

A Critical Analysis On Effectiveness Of Instructional Design Techniques On Provision of Quality Mathematics pedagogy in Kenyan Schools

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ABSTRACT

School students today needs mathematics education which requires more modern teaching and learning methods than what was needed in old system of education, this is a challenge to current teachers as a results they need support from education leaders especially head of institutions as stated by Dickey, NASSP Bulletin,(1997). Teachers are teaching new and more challenging aspects in mathematics to a very developed learners using todays learning and teaching designs techniques to enhance understanding which is a setback to them according to Dickey, (1997). To this end the aim of this study was to critically analyze the new instructional design techniques used by teachers on provision of quality mathematics pedagogy in schools in Kenya. The objectives of the study were: to critically analyze how the use of new curriculum materials affect teaching and learning mathematics in Kenyans school; to

critically analyze if assessment methods used are aligned with the curriculum goals; to critically analyze combination of mathematics pedagogy in schools in Kenya; critically analyze how block scheduling enhance mathematics pedagogy in schools and critically analyze how students and teachers have higher expectation in mathematics pedagogy in Kenyan school. This study used the systematic collection, analysis and interpretation of data. The document analysis approach was used to collect the required data.

Keywords: instructional design techniques, quality teaching and learning, ICT integration.

INTRODUCTION

There is general assumption that mathematics is more about calculation yet it is utilized in merging structures, framework, interconnections and ideas as a way of

coming up with resolutions to real life difficult endeavors as stated by Saritas & Turkey, (2009). This understanding of mathematics wizard has portrayed a tremendous significance with the first development of Information and communication Technologies hence mathematics knowledge can be effectively utilized in daily living when solving problems. Today's mathematical instructions involving of "arithmetic, algebra and geometry "has vital undertaking in educational sector as recommended by Fatema,(2015).the subject should be considered as a most important subject in learning .It is made compulsory in primary and secondary schools in Kenya. Unfortunately many students have negative attitude towards mathematics and seems to fear and belief that the subject is difficult.

According to .Hackling..and Rennie.(2001).Teachers are vital determinant to enhance learning in connection to this, teachers have paramount task in assisting their learners understanding. Mathematics and change their attitude towards it, Education leaders should provide in-service training and courses to equip mathematics teachers with skills and knowledge of using technology materials

and media.In our country we have shortage of teachers and this is a setback in effective of teaching and learning. This may affect number of issues especially in students' enrollment, performance in the discipline of science and mathematics. Inadequate infrastructure, teachers are poorly payed, negative attitude towards the teaching profession by the community these aspects leads to most Kenyan teachers looking for other career opportunities. Which results to constrain in education sector as recommended by Fatema,(2015).

Teaching and learning resources are insufficient and do not meet the need of learners and instructors of variant stage of education, as a results learners opt to go for reference book and question papers for rotten learning which is not advisable as concluded by Fatema,(2015).Mathematics subject requires a lot of practice in order to master the concept and to familiarize with formulae. Research shows that homework and assignment enhances success and attitude of students especially if teachers provide their feedback .Rasmusser and marrongelle ,(2006). Recommend the education sector to come up with new design techniques for quality pedagogy of

mathematics which will enable students in schools to enhance their achievement.

2: STATEMENT OF THE PROBLEM

Most of teachers does not have skills and knowledge of using current teaching and learning materials such as computer, driving diskets this has resulted to Information communication and technology not integrated fully in learning and teaching mathematics like other subjects according to Dickey,(1997).In most schools in Kenya students fear and hate mathematics since they believe that the subject is difficult and requires a lot of practice.

Most schools in Kenya have inadequate infrastructure and this is a big challenge in mathematics pedagogy since the condition of leaning in classroom is not favorable for students. Teachers are unable to access materials for effective learning in Kenya. Most of learning rely on market exam for internal assessment of their students such exams do not test the content from the syllabus. They focus on areas which are not

in current curriculum hence if reliable can destruct learning since exam oriented.

3; PURPOSE OF THE STUDY

The aim of the research was to critically analyse the use of instructional design techniques used by teachers on teaching and learning mathematics in kenyan schools. Specifically to analyze curriculummaterials used in teaching and learning mathematics, investigations are made on ICT integration and its effectiveness on mathematics pedagogy in Kenyan learning institutions.

4.OBJECTIVES

1. ToCriticallyanalyze the use of mathematics new curriculum in the provision of quality pedagogy in To Kenyan schools.
2. To critically analyze the assessment methods used for provision of quality pedagogy in Kenyan schools.
3. To critically analyze the integration of ICT in ensuring standard pedagogy of Kenyan schools.
4. To critically analyze if the block scheduling used in today enhance quality pedagogy in Kenyan schools
5. To critically analyze the expectations of students for provision of quality pedagogy in Kenyan schools.

5. RESEARCH QUESTIONS

1. To what extent does the use of mathematics new curriculum provide quality pedagogy in Kenyan Schools?
2. To what extent does the assessment methods used affect pedagogy in Kenyan schools.
3. To what extent does the integration of ICT affect pedagogy in Kenyan Schools?
4. To what extent does the block scheduling used today provide quality pedagogy in Kenyan Schools?
5. What are the expectations of students on provision of quality pedagogy in Kenyan schools

6. SIGNIFICANCE OF THE STUDY

Student in Kenyan school need mathematics knowledge which relate to current real life .mathematics instructors require support by all stake holders so as to assimilate the current instructional media and ways of teaching. Most of teachers teaching today were taught mathematics using old methods

of teaching for instance lecture approach, according to Dickey,(1997).

This study intends to inform ministry of education (MEO) in order to include new teaching strategies and techniques to teacher training curriculum in order to enhance mathematics teaching and learning in schools. The study also intends to find out challenges faced by mathematics teachers in effecting new mathematics curriculum and performance of the subject in Kenyan schools through collecting opinions from both teachers and students in Kenya. Instructional design mostly affects teaching and learning mathematics since it relates problems affecting teaching but they require teachers to design them and make use of them in class effectively for them to produce achievement among students.

7. RESEARCH METHODOLOGY

The research employed the systematic collection analysis and interpretation of data on the subject area through thematic analysis and content analysis. The critique analysis provided evaluation which offered suggestions in form of recommendations. The critical method offered further the solutions to be undertaken by ministry of

education (MEO) for the provision of new curriculum which involves new methods of pedagogy. This is in attempt to improve instructional designs and technique used today.

8.0 ANALYSE ON EFFECTIVENESS OF INSTRUCTIONAL DESIGN TECHNIQUES ON PROVISION OF QUALITY MATHEMATICS PEDAGOGY.

8.1 Critically analyze how the use of new curriculum materials affects mathematics pedagogy in Kenyan schools

The ministry of education is adopting new curriculum materials which the study shows that they are effective in today's teaching and learning mathematics, for instance technology materials require skills and knowledge to use unlike traditional materials as results teachers are required to be inducted on them so that they can use them effectively in schools. Use of these materials is challenge to most of teachers in Kenya since there is inadequate of them in schools.

Mathematics pedagogy is affected and if education officers do not visit schools to monitor and evaluate teaching and learning process. It is difficult to know whether new curriculum materials used are effective to today's teaching of mathematics. Although the government provide tuition fee in secondary schools, colleges and universities to cater for curriculum materials, this effort has little impact since most of the learning institutions are still running without enough teaching materials and infrastructure .There is limited or no effective procurement and supply of text books and stationeries in schools by Kelly, (1999).

It is the responsibility of the government to provide schools with funds for teaching and learning materials but the insufficient funds are provided for the same, hence some of the institutions are left without enough learning materials and these results to less achievement on students. The findings shows that some institutions have insufficient infrastructure such as classrooms for instance learning takes place under trees or on craves hence the conducive environment is unfavorable for learning.

Some of the teachers lacks skills and knowledge of using materials of teaching e.g. computers in institutions and in this case

teaching and learning becomes not effective to some extent regardless of the government efforts to train and provide in-services workshops for teachers. In connection to that some teachers develop ignorance of using available materials and engage their learners to revision of exam papers for the purpose of examination as a results learners acquire rotten learning.

Dickey,(1997),states that, Ourtoday's curriculum is not career based in that it pumps the learner with a lot of knowledge which may not be relevant to his or her future career line in addition, syllabus content less equips the learners with skills and knowledge necessary in the current job market. Mathematics teachers require an opportunity to evaluate and review the new design techniques and materials putting into consideration the interest of learners. They choose the effective one. It is advisable to practice use of them and adjust changes if need be before using them in class.

New instructional methods of teaching and learning mathematics are arising, as a result, teachers should make preparation involving use of instructional media of various origins hence facilitating learners understanding and utilize preparation of teachers work by Dickey,(1997).

8.2Criticallyanalyze the assessment methods used for provision of quality mathematics pedagogy in Kenyan schools.

Most of the exams done today are commercial and does not consider what the learners have covered and thus, they are ineffective since they don't test the content in the syllabus. They emphasize on techniques and skills of answering questions and based on passing exams not retention of content hence, more on cramming than understanding.

Currently, most evaluation test do not target on a large scope of mathematical content. In addition they do not assess learners acquisition in handling challenges articulating mathematical concepts, applying it to actual life situation and rationalizing mathematically as stated by NASSP Bulletin by. Dickey,(1997).

Research shows that the commercial examinations from the market address only on concept of mathematics tested in final exam i.e. national examinations as a results teachers expose their students to these exams with the intention of passing examination but not acquiring knowledge and skills in the life. Many students pass

examination with 'A's but they may lack knowledge and skills required during the course. Through assessment teachers are able to understand the progress of students academically, nevertheless tests connects students with parents and all stake holders of educations since the discipline is known through performance. Teachers should be examiners of exams since are the ones who knows the content a student should cover and the level of their students dealing with.

8.3 Critically analyze the integration of technology on provision of quality mathematics pedagogy in Kenyan schools.

Majority of the current mathematics teachers did not have an opportunity to access modern technology too during their training. However the minority of Kenyan teachers were initiators as these tools were introduced in teaching and learning as well as programming languages wherein in mathematics, technologies inadequately and ineffectively integrated. The introduction of scientific calculators in the curriculum is enhancing teaching and learning mathematics according to Dickey,(1997).

According to Currence,(1992),He stated that, graphing calculators have been utilized

in simplifying mathematical ideas, trying out, digging deep, concluding and working out algebraic problems. Also training has resulted to reorganization of units taught in mathematics. At the same time some topics are ignored or less emphasized when teaching. Notably, mathematics instructors utilize practical life experiences to encourage their learners while teaching algebra and using scientific calculators to work out equations.

The government is putting into consideration the acquisition of basic skills and concept of ICT as an area of core principles in education. However new instructional designs and techniques of teaching are coming up in response to new chances in integration of ICT and internet technologies into teaching and learning mathematic, However a large percentage of teachers are not familiar and have inadequate knowledge and skills on technology as stated by Dickey,(1997).

Mathematics teachers should be in front line to know the use and application of ICT as teaching and learning for their own benefits so that they can help students to use them unfortunately some of them fear and ignore use of computers as a results integration of ICT becomes a setback in education sector.

Dickey,(1997).States that, most teachers in today's institution are analogue and they may not be able to operate or have basic knowledge on ICT as a results they lack competency in handling computer use in classes since students believes that teachers know everything, this is what teachers fear.

According to Chee-Keogchong,(2006). The tight school schedule does not allocate time for information and communication technology based studies. There inadequate chances for teaching training for information and communication technology activities as well as insufficient technical for these adventures. There is ignorance on how to merge information and communication technology to enhance curriculum challenges in applying and using these various technology tools in a single lesson and total lack of resources at home for learners to access the necessary educational materials.

To curb some of these problems this paper recommends a website for teaching mathematics. "The website involves a resource repository and a lesson planner". From the finding of the research done, it has been noted that there are many advantages of using Information and communication technology in mathematic as stated by

Becta, (2003). These major benefits are summarized as; Information and communication technology promotes greater collaboration among learners, enhances communication and sharing of knowledge. It gives fast and exact results to learners which brings motivation. Consequently, it grants them a chance to concern themselves more with approaches and results interpretations. Instead of spending time on tiresome computer-based calculations.

Information and technology also enhances modernist method of teaching and learning through which learners access and acquire mathematical ideas through technology. This tactic facilitates a better thinking capacity and solution-based plans, hence learners will be more problem solving oriented using technology and not more on the computations about the problems, according to Ittigson and Zewe,(2003).

Eric (2016).wanjala,martin.form the outcome it is observed that that there is less application of ICT in methods of teaching mathematics which is consequently associated to lack of self determination and ineffectiveness in the use of technology tools. This is also attributed to lack of necessary soft ware materials and technical know-how.it is vital to provide learning

institutions with appropriate ICT equipment and facilities as well the necessary contents software and knowledge to effectively use this technology in teaching it is paramount for teachers to acquire the skills and knowledge which can be done through ICT pedagogy programs for professional development

8.4 To critically analyze if the block scheduling used in today enhance quality mathematics pedagogy in Kenyan schools.

The current block scheduling used today in primary schools is 35 minutes per lessons and in secondary schools is 40 minutes, the findings shows that the schedule does not consider time takers since the time allocated for a lesson is the same respective of learners ability. Instructors are in capable of covering syllabus in scheduled time, thus they are to look for extra time to cover the syllabus for instance students are involved in tuition which is against current education policy guidelines. Mathematics require a lot of time to practice and involve students in solving problems in connection to this, teachers require more time to plan for the same, as a results the current block schedule used in schools is not enough to

accommodate all this work by Dickey,(1997).

The time scheduled for mathematics is insufficient for practice in teaching and learning during classroom and does not allow the use of students' centered methods of teaching and learning as a results lecture methods are used to rhyme with the block scheduling. The government of Kenya is looking forward to instill the computer technology in mathematics pedagogy programme. Due to this, the block scheduling should be lengthened to accommodate application of computer in the classroom.

Current block schedule used today restrict teachers from exploring learners to discussion and practical lessons since the time scheduled is insufficient for coverage of the content one requires to cover, during the calendar year and as results most mathematics teachers go for lecture methods of teaching which not learner is centered. Longer time period is required to lessons with use of technology or experiment than traditional methods of teaching like lecture approach.

Both secondary school and university timetables vary in that in secondary schools,

learners are almost entirely engaged and monitored especially through giving and marking mathematics assignments as well as revising the so-called difficult areas by mathematics teachers with the students. This results to a heavier teaching tasks as compared to higher institution of learning for instance universities whose timetables involve more human judgment unlike in high school where timetabling is a more computer-based intensive task

8.5 To critically analyze the expectations of students for provision of quality mathematics pedagogy in Kenyan schools

Okello and Kagoire,(1996).Teachers are core elements who determine the implementation of curriculum since they implement ideas and instructional designs techniques hence the expectations of students should be met by teachers performance, in schools since they have paramount role to play in learning institutions. Training institution for teachers in Kenya, train and educates teachers effectively but when they go to the field most of teachers do not perform well in mathematics since most of schools lacks enough material and resources needed for

smooth learning by Kelly,(1999).For instance the absence of geometrical sets, mathematical time tables ruler and other apparatus needed for experiments fails to expose the learners to the practical aspects of the content.

addition to this the subject requires a lot of practice and commitments but the treatment for mathematics teachers as far as payment is concerned is the same as for other subjects hence the work load is big, as a results most teachers opt to specialize on other subjects. Majority of learners in Kenyan schools take into attention that mathematics. Is a vital subject contrary to this most of them dislikes the subjects since they don't portray attentiveness to the subject, for instance difficulty with the subject matter?

9.0. RECOMMENDATIONS.

9.1 New curriculum materials used in mathematics pedagogy

Mathematics teachers require an opportunity and should be directed to review the new curriculum materials by taking into account the interest of learners, Then choose the appropriate one for the effective mathematics pedagogy. It is advisable to

utilize curriculum tools carefully and make changes as they acquire know-how when interacting with them in classroom as recommended by Dickey,(1997). Teacher should use new delivery design techniques of mathematics and make preparation of lesson to promote the learners understanding, mastery of the content and utilization of time for preparation of lesson.

Head of institution should grant mathematics teachers with enough opportunity and motivate them for survey and revise of new curriculum resources. Education leaders should provide professional development training teachers and back up teachers to use new curriculum materials in teaching and learning mathematics as concluded by Dickey,(1997).They should also motivate teachers to assess and interview the effectiveness of these materials.

Mathematics teachers should assess and make use of varieties of resources to collect more knowledge and information from different authors and theories. Education leaders should organize and schedule time for in-service courses for instance, SMASE or workshop to equip mathematics teachers with more knowledge and skills in teaching mathematics.

9.2The assessment methods used today in mathematics pedagogy

Teachers should evaluate the type of test used if the content tested aligns with syllabus, they should also get opportunity to judge and make recommendation on it. Education leaders should advice and discourage teachers to rely on market exam text and prepare and test their own exams since they understand their students' level and interest considering syllabus requirements. Standard exam test should consider the interest for instance gifted and talented, and slow learners, so Examiners should consider this when setting exams and teachers should review on these qualities of a good test for them to select wisely the effective test before they expose them to students

9.3 ICTintegration in mathematics pedagogy

Students should be advised to make use of technology tools and practice mathematics with them effectively. Parents should be advised to provide their pupils with special computer at home, equipped with graphic calculators for them to make use of them both at home and in school.The head of institution should ensure students have

access of graphing calculators and use them in learning. The ministry of education should train teachers on how to use computers and facilitate the institutions with technology materials. The government should consider the interest of learners while ensuring integration of Information and communication technology in schools. They should enhance the Information communication and Technology integration training of teachers.

The ministry of education should ensure that the leaders in education monitors and assess the use of computers in teaching and learning, they should ensure that all institution can access source of power and are connected to internet network, this will enhance use of technology. The government should facilitate training together with induction of teachers and education leaders on Information and communication technology for effective implementation of the laptop project as a one of the manifesto of the current government

9.4 Block scheduling used in mathematics pedagogy

The ministry of education should review the block scheduling used today since it does not provide enough time for experimentation

and application of computers in mathematics pedagogy. For instance, periods should be suited for long time, in addition to that teachers should be advised to use students centered methods of teaching since learners are associated in the lesson as recommended by Dickey,(1997). The time schedule for mathematics should be increased to accommodate mathematics content learned and period for practice. Using computers to teach mathematics an extension of period is required to allow teacher use the ICT facilities effectively in classroom.

9.5 Higher expectation of students

The ministry of education should provide teaching personnel and establish teachers with in service training i.e. workshop for instance; SMASE, facilitations to equip them with skills and knowledge of using new teaching methods and tools which are proposed to be sufficient with correct teaching and learning as clarified by Dickey,(1997).

Mathematics teachers should be involved in examining new curriculum, teaching materials and resources suitable for the effective teaching and learning in today's teaching of mathematics as recommended by .Dickey,(1997). Mathematics teachers

should be motivated and considered in payment since they do a lot of work compared with their colleagues in other subjects.

Teachers should motivate learners to like the subject and practice the concept using their own methods of learning for instance, discussion. They should also make use of practical lessons and involve learners in using graphic calculators, set squares and other equipment to make mathematics interesting in classroom. The head of institution should ensure that the equipment are provide and effectively used in learning to improve mathematics performance.

10.0 CONCLUSION

The teaching and learning mathematics in Kenyan schools has been a problem for some years now, it has brought problem to our students who take mathematics as a subject. This problem of poor performance in the subject has persisted a year after a year. The purpose of study is aimed at finding difficulties in teaching and learning mathematics. To find out what extent to which the government support improvement of mathematics setbacks. Government and other stakeholders in education should provide adequate facilities and conducive

environment to enable mathematics teachers on their part. The government should employ more qualified teachers and those with low qualification should be taken through the in-services finally a lot of effort should be made to facilitate mathematics pedagogy in Kenya.

Government should ensure that the institutions contains enough information and communication technology facilities for example; computers for effective integration of Information communication and technology, should train teachers to acquire the knowledge and skills of using computers for effective and implementation of the same. The research aimed at finding the challenges faced by mathematics teachers in teaching and learning mathematics where by the findings show that the subject is taught mostly theoretically and less practical regardless of it requiring a lot of practices.

Even if the government is training teachers on ICT integration there are no facilities in most educational institution for use and some schools lack enough source of power to run them if provided. In most schools students have developed negative attitude towards mathematics for instance teachers does not encourage students to practice the subject and allow learners to use their own

methods of solving problems hence difficult

to achieve in the subject.

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