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Influence of Policy and Curriculum Formulation Procedures on The Implementation Of Alternative 'B' Mathematics Curriculum In Secondary Schools In Kericho County

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ABSTRACT: *Several factors have been highlighted as impediments to effective implementation of Alternative 'B' Mathematics curriculum in secondary schools that include; level of involvement of stakeholders and policy issues. This study however specifically dealt with the Influence of policy and curriculum formulation procedures on the implementation of Alternative 'B' Mathematics curriculum in secondary schools with reference to Kericho County. Leithwood's model of evaluation of curriculum implementation was adopted in this study. Descriptive survey design was chosen as the study design. A population of 157 principals, 401 teachers of Mathematics and 20 heads of secondary Mathematics curriculum at KIDC, MoE and KNEC were targeted. Simple random sampling was employed to select respondents.. Data were collected by use questionnaires and interview guides. The findings indicate that there is a strong correlation between Policy and Curriculum Formulation Procedures and acceptability of new curriculum as indicated in the Chi Square test.*

KEY WORDS: *Policy, Curriculum formulation procedures, Implementation, Alternative 'B' Mathematics*

I. INTRODUCTION

Background Information : According to Miliband (2004), alternative curriculum seeks to improve the education achievement of all learners by tackling underachievement of particular groups of learners at risk of educational failure due to various risk factors such as poor economic background, poor grades, truancy, disruptive behavior, and suspension (Kliener, Porch & Farris, 2002). Ahuja (2006) suggests that there is need to develop an official 'Alternate Mathematics Framework' for slows learners. According to Ahuja such a framework would ensure that these students are taught all the required material in less depth but at a slower pace by specially trained and competent mathematics teachers within an extended period of time. This curriculum is therefore, expected to have an effect on how students are to be organized in mathematics classes; the teaching and learning methods to be used; the extent for which emphasis was to be placed on co-operation learning as against competition and for the provision that should be made for students from diverse cultural group (UNESCO,1984). Several countries have since developed several mathematics syllabi or initiated elaborate support programme for slower mathematics students. For instance, although most states and NCTM curricula in the U.S.' do not provide any alternative framework for slower mathematics students, many school districts across the United States are upgrading the quality of the mathematics curriculum by exploring alternatives for both struggling and high-achieving students (Gamoran, 1997; Ahuja, 2005).

In most of the states, slow mathematics students in the U.S. are often tracked into slower and watered down mathematics courses where they are generally not taught the *required mathematics materials.* Australia's, states such as Queensland., New South Wales and Victoria, mathematics curriculum structure provides students of different abilities with much choice and flexibility. There are clear pathways identified for students to follow, with increased in content and difficulty at each of the pathways (Coupland, 2006).In Pakistan secondary mathematics syllabus is divided into advanced and general mathematics, for the students strong in mathematics and those experiencing challenges in learning mathematics respectively. The syllabus stipulates the content in details and examinations are also set according to the each of the syllabus (Halai, 2010; EdQual, 2007). New Zealand (Steel, 2005) mathematics curricula are structured in such a way that students of different abilities, aptitudes and varying interests, have an opportunity to choose the type of curriculum to take and even career path to follow.

Kenya Institute of Education (KIE) introduced mathematics alternative 'B' syllabus at secondary school level in January 2009 (KIE, 2010). This was as a result of numerous recommendations made in several KIE monitoring reports namely: KIE Report No. 53 (1995); KIE Academia Board of 1997 recommendation of 1999, Report No. 68 [1999] (KIE, 2007) and Non-Formal Education (NFE) Survey Report (2008). The general observation from these reports was that mathematics curriculum was not sensitive to learners with special needs. The two main reasons of developing and implementing mathematics alternative B curriculum was to tackle poor achievement in mathematics and foster positive attitude towards mathematics(KIE,2008). However, although schools that offer mathematics alternative B subject improved performance marginally, results indicate that mathematics alternative A subject registered better performance than latter. It is imperative that an assessment of the implementation process of this subject is carried out with reference to Kericho County.

Statement of the Problem : As much as mathematics alternative B subject being considered as a *simpler* version of the two mathematics subject offered in Kenyan secondary schools (Miheso-O'Connor, 2011), the students examined did improve the performance as it was anticipated (Wachira, 2011). According to (KNEC statistic, 2011) mathematics alternative A subject performance improved to (23.06 %) from the previous year's (21.13%). However, few gains were noticeable in the newly introduced mathematics alternative B subject which was examined for the first time in 2010. Mean score for the mathematics examination was (19.09 *(Yo)*, (3.97 %) lower than the results of candidates that sat for mathematics alternative A examination. According to Nairobi province examination office, the mean score for mathematics alternative A and B subjects for the year 2010 and 2011 was 4.113: 3.896 and 4.308:3.896 respectively.

This is a clear indication that other factors other than the curriculum influenced the outcomes. Altricher (2005) contends that all seriousimprovement programs encounter problems. Therefore, the assessment of both the learner and the process of implementing change are essential for early and quick intervention measures to be taken. Since the introduction of mathematics alternative B curriculum in secondary school in Kenya, no study known to the researcher has been carried out regarding implementation of mathematics alternative B subject in secondary schools in Kericho County. This study, therefore, sought to fill this gap.

Objective of the Study

- To establish policy and curriculum formulation procedures that influenced the implementation of Alternative 'B' Mathematics curriculum in secondary schools in Kericho County

Hypothesis : Ho: There is no statistically significant relationship between Policy and Curriculum Formulation Procedures and implementation of Alternative 'B' Mathematics curriculum in secondary schools in Kericho County.

II. LITERATURE REVIEW

Review of theory : Leithwood (1982) model of evaluating curriculum implementation was used in this study. According to this model, new curriculum implementation is a process of change. In the practical sense, the inadequate teaching and learning resources for the implementation of the new Mathematics curriculum, means there is a gap in actual classroom practice. This would be an indication that educators are experiencing difficulties or have concerns which have adverse effects on the implementation of the innovation.

Policy Formulation Process in Curriculum Development : Generally policy refers to formal decisions made by governments that have direct influence on operations of a country. This includes educational issues involving curriculum development. Studies done by Hai (2010) on the process of public policy formulation in Vietnam, pointed out that policy formulation was a critical phase of the policy process which also was an explicit subject of policy design. The public policy formulation was part of the pre-decision phase of policy making that entails crafting of the goals and priorities and options, costs and benefits of each option, externalities of each option. These decisions are not arrived at in a vacuum. Key stakeholders are carefully and extensively involved. This idea was supported by Howlett and Ramesh (2003) who postulated that the involvement of businesses and civil society-consumers, private entrepreneurs, employees and citizens and community groups, non-governmental organizations (NGOs) in designing public policy was critical if the governments were to improve the transparency, quality and effectiveness of their policies.

In this regard, experts of Mathematics curriculum studies, parents, teachers, principals are key and pertinent members in curriculum decision making. According to studies done by Thunradee (2010), most policy design theorists claim that the policy formulation process was the main cause of the policy success or their failure. This made some curriculum implementation proposals to be effected or shelved. Research done in

America by Nomdo (2005) found that centralized policy formulation and traditional hierarchical authority compromised monitoring channels which in turn diffused and made curriculum implementation unreliable hence leaving out or shelving subject key components of the desired curriculum innovation.

This scenario was found to be a similar practice in Africa especially in Nigeria by Adeyemi (2008) who posited that technical education was spearheaded but the curriculum for technical subjects failed due to poor coordination and consultation with various stakeholders.
This made the coveted technical education curriculum to be shelved.According to UNESCO (2005) and Malande, (2005), policy formulation is one of the major problems confronting developing countries in Africa, south of Sahara. Comments from World Bank (2005) suggested that implementation problem occurs when the desired result on the target beneficiaries is shelved hence not achieved. Wherever and whenever the basic critical factors of policy formulation are not dully considered implementing a public policy may be challenge. UNESCO (2002) identifies that some of these critical factors include proper communications, available resources, stakeholders' participation, dispositions or attitudes and bureaucratic structures.

The work of Otula (2002) contended that these factors operated simultaneously and they interacted with each other to aid, shelve or hinder policy on curriculum implementation. World Bank (2000) opined that little attention was being paid to the subject of policy implementation by policy decision-makers while it was often taken for granted that once a policy was adopted by government, it must be implemented and desired goals achieved. This was never the case with mathematics curriculum innovations in Kenya as put forward by Mwangi (2010).Deliberations of UNESCO (2006) observed that, there could be implementation gap as a result of many factors, which could arise from the policy itself, the policy maker, or the environment in which the policy had been made. Implementation gap could arise from policy itself when such a policy emanates solely from government rather than from the target group. By this, it means that planning was top-down, and, by implication, the target beneficiaries were not allowed to contribute to the formulation of the policies that affected their lives. Consequently, World Bank (2002) insisted in its annual report that, it should be noted that for policies to be successful, target groups should be involved whereby policy makers should plan with the people rather than for the people in meeting their felt needs. Similarly, Makinde (2005) posited that such participation would give the target group a sense of belonging as well as get them committed to the successful implementation of the policy. In order to find complete policy ownership for any significant curriculum, World Bank (2002) advised by giving another case of implementation gap as the failure of the policy makers to take into consideration the social, political, economic and administrative variables when analyzing for policy formulation.

In support of this, UNESCO (2006) identified some other problems that affected policy implementation in developing countries; among them were inadequate definition of goals in the process of policy formulation, lack of clarity, internal inconsistency, and incompatibility with other policy goals with the result that the successful implementation of such a policy becomes problematic. When the needs assessment stage is ignored, Makinde (2005) posits that in some instances, the policy makers assume that they know the needs of the target groups and therefore see no reason for their participation, which is key and critical. Howlett and Ramesh (2003) went further to state that over-ambitious policies were frequently beclouded in ideological context that may hide the actual problems involved in executing them. A good example of an over-ambitious policy was the free primary education in Kenya. Studies done by Metto (2006) revealed that the rate at which private institutions are being established and the rate at which they are growing shows that the public has lost confidence in public schools due to its ineffectiveness. Even many of those who are sometimes considered as illiterates in the society now prefer to send their children to fee-paying primary schools so that they may perform well in all subjects including mathematics. According to Handal (2001) when the policy was too lightly defined, teachers would not have the flexibility to customize the innovation and change it to accumulate their situation including implementation of the desired mathematics curriculum. Furthermore, when the top is overly vague and general, teachers are unable to receive sufficient guidance and structure to understand what the change effort is really about. This was echoed by Hull, (2006) who claimed that problems begin when the detail of how to do it are not made clear hence brings about the shelving of significant subject innovations including those of mathematics.

Further studies done by Fullan (2001) suggested that unclear and unspecified goals and means could cause great anxiety and frustration to the teacher who tries to implement an innovation especially mathematical subjects which students take to help in their future careers. Research done by Adu (2005) opined that, majority of teachers were never familiar with policies which in many occasions are not clearly defined or disseminated hence it made it difficult to implement curriculum innovation in subject areas especially in mathematics that normally have various alternatives. Further studies by Braslausky (2003) commented in agreement that in such

cases, teachers often remained sceptical about policy, and in some cases, they were forced to wait for a clear direction and in the process, this hindered prompt and timely implementation of innovations which ultimately ended up in poor academic performance. Ouwuka (2000) concluded that policies were important to success of curriculum implementations and innovation of projects. In view of the aforementioned, this study examined government policy formulation procedures and established the policies that were enacted to guide implementation of the new alternative 'B' Mathematics Curriculum.

Studies done in Kenya by Sinei (2013) argued that within sub-Saharan countries, little attention paid to the subject of policy enforcement by policy decision-makers, while they often assumed that once a policy was adopted by government, it must be implemented and the desired goals achieved. This has not been automatic as such. It was further noted that, there was a policy failure when there was a sizeable gap between a policy decision and its enforcement hence the shelving of alternative 'B' mathematics curriculum. World Bank (2000) reported that policy implementation was one of the major problem confronting developing countries. In a quick rejoinder, UNESCO (2008) observed that enforcement gap could be as a result of the policy itself, the policy makers, or the environment in which the policy was made. This therefore made Ornstein and Hunkins (2004) to pose a question that, what was the essence of formulating public policies without economic support for their implementation? Such policies would suffer implementation gap especially where there was need to employ education staff for the purpose of implementation or acquire equipment for similar action; adequate funding became very crucial. This could have eventually necessitated the shelving of curriculum innovations.

III. METHODOLOGY

Research Design : Expost-facto design was employed in the study. Expost-facto design according to Mathooko, Mathooko and Mathooko (2007), explores and clarifies relationship between two or more variables. This design was found to be most appropriate for this study because both independent and dependent variable could not be manipulated since they had occurred. In this study the design helped the researcher to establish the relationship between policy and curriculum formulation procedures and implementation of Alternative B curriculum.

Target Population : The study population was Head teachers and teachers in Kericho Districts.Records held by TSC (2010), shows that there were about 157 secondary schools with 157 principals and 401 mathematics teachers which formed the study population with 20 heads of mathematics from KICD, MOE and KNEC.

Sampling Size and Techniques : The sample size constituted 157 Head teachers and 401 science teachers. The formula used to arrive at the sample size was adopted from Krejcie and Morgan (1970) as cited by Kathuri and Pals (1993).

$$S= \frac{X^2NP(1-P)}{d^2 (N-l) + X^2P (1-P)}$$

Where;
S= Required Sample Size.
N=. Number of secondary school teachers in the District (401),
P= Population proportion of individual that yield maximum possible sample size (Assumed to be 0.5).
d= Degree of accuracy as reflected by amount of error that can be tolerated (taken as 0.5).
X^2=Table value of chi-square for one degree of freedom taken as 3.841 for 0.95.

District schools were the only used to ensure that only schools with comparable academic resources formed the framework of the study. The total number of secondary schools in the district was 157. From this, 47 schools were randomly sampled. A list of all schools was used as initial sampling frame. The schools were sub-divided into sub-groups or strata based on their locality and gender of students. A proportionate number of respondents were selected from each stratum in order to obtain a sample which could typically reflect the schools' characteristics. Teachers' sample was obtained using simple random sampling method as recommended by Muthooko, Muthooko, and Muthooko, (2007). Head teachers were purposively sampled.

Table 1: Sample units of principals and teachers of Mathematics

No.	Participants	Sub-County	School Type	Target Population	Sample size	%
1	Principals	Kericho East	Boys	8	3	1.9
			Girls	9	3	1.9
			Mixed	9	3	1.9
		Kericho West	Boys	8	3	1.9
			Girls	10	3	1.9
			Mixed	12	4	2.5
		Londiani	Boys	6	2	1.3
			Girls	7	2	1.3
			Mixed	10	3	1.9
		Kipkelion	Boys	7	2	1.3
			Girls	6	2	1.3
			Mixed	11	4	2.5
		Bureti	Boys	13	4	2.5
			Girls	17	5	3.2
		Sub total	Mixed	24	7	4.5
				157	47	**30.0**
2	Teachers of Mathematics	Kericho East	Boys	24	7	1.7
			Girls	20	6	1.5
			Mixed	27	8	1.9
		Kericho West	Boys	18	5	1.2
			Girls	25	7	1.7
			Mixed	26	8	1.9
		Londiani	Boys	14	4	0.9
			Girls	19	6	1.5
			Mixed	24	8	1.9
		Kipkelion	Boys	18	5	1.2
			Girls	14	4	0.9
			Mixed	27	8	1.9
		Bureti	Boys	33	11	2.7
	Sub-Total		Girls	44	13	3.2
			Mixed	68	20	4.9
				401	120	**30.0**

Source: Field Data,2012

Data Collection Methods : A research permit was sought from the National Council for Science and Technology (NCST) through the school of education, Kisii University. On obtaining the research permit, the researcher sought permission from the DEO's office to visit schools. Selected schools were thereafter visited by the researcher after an appointment had been made with the school administration. Questionnaires and the interview schedules were administered personally by the researcher to the teachers and interviews conducted with head teachers. Adequate instruction and assurance of confidentiality was provided to all participants. Thereafter, the questionnaires were collected by the researcher after being filled.

Validity and Reliability of the Instruments : Kothari, (2006) defines content validity as the extent to which a measuring instrument provides adequate coverage of the topic under study. According to Mugenda and Mugenda, (2003:99), "content validity of the measuring instrument refers to the accuracy and meaningfulness of inferences which are based on the research results". It is the degree to which results obtained from the analysis of the data actually represent the phenomenon under study. In order to determine the content validity of the

instruments, the researcher discussed the items with colleagues and experts in the department of curriculum and instructional media who helped to determine the relevance and content validity of the questionnaires developed. The tools were piloted and the weaknesses found to exist were rectified as well. Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials, (Mugenda and Mugenda 2003). For research to be reliable, it must demonstrate that if it is carried out on a similar group of respondents in a similar contact, then similar results would be found (Cohen et al, 2000). One way to ensure reliability in qualitative data is by use of measures that have proven themselves in previous research, (Babbie, 1992). Test-retest technique was used during piloting to establish the reliability of the questionnaires and interview schedules. The responses from the pilot study were compared and found to be reliable.

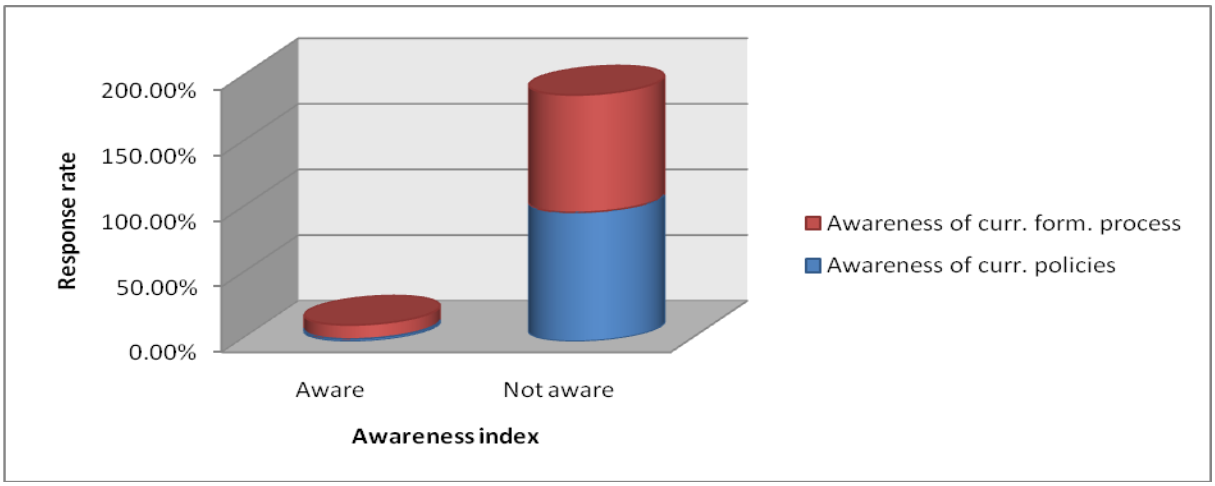
Data Analysis : Data was analyzed using quantitative techniques. Quantitative data collected was tabulated and pie charts, bar graphs and frequency tables developed. The frequencies were converted to percentages to illustrate relative levels of opinions. Qualitative data from the HODs and head teachers' interview schedules were coded and analyzed to establish thematic patterns from which useful conclusions were drawn. The statistical Package for Social Sciences (SPSS) assisted to analyze the data collected.

IV. RESULTS AND DISCUSSION

Policy and Curriculum Formulation Procedures that influenced the Implementation of Alternative 'B' Mathematics Curriculum : Objective four stated that policy formulation has been a critical phase of the policy process. This has been an explicit subject of policy design. The public policy formulation is part of the pre-decision phase of policy making including crafting the goals and priorities and options, costs and benefits of each option, externalities of each option where all key stakeholders play participatory roles.

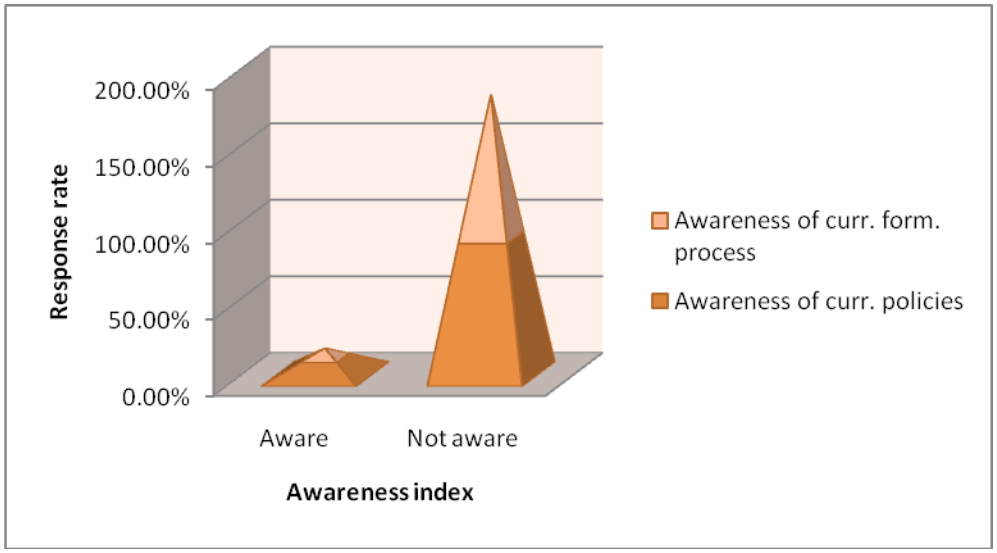
Three main factors that aided in establishing policy and curriculum procedures that influenced the implementation of the new curriculum innovation were identified. These were level of awareness of teachers and principals on the policies that were to guide the implementation process, the level of awareness of teachers and principals on curriculum formulation procedures that were to the implementation process and level of incorporation of policy concerns by teachers of Mathematics and principals during the policy formulation process. Teachers of Mathematics were asked to indicate whether they were aware of the policies that were to guide the implementation of Alternative 'B' Mathematics curriculum implementation. Majority (110; 98.2%) indicated that they were not aware of any such policies while only 2 (1.82) said they were aware of such policies. Principals too were asked to indicate if they were aware of any such policies that were to guide the implementation of Alternative 'B' Mathematics curriculum. A negligible proportion of 3.6% (5) of the teachers indicated that they were aware of such policies while a bigger proportion of the sample of these respondents of 89.4% (107) was of a contrary opinion. A further negligible proportion of 10.6% (5) of the principle indicated that they were aware of policy guidelines that were to guide the implementation of Alternative 'B' Mathematics while a proportion of 89.4% (42) was of a contrary opinion. Besides, only a small proportion of 6.4% (3) were aware of curriculum formulation procedures that were to inform the implementation of Alternative 'B' Mathematics curriculum. Majority (93.6%; 44) of these respondents indicated that they were not aware of any such procedures.Figure1a and 1b summarize these findings.

Figure 1a: Teachers awareness of policy and curriculum formulation



Source: Field data, 2012

Figure 1b: Principals' awareness of policy and curriculum formulation



Source: Field data, 2012

Besides, teachers of Mathematics and principals of the sampled schools were asked to indicate whether their concerns pertaining to implementation of new curriculum innovations were ever incorporated in the curriculum formulation process of Alternative 'B' Mathematics curriculum. A proportion of 98.2% (110) of the teachers of Mathematics indicated that their concerns over curriculum policy formulation process have never been incorporated in the curriculum development of Mathematics discipline. Only a negligible proportion (1.8%; 2) was of a contrary opinion. Similarly 87.2% (41) of the principals negated the study. Table 2 summarizes these findings.

Table 2: Level of incorporation of policy concerns

Level of incorporation	**Teachers**		**Principals**	
	Yes	No	Yes	No
Curriculum policy formulation process concerns incorporated	2 (1.8%)	110 (98.2%)	6 (12.8%)	41 (87.2%)

Source: Field data, 2012

Studies done by Thunradee (2010), support this finding that, most policy design theorists claim that the incorporation of concerns of policy formulation process is the main cause of the success or failure of the implementation of a new curriculum innovation. Besides, this finding was further supported by UNESCO (2005) and World Bank (2000) reports which articulated that policy issues needed to be sufficiently consultative if the implementation process were to be successful.

During the interview with KICD, MOE and KNEC it came out clearly that they all believed that once a policy has been made, it becomes automatically implemented, which was not the case for alternative "B" mathematics curriculum. Further, the same findings indicated that top-down implementation strategy that makes participation limited was being employed in Kenya during policy enforcement. Research by Sinei (2013) argued in support of this matter that within sub-Saharan countries little attention is being paid to the subject of policy enforcement by policy decision makers, while it is often assumed that once a policy adopted by the government, it must be implemented and desired goals achieved. There is a need therefore to have not only a top-down but bottom-up policy enforcement strategies for successful implementation of curriculum innovation or else, shelving of pertinent curriculum cannot be avoided.

Hypothesis Testing

Ho: There is no statistically significant relationship between Policy and Curriculum Formulation Procedures and implementation of Alternative 'B' Mathematics curriculum in secondary schools in Kericho County.

A Chi square correlation analysis was computed to determine the relationship between Policy and Curriculum Formulation Procedures and implementation of a new curriculum innovation in secondary schools.
The results obtained showed the existence of a positive and significant relationship between the two study variables. Table 4.7 shows the tabulated results from the computation.

Table 3: Chi square correlation analysis results

	Correlation	**New Curriculum Implementation**
Participation in policy formulation		
	Correlation coefficient	.835**
	Sig. (2-tailed)	.000
	N	161

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Field data, 2012

The results indicated that, the calculated p-value (0.000) was less than the hypothesised p-value (0.01). Further, the results confirmed a strong positive correlation for the variables tested at one percentage significance level whereby participation in policy formulation having a very high score, r =0.835.
The overall implication was that Policy and Curriculum Formulation Procedures play a significant role in the implementation of a new curriculum innovation. This factor should therefore be taken into consideration before the implementation process begins.

V. CONCLUSIONS AND RECOMMENDATION

Since the study established that there is a strong correlation between Policy and Curriculum Formulation Procedures and acceptability of new curriculum, it is recommended that the curriculum developers review their Policy and Curriculum Formulation Procedures to enable quick adoption of new innovations in curriculum development.

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