses

Ho_1 : There is no significant relationship between the availability of instructional resources in the teaching and learning of mathematics and students' performance in the South West Region of Cameroon?

Ha_1 : There is a significant relationship between the availability of instructional resources in the teaching and learning of mathematics and students' performance in the South West Region of Cameroon?

Ho_2 : There is no significant relationship between the appropriateness in use of instructional resources in the teaching and learning of mathematics and students' performance in the South West Region of Cameroon?

Ha_2 : There is a significant relationship between the appropriateness in use of instructional resources in the teaching and learning of mathematics and students' performance in the South West Region of Cameroon?

Significance of study

This study may illuminate rays of light on the necessity to select and use varied suiTable21st century instructional resources. Modern day instructional resources are technologically inclined and help teachers and learners by facilitating knowledge transfer in most schools. Technology integration nowadays has gone through innovations and transformed societies that change the way people think work and live. According to Etcuban (2019), a resource such as the computer is a tool, which may have multiple uses in the mathematics classroom. It may be a device for making the learning of concepts, skills, and problem solving more effective than that of traditional practice. According to King (2000), technology in the hands of great teachers is transformational. It cannot work itself but if a teacher uses it who has skills and knowledge the learning would be meaningful (Kirschner et al., 2006).

The knowledge obtained from this study will help the government most especially educators to reflect and make evaluation on the requirements of other instructional materials apart from class-rooms alone. Following the creation of many secondary schools, the government and local communities have been putting more emphasis on the construction of new class-rooms, and recently, construction of laboratories. However, provision of quality secondary school education requires more than just class-rooms and laboratory buildings. The evaluation of instructional materials, along with other reform movements, allows educators and planners to plan for appropriate environment for teaching and learning so as to provide quality secondary school education.

Also the knowledge acquired from this study would be very important to other researchers who have interest in the use of instructional materials in schools in general and secondary schools in particular. If the study concludes that students in community secondary schools perform poorly due to the lack of sufficient instructional materials, this knowledge will enable education planners to re-think the range of services the government and local communities can provide to school-aged children, and the wider community, and to find creative ways of improving school facilities that would otherwise be ineffectively utilized due to funding pressure. The benefactors of using instructional resources are; the students, the stakeholders, the government and the society at large.

This study also projects the need to embrace modern day technologically based instructional materials in classrooms. In today's classroom, teachers have more tools to help students understand mathematical concepts and a balance of traditional and modern methods of teaching can help students of all abilities. Instructional resources like Information and Communication Technologies (ICTs) are essential in teaching and learning mathematics; they influence what is taught and enhances students' learning. Mathematics is not only a subject; it relates to many things in human's daily life. Its study provides students with sure basic life, skills, and processes that will prepare them to be productive members of society.

Proper and coordinated utilization of innovation impacts each aspect of mathematics education: why mathematics is taught, how mathematics is taught and learned, and how mathematics is assessed. Changes in mathematics including the use of technology have been advocated for across several years. The teachers who use materials to enhance their classroom such as computers, calculators, and other technology along with concrete materials can connect materials with effective and developmentally appropriate tasks in which students can engage learning mathematics with technology engaging students in more active mathematical practices such as experimenting, analysing, reasoning, problem-solving (Capuno, Revalde, Etcuban, Aventuna, Medio, and Demeterio 2019).

This study would be useful to classroom teachers as they will be better informed on how to help guide their students on better ways of selecting and using instructional resources. The teachers can also engage students to do some of the illustrations during mathematics instructions. This study will also steer government and proprietors of schools to recognize the need to adequately equip their schools with current and appropriate instructional materials, prove the worth of instruction materials in the teaching learning processes and inculcate in teachers the habit of using instructional materials appropriately in teaching learning process to arouse interest and determination among students.

This study will also help to develop problem solving skills in students and enable them to be more resourceful during lessons. The study could be beneficial to curriculum planners who would design functional curriculum by taking into consideration instructional resources. The findings of this study, if discussed in workshops and seminars will guide the choice of instructional resources used in the teaching/learning process in mathematics and other subject areas. The findings of this study will equally help to alleviate the problem of the scarcity of instructional materials for mathematics teaching/learning.

The results of the study could provide information to researchers interested in working on student-teachers generated improvised instructional resources in other subject areas. This may help them to get more information on the efficacy of improvisation, especially researchers in the area of science and technology. Parents and teachers will be better informed on how to encourage and help their children towards the production of improvised materials. This may be in form of sourcing local materials and providing funds for those that cannot be found in their environment.

REVIEW OF RELATED LITERATURE

MATHEMATICS INSTRUCTION: GENERATING AND SUSTAINING INTEREST.

Preceding this section were explanations on factors that militate towards lack of interest and fear in mathematics. The factors expounded above were largely responsible for the low attainment and dampen interest in the teaching and learning of mathematics in secondary schools. A shift now and focus is on the examination of ways in which interest in the learning and teaching of mathematics can be enhanced and sustained.

Recommended strategies which the secondary school teacher can adopt to enhance and sustain the interest of learners in the study of mathematics include:

A. Appropriate Set Induction Strategies:

Set induction simply refers to the manner and way a teacher introduces the lesson. This skill is a potent determinant of the students' level of interest in the lesson. In order to awaken or arouse the interest of the students ab initio, it is important for the instructor to employ this technique. In order to arouse the interest of the learners from the onset of the lesson, the instructor should seek to introduce the lesson in such a way that it is efficacious in terms of arousing the interest of the students. The students' interest can be sustained through skillful instructional management if at this stage their interest has been aroused. Mkpa (1989) asserts that until instructors will come to grips with appropriate set induction strategies, then will there be meaningful instruction in our classrooms. .

In order to effectively impart on the learners skills and attitudes for meaningful learning and objectives to be attained, instructors need take time in lesson preparation .

Instructors necessarily have to incorporate in their lessons those instructional resources and practices that will arouse, sustain and develop latent mathematical skills in the learners, rather than rely on textbooks Moulton (1997).

B. Effective Use of Instructional Resources

Thinking out effective ways of introducing a lesson requires that the instructor plans lessons in advance Jaeger (1988).During the planning stage, it is demanded of the instructor to think out effective ways of introducing a lesson such as to arouse the interest of the students. There are several reasons to advocate the use of instructional resources as a means of generating and sustaining interest in mathematics learning. In general, the level of abstraction involved in the learning of a mathematical concept can be reduced can be reduced by the use of instructional resources. Bassey (2005) agrees that instructional resources help to concretize learning and make instruction more meaningful. The greatest obstacle in cultivating interest for mathematics to many learners is its abstract nature. This can considerably be reduced through the effective application of instructional resources in mathematics instruction.

Instructional materials are often accompanied by teacher manuals, which are important resources for teachers. Beverlee (2004) opines that depending on textbooks by instructors usually undermines fundamental educational reforms.

If the goal is to teach according to standards, the quality of the instructional materials is as important to teachers as it is to students. Such a situation arises, for example, if the materials represent an activity-based or inquiry-based science program, and the teachers have traditionally depended on textbooks and didactic lessons (Little, 1999). This dependence on textbooks by instructors unfortunately has a negative toll in the instructional process Beverlee (2004).

The lack or absence of standard instructional resources in a school is not a sufficient reason for instructors not to use them during instruction. Instructors have the option to improvise in the case where standard instructional resources are not available. Mathematics teachers can improvise and use a lot of cheap instructional resources with relative ease. Cheap instructional resources from the leaners' environment will most often compare favourably with standard ones in terms of satisfying the instructional objectives.

C. Involving Students in Activities

In order to sustain the interest of the students in mathematics, it is but necessary to involve them in relevant classroom activities. This would go a long way to definitely sustain the interest of the learners. Instructional activities which are purely didactic with little or no provision for students' participation in classroom activities often become boring and unexciting, Donald, J. F. & Andrew, C. P. (1989). One sure way of making students loose interest in the subject, is to teach mathematics as though one is telling a story. Sufficient activities either in a physical or intellectual sense should be provided for learners. These activities will make mathematics learning fun for the students.

Because instructional materials influence the instructional process, they also affect the content of professional development .Workshops are organized to sharpen and update the skills of the instructors on how to use instructional resources in classrooms. In particular, inexperienced teachers who are preoccupied with the practicalities of teaching are interested in workshops directly related to their lesson plans (Loucks-Horsley, Stiles, and Hewson, 1996). Thus, the quality of the instructional materials will directly affect the quality of the teaching. Developing lesson plans that make for interactive classrooms for teaching mathematics so as to meet content standards (Massell, Kirst, and Hoppe, 1997) remains an uphill task for many mathematics instructors.

D. Relating Mathematics Instruction to Real Life

Tyson-Bernstein (1988), asserts that "commercial" writing and lack of ethical standards are obstacles to textbook reform at all educational levels. This same author advocates sequencing of learning, so as to meet the needs of the learners. The same author argues that publishers are compelled by public policies and practices to produce textbooks that confuse and mislead the learners. The writer is opined that the textbooks misinform the learners and are boring with pointless arid writing. Consequently, relating mathematics instruction to real life situations in our classrooms is not common place.

From the perspective of promoting mathematics instruction in such a way that will develop, enhance and sustain interest in the learners, instructional materials are critical and essential tools. Adoption of materials that promote the learning of important ideas, competences and skills is then essential if mathematics education is to become a reality in Cameroon classrooms. Therefore, frantic efforts have to be made by government and policy makers in conjunction with education stakeholders and teachers to relate mathematics instruction to real life situations. Instructors at all times should endeavor to make use of instructional resources that relate the lessons to real life situations, this in a bid to develop, enhance and sustain the interest of the learners. Such materials would improve curricula and significantly impact daily teaching practices (Tyson, 1997; Tyson-Bernstein, 1988). The review of instructional materials during a selection process, if well structured, can serve as an important professional development experience for participants. Review processes that require understanding of the standards and foster rigorous analysis of the materials can be powerful learning experiences (Brearton and Shuttleworth, 1999).

METHODOLOGY

The study employed the mixed-methods approach with the adoption of qualitative and quantitative methods. The type of mixed method design employed for the study was the sequential explanatory design which incorporated the quasi-experimental and survey strategies. This mixed method was characterized by collection and analysis of both quantitative and qualitative data. Quantitative data from questionnaire survey and quasi-experiment were analysed alongside qualitative data. The data analysis and explanations were done sequentially; hence the name sequential explanatory design that was used in this study (Creswell and Plano Clark, 2011).

The research design chosen for this study is relevant because it plan; structure and strategy were conceived to obtain answers to the study's research questions and hypotheses. It was also presumed that the outcome of the study would not be the generalization of the result obtained, but a profound understanding of the experiences from the perspectives of the selected participants for this study (Creswell, 2009).

Area of Study

This study is carried out in the South West region of Cameroon which has a total of 183 public secondary schools. The South West region has both urban and rural secondary schools. The choice of the South West region was determined by accessibility and familiarity of the locality to the researcher which made it easy to develop immediate rapport with the respondents hence making data collection easy. The researcher also found the location quite accessible. Best (1993) pointed out that, since research requires careful thought, a number of practical factors including accessibility and cost factors become legitimate considerations.

The South West region of Cameroon has schools of all strata in the region. These schools range from the tertiary to kindergarten. The region has one state owned university situated in Buea run by state authorities and about fifteen private universities. There are one hundred and eighty three first cycle and second cycle secondary schools. There are about 140 confessional and lay private secondary schools located in all the six divisions of the region. The South West region is divided into six divisions: Fako, Koupé-Manengouba, Lebialem, Manyu, Meme, and Ndian. These Divisions are in turn broken down into subdivisions.

Equally, the government of Cameroon has the responsibility of creating and opening public secondary schools in Cameroon. The administrators and teachers are appointed and posted to the public schools by the government precisely by the minister of secondary education in Cameroon. Generally, in many public schools there is a problem with shortage of teachers generally and particularly in most public secondary schools there are few mathematics and science teachers in schools in the schools. This lack of trained mathematics and science teachers in the South West Region influences the teaching of mathematics in secondary schools with respect to strategies, materials and resources used by the teachers to teach the subject to the students.

Again, over 80% of the inhabitants of the South West Region of Cameroon are engaged in agriculture (Ngulle, Njabebuh, Ngeti, Obenengu, and Ewane, 2007). The crops include cassava, cocoyam, plantains, banana, yams, and fruits such as avocado, orange and mango. Cash crops include cocoa, coffee and banana. Maize can be cultivated continuously throughout the year, due to the year-round rainfall in the area. There is small scale poultry farming and piggery. Plantation agriculture for banana and pineapples is carried out by the Cameroon Development Corporation (CDC) in partnership with the company Del-Monte (Ngulle *et al.* 2007). Agriculture is the most dominant economic activity, with both indigenous and settlers involved in subsistence food crop farming of cocoyam, yellow coco (Akwana), taro (Ibo-coco), plantains, cassava, yams, maize, tropical fruits and vegetables. Although as parents engage in agriculture and farming activities, they believe in the profound education of their children in schools. This is clear as the schools in both rural and urban areas have a high student enrolment (South West Regional Delegation of Secondary Education Buea, 2015/2016 academic year).

Culturally, most of the inhabitants of the South West Region are from diverse cultural backgrounds who share the same beliefs of proper and responsible upbringing of their children to respect family and community norms (Lo-oh & Monju, 2018). Most families here believe that children should be trained to be responsible rather than being idle and lazy. As such, parents ensure that their children are in schools as it is accepTableamong the settlers of the Region who belief in proper socialisation of their children culturally to the norms and values they hold.

In addition to the economic and socio-cultural background, families believe that educating children in schools would prepare them for the changing society (Tchombe, 2011). Still, parents commonly encourage their children to study as they tell the children that schooling would provide better opportunities for them to be skilled in different professions. Furthermore, Nsamenang (2003) argued that African parents use a holistic approach to train their children to adapt culturally, socially, economically and politically as they grow up.

The South West region is situated in the Latitude of Greenwich Meridian Time (GMT). This zone is characterized by dense vegetation, a vast hydrographic network and a hot and humid climate. This region is famous for the farming of cocoa, palm trees, banana, rubber tree and coffee, etc. The South West Region is situated in between the latitudes 4^{o} and $6^{o}59N$ and longitudes $8^{o}$and $10^{o}E$.

The southern part is bordered by the Atlantic Ocean and the Northern part by the Bamenda and Bamboutos Plateau at the North-West and West regions respectively. The Western part is bordered by the Federal Republic of Nigeria while the Eastern part is bordered by West and Littoral Regions. The South-West covers an area of 22085 Km^2 representing about 5% of the total surface area of Cameroun and with an estimated population of about 1384286 inhabitants. It is one of the two regions that make up the Anglophone Cameroon. It constitutes one of the richest regions of the country. Mt. Cameroon (elev. 4,095 m), which last erupted in 2000, is the only active volcano in the Gulf of Guinea, West Africa. It is a member of an alignment of volcanoes stretching from islands of the Atlantic Ocean (Pagalu, Sao Tome and Principe and Bioko) to the main land (Mounts Cameroon, Manengouba, Bamboutos and Oku).

Population of the Study

The population of this study comprised of 1,032 mathematics teachers from 183 secondary schools and 40,866 form 5 mathematics students in the South West region of Cameroon**.**

Table1: Distribution of Form 5 Students in Secondary Schools in the South West region of Cameroon

Division	Number of Form 5 students
Fako	16579
Kupe Muanenguba	5318
Lebialem	5854
Manyu	4620
Meme	5642
Ndian	2853
Total	**40,866**

***Source**: List of Schools Operating in the South West Region 2015/2016. RDSE/SW (Regional Delegation of Secondary Education/ South West).*

Target and accessible population of the study

The target population of the study was the same as the accessible population of the study which comprised of 1,032 mathematics teachers from 183 secondary schools and 40,866 form 5 mathematics students in the South West region of Cameroon.

SAMPLING PROCEDURE

Stratified random sampling was used in this study. For the purpose of getting a representative sample, schools were categorized into two groups, namely, urban and rural schools. 408 form 5 students were randomly selected across the classes to fill the questionnaire.

RESEARCH INSTRUMENTS

The collection of data was done by use of questionnaire and a Mathematics Achievement Test (MAT).

VALIDITY OF INSTRUMENTS

Construct validity, content validity, face validity and external validity were done, the instrument were pre-tested and missing value analysis was done to identify questions that were not answered and to understand the reason why. Cronbach's Alpha reliability test was to make sure that the internal consistency assumption is not violated. These validation procedures and tests were important to identify potential problems with the data collection instruments or data gathering procedure and solve them. Besides these, the competence of research assistants was properly checked and they were properly enlightened on the topic and the research protocol before being sent to the field. The consent of students was sought after they were properly presented with the rationale behind the study before their participation in the study.

To ensure that the research instruments measured consistently what they were designed to measure, the instruments were trial-tested using 10 students from Government High School Great Soppo, both schools in the South West Region of Cameroon. The Alpha reliability coefficients ranged from 0.646 to 0.826 while this value was equally very satisfactory for the integrated value mapping (IVM) of 0.817 as indicated on Table2 below.

Table2: Reliability analysis for the pilot study

Conceptual components	Cronbach's Alpha	Variance	N_{cases}	N_{items}
Availability of instructional resources	0.826	0.038	10	8
Appropriateness of instructional resources	0.738	0.023	10	9
IVM	**0.782**	**0.049**	**10**	**17**

From Table2 above, the Cronbach Alpha reliability coefficient for availability of instructional resources was 0.826, appropriateness of instructional resources it was 0.738. The IVM was appreciated at 0.782. This showed that the questionnaire was reliable as the reliability coefficient was above the 0.5 threshold level.

DATA COLLECTION

Simple random sampling was used to select students whom the questionnaire was administered to across the forms 5 and upper sixth mathematics students. Data were entered using EpiData Version 3.1 (EpiData Association, Odense Denmark, 2008) and analyzed using the Statistical Package for Social Sciences (SPSS) standard version, Released 21.0 (SPSS Inc. 2012).

DATA ANALYSIS AND PRESENTATION

In the research, descriptive (quantitative) statistics, and qualitative techniques were used to analyze the data. This study also used qualitative techniques to analyze data collected from content analysis. Descriptive analysis employed frequencies, proportions and MRA to aggregate scores within conceptual components while the research question was answered using Logistic Regression. The effect of individual predictors was appraised using the Log-likelihood Ratio test, the overall variability explained using the Cox and Snell R-Square while the significance of the variability explained was depicted by the Omnibus Tests of Model Coefficient. Discrepancy between rural and urban schools was appraised using Chi-Square test of equality of proportion. As for the qualitative data that emerged from open-ended questions, they were analyzed using the process of thematic analysis whereby concepts or ideas were grouped under umbrella themes or key words with the support of Atlas Ti 5.2 (Atlas Ti GMBH, 2006).

FINDINGS

Research question one: To what extent does the availability of instructional resources in the teaching of mathematics affect students' performance?

The findings here reveal information on the availability of instructional resources in the teaching of mathematics. This brings out the different instructional resources available and how they are used in the teaching of mathematics.

Table3: Availability of instructional resources

Items	Not at all	Low extent	High extent	Total	Mean	SD
Printed material is available in schools for the teaching of mathematics.	00 (0.0%)	85 (20.8%)	323 (79.2%)	408	2.97	0.56
My mathematics teacher uses available printed materials in his daily teaching of mathematics.	12 (2.9%)	112 (27.5%)	284 (69.6%)	408	2.62	0.63
Non-projected / display instructional resources are available in schools for the teaching of mathematics.	45 (11.0%)	216 (53.0%)	147 (36.0%)	408	2.00	0.55
Projected / audio-visual instructional resources are available in schools for the teaching of mathematics.	192 (47.1%)	174 (42.6%)	40 (10.3%)	408	0.94	0.23
My mathematics teacher uses projected / audio-visual instructional resources in his daily teaching of mathematics.	220 (53.9%)	147 (36.0%)	41 (10.1%)	408	0.76	0.47
Computer laboratories are available in schools for the teaching of mathematics.	215 (52.7%)	125 (30.7%)	68 (16.7%)	408	1.01	0.63
Mathematics laboratories are available in schools for the teaching of mathematics.	352 (86.3%)	49 (12.0%)	07 (1.7%)	408	0.23	0.65
Library centres in school are used for the teaching of mathematics.	205 (50.3%)	150 (36.7%)	53 (13.0%)	408	0.96	0.96
MRS	1241 (38.0%)	1058 (32.5%)	965 (29.5%)	3264 (100%)	1.44	0.59

The findings revealed on Table1 that some (20.8%) respondents indicated that there was a low extent of printed materials available in schools for the teaching of mathematics while majority (79.2%) respondents indicated a high extent. Again the mean (2.97) and standard deviation (0.56) reveals the availability of printed materials. Also very few (2.9%) respondents indicated that there no mathematics teachers use available printed materials their daily teaching of mathematics while some (27.5%) indicated a low extent and majority (69.6%) a high extent with a mean (2.62) and a standard deviation (0.63). Still, few (11.0%) respondents indicated that non-projected/display instructional resources were not available in schools for the teaching of mathematics while majority (53.0%) indicated that they were to a low extent and some (36.0%) indicated to a high extent.

Furthermore, most (47.1%) respondents indicated that they were no projected/audio-visual instructional resources were available in schools for the teaching of mathematics while some (42.6%) indicated they were to a low extent and few (10.3%) indicated they were to a high extent. Equally, majority (53.9%) respondents indicated that their mathematics teacher did not use projected/audio-visual instructional resources in their daily teaching of mathematics while some (36.0%) indicated they used to a low extent and few (10.1%) indicated they used to a high extent.

Moreover, majority (52.7%) respondents indicated that they were no computer laboratories available in schools for the teaching of mathematics while some (30.7%) indicated that they were available to a low extent while few (16.7%) indicated that they were available to a high extent. In the same light majority (86.3%) respondents indicated that there were no mathematics laboratories available for the teaching of mathematics while few (12.0%) indicated they were to a low extent and very few (1.7%) indicated they were available to a high extent. In addition majority (50.3%) respondents indicated that there were no library centres in schools used for the teaching of mathematics while some (36.7%) respondents indicated they were available to a low extent and few (13.0%) indicated they were available to a high extent.

The findings from the multiple response sets indicated that most (38.0%) respondents revealed that instructional resources were not available in schools for the teaching of mathematics while some (32.5%) respondents indicated that they were available to a low extent and some (29.5%) indicated that they were available to a high extent. Again the weighted mean (1.44) and standard deviation of (0.59) indicated that instructional materials were available in schools to a low extent. This shows that there is limited use of instructional resources in secondary schools for the teaching of mathematics.

Furthermore findings from observations indicated that instructional resources such as textbooks, mathematics journals, hand outs and photocopied materials were always used for the teaching of mathematics in most schools while in some schools the materials were used sometimes. Again interviews conducted revealed that instructional materials were available for the teaching of geometrical shapes such as circles, triangles, rectangles, squares, cubes and cuboids.
Also interviewees indicated that non-projected/display instructional resources such as charts, flannel boards, radio, abacus, flip charts and graph boards were available to a lesser extent in some schools. Interviews further indicated in some schools that projected/audio-visual instructional resources such as television, overhead projectors and computers were available for the teaching of mathematics. The findings therefore show that instructional resources are available to a lesser extent for the teaching of mathematics.

To further ascertain the effect of availability of instructional resources on students' performance in mathematics in secondary schools, the quasi-experiment carried out indicated that there was a mean gain in score of 11.19 after the treatment was administered with instructional resources used in the experimental group from the pre-test and post-test scores. On the other hand there was a mean score gain of 10.54 in the control group using the conventional teaching method from the pre-test and post-test scores as indicated on Tablebelow.

Research Hypothesis one: There is no significant relationship between the availability of instructional resources in the teaching of mathematics and students' academic performance
To further ascertain the effect of availability of instructional resources in the teaching of mathematics and the performance of students in mathematics the Pearson product moment correlation coefficient was used to ascertain the effect as indicated on the Tablebelow.

Table4: Perceived effect of availability of instructional resources on students' performance in mathematics

		Availability of instructional resources	Students performance in mathematics
Availability of instructional resources	Pearson Correlation	1	.303**
	Sig. (2-tailed)		.000
	N	408	408
Students performance in mathematics	Pearson Correlation	.303**	1
	Sig. (2-tailed)	.000	
	N	**408**	**408**
**. Correlation is significant at the 0.05 level (2-tailed).			

From Table3 above the Pearson Product moment correlation coefficient (R = 0.303, P=0.05) indicates that there is a strong positive effect of the availability of instructional resources on students' performance in mathematics in secondary schools in the South West Region of Cameroon. This shows that if more instructional resources are available students would perform better in mathematics. Hence the null hypothesis is rejected and the alternate hypothesis is accepted which states that the there is a significant relationship between the availability of instructional resources in the teaching of mathematics and students' performance.

Furthermore from the quasi-experiment findings revealed there is a significant effect for mode of instruction on availability of instructional resources on students achievement in mathematics f(1.139) = 0.021, p<.018. The null hypothesis therefore, was rejected, indicating that there is a significant difference in the mean achievement score of students taught mathematics using available instructional resources than those taught using conventional instructional resources. The mean achievement score for availability of instructional resources was 24.76, while that for conventional teaching methods was 18.51. The null hypothesis therefore was rejected indicating that there is significant difference in the mean achievement score of students taught.

Research question two: To what extent does appropriateness in use of instructional resources in the teaching of mathematics affect students' performance?
The findings here reveal the appropriateness in use of instructional resources in the teaching of mathematics and the effect on students' performance in mathematics.

Table5: The appropriateness in use of instructional resources

Items	Not at all	Low extent	High Extent	N	Mean	SD
Appropriate printed materials are found in schools for the teaching of mathematics.	64 (15.7%)	128 (31.4%)	216 (52.9%)	408	2.12	0.66
My mathematics teacher makes use of appropriate printed material in his daily teaching of mathematics.	11 (2.7%)	107 (26.2%)	290 (71.1%)	408	2.63	0.63
Non-projected / display instructional resources are appropriate in schools for the teaching of mathematics.	63 (15.4%)	166 (40.7%)	179 (43.9%)	408	2.05	0.56

Teachers appropriately use non-projected/display instructional resources in daily teaching of mathematics.	25 (6.1%)	79 (19.4%)	304 (74.5%)	408	2.73	0.72
Projected / audio-visual instructional resources are appropriate by students in schools for the teaching of mathematics.	120 (29.4%)	194 (47.5%)	94 (23.0%)	408	1.52	0.78
My mathematics teacher can appropriately use projected / audio-visual instructional resources in daily teaching of mathematics.	274 (67.2%)	82 (20.1%)	52 (12.7%)	408	0.66	0.56
Computer laboratories are appropriate in schools for the teaching of mathematics.	343 (84.1%)	55 (13.5%)	10 (2.5%)	408	0.28	0.92
Mathematics laboratories are appropriate in schools for the teaching of mathematics.	261 (64.0%)	127 (31.1%)	20 (4.9%)	408	0.52	0.53
Library centres in school are appropriate for the teaching of mathematics.	96 (23.5%)	121 (29.7%)	191 (46.8%)	408	1.92	0.65
MRS	1257 (34.2%)	1059 (28.8%)	1356 (36.9%)	3672	1.60	0.67

The findings from Table4, indicated that few (15.7%) respondents indicated that appropriate printed materials are not found in schools for the teaching of mathematics while some (31.4%) indicated to a low extent that appropriate printed materials were found in the schools and majority (52.9%) indicated to a high extent that appropriated printed materials were found in the schools for the teaching of mathematics giving a mean score of 2.12 and standard deviation of 0.66.

Furthermore, very few (2.7%) respondents stated that their mathematics teacher do not make use of appropriate printed materials in their daily teaching of mathematics while some (26.2%) respondents indicated to a low extent that their mathematics teachers make use and majority (71.1%) respondents indicated that their mathematics teachers made use of printed materials in the daily teaching of mathematics. Again the mean score of 2.63 and standard deviation of 0.63 on the statement indicate that students indicated a high extent to the use of printed materials by their teachers in teaching mathematics. Still few (15.4%) respondents indicated no appropriate use of non-projected/display instructional resources in schools for the teaching of mathematics while some (40.7%) indicate to a low extent an appropriate use of non-projected/display instructional resources and most (43.9%) indicated a high extent to the use appropriate use of non-projected instructional resources.

Furthermore few (6.1%) respondents indicated that teachers do not appropriately use non-projected instructional resources in daily teaching of mathematics while few (19.4%) indicated teachers appropriately use to a low extent and majority (74.5%) indicated that teachers appropriately use to a high extent recording a mean score of 2.73 and a standard deviation of 0.72. Also, findings indicated some (29.4%) respondents indicated that projected/audio-visual instructional resources are not appropriate by students in schools for the teaching of mathematics while most (47.5%) respondents indicated to a low extent that projected/audio-visual instructional resources are appropriate by students and some (23.0%) respondents indicated they are appropriate to a high extent.

More so, majority (67.2%) respondents indicated that their mathematics teacher cannot appropriately use projected/audio-visual instructional resources in daily teaching while some (20.1%) indicated that they can use to a low extent and few (12.7%) indicated that they can use of a high extent. Likewise, majority (84.1%) respondents indicated that computer laboratories are not appropriate in schools for the teaching of mathematics while few (13.5%) respondents indicated to a low extent and very few (2.5%) indicated to a high extent that computer laboratories were appropriate for the teaching of mathematics in the schools.

In addition, majority (64.0%) respondents indicated that mathematics laboratories are not appropriate in schools for the teaching of mathematics while some (31.1%) respondents indicated to a low extent and very few (4.9%) indicated to a high extent that mathematics laboratories were appropriate in schools for the teaching of mathematics. Additionally, some (23.5%) respondents indicated that library centres in schools were not appropriate for the teaching of mathematics while some (29.7%) indicated to a low extent and most (46.8%) indicated to a high extent that library centres were appropriate for the teaching of mathematics in secondary schools. The multiple responses set revealed that some (34.2%) respondents indicated that appropriate instructional resources are not in the schools for the teaching of mathematics while some (28.8%) indicated to a low extent and most (36.9%) indicated to a high extent that appropriate instructional materials are used in secondary schools for the teaching of mathematics. This shows that there is an appropriate use of instructional resources in secondary schools to a low extent from the average mean score (1.60) and a standard deviation of (0.67).

Findings from observations in the classroom further indicated that some teachers always use appropriately instructional resources such as textbooks, mathematics journals, hand outs and photocopied materials were always used for the teaching of

mathematics in most schools while in some schools the materials were used sometimes. Again interviews conducted revealed that few teachers appropriately used instructional materials available for the teaching of geometrical shapes such as circles, triangles, rectangles, squares, cubes and cuboids.

Also interviewees indicated that few teachers appropriately used non-projected/display instructional resources such as charts, flannel boards, radio, abacus, flip charts and graph boards available to a lesser extent in some schools. Interviews further indicated that few teachers appropriately used projected/audio-visual instructional resources such as television, overhead projectors and computers available for the teaching of mathematics. The findings therefore show that instructional resources were appropriately used to a lesser extent for the teaching of mathematics.

To further ascertain the effect of appropriate use of instructional resources on students' performance in mathematics in secondary schools, the quasi-experiment carried out indicated that there was a mean gain in score of 11.19 after the treatment was administered with instructional resources used in the experimental group from the pre-test and post-test scores. On the other hand there was a mean score gain of 10.58 in the control group using the conventional teaching method from the pre-test and post-test scores as indicated on Tablebelow.

Research hypothesis two: There is no significant relationship between the appropriateness in use of instructional resources in the teaching of mathematics and students' performance

To further ascertain the effect of appropriateness in use of instructional resources in the teaching of mathematics and the performance of students in mathematics the Pearson product moment correlation coefficient was used to ascertain the effect as indicated on the Tablebelow.

Table6: Perceived effect of appropriateness in use of instructional resources on students' performance in mathematics

		Appropriateness in use of instructional resources	Students performance in mathematics
Appropriateness in use of instructional resources	Pearson Correlation	1	.201**
	Sig. (2-tailed)		.000
	N	408	408
Students performance in mathematics	Pearson Correlation	.201**	1
	Sig. (2-tailed)	.000	
	N	**408**	**408**
**. Correlation is significant at the 0.05 level (2-tailed).			

From Table5, above the Pearson Product moment correlation coefficient (R = 0.201, P=0.05) indicates that there is a weak positive effect of the appropriateness in use of instructional resources on students' performance in mathematics in secondary schools in the South West Region of Cameroon. This shows that if appropriate instructional resources are used students would perform better in mathematics. Hence the null hypothesis is rejected and the alternate hypothesis is accepted which states that there is a significant relationship between the appropriate use of instructional resources in the teaching of mathematics and students' performance.

Furthermore from the quasi-experiment findings revealed there is a significant effect for the appropriateness of instructional resources on students achievement in mathematics f(1, 139) = 2.140, p > .146. The null hypothesis therefore, was rejected, indicating that there is a significant difference in the mean achievement score of students taught mathematics using appropriate instructional resources than those taught using conventional instructional resources. The null hypothesis therefore was rejected indicating that there is significant difference in the mean achievement score of students taught.

CONCLUSIONS

The findings of this study indicated that students' performance in mathematics was significantly impacted by the use of instructional resources.

The four research questions showed that the mean scores for students taught mathematics using instructional resources was higher than that of the students taught with the conventional teaching methods. Results revealed that students taught using instructional resources performed better than students taught using conventional methods by quasi-experimental design.

The findings of this study indicated that students' performance in mathematics was significantly impacted by the use of instructional resources. The findings further showed that the textbook was the most used instructional resource by teachers in classrooms. The findings of this study also demonstrated that the mean performance of students in urban areas was slightly higher than students in rural areas on the influence of the use of instructional resources in the teaching of mathematics on students' performance in mathematics. Moreover, findings of this study indicated that no display instructional resources were ever seen by students in classrooms during instruction. Findings from this study suggest that students have the impression that teachers talking to them directly are better than using audio-visual instructional resources during mathematics instruction. They however expressed a high need for computer and mathematics laboratories.

Limitations of the study

I acknowledge several limitations of this study. These include issues related to:

- the sample and analyses,
- limited observation data,
- Challenges associated with equating groups, as well as school, teacher, and student attrition.

Recommendations

The availability of instructional resources in the teaching-learning process is of immense importance. The ministry of secondary education in Cameroon and other education stakeholders should collaborate to encourage teachers' adoption and successful integration of multidimensional pedagogies. The use of instructional resources such as print media, non-projected/ display instructional resources, projected/audio-visual instructional resources in the teaching of mathematics would enhance output. It is hoped that the adoption and integration of the aforementioned instructional resources would blend the instructional process. These instructional resources would greatly enhance the quality of instruction and the quantity of students' performance. The use of instructional resources in mathematics instruction is still at the infancy stage in Cameroon.

The appropriateness in use of instructional resources impacts the teaching–learning process. One area that may be of concern to the stakeholders in the education sector in the South West region in particular and Cameroon in general is how to build the capacity of the teachers to enable them to effectively integrate the use of instructional resources in mathematics instruction classrooms. Probably, strategic plans on how to engage teachers in capacity building programmes relating to effective integration of the aforementioned instructional resources should be considered.

Government, policy makers and education stakeholders, alongside mathematics instructors in the education sector in Cameroon as a whole may have as an issue of primary concern to build the capacity of the teachers to enable them to effectively integrate the use of instructional resources in mathematics instruction classrooms. Probably, strategic plans on how to engage teachers in capacity building programmes relating to effective integration of the aforementioned instructional resources should be considered.

Mathematics instructors at all times should endeavour to teach mathematics using instructional resources that relate to real life situations. The following are some instructional resources which mathematics instructors can improvise and the mathematics concepts or topics to which they relate:

Table7: Some Instructional Resources which mathematics instructors can improvise

Locally Improvised Instructional Resources	Mathematics Concepts / Topics
Cassava Leaf	Symmetry
Orange or Grape fruit	Sphere (Mensuration)
Weighing Balance	Simple Linear Equations
Bean seeds, sticks, Bottle tops, Beads.	Addition , Subtraction, Counting
Coins of various sizes, Milk cans, Beverage cans of various sizes, Compact Discs.	Derivation of π, Circumference of circle, Area of circle
Thread, Ropes, wooden rule, tape.	Length
Various shapes from cardboard paper cut out	Fractions,Similarity,Geometric shapes
Assorted Articles, Bank Notes, Coins.	Shopping
Geo(or nail) Board	Addition ,Subtraction,Geometry
Abacus(from empty beverage or milk cans,sticks,spokes)	Addition , Subtraction, Counting
Soft Drink bottle, Tea /Tablespoons, Cans.	Capacity (Mensuration)
Sugar cube, maggi cube,Sugar packet, Match Box	Mensuration

Consider a mathematics instructor who wants to teach the topic "Area of a Rectangle" to form 2 students in secondary school. The instructor starts as follows:

"Today we shall study the area of a rectangle". The instructor draws the rectangle on the board and labels the length, L and width, W. The instructor proceeds to tell the learners: "the area of a rectangle is obtained by multiplying the length by the width. He then gives a few examples and the lesson is done.

Now, consider another mathematics instructor who proceeds thus, in the same topic above. The instructor carefully cuts out various rectangular shapes from cardboard paper and hands to the learners. The instructor asks the learners to divide the shapes given them into unit squares. The instructor asks each learner to count the total number of unit squares of the rectangular shape given. The instructor then guides the learners to "discover" the relationship between the total number of squares (Area) and the product of the number of units along the length and that along the width. It is evident that this second teacher will be more effective in developing, enhancing and sustaining interest in the learners than the former.

Preparing a lesson in advance incorporating instructional resources which relate to real life, certainly will help develop, enhance and sustain the interest of the learners. Mathematics instructors need to devote time to plan well their lessons and also plan ways of introducing the leaners so as to arouse the interests of the learners.

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APPENDIX

MATHEMATICS ACHIEVEMENT TEST (MAT)

Name of Student: …… Class …… Sex ……

School: ……

TICK (√) THE CORRECT OPTION IN THE FOLLOWING MENSURATION QUESTIONS.

SECTION A

1. Mensuration is best defined as the process
A. calculating
B. measuring
C. of geometry
D. of shapes

2. The term mensuration is linked to
A. Volume
B. Area
C. Lines
D. applied geometry

3. The area of a sphere is
A. 1 time the area of a circle.
B. 2 times the area of a circle.
C. 3 times the area of a circle.
D. 4 times the area of a circle.

4. If the diameter of a circle is 14 cm, its area is
A. 49π cm^2
B. 14π cm^2
C. 28π cm^2
D. 7π cm^2

5. The perimeter of a semi-circle of radius a cm is
A. π cm
B. a cm
C. πa cm
D. πa^2 cm

6. A square of side l has area
A. $4l$
B. l^2
C. l^3
D. $4l^2$

7. The area of sphere is 16π cm2, its radius is
A. 2 cm
B. b. ± 2 cm
C. c. ± 4 cm
D. d. 4 cm

8. The surface area of a square of side x cm is
A. $6x$
B. $6x^2$
C. x^2
D. $4x^2$

9. The area of a square is 16 cm2, the length of a side is
A. 8 cm
B. 4 cm
C. 2 cm
D. 4 cm^2

10. The volume of a cube of side 2 cm is
A. 8 cm^3
B. 4 cm^3
C. 2 cm^3
D. 6 cm^3

11. The volume of a cube is 27 cm3, the length of its side is
A. 9 cm
B. 3 cm
C. 2 cm
D. 6 cm

12. A pyramid is usually defined in terms of its
A. Side
B. Length
C. Base
D. width

13. A 3–D shape which is the same shape all along its length is called .
A. Circle
B. Sphere
C. cone
D. Prism

14. The amount of space a 3–D shape takes up is called
A. length
B. width
C. Volume
D. Area

15. The cross–section of a cylinder is
A. diameter
B. Radius
C. Circle
D. sphere.

16. The cross–section of a prism is
A. prism
B. Trapezium
C. Square
D. triangle.

17. A pyramid whose base is a circle is called
A. prism
B. Trapezium
C. Cone
D. triangle.

18. A 3–D shape which is circular in every direction is called
A. Cylinder
B. Sphere
C. Cone
D. triangle.

19. 1litre is equivalent to
A. 10 cm^3
B. 100 cm^3
C. 1000 cm^3
D. 10,000 cm^3

20. The volume of a sphere with radius r is given by the formula
A. $\frac{4}{3}\pi r^2 h$
B. $\pi r^2 h$
C. $\frac{4}{3}\pi r^3$
D. $\frac{1}{3}\pi r^2$

21. The volume of a cube of side 1 m in terms of cm is
A. 100 cm^3
B. 1000 cm^3
C. 10,000 cm^3
D. 1000,000 cm^3

22. A pyramid whose base is a polygon, all the other faces are
A. prism
B. Trapezium
C. Squares
D. triangles.

23. The solid remaining when a cone is cut by a plane parallel to its base and the top cone is removed
A. frustrum
B. Frustum
C. Circle
D. ring.

24. The volume, V, of a cuboid with length l, width w and height h is given by
A. $V = lwh$
B. $V = lw$
C. $V = 4lw$
D. $V = 6lw$

25. The volume of a cone with base radius r and height h is given by the formula
A. $\frac{4}{3}\pi r^2 h$
B. $\pi r^2 h$
C. $\frac{4}{3}\pi r^3$
D. $\frac{1}{3}\pi r^2 h$

26. The area of circle is 16π cm2, its circumference is
A. a. 8π cm
B. b. 4π cm
C. c. 2π cm
D. d. 8 cm

27. The distance round a circle is called
A. length
B. circumference
C. axis
D. Diameter

28. The base area of a cone is given by the formula
A. $\frac{1}{2}\pi r^2$
B. $r^2 h$
C. πr^2
D. $\pi r^2 h$

29. Given the radius of the end of a cylinder is 3 cm, whose length is 10 cm, then its volume is
A. 30π cm^2
B. 90π cm^2
C. 30 cm^2
D. 90 cm^2

30. The total surface area, S, of a solid cylinder of radius r and length h is given by the formula
A. $2\pi rh$
B. $2\pi r^2$
C. $2\pi rh + 2\pi r^2$
D. $\pi r^2 h$