



# The Importance of Digital Application of Mathematics and its Application in Secondary Schools in the South West Region of Cameroon

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## ABSTRACT

This study examined the importance of digital application of mathematics and its application in secondary schools in the South West region of Cameroon. Now the question is: to what extent does the educational system in Cameroon consider these contemporary challenges in the teaching of mathematics? It is in this line that this study was conducted to appraise how effective the use of specialized rooms notably computer laboratories have been integrated in the teaching of mathematics in secondary schools in the South West region of Cameroon. To answer this question, a total of 12 schools were sampled through simple random sampling, stratifying for setting type (urban Vs. rural) and for the 6 divisions making up the South West region of Cameroon, with one school in the urban area and another one in the rural area per division. Employing a survey design, notably a mixed method approach and more specifically concurrent triangulation. As such a survey employing a semi-structured questionnaire and focus group discussions were corroborated with observation, and concurrent transformative. Given that the availability and usage of specialized rooms in the teaching of mathematics were appraised through set indicators defined as closed-ended questions. However, prospective response-measures were assessed qualitatively through open-ended questions. Altogether, 408 students sampled conveniently were involved in the study. The research procedural rigors were respected whereby administrative clearance was obtained from the University Buea. Descriptive analysis employed frequencies, proportions and MRA to aggregate scores within conceptual components while hypothesis was tested using Logistic Regression.

## Keywords:

*Digital* : That which has to do with performance of the fingers.

*Application* : The act of applying a concept learnt or studied.

## INTRODUCTION

Kilundo (2002) observes that, it is impossible to have meaningful teaching and learning in schools in the absence of teaching materials. There are a plethora of teaching materials for the teaching of mathematics such as radios, tape recorders, overhead projectors and sometimes the computers, etc. The multi-dimensional benefits that learners and instructors gain from the effective use of instructional materials abound. This study concentrated on the use of ICTs in the teaching mathematics. The consideration of the above instructional resources was necessitated by the fact that the world is fast becoming a global village. Therefore, anyone who needs to stand on the academic highway in mathematics has to go digital in order to meet up with the current trend.

## SIGNIFICANCE OF THE STUDY

This study can be helpful in that it can contribute to identifying if there are any problems and inadequacies in the way mathematics is taught in our secondary schools. The study can also shed light on the content of our syllabuses and schemes of work in mathematics in Cameroon. The study can also contribute to the training of teachers of mathematics in our training institutions in Cameroon.. This is especially in the use of the readily available resources for teaching mathematics. It will also benefit mathematics teachers in identifying the shortcomings in their instructional methods. It is also hoped that the findings will be useful to the Ministry of Secondary Education

(MINESEC) which is responsible for curriculum development, interpretation and implementation. This study is also geared towards identifying areas where teachers and students lack the skills in the use of ICTs (Information Communication Technology) in mathematics instruction. This study can go a long way in improving students' achievement in mathematics.

### THE RESEARCH QUESTION

To what extent are specialized rooms (computer laboratories, mathematics laboratories, library) used and how does that influence the teaching of mathematics in public English Speaking Secondary Schools in the South West Region of Cameroon?

### REVIEW OF RELATED LITERATURE

We are now living in a digital world and most of the equipment and machines that are used nowadays are electronic or digital. It is therefore clear that translating mathematical theories into digital simulations is becoming a pre-requisite if mathematics shall be effectively applied and made useful of in our contemporary world. To serve this purpose, it is important that teaching and learning of mathematics consider the digital nature and realities of our world today as to make learners meet the challenges of the digital era. Instructional materials and aids are an essential requirement for successful teaching, Brown, Lewis, Richard and Harclerod (1985). Use of teaching and learning materials activates students and as they learn actively, the teacher can enjoy the evidence of their progress. Instructional materials when used well make the entire teaching and learning processes complete and functional. They facilitate the understanding of difficult concepts and principles. Gamble, (1984) asserts that ideally instructional materials make it easier for learners to follow, understand, respond to and retain content of the lesson. Kilundo (2002) observes that, it is impossible to have meaningful teaching and learning in schools in the absence of these teaching materials such as radios, tape recorders, overhead projectors and sometimes the computers. Lack of teaching of ICTs in our secondary schools would compound the problem of mathematics instruction.

Many other studies have examined the impact of varied factors on students' learning process (e.g., Chang, Singh, & Mo, 2007; Ma, & Wilkins, 2007; Wilkins, & Ma, 2002, 2003). The results in these studies show that student learning is modeled using

multiple measures, including digitalization of student achievement over time; that is they are longitudinal studies. In general, teaching is a complex process (Barkatsas & Malone, 2005; Beswick, 2005; Ernest, 1989; Raymond, 1997; Thompson, 1984), and there are several factors that affect teacher instructional practices. Teacher beliefs have been found to influence teacher instructional practices (Nespor, 1987; Peterson, Fennema, Carpenter, & Loef, 1989; Wilkins, 2008). Research has also found teacher background characteristics as possible factors influencing teaching practices (Gilbert & Bush, 1988; Opendakker & van Damme, 2006; Wilkins, 2008). Therefore the digital application of mathematics in real life classroom situations demands more than academic skills.

### METHODOLOGY

The research design used in this study is descriptive survey. Descriptive survey is a method of collecting information by interviewing or administering a questionnaire to a sample of individuals (Orodho, 2002).

Employing a survey design, notably a mixed method approach and more specifically concurrent triangulation. As such a survey employing a semi-structured questionnaire and focus group discussions were corroborated with observation, and concurrent transformative. A total of 12 schools were sampled through simple random sampling, stratifying for setting type (urban Vs. rural) and for the 6 divisions making up the South West region of Cameroon, with one school in the urban area and another one in the rural area per division. However, prospective response-measures were assessed qualitatively through open-ended questions. Altogether, 408 students sampled conveniently were involved in the study. The research procedural rigors were respected whereby administrative clearance was obtained

The study was carried out in the South West region of Cameroon. The South West region is situated in the maritime and equatorial zones of Cameroon. This zone is characterized by dense vegetation, a vast hydro graphic network and a hot and humid climate with abundant precipitation. This region is famous for the farming of cocoa, palm trees, banana, rubber tree and coffee, etc. The South West Region is situated between the latitudes 4° and 6°59'N and longitudes 8° and 10°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 22085Km<sup>2</sup> 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 Cameroun. It constitutes one of the richest regions of the country, even seen as "Cameroun in miniature". Mt. Cameroun (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 Cameroun, Manengouba, Bamboutos and Oku).

The study focused on mathematics teachers and forms 5 and upper sixth mathematics students in secondary schools in the South West region of Cameroun. 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 and upper sixth students were randomly selected across the classes to fill the questionnaire. This number formed at least the recommended 30% of the population which is an adequate sample size that was required.

The collection of data was done by use of questionnaire, focus group discussions, and classroom observational check lists.

The researcher developed a questionnaire based on the objectives and research questions, named Mathematics Students' Questionnaire (MSQ). The questionnaire comprised of structured and unstructured questions.

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. Simple random sampling was used to select students whom the questionnaire was administered to across the forms 5 and upper sixth mathematics students. A focus group discussion was conducted in 12 schools in the South West region. One school was from the rural area and one from the urban area.. 12 observational checklists were also done, with one school from the rural area and one from the urban area in the 6 divisions of the South West region.

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).

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, focus group discussions and observational checklists. Descriptive analysis employed frequencies, proportions and MRA to aggregate scores within conceptual components while hypothesis was tested 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 and focus group discussions, they were analyzed using the process of thematic analysis whereby concepts or ideas were grouped under umbrella terms or key words with the support of Atlas Ti 5.2 (Atlas Ti GMBH, 2006).

## FINDINGS

The findings of the study revealed that students were mostly not satisfied with the use of specialised rooms in the teaching of mathematics as the highest weight response of 52.0% highlighted that they were not available, 20.3% perceived that they were less available while only 27.7% agreed that they were highly available. A strong majority of the students making 68.6% (280) stated that computer laboratories

were not available in schools while 73.5% (300) acknowledged that computer laboratories in the school even when available were not used at all in the teaching of mathematics. A strong majority of the students making 67.6% (276) stated that mathematics laboratories were not available in schools while 68.9% (281) acknowledged that mathematics laboratories in the school even when available were not used at all in the teaching of mathematics. The problems were almost equally shared between rural and urban schools ( $\chi^2$ -test:  $P>0.05$ ). The variability explained by this model was not significant (Omnibus Tests of Model Coefficient:  $\chi^2=14.054$ ;  $P=0.297$ ). The Explanatory Power (EP) / Predictive Power was very small with a value of 3.6% (Cox & Snell R Square=0.036), thus implying the performance of students in mathematics is not significantly influenced by the use of specialized rooms whose contribution is perceived to be very weak given the inadequate availability and usage as depicted by the descriptive statistics.

## CONCLUSIONS

The aim of this study was to investigate to what extent specialized rooms (computer laboratories, mathematics laboratories, and library) are used and how does that influence the teaching of mathematics in public English Speaking Secondary Schools in the South West Region of Cameroon? Results from this study revealed that students were mostly not satisfied with the use of specialised rooms (computer laboratories, mathematics laboratories, and library) in the teaching of mathematics as the highest weight response of 52.0% highlighted that they were not available, 20.3% perceived that they were less available while only 27.7% agreed that they were highly available.

## Limitations of the study

It is important to point out the limitations of the present study. First, this study was conducted as a secondary analysis on data that were collected for a purpose other than the study of digital application in classrooms. Second, the data collected was self-reported and teachers' reported practices may be different than what might be observed in their classroom. Finally, it was not possible to identify the curriculum that teachers were using at the time the survey was completed, which could be another factor affecting the frequency of digital application use during mathematics instruction.

## RECOMMENDATIONS

Stakeholders in the education sector in the South West region and 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 digital 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.

The use of digital application of mathematics and its application in secondary schools is still at the infancy stage in Cameroon. The Cameroon government and the ministry of secondary education in particular should design policies and best practices that should encourage effective use of digital application of mathematics and its application in secondary schools.

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