University of Botswana

Department of Mathematics and Science Education

University of Botswana

CURRICULUM DEVELOPMENT: Teacher involvement in the development and review of the junior secondary mathematics curriculum in Botswana (Study to be conducted in Southern District)

A Research Proposal submitted in partial fulfilment to the requirements for the award of Degree of Master of Education (Mathematics Education)

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Abstract

This is a proposal of a study intending to investigate or assess the extent to which junior secondary school mathematics teachers are involved in the curriculum development and review processes of the Junior Certificate of Education (JCE) mathematics curriculum (syllabus) in the Southern district of Botswana (Kgatleng). In realizing, from experience that teachers are faced with challenges in implementing the syllabus, some of which may be attributed to the extent of the nature of teacher involvement during curriculum development, the researcher is prompted to carry out this proposed study.

The study will employ a mixed method approach. The sample will consist of forty junior secondary school mathematics teachers to be drawn from 10 junior secondary schools in the region. Data will be collected through questionnaires, semi-structured interviews and document review. The collected data will then be analysed using various techniques such as statistical tables and descriptive analysis. Transcribed data will be collated for each interview question whereby similar meanings will be grouped and summarized. The analysis will focus on establishing the nature of impact teacher involvement in curriculum development appears to have on their understanding and implementation of the curriculum.

Abbreviations

BED	Bachelor Degree in Education
CD&E	Curriculum Development and Evaluation
DSE	Diploma in Secondary Education
JC	Junior Certificate
JCE	Junior Certificate Examination
Med	Masters in Education
MOESD	Ministry of Education and Skills Development
MPhil	Masters of Philosophy
NCE	National Commission on Education
PGDE	Post Graduate Diploma in Education
RNPE	Revised National Policy of Education
SADC	Southern African Development Community
SPSS	Statistic Package for Social Sciences

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Chapter 1

Introduction to the study

1.0 Statement of the Problem

The study will investigate the extent to which junior secondary school mathematics teachers in Botswana are involved in curriculum development and review of the three-year junior secondary school mathematics syllabus. In realizing through experience that, there are many challenges that are faced by mathematics teachers in implementing the syllabus, some of which may be attributed to the extent of the nature of teacher involvement during curriculum development the researcher was motivated to conduct the proposed study.

Curriculum development and review are vital constituents in the improvement of educational quality of any nation. And for such to be attained, key stakeholders in the education field such as teachers are to be involved in this process. Therefore, their involvement needs to be examined to establish whether it does not add to the challenges experienced in an education system for any given country. This is so because, for instance, if indeed it is established that there is lack of teacher consultation in curriculum development and review this may become a great challenge above that of all other stakeholders in the education field since they are the implementers of the curriculum and thus need to play an explicit role in its development for better understanding. The need for better understanding by the curriculum implementers is a basic necessity that calls for close scrutiny with an aim of providing intervention strategies to effectively make the teachers feel that they have a sense of ownership of the curriculum through

adequate involvement in its development and review, for them to implement it better. It is from this point of view that this study is proposed.

1.1 Background information

The education system of Botswana mirrors that of the former colonists, the British as she adopted the British school curriculum at the time she acquired her independence. According to Mosothwane (2013), "Botswana, a former British protectorate became independent in September, 1966, but continued using the British Education System so that its graduates are internationally recognized and are admitted into institutions of higher learning in other countries" (p. 332). This in itself was an understandable move as the country could not afford to invent the wheel, as well as for purposes of fitting very well within the global village.

Education is a generic, purposive, social and psychological process of learning engaged in by individuals and members of cultural and political community. It is one experience that most children worldwide have in common and the most common means by which societies ensure that their young ones are prepared for the future. As stated in one of the famous sayings of Nelson Mandela, "Education is the most powerful weapon which [one] can use to change the world" (Duncan, 2013, para.1) and also corroborated by Max Dee Pree (1987) in saying that, 'we cannot become what we need to be, by remaining what we are' (para. 1). In Max Dee Pree's view, education is a tool that can be used to transform people for the better. Again, Paulo Freire, a Brazilian educator, saw education as a means to enlighten people of the inequities in society and to empower people to acquire their freedom (Ornstein & Hunkins, 1993: 197). All the above sentiments imply that, it is important for each nation to establish high quality educational policies and country systems, so as to produce educated and informed citizens who will contribute effectively to the country's economy. Education has an underlying goal to create a

positive change in students' knowledge, achievement and behaviour. And for this goal to be achievable, the education system matters.

According to one Chief Education Officer in the Department of Curriculum Development and Evaluation, Menyatso (2013), insights, at the core of the education system is the "*Curriculum*", which plays a pivotal role in the development of Human resource. Thus, at the heart of various learning experiences is the curriculum. Cohen and Ball (1999) have also argued that, curriculum holds a central place in any model of teaching and learning because it represents that which is to be taught in classrooms. Over time, the government of Botswana has been involved in activities that will help it to own its education. The government of Botswana has continually sought to modify the curriculum to achieve context relevance. For instance, we are living in modern age of science and technology, where mathematics, either as a discipline or as a service subject, is expected to be accorded a prominent place in the nation's education system. Botswana prides herself as having done so in her 7-3-2 education system. The 7-3-2 education system means 7 years of primary school education, 3 years of junior secondary and 2 years of senior secondary school education. Despite such efforts, the mathematics performance and its state of teaching and learning in Botswana is observed to be declining at a high rate that one is forced to question a successful realization of Botswana's objectives for the subject, particularly at the junior secondary school level. This shows that the education system of Botswana is faced with challenges of developing a relevant and appropriate curriculum that will provide a foundation for lifelong learning that nurtures human development.

One of Botswana's Vision 2016 pillars of the strategy to propel its socio-economic and political development into a competitive, winning and prosperous nation is to be an educated and informed nation. For this goal to be achievable, the role of a teacher in curriculum development

and/or review should be considered of utmost importance. This is so because, the teacher is the person that does the teaching of students and therefore is the one who directly influences the interpretations of the curriculum in the actual teaching and learning situation to a greater extent. This is emphasized by Bayona (1995) in noting that strategic and logical position of the teacher and their responsibilities in curriculum implementations have a great influence in the success of the school curriculum in any school system. Since teachers are the ones who are directly involved in curriculum implementation, they are central to learning, thus, what is to be taught, how and when is upon them.

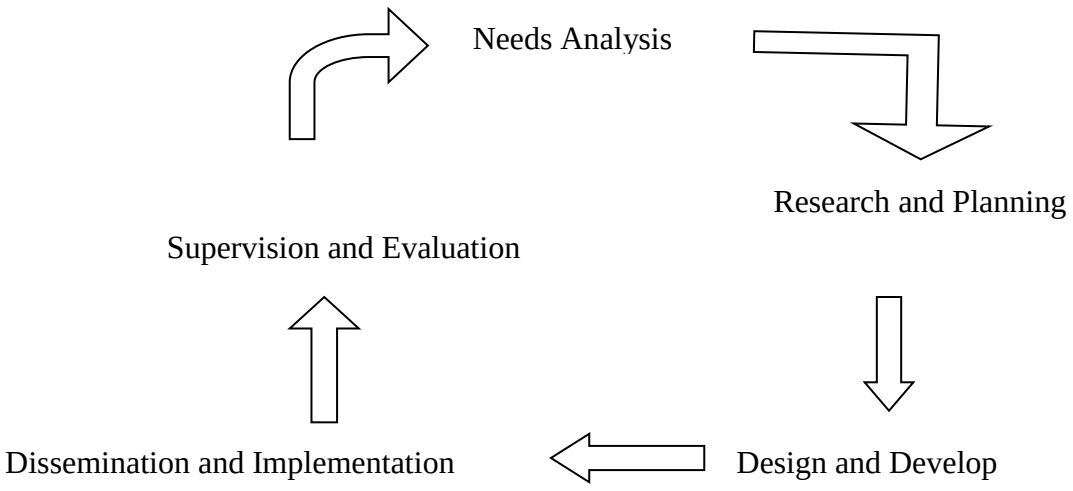
In 1993 Botswana unveiled her latest education policy that was revised in 1994 that is known as the Revised National Policy on Education, which aimed to improve the quality of instruction among other educational factors. For the quality of instruction to improve, teacher training and/or preparation should be adequate and their participation in curriculum development should be recognized as significant. Thus, teacher expertise should be considered during curriculum development and review. It is important to note that teachers are the catalysts of learning. Their value in curriculum development and review is crucial if the education system hopes for efficient and effective educational strategies that would bring desired results.

1.2 Curriculum Development in Botswana's context

In Botswana the Department of Curriculum Development and Evaluation (CD&E) is responsible for all curriculum development activities which include, selection, development, monitoring and evaluation of the appropriate learning programmes for the general education levels. It also identifies and offers localized programmes for the lower and upper primary, as well as the Junior and Senior Secondary schools. The department's role is to design and develop the school curriculum. This department is made of units that specialise in curriculum

development and the publication of education material. These specialisation units are made up of a number of stakeholders amongst them subject teachers, school principals, central office staff, university researchers and lecturers, professors of education and lecturers from various colleges of education in the country and people from the Department of Curriculum Development and Evaluation (CD&E). The Department of Curriculum Development and Evaluation as the responsible unit should have strong partnership with all other stakeholders, in particular the teachers, who play a significant role in curriculum implementation to ensure that the teachers' involvement is not viewed as being discouragingly low as this may have a negative impact on the overall implementation of the curriculum.

The process of formulating a new curriculum or revising an existing one follows a cyclical model. It starts with needs analysis, followed by planning, development, piloting, dissemination and implementation, evaluation and finally back to the identification of needs as illustrated below:



According to Menyatso (2013), since the inception of the Department (CD & E), it has enjoyed numerous successes which include the localization of the senior secondary programs

from the Cambridge syllabus" (para. 3). In his view the department ensured the Junior Secondary and Primary School programmes are revised for relevance. These revisions brought the levels of the curriculum at par with international standards. He however noted that, in future the review would like to localize the sciences and added mathematics which has not been fully localized since Additional Mathematics syllabus being currently offered is that from the Cambridge syllabus. Such a review would also follow a consultative process in which all the relevant stakeholders including tertiary institutions in the education system who are engaged as part of their standing and national committee, since the CD & E is a curriculum value driven entity that finds it imperative that curriculum issues are addressed by all.

However, over the years the CD & E has had its fair share of challenges which include the rampart shortage of skilled man power and has tried to deal with these issues by sending its employees for long term or short term training as it is their goal that in future all curriculum development and evaluation personnel have the highest qualifications and expertise.

1.3 Purpose of the proposed study

The purpose of the proposed study is to investigate the extent to which junior secondary school mathematics teachers are involved in curriculum development and review processes in Botswana. Since curriculum has many components, the researcher will focus on the development of the syllabus. The proposed study aims at enquiring, analysing and describing the procedures followed during syllabus development and seeks to assess the extent and relevance of teacher involvement in curriculum development processes.

The study will further identity teachers' concerns regarding the consultation approaches used during syllabus development. Effective procedures on how teachers can be involved and

how they can be introduced at school level will be discussed and solicited. Furthermore, the study will reflect on how teacher involvement in curriculum development can benefit the education system of the country, reduce the load of curriculum developers as well as ensuring that teachers play a vital role in selecting what is to be taught and how it is to be taught. This is so because mathematics unfolds various mathematical knowledge and concepts among the diverse cultures in schools and teachers are the ones with the likelihood to inject better ideas on the subject matter of the curriculum. These purposes will be investigated through the research questions stated below.

1.3.1 Research questions

The proposed study seeks to answer the following research questions:

1. To what extent are the junior secondary school mathematics teachers involved in the curriculum development and review process of the Junior Certificate of Education (JCE) mathematics curriculum?
2. What kinds of difficulties do teachers encounter in implementing the junior secondary school mathematics curriculum?

1.4 Limitations of the study

The proposed study is perceived to have a number of limitations that include covering a small area of the country, with a sample that will be limited to a small region due to time and budgetary constraints as it was going to be difficult to coordinate a dispersed population that would otherwise provide useful data for generalisation. Another limitation concerns the fact that some of the questionnaires may not be returned as it is often the case with this data collection method, which in a way adds to the problems related to generalization of the findings. One other

possible limitation maybe that associated with the nature of the data to be collected that may not be revealing because of the uneasiness that might arise from the presence of a tape recorder in front of the interviewees as they might feel uncomfortable to have their voices recorded. However, the researcher will do everything possible to minimize the effect of the possibility of this limitation by sensitizing the interviewees of the importance and purpose of the research as well as assuring them of the observed confidentiality. Another limitation may arise due to a fewer number of studies conducted in Botswana under the same area of study, something that might impact on the quality and value of the study in terms of contextual relevance, due to the study being minimally informed in this regard.

1.5 Significance of the study

The anticipated study is of utmost importance in the sense that it reflects on how teachers are valued in curriculum development and its consequent implementation. Furthermore, this study will provide significant implications for curriculum research, reform and innovations for mathematics teachers and/or educators, curriculum developers and policy makers. It would provide policy makers with an objective and constructive measure of how teachers and other curriculum development stakeholders can work together in drawing relevant school mathematics curriculums in a more synergetic manner with an emphasis on the vital role of teachers.

1.6 Organization of the Proposal

The proposal starts with an abstract that gives a succinct picture of what the study is aimed at followed by Chapter 1 that introduces the study, stating the proposed research questions, the limitations of the study and the anticipated significance of the study. Next, being Chapter 2, that reviews the relevant literature to show how the proposed study fits in within the entire work conducted by others, including the meaning of curriculum and the advocated

processes of its development and implementation with a focus on the role of the teacher. The proposal then ends with the methodology recommended for answering the research questions by the researcher as guided by the literature on research design and methodology selection. Lastly, a list of references is provided to acknowledge sources read to inform the design of the proposed study followed by the appendices showing the proposed data collection instruments and items.

1.7 Theoretical Framework

Curriculum development is a practical and social phenomenon that does not often couple well with theory at the exclusion of realities or what pertains on ground. It is therefore best driven by the interaction between teachers and students as defined in theoretical perspectives like those of behaviourism and cognitivism to name a few. As such, curriculum development process usually involve envisaged behavioural learning objectives, proceeds with content decisions and finishes with instructional methods all of which can be informed by that takes place during teaching. This therefore means that teachers as curriculum implementers are to be active participants in the creation of classroom practices as they would act in light of their beliefs, attitudes and perceptions of relevant teaching expectations to contribute meaningfully to the curriculum development processes.

According to the vast literature, it is worth noting that teachers are seen to have a wide spectrum of roles in curriculum development. These roles include being a researcher, leader, planner, developer, judge, contributor, negotiator, implementer, diagnostician, analyzer, manager, evaluator, student and material developers (Bayona, 1995: Carl, 2009: Hunkins, 1972) hence the study shall be directed by a number of theoretical perspectives. Thus, the theoretical framework of this study shall derive from the various roles assumed by teachers in curriculum development as their attitudes, feelings and perceptions cannot be devalued from classroom

practices. Giroux (1988) has stated that, teachers possess knowledge, skills and values and attitudes to question, understand, interrogate and eventually act as change agents of the structural inequities in their place of employment. This can therefore imply that teacher involvement in curriculum development can create new knowledge and strategically bring relevant expertise in the field of education that could promote and improve the teaching and learning quality of mathematics.

Furthermore, concerning the social aspect of curriculum development process, the interpretivists, constructivist and the transformative lens are found appropriate for the exploration of teacher involvement in curriculum development. Thus, the three schools of thoughts will also be considered as the leading principles underpinning the phenomenon under study. Firstly, constructivists view point will be among the foundation and underlying assumptions of this study since it is concerned with how personal understanding or knowledge is formed. This theoretical assumption fits this study because it has more focussed on knowledge construction more concerned with teaching and learning. Constructivism is a concept which attempts to understand the world as experienced by other individuals (Chilisa, 2012). According to Howard, McGee, Schwartz and Purcell (2000), constructivism is typically contrasted with a transmissionist (objectivist) model of learning. They continue to mention that, instead of focussing on learning objects are transmitted from one person to another, students and teachers are engaged in a community in which learning is the result of interactions, reflections and experiences. Constructivists like Piaget and Vygotsky view knowledge as something which an individual constructs and reconstructs for themselves as emphasised by London (1988). It is from this view point that teacher and student interactions are considered an underlying factor in the curriculum development processes.

The second underlying assumption to be used in this study will be the interpretivism. Interpretivists focus on the centrality of meaning and understanding. They are of the view that there exit multiple realities, thus, knowledge is subjective. For interpretivists at the strong end of the spectrum, there is no reality outside of our social constructions. Thus interpretivists agree with the social constructionism/constructivism. Both theories examine the world in a far more subjective and interpretive manner which is what is required for curriculum development. Interpretivists and constructivists operate under the assumption that meanings and realities are socially and culturally constructed, always open to cultural and social interpretation and influence. This implies that more emphasis and attention to the notion that reality and knowledge are socially constructed through dialogue gives teachers a chance to participate in curriculum development process hence this co-constructed reality may be viewed differently by different individuals involved in the education field.

The third and final fundamental assumptions guiding this study will be the transformative school of thought. This study will also be guided by the belief that, teachers are transformative intellectuals who are to construct, reproduce knowledge and use it to transform the society. Transformation is the process of 'perspective revolution' with three dimensions: psychological, convictional and behavioural. An important part of transformation entails changing individual frames of reference by critically reflecting on ones' assumptions and beliefs hence consciously making and implementing plans that shall bring about new ways/ideas defining our worlds. This therefore implies that teachers are meant to assume the leadership role where they select, produce and plan relevant teaching and learning materials that shall help transform the education system. They shall also organise workshops and other forms of empowering fellow colleagues on curriculum reforms and changes. The country's education system needs to improve as children

need a high quality education that shall prepare them for the changing needs of our workforce and increasingly intense global economic competition. This goal is achievable only if locals, state and federal policy makers and educators invest in effective programs, personnel, schools and services. With teachers involved in all stages of curriculum development, there is a likelihood that its implementation will be efficient and effective to bring better or improved student academic success. This is so because they become managers of such a curriculum hence they would ensure it does not fail. So with their participation in the development process they can come up with measure/strategies that will help in the successful implementation of the curriculum.

1.8 Summary

This chapter provides a brief orientation of the study. It gives a brief introduction to the study, the context of the study, an overview of the area in which the study shall be taking place as well as the aims and objectives of the study. It is in this chapter where curriculum development in the context of Botswana is explained as well as the theoretical framework guiding this study. The research though limited to the south central region of the country, has potential to provide both theoretical and hands on experiences from which educational stakeholders will be able to benefit by either improving their approaches or creating new research opportunities on related issues to the investigated phenomenon.

Chapter 2

Literature Review

2.0 Introduction

This chapter examines literature on what curriculum and curriculum development entails, what models are used, who is involved in the processes and the role of mathematics teachers in curriculum development as well as teacher involvement in curriculum review generally. The researcher explores researches on challenges brought by the implemented syllabus, particularly those associated with the nature of involvement of teachers in the curriculum development process. The paper draws upon literature from Western countries, Southern African Development Community (SADC) countries and the entire African continent.

The researcher also examined literature related to studies of this nature with a purpose of ensuring that the proposed research methodologies will be considered appropriate to reveal meaningful findings for this type of a study and the phenomenon being investigated. This is done because research designs and methodologies are known to vary and to be applicable for different research purposes. The Chapter starts by considering what curriculum is all about, what curriculum development entails looking at all stages of the development, starting with the review, models and implementation. It further reviews teachers' role in curriculum development process in various models and key stakeholders in its implementation. The Chapter also considers the literature employed in investigations of this nature and ends with a summary that shows how the various sections of the Chapter fit together and informs the proposed study.

2.1 What is a curriculum?

The term curriculum has various interpretations or definitions as defined by many scholars. It is a broad term used to refer to both specific instruction of a class to the programme of instruction for an entire school. This is also emphasized by Chalufu (1996) who states that, the concept of curriculum is in itself broad and comprehensive and because of this it lends to different and varied interpretations. From history, the word *curriculum* originally came from a Latin verb *currere*, which meant a racetrack that horses ran around. The term today has diverse interpretations or definitions which are dependent on one's philosophical belief. This is emphasized by Goodlad (1994) who states that, "it is tantalizingly difficult to know what curriculum is" (p. 1266). Some scholars perceive curriculum as the content, processes and the materials employed for students to gain knowledge. Thus, it is the foundation of the teaching and learning process. Other researchers regard curriculum as a concept that occurs in and out of school. Tanner and Tanner (1980) define curriculum as, "the planned and guided learning experiences and intended learning outcomes, formulated through the systematic reconstruction of knowledge and experiences, under the auspices of the school, for the learner's continuous and wilful growth in personal social competences" (p. 13). While Johnson (1967) defines curriculum as, "a structured series of intended learning outcomes" (p. 130) that prescribes the results of instruction. Other definitions and interpretations of curriculum include the following:

- "A plan or program of all experiences which the learner encounters under the direction of a school" (Tanner and Tanner, 1995, p. 158).
- According to Taba (1962), a curriculum usually contains a statement of aims and of specific objectives, indicates some selection and organization of content, implies or

manifests certain patterns of teaching and learning and includes a programme of evaluation of outcomes. Taba (1962) defines 'curriculum' as "all the learning of students which is planned by and directed by the school to attain its educational goals" (p. 422).

- According to Tyler (1957), it is "all the experiences that individual learners have in a program of education whose purpose is to achieve broad goals and related specific objectives, which is planned in terms of the framework of theory and research or past or present professional practices" (p. 79).
- Ornstein and Hunkins (1993) have defined curriculum as "a plan for actions or a written document that includes strategies for achieving desired goals or ends" (p.9). This plan is usually in the form of organized set of formal education or training intentions.

All these evidently portray various ways of defining the word curriculum as observed above and indeed as viewed through one's lenses of view and intended usage.

Historically, curriculum conveys what students should learn and at the same time, it also serves as an agent for instructional improvement (Howson, Keitel, & Kilpatrick, 1981; Thompson, 2003). It lies at the heart of educational enhancement policies geared towards quality improvement. The New Zealand Ministry of Education (1993) has also provided a definition of curriculum as "a set of national statements which define the learning principles and achievement aims and objectives which all schools are required to follow" (p. 4). They further define the school curriculum as "the ways in which a school puts into practice the policy set out in the national curriculum statements" (p. 5). Curriculum plays a significant role in mathematics education because it influences what students learn and when and how well they learn it. There are various forms of curriculum which include the following as adopted from Cuban (1992):

a. *The written/intended/official curriculum*: This refers to the formally written documents such as curriculum frameworks, syllabuses, textbooks and other learning materials/resources, teacher guides, learner exercise books, assessment guides that set system level expectations for learning. It includes goals and expectations set at the educational system along with textbooks, official syllabi or curriculum standards, and course. This is the ideal curriculum that is to be delivered as seen or prepared by the Task Force Committee of Curriculum Development and Evaluation panel.
b. *The applied/implemented curriculum*: refers to school and classroom processes for teaching and learning of mathematics. It is what result from school and classroom interactions, as well as from the interaction between learning environments and communities. It is therefore, a combination of the perceived and operational curriculums. That is, what teachers have seen and are using for the teaching and learning process. Teachers implement the curriculum according to their individual interpretations.
c. *The attained curriculum*: refers to what is learned by students and is manifested in their achievements and attitudes. Thus, it is the experienced curriculum, what learners receive and interpret to make sense of. Under this category, there are other two forms of curriculum: the *assessed curriculum* that result from assessment and the *learned/effective curriculum* that constitute the sheer learner acquisitions.
d. *The hidden curriculum*: this may be based on different values and other assumptions that the official curriculum does not represent what was intended.

Therefore in this proposal the term curriculum will be used in reference to the syllabus. A syllabus describes the content of a programme and can be seen as part of a curriculum. This is a school curriculum developed according to the needs of the school community and the learners.

School curriculums or syllabuses should therefore be thoroughly planned and should make provisions for compulsory and optional activities in the form of examination and non-examinable subjects and for suitable after-school activities. This is emphasized by Olivia (1988) who points out that, a curriculum "… may be a unit, a course, a sequence of courses, and the school's entire programme of study and may take place outside of class or school" (p. 9-10).

2.2 Curriculum development

It is difficult to give a definition for curriculum development, because it will always be affected very strongly by the context in which it takes place. Most scholars conceive curriculum development as a process that incorporates the various processes employed in the pursuit of certain goals in a school system. Different authors and researchers state that, something continuous is happening, maybe over a long time, although it is equally valid for short courses. These therefore, could lead one to think of curriculum development as a continuous process, which is relevant to the situation where it takes place, and its flexibility, so you can adapt it over time. As in a race, there may be a finishing point, but if you work in curriculum development, you will probably find out that the work does not end at a particular moment.

Curriculum development covers the entire spectrum of curriculum construction. This ranges from initial conceptualization and planning of design, development and implementation to evaluation and revision. It is concerned with reviewing, planning, developing, implementing and maintaining curriculum while ensuring that stakeholders engaged in this process have a high level of commitment and ownership of the curricula. Thus curriculum development is a cyclic process that encompasses the design and development of integrated plans for learning, the design of implementation of the plans, and of the evaluation of the plans, their implementation and the outcomes of the learning experience. This is emphasized by Ornstein and Hunkins (2009) who

contend that, curriculum development encompasses how a "curriculum is planned, implemented and evaluated, as well as what people, processes and procedures are involved.." (p. 15).

There are a number of interpretations of curriculum development. These includes Hansen, Fliesser, Froelich, & McClain (1992) interpretation which reveals curriculum development as a local, regional, or state/provincial level process that student teachers often have difficulty comprehending. According to Johnson (1989) curriculum development is "all the relevant decision-making processes of all participants" (p. 1), while Carl (1995) defines curriculum development as "… an umbrella and continuous process in which structures and systematic planning methods figure strongly from design to evaluation…" (p. 40). Besag and Nelson (1984) perceive curriculum development as "a kind of engineering, beginning with exhaustive description of the tasks to be accomplished. The curriculum developer was to as a matter of fact describe what was, while maintaining a proud disinterest in what should have been" (p.60). Curriculum development is therefore the umbrella world that describes all the process of coming up with a complete curriculum. The researcher therefore, is inclined to Carl's definition as it includes all aspects from design, dissemination, and implementation to evaluation.

Fundamentally, the purpose of curriculum development is to ensure that students receive integrated, coherent learning experiences that contribute towards their personal, academic and professional learning and development. Thus curriculum development is a process of needs assessment that is concerned with deciding what is to be taught. It describes all the ways in which training or teaching organization plans and guides learning. This learning can take place in groups or with individual learners either in or outside classroom. Generally curriculum development is not something done to teachers but rather through and with them. As purported

by Roger and Taylor (1998), curriculum is central to what goes on in classroom situation in relation to the teaching and learning. This therefore, means that it is essential for teachers to take part in curriculum development. So if an education system intends to optimize the teaching and learning situation in the classroom, teachers should be empowered in regard to the whole process of curriculum development.

Miller (1994) asserts that, a teacher's adaptation and styles determine the quality and standards of what takes place in the classroom. This therefore implies that, teachers need to be involved in curriculum development processes so that they are empowered so as to pre-eminently be able to develop learners' potential optimally. This is emphasized by Akinpelu (1981) who states that, in curriculum development, it is important for the teacher to know the limitations of their subjects as well as the types of knowledge that can be acquired in the school subjects. The same sentiments are shared by Farrant (1980) who strongly believes that, the key to successful curriculum development lies in teacher training. Thjis and van den Akker (2009) have noted that, processes for curriculum development are more focused on building synergy among curriculum development, teacher development and school organization development in responding to community concerns, needs and conditions. Thus, in their view, curriculum today is striving to be "more challenging and intrinsically motivating" (p. 9) and more toward instruction that is more meaningful and autonomous. This therefore implies that, curriculum development as a continual process will continue to strive to find newer, better, more effective and efficient means of improving the quality and relevance of education. It presents both strategic process challenges as well as policy challenges.

2.2.1 Curriculum design

The quality of the curriculum is as much in its design as in its implementation. Curriculum design and review is an on-going work. Abosi and Kandiji- Murangi (1995) state that the term curriculum design is at times equated to curriculum development. The term is generally understood as a high level process defining learning to take place within a specific programme of study, leading to units of credit or qualification. Thus a process that leads to the production of the core module documents such as the module description, validation and the course handbook. It is a complex task as are the processes required to develop curriculum. Curriculum design is commonly understood as an elite process defining the learning to take place within a specific programme of study, leading to specific unit(s) of credit or qualification. According to Jacob and Gawe (1996), curriculum design is concerned with the arrangement of major components of the curriculum and follows logical steps which guide the development of the curriculum. Therefore, any nation that embarks on curriculum design for its educational programme must consider certain factors such as;

1. The national aims or goals of education. These often tend to be general and ambiguous and often curriculum designers have to work out how best these goals can be achieved (Abosi & Murangi, 1995).
2. What is to be taught (subject matter, practical skills, attitudes, and values)? This depends on the national policies of the government, and the demands of the society, the nature and characteristics of the learners, their stage of development and their interests.

It is within this process where critical questioning of the frame of teaching and learning is done with the main aim of translating broad statements of intent into specific plans and actions. The general aim for this process is to ensure curriculum is aligned well between the planned

curriculum, the delivered curriculum and the experienced curriculum (from the student's point of view). This is the stage of development where specific planning of guides, the analysis of materials required for the teaching and learning is done. Thus, this is the stage where syllabi are formed. Key elements of this stage include, noting the intent or objectives, content or activities, organizing the content and evaluating. Subject panels are the key drivers of this stage; this implies involving teachers since they are essential drivers of subjects. It is a stage that plays a major role in the structure of any educational system. One can therefore conclude that curriculum design plays a fundamental role in the planning and development of curriculum.

2.2.2 Curriculum review

This is one of the most important component of "curriculum cycles" that implies to examine the curriculum with an eye to constructive criticism or correction in order to determine the best possible links between curriculum vision and planning, on the one hand, and curriculum implementation on the other hand. It is a process based on which strengths and weaknesses in the current curriculum are identified in accordance with certain defined quality criteria, as well as with needs for change and curriculum trends considered. As emphasised by Tyler (1957), curriculum review takes place in phases as outlined below:

a. Phase 1: Preparing

The stage is concerned with the following steps;

- start discussion
- set the vision
- research/analyse curriculum trends

b. Phase 2: Carrying out curriculum review

The stage is concerned with the following steps;

- assess the curriculum against identified trends and quality criteria,
- set the vision,
- consult stakeholders
- prepare report/recommendations

c. Phase 3: Take action

The stage is concerned with the following steps;

- upgrade the curriculum,
- align curriculum, assessment
- train teachers, teacher trainers, headmasters, inspectors etc.
- monitor and evaluation

2.2.3 Curriculum implementation

It is the process of taking curriculum design specifications through channels to teachers and classroom. Curriculum implementation does not focus on the actual use but also on the attitudes of those who implement it. These attitudinal dispositions are particularly important in educational systems where teachers and school principals have the opportunity to choose among competing curriculum packages. Nnadozie (2004) defines curriculum implementation as the execution of relevant curriculum and teaching tasks within and outside the school setting. While Ornstein and Hunkins (1998) note that curriculum implementation focuses on the processes and practices through which a curriculum is implemented. At this stage of curriculum development teachers need to have been involved in the other stages of development as creators and adapters

of the curriculum. Teachers are not to follow orders but rather develop experience based on knowledge derived from continuous interaction with curriculum.

2.2.4 Curriculum evaluation

According to Rossett and Sheldon (2001), evaluation is the process of examining a program or process to determine what's working, what's not, and why. Rossett and Sheldon continue to state that, it determines the value of learning and training programs and acts as the blue prints for judgement and improvement. Evaluations are normally divided into two categories, namely; formative and summative.

2.2.4.1 Formative evaluation

Formative evaluation can be referred to as an approach used to judge the worth of a program while the program activities are in progress. In curriculum development, formative evaluation provides feedback during the process of developing the curriculum as it is used during the needs assessment, product development and testing steps. It permits the designers, instructors, managers and learners to monitor how well the instructional goals and objectives are met. It is also useful in analyzing learning materials, students' learning and achievement and teacher effectiveness. Guyot (1978) articulates that, formative evaluation is primarily a building process which accumulates a series of components of new materials, skills and problems into an ultimate meaningful whole.

2.2.4.2 Summative evaluation

Summative evaluation is the process of judging the worth of a program at the end of the program activities. Thus, the process of answering questions about the impact/changes that might have occurred in learners due to their learning experiences. In curriculum development,

summative evaluation is undertaken to measure and report on the outcomes of the curriculum, thus, provides evidence for what works, what does not and what needs to be improved. According to Scriven (1967), all assessments can be summative but only some have additional capability of serving formative functions.

A number of scholars have distinguished these two forms of evaluation. According to Scriven (1967), formative evaluation is intended to foster development and improvement within an ongoing activity while summative is meant to assess whether the results of the object being evaluated met the stated goals. Saettler (1990) defines the two forms as; (a) formative is used to refine goals and evolve strategies for achieving goals while (b) summative is undertaken to test the validity of a theory or determine the impact of an educational practice so that future efforts may be improved or modified.

Generally, curriculum evaluation is concerned with assessing the value of a programme of study, a field of study and a course of study. This is a system of feedback, providing information to curriculum planners, teachers, students, parents and decision makers. Thus, a process involving on-going activities aimed at gathering timely information about the quality of a programme. Evaluation attempts to answer the two questions:

1. Do planned courses, programmes, activities and learning opportunities as developed and organised actually produce the desired results?
2. How can the curriculum offerings best be improved?

2.3 Curriculum Development models

In developing a curriculum, one employs a certain model. According to Lunenburg (2011), models can be defined as interacting parts that serve to guide actions. Curriculum

development models guide the development of curriculum in activities such as textbook selections, teacher's guides, as well as supplementary readers or workbooks. Chipeta, Mazile and Shumba (2000) contend that, "a curriculum development model is a perfect example, pattern or copy to be followed in developing curriculum materials" (p.49). These curriculum models enlighten curriculum development task force committees by suggesting analogical arguments from known to unknown resemblances. O' Neill (2010) states that, curriculum models help designers to systematically and transparently map out the rationale for the use of particular teaching, learning and assessment approaches. In Ornstein and Hunkins (1993) views, the approach to curriculum development can be termed a Technical scientific approach and it "requires that educators use a rational approach to accomplish their task and that they believe is possible to outline systematically those procedures that will facilitate the creation of a curriculum" (p.266).

There are several elementary curriculum development models that are employed by education systems in developing school curriculum, some of which are complex while others are a bit simple. Some of the conceivers of these models according to Olivia (1988) include persons like Tyler, Taba, Saylor, Alexander and Lewis. These models are more similar in many ways than different, and they often differ only when it comes to elements that comprise the model. Most models have a cyclical process, characterized as, analysis, design, development, implementation and evaluation. Normally, where these models differ is in the process of development which to some extent will reflect the curriculum orientation. These models can be categorized into two curriculum development models, namely: Deductive and Inductive models. A deductive model proceeds from the general to specific objectives. That is, the model derives

from examining the needs of the society at large to specific instructional objectives. While the inductive model starts with the development of curriculum materials and leads to generalization.

The benefit of having different models, with varying elements provides option to choose from in the development and design processes and for defining roles and responsibilities of the different stakeholders involved in curriculum development.

2.3.1 Taba's Model

Taba's curriculum development model is an example of an inductive approach to curriculum development that starts with specifics and building up to general design. Taba believes that there should be a clear definite order to curriculum design and that teachers must be involved in the process. She believes that curriculum should be developed or designed by the teachers rather than handed down by a higher authority. She is of the view that, teachers should begin the process by creating teaching and learning units for their students in schools rather than initially in creating a general curriculum design. Taba came up with seven steps in which teachers should have input. These steps are adopted from Ornstein and Hunkins (1993) as follows:

a. *Diagnosis of needs:* at this stage the curriculum designer identifies the needs of the students for whom the curriculum is being planned. (The designers find the gaps, deficiencies and the variations in students' backgrounds).
b. *Formulation of objectives:* after the teacher has identified the needs that require attention, he/she will specify the objectives to be accomplished.

c. *Selection of content:* these specific objectives that are selected will determine the content or subject matter of the curriculum. These objectives should match the content and the content should also be valid and significant.

d. *Organisation of content:* the content must be sequentially organised, taking into account the maturity of the learner, their academic achievement and their interests.

e. *Selection of learning experiences:* the content must be presented to students and they in turn should engage the content. It is at this stage that, the teacher selects instructional methods that will involve the students with the content.

f. *Organisation of learning activities:* the learning activities should be organised and this will be determined by the content. It is important for the teachers to consider the kind of the learner they have as they organise the learning activities.

g. *Evaluation and means of evaluation:* the curriculum planners must determine those objectives that were accomplished. These evaluation procedures need to be considered by the students and the teacher (p. 199).

Taba's steps for what is commonly referred to as the Grass-roots rationale are almost similar to those of Tyler's model. She is of the view that, Tyler's model is more of an administrative model and is in a wrong order. That is because it was mostly the curriculum experts who drew up ideas which would be given to the teachers to develop and then administrators supervise teachers to ensure that these ideas are implemented. She believes that curriculum should be developed by the users of the programme.

2.3.2 Tyler's Model

According to Olivia (2012), this is one of the best known curriculum development models. It is well known for the special attention it gives to the planning phases. Tyler's model is

a deductive model that proceeds from the general objectives to the specific objectives. The model is sometimes known as the 'Tyler rationale' or the 'objectives model'. His model provides a framework of how to construct a planned curriculum. Ralph Tyler's model was developed based on the four questions he refers to as the basic principles of curriculum development. The questions provide a four step approach which is logical, sequential and systematic. Tyler believes that those involved in curriculum development should try to define the following:

i. What is the purpose of the school?
ii. What related educational experiences will attain the purposes?
iii. How can these experiences be effectively organised?
iv. How can we determine when the purposes are met?

Tyler in Olivia (1988) recommends that curriculum planners identify general objectives by gathering data from three sources namely: learners, contemporary life outside the school and the subject matter. After identifying numerous general objectives, the planners refine them by filtering them through two screens: the philosophical and the psychological screens of learning. These general objectives will be reduced and staged in behavioural terms thus turning them into instructional classroom objectives.

2.3.3 Saylor, Alexander and Lewis model

This is a deductive model of curriculum development. Saylor, Alexander and Lewis state that, curriculum planners must begin by setting educational goals and specific objectives that they wish to accomplish. Their method emphasizes on means rather than ends. They classified sets of broad goals into four domains under which learning experiences may take place:

a. Personal development: the curriculum planners should start off by determining the learning goals, objectives and domains so that they can move on to the process of curriculum planning.
b. Social competence: The first step: curriculum design is made by the curriculum planning groups, there the curriculum workers decide on the appropriate learning opportunities for each domain and how and when these opportunities will be made available.
c. Continued learning skills: after the designers have been created, curriculum implementation begins. Teachers select the methods through which the curriculum will be related to the learners. Teachers identify the specific instructional objectives before selecting the strategies to implement.
d. Specialization: finally, teachers and curriculum planners evaluate the curriculum. They evaluate the total educational programme and the evaluation programme itself during this step of the process. This process allows educators to determine whether or not the goals and learning objectives have been met.

2.3.4 Olivia's model

Olivia's model is a didactic model. According to Olivia, a curriculum should be simple, comprehensive and systematic. He is of the view that curriculum development should be a step by step process. The model is composed of 12 components:

i. Component 1: philosophical formulation, target, mission and vision of the institution.
ii. Component 2: analysis of the needs of the community where the school is located.
iii. Component 3&4: general purpose and special purpose curriculum.
iv. Component 5: organizing the design and implement curriculum.

v. Component 6&7: describe the curriculum in the form of the formulation of general objectives and specific learning.

vi. Component 8: define the learning strategy.

vii. Component 9: preliminary studies on possible strategies or assessment techniques to be used.

viii. Component 10: implement the learning strategies.

ix. Component 11&12: evaluation of the learning and curriculum evaluation.

This model can be simplified by setting it forth in seventeen specific steps;

a. Specify the needs of the students in general.
b. Specify the needs of the society.
c. Write a statement of philosophy and aims of education.
d. Specify the needs of students in your school.
e. Specify the needs of the particular community.
f. Specify the needs of the subject matter.
g. Specify the curriculum goals of your school.
h. Specify the curriculum objectives of your school.
i. Organise and implement the curriculum.
j. Specify instructional goals.
k. Specify instructional objectives.
l. Specify instructional strategies.
m. Begin selection of evaluation techniques.
n. Implement instructional strategies.
o. Make final selection of evaluation techniques.

p. Evaluate instruction and modify instructional components.

q. Evaluate the curriculum and modify curricula components.

There is though not one model that can be prescribed as the best model when it comes to curriculum development. This is so because none of the models is inherently superior to any other model. Curriculum developers are at liberty to adopt and adapt one that they feel is suitable for them. However, the Taba model tends to be strong on teacher involvement in curriculum development which is the focus of the proposed study.

2.4 Stakeholders in curriculum development

Curriculum development is an ongoing process and not just a product, which requires expertise and continuous production of new knowledge. As such, it requires well-resourced and well-equipped personnel. These personnel are then referred to as stakeholders. Internationally and nationally, stakeholders in education refer to all those working in the education field: students, teachers, principals or headmasters, lecturers (University and Colleges) and as well as Ministry of Education employees. It is considered important and assumed more valuable to engage with the client/customer and consumer of education hence it is recognized in some jurisdictions. Responsibilities and roles are shared amongst this range of stakeholder. But, not every stakeholder needs to be involved at every step of the development process, and the coordination of which stakeholders to be involved at each level requires careful planning and insight into various agendas of all those involved. The proposed study will focus more on the teachers' role in curriculum development as they are the ones responsible for delivering the curriculum in the classroom. Therefore, how they perceive and understand the curriculum will affect how it is implemented. But for them to understand it, they need to know their roles in its development.

2.5 Roles of teachers in curriculum development

There is little of early literature on curriculum development that calls for teachers to take curricular leadership roles. These early work clearly centres teachers' curricular role within the classroom and focused on instructional practice. As years went by, various literatures have reflected and made it clearer that teachers have become the focus of attention in modern world because of their unique roles in the society. According to Federal Government of Nigeria (FGN) (2004), it is becoming increasingly clear that no nation can rise or develop without the right calibre of teachers. Teachers' responsibilities in curriculum development have now been extensive than in the past.

Scholars across the decades have identified limited engagement of teachers in meaningful decision making as a major flaw in educational organization and have suggested that it has been elemental in the failure of meaningful educational reform efforts (Barth, 1990; Fullan, 1993; Giroux, 1988; Ornstein & Hunkins, 2004; Young, 1979). This is emphasized by Fullan (1991) and Sarason (1990), who state that, scholars placed teacher involvement at the centre of effective realization of fundamental educational reform. Rugg and Shumaker (1928) have also recognized the need for teacher involvement in curriculum development and suggested that teachers work collaboratively with curriculum specialists to organize content and materials. Similarly, Caswell and Campbell (1935) supported teacher participation in curriculum committees at all levels, partly because they believed such participation would help teachers align content with student needs. Nevertheless, neither Rugg and Shumaker (1928) nor Caswell and Campbell (1935) placed overall responsibility for curriculum, especially at the district level, in the hands of teachers. These responsibilities can be categorized as follows: curriculum leaders, curriculum

researchers, problem definers and solution presenters and curriculum decision-makers and negotiators.

2.5.1 Teachers as Curriculum Leaders, Decision-Makers and Negotiators

A curriculum leader should be a person who is conversant with the curriculum content, theory and pedagogy (Handler, 2010; Lemlech, 1998). The major role of curriculum leaders is to ensure that the concerned parties understand the curriculum and any intended changes in it. They should also ensure that they keep these members on track especially with particular reference to the choices and decisions they make about the curriculum (Sharpes, 1988). This implies that teachers should be allowed to use their preferences to suggest how best the curriculum may be developed. In simpler terms, teachers know their students' needs better than others involved in the curriculum process. They can provide insight into the types of materials, activities and specific skills that need to be included (Zeiger, 2000). According to Zeiger (2000) teachers from multiple grade-levels may collaborate to identify skills students need at each level and ensure that the curriculum adequately prepares students to advance to the next level and to meet the values of the nation.

According to Handler (2010), a number of scholars identified minimal involvement of teachers in meaningful decision-making as a major flaw in educational organization. A typical example of areas that have this minimal involvement of teachers is curriculum development and designing. Handler (2010) related the failure of meaningful educational reform efforts to this. He also pointed out that teachers express displeasure for not being involved in larger decision-making. Teachers are the ones who should make decisions on what is taught, the order in which it is taught, strategies to be used as well as “who” should teach the content of the curriculum (Jones and Reynolds, 1992; Sharpes, 1988; Lemlech, 1998). Teachers are negotiators in

curriculum development. They negotiate with curriculum development officers on who should be involved, the timing of introducing the new curriculum, the launching of workshops to familiarize teachers with the new curriculum, who should teach the designed curriculum and they negotiate for teaching materials that would facilitate the implementation process (Mosothwane, 2012). Sometimes they negotiate for the payment of teachers who will teach the new curriculum to be improved (Mosothwane, 2012).

2.5.2 Teachers Define Problems and Present Solutions, Research and Reflect on Education Issues

Teachers' knowledge of work put them at a better position to understand the problems that prevail in the teaching and learning of mathematics. They are therefore the best people amongst other curriculum developers who can define such problems and use their knowledge and experience to present their solutions (Handler, 2010). According to Mosothwane (2012), teachers play a diagnosticians role, and it is highly prized in curriculum development. "As diagnosticians, teachers are able to diagnose where the weaknesses of a curriculum are. For example, if a curriculum lacks certain concepts essential to learning mathematics… teachers would be able to identify and remedy such gaps" (Mosothwane, 2012, p.120).

Research shows that teachers should play a crucial role in the development and designing of the curriculum. Sharpes (1988) states that, "curriculum is in the mind of the curriculum transmitter, and can only be learned (in an interactive sense) from the words and actions of such a mind" (p. 19). This means that teachers are the ones who do the work of teaching. They are directly implementing the curriculum. And so they know the learners that they are dealing with; they are the same learners that the curriculum is designed for. Teachers also understand the working conditions they are working under; the resources they are to use, and many other

aspects. So the knowledge, skills and experience, they have is instrumental in curriculum development and designing. In other words, teachers are there in schools to teach and also to collect information for use by curriculum developers. Reflecting on a curriculum allows teachers and others involved in the process to find any weaknesses in the curriculum and attempt to make it better. Teachers reflect on curriculum in multiple ways, such as keeping a journal as they implement the curriculum, giving students' surveys and reviewing the results or analyzing assessment data and individual student performance. Not only can reflection serve to improve a specific curriculum, it may guide the creation of new curriculum (Zeiger, 2000).

2.6 What do scholars have to say about teacher involvement in curriculum development

According to Okeke (2004), teachers are nation builders since majority of the members of a particular society will pass through their moulding hands. It can therefore be said that whatever levels of development a particular nation passes through will partly be a true reflection of the calibre of the teachers. As stated in Essays, UK (November, 2013), curriculum development requires the input of different stakeholders such as teachers, school heads, parents, community members, students, district administrators and school boards. This has also been expressed by the Report of the National Commission on Education (1977), Volume 2, Annexes, which states that, education system should consider that curriculum development is a complex and continuous process that should involve a wide range of people from classroom teachers and subject experts to senior policy making officials. This therefore, reflects that curriculum development is a process that requires a number of stakeholders to participate in hence strategies used to pick teachers and other stakeholders for the subject panels and curriculum development panels need to be considered carefully.

According to Jadhav and Patankar (2013), "curriculum is the best means of overall development of students. And teacher is mediator between curriculum and students. She/ he knows the various needs of students, educational institutions, industries and parents" (p. 17). Zeiger (2015) states that, "while curriculum specialists, administrators and outside educational companies spend countless hours developing curriculum, it is the teachers who know best what the curriculum should look like" (para. 1). This view is based on the fact that, teachers work directly with students who are meant to benefit from the curriculum. Young (1988) states that, teachers have practical knowledge based on their daily work with students, and this knowledge is useful to curriculum committees because teachers can assess whether the ideas being developed will work in the classroom. Therefore, in order to create a strong curriculum, teachers must play an integral role in every step of the process. Shulma (as cited in Sowell 2000) indicates that teachers are key players in curriculum development hence their knowledge described in several categories as follows:

a. content knowledge
b. general pedagogical knowledge
c. curriculum knowledge
d. pedagogical content knowledge
e. knowledge of learners and their characteristics
f. knowledge of educational context
g. knowledge of educational philosophies.

Because of their various expertises that can be valuable in curriculum development, teachers need to be involved in this process. This was emphasized by Zeiger (2015) who states that, teachers know their students' needs better than others involved in the curriculum process. In

her views, while state or federal standards often dictate the skills covered by the curriculum, a teacher can provide insight into types of materials, activities and specific skills that need to be included. According to Jadhav and Patankar (2013), teachers can understand the psychology of the learner. Teachers should be involved in defining different course components that will be relevant to learners which will be in line with the latest technological development in the education sector. A number of teachers from different grade levels may collaborate to identify skills students need at each level and ensure that the curriculum adequately prepares students to advance to the next grade level and meet the standards. This is emphasized by Jadhav and Patankar (2013) who states that, teachers must possess some qualities such as planner, designer, evaluator, researcher, decision marker and administrator so that they play the role of an evaluator for the assessment of learning outcomes.

According to Zeiger (2015), because teachers must use the curriculum, they should have an input in its creation. A teacher can gauge whether an activity will fit into a specified time frame and whether it will engage students. If multiple teachers will use the curriculum, allow as many of them as possible to provide input during the creation stage. As teachers provide input, they will gain ownership in the final product and feel more confident that the curriculum was created with their concerns and the needs of their particular students in mind. Teachers continuously contribute to the development of school curriculum by developing periodic course teaching plans and giving considerations to the special needs of the students (Dillon, 2009 as citied in UK Essays 2013). Therefore, having a good curriculum without the input of teachers cannot help in achieving the learning objectives and goals.

Curriculum development is a starting point for ensuring success in improving the teaching processes and student learning outcomes. This therefore can be attainable only when

teachers have an input in the process. Blyth (1984) asserts that there can be no curriculum without teachers. He purports that the teacher will largely determine the success of any curriculum. According to Zeiger (2015), teachers must implement the curriculum, in their own classrooms, sticking to the plan that has taken so much time, careful planning and effort to create. Teachers' competencies directly influence the interpretation of the curriculum in actual teaching and learning situation. When a teacher fails to properly implement a strong curriculum, she/he risks not covering standards or failing to implement effective practices in the classroom. That does not mean that teachers cannot make minor changes. In fact, a strong curriculum is designed to allow a teacher to be flexible and to insert a few personalized components or choose from among a selection of activities. Teachers have the opportunity to gather valuable insights with regard to defects in the curriculum such as, the practical feasibility thereof, the degree of difficulty of the content for pupils of particular age groups, realization of objectives within the allowed time schedule and unclear formulation.

According to Zeiger (2015), reflecting on the curriculum allows teachers and others involved in the process to find any weaknesses in the curriculum and attempt to make it better. Teachers reflect on curriculum in multiple ways such as keeping a journal as they implement the curriculum, giving students' surveys and reviewing the results or analyzing assessment data and individual student performance. Not only can reflection serve to improve a specific curriculum, it may guide the creation of a new curriculum. Teachers are the executors of school curriculums. This therefore implies that since they help in executing the curriculum findings they need to have an impact on its creation. Teachers are key agents in the implementation of the curriculum hence it is important to discover their collective view about the curriculum and keep track of this. Norrel (1997) argues that policy makers should develop curricula that are more appropriate to

their particular national circumstances. He feels that it is time to allow all the stakeholders to participate in curriculum reform or improvement.

Curriculum development cannot be seen as separate from individual teacher. Teachers believe that they need to own the curriculum. They also assume the right to make choices about the curriculum content and all other associated aspects of their practice, subject to certain constraints, such as the need to provide for breadth and balance and to a less extent, for continuity and provision (Campbell and Southworth, 1992). Ornstein and Hunkins (1993) identify and acknowledge that the teacher should be one of the members of the curriculum team. The two purport that the teacher occupies a central position in curriculum decision making as they decide what aspects of the curriculum, newly developed or ongoing to implement or stress in a particular class.

Saba, Silberstein and Shafriri (1982) hold that teacher should be the grassroots developments of the curriculum. They argue that the "top down fashion whereby teachers are expected to execute and realize the developers' intensions proved to be an ineffective way of introducing educational and pedagogical innovation into schools" (p.53). Similarly, Peretz in Saba, Silbersterin and Shafriri (1982) has also emphasized the teachers' contribution to curriculum development as paramount. This contribution could be done through curriculum development workshops where all teachers have an opportunity to contribute. Eden (1979) as cited in Saba, Silbersterin and Shafriri (1982) points out that there has been a growing recognition of the need for incorporating teachers effectively in the process of curriculum development and a variety of ways for achieving this should be tried out.

Some of the research studies have reflected that teachers are essential for the development of any nation due to the fact that teachers are believed to be nation builders. This therefore implies that they have a significant role to play in the education system of a country. Cincioglo (n.d) conducted a study on the topic: Why to Involve Teachers in the Process of Language Curriculum Development, found out that it is important to involve all stakeholders in curriculum development as, one of the prerequisites of language curriculum development process is to enable the active participation of teachers as the primary stakeholders in all the stages. In his view, being the practitioners, teachers are the ones who translate theory into practice, which necessitates them to be in the decision making process of language curriculum development. He continues to say that what is a must if an institution wants to come up with a commonly praised and obviously successful curriculum will be to make teachers to be actively involved in every step of curriculum development process. Punia (1992) also presented in her MPhil thesis that teachers are the missing link in curriculum development. In her view, after teachers' reports and her personal beliefs as a teacher educator she found it fit that to achieve curriculum objectives, management, teachers, advisors, students and other stakeholders should be jointly responsible for developing a model that will enable all parties to participate in curriculum development. The studies carried out by European Union to provide and sustain quality and standards point out the essential role of teachers' participation in curriculum development as well.

2.7 Summary of literature

From the various reviewed literature, it is evident that employee participation in decision making have greater job satisfaction, work achievements, and personal integration into organization. Therefore, curriculum developers/planners and the ones who implement it should ensure that objectives intended by the curriculum are satisfied and this can be possible through

the involvement of the right personnel and the employment of the best procedures for development. Thus, teachers must have comprehensive understanding of their content areas and methods for communicating knowledge to students.

Neagly and Evans (1967) have indicated in their work that, since curriculum development is a process, it should include the organization of subject panels or curriculum committees, planning and conducting needs assessment that will be done by curriculum committee as well as the selection of aims, goals and objectives of instruction. The review of literature has indicated that in some countries like Nigeria, teachers were seldom involved in the process of curriculum development, which is a cause of concern for the proposed study, in the Botswana context.

CHAPTER 3

Research Methodology

3.0 Introduction

The study intends to scrutinize the extent of participation and role mathematics teachers at junior secondary schools in Botswana play in curriculum development. This Chapter presents the research paradigms (methods and procedures) the researcher wants to employ in carrying out the proposed research. It brings about a step by step presentation of procedures which will be employed to get information which addresses the research questions for the study. Thus, it describes the research design, population, sampling procedures, data collection procedures, ethical considerations and issues of validity and reliability. The procedures will be set such that they would by all means reduce contamination of results, biasness, ambiguity and they will also safe guard the reputation and privacy of the respondents.

3.1 Research Design

According to De Vaus (2006) research design refers to, the overall strategy that one choose to integrate different components of the study in a coherent and logical way with the aim of addressing the research problem. In his views it constitutes the blueprint for collection, measurement, and analysis of data. Anderson (2003) describes research design as the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedures (p. 3). There are different meanings or interpretations for research design which can be recapitulated in McMillan and Schumacher (2006) who suggest that research design summarizes the procedures for conducting a study, including when, from whom, and under what conditions the data will be obtained. With this definition, the research design explains the procedures the researcher will employ in

collecting and analyzing data in response to the problem identified. According to Burns and Grove (2001), the purpose of the research design is to achieve greater control of the study and to improve the validity of the study by examining the research problem.

Upon deciding which research design to use, the researcher had to consider a number of factors which include; the focus of the research, the unit of analysis and the time dimension. The proposed study will adopt a mixed method approach, thus, a combination of qualitative and quantitative research approaches. This study will use a mixed methods (Tashakkori and Teddlie, 2003) design, which is a procedure for collecting, analyzing and mixing both qualitative and quantitative data at some stage of the research process within a single study, to understand a research problem more completely (Creswell, 2002). In Cohen and Manion (1995) views, integrating qualitative and quantitative approaches in one study is advantageous in the sense that there is balance maintained since qualitative data is strong in depth and interprets the specific while quantitative data can be generalized to a larger population. The rationale for mixing methods is that neither qualitative nor quantitative methods are sufficient by themselves to capture the trends and details of a situation, such as complex issues of teacher involvement in curriculum development. Thus, mixed methods permits a more complete and synergistic utilization of data than do separate qualitative and quantitative data collection and analysis. When used in combination, qualitative and quantitative methods complement each other and allow for more complete analysis (Green, Caracelli and Graham 1989, Tashakkori and Teddlie 1998).

The study intends to elicit teacher experiences, teacher concerns, models of curriculum development and the extent of teacher involvement in curriculum development and review processes, therefore mixed methods shall be appropriate in enabling the researcher to gain in-

depth understanding of the teachers' assessment of curriculum development. This is emphasised by Johnson (2009) who states that mixed methods research provides an antidualistic and syncretic philosophy and set of approaches or possibilities for emerging insights from diverse perspectives. Its working goal is to provide pragmatic, ethical solutions to local and societal problems. Evaluation of teacher involvement in curriculum development provides an ideal opportunity for mixed methods studies to contribute to learning about the best models that will involve teachers as well as how teacher involvement can effectively help to improve the education system. Mixed methods are well suited for the study as its characteristics for this study will include: collecting and analysis both qualitative (open-ended) and quantitative (close-ended) data.

Integrating qualitative and quantitative methods will be advantageous to the researcher as it would allow the researcher great gains in breadth and depth of understanding and corroborating data on curriculum development while offsetting the weakness inherent to using each approach by itself. The other advantage of mixed methods is that, it provides methodological flexibility and reflects participants' point of view better as it gives a voice to study participants and ensures that the study findings are grounded in participants experiences. Generally, mixed methods provides the study with a more complete and comprehensive understanding of the research problem enabling the researcher to come up with approaches for developing better and more context specific instruments.

Cohen, Manion and Morrison (2007) contend that the views of social reality can be understood from either the subjective or objective approach. This research will be conducted within the interpretive and transformative paradigms. According to Cohen, Manion and Morrison (2000), an interpretive paradigm gives the researcher an opportunity to understand and interpret

the world in terms of its actors hence mixed methods approach is found appropriate for a study on teacher involvement in curriculum development and review. The data gathered from this research shall be heavily influenced by teachers' experiences pertaining curriculum development processes which provides justification to purse this study from the interpretive paradigm. Bryman (2008) have described the interpretive paradigm as the view that sees "the subject matter of the social science- people and their institutions- is fundamentally different from that of the natural science" (p. 15). The interpretive paradigm is also said to place a great emphasis on "the meaning people attribute to their experiences" (Davidson & Tolich, 2003, p. 29). It allows more flexibility in terms of research instrument as compared to the positivist paradigm where methods often dominate the subject matter. Furthermore, Cohen, Manion and Morrison (2007) add that the interpretive paradigm treats the knowledge gathered from an undertaken research as "personal and unique" (p. 7)

For the above mentioned reasons, the interpretive paradigm is therefore believed to be the most suitable approach as it allows in-depth exploration of the teachers' views on teacher involvement in curriculum development processes. Though adopted for this study, interpretive paradigm has its weaknesses. According to Davidson and Tolich (2003), one of the critisms of the interpretive paradigm put forward in the literature is its lack of reliability. To counter act against the weaknesses of the interpretive paradigm, the transformative research paradigm is then adopted. According to the transformative paradigm, there are multiple realities that are constructed and shaped by social, political, cultural, economic and radical/ethnic values which therefore imply that power and privilege are important determinants of which reality will be privileged in a research context. Methodological inferences based on the underlying assumption of the transformative paradigm reveal the potential strength of combining qualitative and

quantitative methods. The transformative aspect of this study should look at the interaction of the researcher and the participants as they seek to gather teachers views at each stage of the research (qualitative dimension) and provide the opportunity to demonstrate that outcomes that have credibility for community members and scholars (quantitative dimension).

The study will adopt a concurrent nested mixed methods approach/strategy, with the qualitative approach being the predominant approach and the quantitative being embedded. The reason for using the concurrent nested approach is to ensure that broader and in-depth perspective is obtain on the topic as well as ensuring that the possible weaknesses inherent to the predominant method are offset. Creswell (1994) describes the use of these two approaches as triangulation. Creswell suggests that mixing the methods brings better solutions through interdisciplinary input. Cohen and Manion (1985), defines triangulation as "the use of two or more methods of data collection in the study of the aspect of human behaviour". Janesick (2000) defines triangulation as a process in which a "researcher deploys different methods such as interviews, census data and documents to validate findings" (p. 934).Triangulation of methods is used with the idea that one can be more confident with the results by examining the consistency of different data sources than from within the same method. Thus, the assumption is that the bias found from a particular data source, would be neutralized when used in conjunction with data from other sources and methods. This implies that triangulation facilitates validation of data through verification from two or more sources.

3.2 Setting of the Study

The setting in which this study will take place is in and around one of the large villages in the south-central region of Botswana, with ten junior secondary schools: School A, School B, School C, School D, School E, School F, School G, School H, School I and School J.

3.3 Population, Sample and Sampling procedure

A population is a group of individuals with at least one common characteristic which distinguishes it from other groups (Best & Kahn, 2006). According to Spradley (1985), when choosing the population of the study it should be on the basis of their involvement in the problem under study. The population of this study will therefore be mathematics teacher community at junior secondary schools in the South Central Region. Teachers are the relevant population for the study in the sense that they are the ones involved with delivering the content of the implemented mathematics curriculum, as they are the ones directly involved in implementing the curriculum. Therefore they are in a better position to provide useful information for the proposed study based on their experience.

Wiersma and Jurs (2009) define a sample as "a subset of the population which the researcher intends to generalize the results" (p. 325). According to Seaberg (1988), a sample is a small portion of the total set of objects, events or persons, which together comprise the subject of our study (p. 240). A sample can also be defined as, an element of the population considered for actual inclusion in the study or a subset of measurements drawn from a population we are interested in. It is also possible to reach accurate conclusions by examining a portion of the total group. Therefore, a sample should be a true reflection of the entire population.

The names of schools will be kept confidential and pseudo names shall be used. These 10 schools shall be conveniently sampled out of all the junior secondary schools in the south-central region because they are accessible to the researcher. Twenty teachers will be purposively sampled for the research interview, with two teachers to be drawn from each one of the participating schools, while the remaining teachers shall be used as questionnaire respondents. Purposive sampling shall be convenient for this study on the basis of the researchers' knowledge

of the population and choice shall be made about which participants or subjects should be selected to provide the best information to address the purpose of the research (McMillan and Schumacher, 2010).According to Mertens (1998), the power of purposive sampling lies with selecting rich information for in-depth analysis of the phenomenon being studied. While Merriam (1988) describes purposive sampling as being a way to discover and understand phenomena from a source known to provide the best possible information. Therefore, teachers with a relatively many years of teaching experience would be able to give in-depth information about the phenomenon to be studied. The remaining mathematics teachers will be given questionnaires to respond to as a way of providing further information.

3.4 Instrumentation

Since the major focus of this study is teacher involvement in curriculum development, a social phenomenon, interviews shall be used to obtain an accurate portrayal of the realities of the problem under investigation. To further understand the extent of teacher involvement in curriculum development process, questionnaires shall be used to gather more data. Thus, the researcher choose to utilise interview and questionnaire as the most fitting methods to gather data for this project with each instrument carefully chosen to maximise the amount of relevant data collected within a limited time frame.

3.4.1 Interviews

Interviews are planned; pre-arranged interaction between two or more people, where one person is responsible for asking questions related to the research topic while the other person respond to the questions asked (Lankshear & Knobel, 2004). There are different types of interviews commonly used to gather data but for this study, the qualitative interview shall be employed. A qualitative interview which is semi-structured shall be used to gather qualitative

data. A semi-structured interview of longer duration and conducted one-to-one is the most suitable for this study as it seeks to get in-depth understanding of curriculum development. Thus, data will be gathered using a direct verbal interaction between the researcher and the respondent. This interaction with participants shall allow them to open up and give the interviewer a chance to breakdown his questions to the participants, thus, allowing for some gestures that will create a relaxed environment and to obtain intensive data. Brown and Dowling (1998) explain that, interviews enable the researcher to explore issues in more detail and give opportunity for probing and prompting questions. Fontana and Frey (2000) stress the importance of utilizing interviewing to gain the superior perspective, "interviewing is one of the most common and powerful ways in which we try to understand our fellow human beings" (p. 645). The research will employ a semi-structured interview which follows a pre-determined sequence of questions related to the research questions. The questions will give the researcher a greater flexibility and help the interviews to avoid reducing them to casual chat events. The researcher will prepare some field notes in conjunction with the interviews, follow-up interviews, observations, and casual encounters with participants as and when necessary.

Both Research Questions 1 and 2 will be central parts of the interview questions. Research Question 1: *To what extent are junior secondary school mathematics teachers involved in the curriculum development and review process of the Junior Certificate of Education (JCE) mathematics curriculum*? Shall be studied under various components such as teacher understanding about what a curriculum is, teacher experience in curriculum development, criteria used to pick teachers for curriculum development and some many other aspects that can help obtain relevant answers to the research question. Research Question 2: *What kind of difficulties or challenges do teachers encounter in implementing the junior secondary school mathematics*

curriculum? Will also be studied using aspiring aspects that will bring closure to the challenges experienced by teachers? Amongst them shall be questions on experience challenges in implementing the curriculum and possible solutions and measures that could be useful to curriculum development. *For interview questions refer to Appendix D.*

Semi-structured interview shall be employed because it is believed to be the most appropriate research instrument for the study as it focuses more on the interviewees' point of view instead of the interviewer. It is also regarded as the more suitable for the study for the reason that, it has the ability to gather information that answers research question as it ensures that the researcher can get clarity where necessary.

3.4.2 Questionnaires

Since it is impossible to interview all teachers in the schools involved in the study due to various reasons like the time factor, a questionnaire is found to be appropriate to cover for that. Quantitative data shall be obtained using a questionnaire. According to Verma and Mallick (1999), a well constructed questionnaire is an economical data collection instrument that has the advantage of providing the answer to the research question. Hinds (2000) have hinted that, designing and developing a good questionnaire can be a very challenging activity especially for novice researchers. It requires considerably a lot of time in planning and preparation stage (Cohen et al., 2007). Verma and Mallick (1999) cautioned that in deciding the best questionnaire design that fits the purpose of the study, researchers need to consider the function of the research instrument used in the data collection process. They asserted that researchers need to decide whether the use of a questionnaire in research is to supplement or complement the other instrument used.

For this study a semi-structured, self-administered/self-completion questionnaire shall be used as the second research instrument for the reason that it is quick to administer and has potentially a higher percentage rate of return. The decision to use a self administered questionnaire was influenced by Bryman's (2008) claim that self completion questionnaire in many ways is similar to a semi structured interview. The questionnaire shall be used to gather baseline information of teachers' views on teacher involvement in curriculum development processes. The questionnaire shall be designed and consequently used to supplement the data collected from the interviews. The researcher will construct the instrument based on the review and analysis of related literature. The questionnaire shall be a combination of open and close ended questions. There will be two sections in the questionnaire: section A & B. Section A will be requesting demographic information from the participants; thus gender, age, qualification, teaching experience, post of responsibility and location to ascertain that indeed they are based in the selected schools. Section B will be made up of open and close ended questions seeking the respondents' views on teacher involvement in curriculum development and review. The questionnaire shall have a Likert scale questionnaire format for the close ended section which will be made up of items on a six point Likert scale: very strongly agree, strongly agree, agree, disagree, strongly disagree and very strongly disagree. Thus, a likert scale questionnaire is a rating scale type of questionnaire that allows a range of responses that require respondents to rate them. This offers degrees of responses and intensity and at the same time makes it possible to generate numbers for analysis purposes. *For interview questions refer to Appendix C.*

Generally, a questionnaire shall be used for various reasons. One of the main reasons for its usage is it is convenient for respondents as teachers will be able to complete it at their own time and pace. The other reason is that it allows and encourages respondents to provide honest

responses for the reasons of anonymity. Moreover, the use of a self-completion questionnaire has potential of eliciting bias-free responses compared to an interview. Bryman (2008) explains that the presence of an interviewer, for example has the tendency to cause respondents to exhibit "social desirability bias" (p. 218). Although the questionnaire was adopted as a data collection instrument based on the above mentioned advantages, it also has disadvantages. One of the main weaknesses of having a questionnaire is that it does not allow the researcher to prompt and probe respondents (Bryman, 2008). Amongst the disadvantages is that it is attributed to respondents anonymity which makes it difficult for the researcher to identify and seek clarity in case it is required. The use of a questionnaire also limits the number of questions that can be asked due to the possibility of the respondent fatigue (Bryman, 2008, p. 219).

Twenty five structured questionnaires will be distributed among junior secondary school mathematics teachers in the selected schools, those that were not chosen for interviews. After three days the questionnaires shall be collected. The questionnaire will be subjected to face, criterion, content and concurrent validity by four University of Botswana lecturers, two from Department of Mathematics and Science Education and two from Department of Educational Foundations- Research and Evaluation who are experts in the educational research. Their suggestions and modifications shall be reflected in the final draft of the instrument. To further validate or check the reliability of the questionnaire, it will be piloted on four teachers in one of the junior secondary schools in Gaborone that is not in the population of study. In piloting the questionnaire the researcher will be checking if; the instructions are understandable, wording is clear, answers are adequate, details are sufficient, there are difficult sections, there are regional differences, there are irrelevant questions and it is lengthy or it is convenient (Roberts, 2004). The questionnaire will then be modified after the pilot findings. To determine reliability of the

questionnaire the test-retest technique would be used and it will be done by administering the modified instrument twice with the interval of one week on another group of five teachers in another junior secondary school in Gaborone that is not in the population of study.

3.5 Data Collection procedure

According to Strauss and Myburgh (1996), data collection is a process whereby the researcher interacts with the respondents and thus obtains data from the respondents. Nxumalo (2001) asserts that the focus of the interaction should be to maximize validity and minimise inconvenience to the respondent before, during and after the process. It is therefore, the responsibility of the researcher to strike a balance between the requirements of the research and that of the respondents. The researcher shall seek permission from the Ministry of Education and Skills Development and the Regional Education Office to collect data from teachers. Since the study is on teacher involvement in curriculum development and review, qualitative and quantitative data is required for this study. Therefore questionnaires will be used to obtain an adequate amount of information of what is happening on ground. The questionnaire data will then be corroborated by data collected through interviews.

3.6 **Data analysis procedure**

Smith (1997) describes data analysis as "categorization and ordering of information in such a way that sense is made out of it and final report that is true and accurate in terms of the study's subject is made (p. 177). According to Brink (1999) as citied by Tsanwani (2009), the aim of data analysis is to reduce and synthesize information to make sense out of it and to allow inference about a population, while the aim of interpretation is to combine the results of data analysis with value statements, criteria and standards in order to produce conclusions, judgments and recommendations. Morse (1991) has also stated the purposes of data analysis as to impose

some order on a large body of information so that general conclusions can be reached and communication in a research project. Quantitative data that will be collected through questionnaire shall be analyzed using Statistic Package for Social Sciences (SPSS) because of it being descriptive in nature. Whereas the qualitative data from both the questionnaires and interviews will be analyzed using content analysis which involves coding, sorting, reducing and editing data so that it could be in the form that can be processed. Content analysis can also be referred to as categorizing and indexing.

3.7 Ethical consideration

Countries have varying ethics on research and since this particular research involves human beings as subjects of the proposed study, high ethical standards set by various ethics committees are to be followed accordingly. According to Strydom in De Vos (2001), ethical considerations are of the utmost importance when one is conducting research. The privacy and dignity of every teacher participant in the proposed study are to be protected. Participants shall be assured of confidentiality and anonymity through identification coding and reports of aggregate data. The participants involved will be notified of the aims, methods, expected outcomes, benefits and potential hazards of the research conducted, if any. The researcher shall prepare some consent letters seeking permission to use schools and mathematics teachers for his study. These letters will be hand delivered to the relevant offices like Ministry of Education and Skills Development, Regional Education Office and to the School Heads of the participating schools. Depending on the outcomes, these letters will then be followed by phone calls asking for appointment and would provide the researcher with an opportunity to elaborate on the purpose of the research and as well as explain the benefits of the study to participants. Grinnell

(2001) recommends that participants must receive adequate information about the research before consenting.

The researcher shall start off by presenting the letters of permission to the Ministry of Education and the Regional Education of Office requesting to be allowed to carry out a study in schools in the region. In those letters the purpose of the study and its benefits shall be explained. The researcher will then submit another letter to school Heads seeking permission to conduct the study in their schools. With permission granted, the purpose of the study will then be explained to all the teachers before administering the questionnaire or interviewing them. Prior to administering the questionnaire or interviewing, the researcher shall make an explanation that the information that will be provided will be held confidential and will be used strictly for the proposed research purposes only. As Richey & Klein (2007) have suggested, the participants shall not be required to write their names on the questionnaires and the data collected will be aggregated instead of reporting for each individual. The information obtained will not be disclosed without the permission of the respondents.

3.8 Summary of the chapter

This chapter is dedicated to the discussion of the research methodology used to collect and analyze the data of this study. Identification of the study population was introduced. A description of the sample, including the required sample for the proposed study and the random method of selecting the sample are also explained. The qualitative methodology that forms the bulk of the mixed method (in the form of an interview) will be adopted in this study hence human error of observation and logical inferences would be reduced. Both the questionnaire and interviews will be conducted simultaneously such that, the terminology used is considered reliable and valid.

This chapter also discusses the instrumentation for data collection whish are interview and questionnaire with the interview being the main instrument of the proposed study. The chapter continues to explain and how the questionnaire instrument will be developed. The way validity and reliability is ensured and also provided. The chapter concludes with explaining how data will be collected and how it will be statistically tested in the analysis procedures as a way of seeing how the research questions have been answered.

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APPENDIX A

REPUBLIC OF BOTSWANA

Research Permit Application Form

Two copies of this form should be completed and signed by the applicant who wishes to obtain a permit for conducting research in the Republic of Botswana, and sent to the Permanent Secretary of the relevant Ministry (See guidelines for addresses). These forms should not be submitted unless the Guidelines for the Research have been carefully studied. A copy of any project proposal submitted to funding agencies must accompany this application. Please refer to annexure I attached to this application form. Fill this form in full.

Description of the Proposal

1. **Title of Research:**

Teacher involvement in the development and review of the Junior Secondary mathematics curriculum (study conducted in the Southern District)

2. **Name and Address of Applicant**

Pelonomi C. Rebaone P O Box 50 Moeng

Mobile 76780937/71587904 E-mail: pelonomir@yahoo.com

3. **Name and address of home institutions (if any) which you are affiliated**

University of Botswana

P/BAG UB 00703

Gaborone

Botswana

4. **Name and address of supervisor of research in home country or responsible referee**:

Dr S. K. Kesianye

University of Botswana

P/BAG UB00703

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5. Research plans

a. Main aims (general)

The purpose of this study is to *investigate the extent to which junior secondary school mathematics teachers are involved in curriculum development and review processes in Botswana.*

b. Objective

Since curriculum has many components, the researcher will be focused on the development of the syllabus. With this case, the researcher intends to inquire, analyse and describe the procedures followed during syllabus development hence assess the extent and relevance of teacher involvement in curriculum development processes.

c. Methods or techniques

According to Bell (2005), research methods are devices the researchers use in an effort to collect data from their sample. This study will use both a structured questionnaire and a semi-structured interview for data collection. *Questionnaire and interview:* since teachers are vital in the delivery of the curriculum, they will be asked to respond to a few questions that seek to assess their knowledge on curriculum development.

6. **Budget for the costs in Botswana (give detailed breakdown of research costs such as subsistence, travelling, local staff, secretarial service, seminar, printing etc). Please state the amount in Pula**.

This is presented in the next page as appendix B.

APPENDIX B

RESEARCH PROPOSAL BUDGET

EXPENDITURE	QUANTIFY			TOTAL EXPENSES (P)
Transport	2 trips from home to School A and back to base @ P14 per trip			56
	2 trips from home to School B and back to base @ P12 per trip			48
	2 trips from home to School C and back to base @ P7 per trip			28
	2 trips from home to School D and back to base @ P7 per trip			28
	2 trips from home to School E and back to base @ P7 per trip			28
	2 trips from home to School F and back to base @ P7 per trip			28
	2 trips from home to School G and back to base @ P7 per trip			28
	2 trips from home to School H and back to base @ P7 per trip			28
	2 trips from home to School I and back to base @ P7 per trip			28
	2 trips from home to School J and back to base @ P22 per trip			88
	Subtotal			**P 388.00**
EXPENSES (Stationary)	Quantity	Item	Unit Price P	Total cost
	1 box	Staples	33.75	33.75
	1	Stapler	28.95	28.95
	2	Correction pen	10.00	100.00
	1	calculator	179.95	179.95
	4 rims	A4 lined papers	42.95	171.80
	3	Blue pen	7.95	23.85
	1	Black pen	7.95	7.95
	1	Puncher	32.95	32.95
	1	File	50.00	50.00
	1	File dividers	11.95	11.95
	3	Clutch pencils	12.95	149.95
	6	Clear binding papers	2.95	17.70
	1	Flash Disk	149.95	149.95
	6	Printing paper	48.95	293.70
	3	Binding	3.00	9.00
	Subtotal			**P770.65**
Food	Breakfast @ P20.00 × 8 and Lunch @ P32.00 × 14			**P608**
	TOTAL RESEARCH PROPOSED BUDGET AMOUNT			**P1766.65**

7. Name and address of financial sponsor(s) of the research (if appropriate)

Self- sponsored.

8. Has funding already been obtained?

Yes.

a. If yes, please state the total amount granted, and the name and address of the funding agency: I have set aside P2000.00 to ensure the project runs as effective as it is scheduled.

b. If no, what steps are being taken to ensure sufficient funding?

N/A

9. **If you have previously done research in Botswana please give details of the research**.

N/A

10. Name and address of institution in Botswana to which the researcher is to be affiliated.

UNIVERSITY OF BOTSWANA

P/BAG UB 00703

GABORONE

BOTSWANA

11. Details of Botswana – based personnel that will be involved (names, functions, qualifications).

Botswana Junior Secondary School mathematics Teachers

12. **Places in Botswana where the research is to be undertaken**.

Mochudi (all the junior secondary schools in and around Mochudi)

13. Proposed time – schedule for the research.

4 WEEKS

WEEK	ACTIVITY
1	Beginning of the first three chapters
2	The beginning of data collection
3	Continuation of data Collection and the beginning of data analysis
4	Completion of data analysis and production of the final report

14. Plans for dissemination of research findings

The researcher plans to share the findings with the CDE, Ministry of Education and Skills Development, teacher development institutions, teachers and other stakeholders involved in curriculum development with the hope that it will in a way help improve the standards of our curriculum hence this could impact positively in the outcomes or performance of our students. This could also motivate the teachers since they will be teaching what they know and understand better.

15. How are the research findings going to be used in the home country?

The CDE could use these findings to assess how they have been doing things and maybe review their criterions and strategies for the better. It will sensitise them on the value teachers can add in curriculum development.

16. Any other information.

N/A

17. **Signature of applicant: _____**

18. Date: _____

19. For Official Use Only

Action taken:

……

..……..

Action Officer: …….. **Date:** …….

Permit: Granted/ Deferred/ Rejected ……..

Appendix C

Interview Questions

1. School Name; _____ 2. Gender; _____

3. Age; _____ 4. Highest qualification; _____

5. What is curriculum? (or syllabus)

6. What do know or need to know about curriculum?

7. What are your thoughts about prior curriculum used?

8. What is your experience with curriculum development?

9. What external, internal and additional factors influence curriculum development?

10. Who is involved in curriculum development?

11. Do you know the criteria used to select teachers to be members of the curriculum task force committee? Explain.

12. What are the roles of teachers in curriculum development?

13. What ways can be used to improve teacher involvement in curriculum development?

14. Do you think teacher participation in curriculum development have significant influence in curriculum implementation? Support your answer with a reason.

15. What is it that the Department of Curriculum Development and Evaluation is doing to facilitate teacher involvement in the development processes?

16. Would you like to be involved in such processes?

Probe: if yes, why? Or if no, why not?

Appendix D

Questionnaire for Secondary Mathematics Teachers

This questionnaire is part of a research project conducted in order to explore the extent of teacher involvement in the curriculum development (Junior Certificate mathematics Curriculum) in Botswana. Please, respond to all items in the questionnaire.

Please note that, your responses will not be used in a any way that will implicate you and the information that you shall provide will be used only for the purpose of the study and that respondents will remain anonymous.

Section A

Demographic information

School Name: _____ Gender: _____ Age: _____

Teaching Qualification

1. What is your highest educational/professional qualification? _____
2. In which year did you obtain your highest qualification? _____

Teaching Experience: For how many years have you been teaching? ***Tick***

0-5 years	6-10 years	11-15 years	16-20 years	Over 20 years

Section B

1. What do you understand by syllabus?

   _____

   _____

2. When was the current JC mathematics syllabus implemented? _____

3. When the current syllabus was implemented were you a teacher?

Yes	No

4. How do you access the curriculum? *Tick*

Have my own copy	
I get it from the library	
It is available at the immediate supervisors' office	
It is available from the school Head's office	
Other places (specify)	

For the items below respond by ticking one of the following:

SA=Strongly Agree A=Agree N=Neutral D=Disagree SD=Strongly Disagree

The extent of teacher involvement in curriculum development	SA	A	N	D	SD
Teachers are often involved in curriculum development process					
They are involved in setting curriculum learning objectives					
Teachers develop teaching methods that are in line with the curriculum during curriculum development					
Teachers are the ones who determine procedures for assessing student achievement during curriculum development processes					
Have a clear idea of how teaching/learning materials like textbooks determined in relation to the curriculum					
As a teacher I have been involved in curriculum development					
I have been involved or been a member of the curriculum task force committee before.					
There is someone in our school involved in the curriculum task force committee.					
I know the criteria used to select teachers to be members of the curriculum task force committee.					
I am consulted by the curriculum task force committee in some of their activities					
The extent to which teachers are involved allows them to make contributions in the development of the curriculum					
Teachers are aware of channels they can use to make contributions and suggestions for the development and review of the curriculum					
Teacher ideas are influential in curriculum development Teachers know of the forums that they can use to make these suggestions.					

For the items below respond by ticking one of the following:

Not really 2. Very little 3. Little 4. Average 5. More 6. Much more

Factors affecting teacher involvement in curriculum development process	1	2	3	4	5	6
Teachers low level of concern						
Autocratic leadership style of those at the helm of curriculum development						
Lack of motivation by the Department of curriculum development to involve teachers						
Lack of resources						
Teachers fear of taking risks						
Teachers' beliefs that decision making is not their responsibility						
Lack of trust and positive between teachers and the department of curriculum development						

Appendix E

INFORMED CONSENT FORM

PROJECT TITLE: *TEACHER INVOLVEMENT IN THE DEVELOPMENT AND REVIEW OF THE JUNIOR SECONDARY MATHEMATICS CURRICULUM*

Principal Investigator: P. C. REBAONE

Phone number(s): 76780937/ 71587904

What you should know about this research study:

- I give you this informed consent document so that you may read about the purpose, risks, and benefits of this research study.
- You have the right to refuse to take part, or agree to take part now and change your mind later.
- Please review this consent form carefully. Ask any questions before you make a decision.
- Your participation is voluntary

PURPOSE

You are being asked to participate in a research study of *Teacher involvement in the development and review of the junior secondary mathematics curriculum.*

The purpose of the study is to investigate, assess the extent to which junior secondary school mathematics teachers are involved in curriculum development and review in Botswana. Junior secondary school mathematics teachers have therefore been identified as the best possible

participants because of their experience and knowledge of the curriculum as they are key implementers. Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

PROCEDURES AND DURATION

If you decide to participate, you will be invited to answer the questions. It needs 10- 15 minutes of your time to participate.

RISKS AND DISCOMFORTS

No risks anticipated.

BENEFITS AND/OR COMPENSATION

Your answers will help come up with relevant findings that will assist in improving the education standards in Botswana. The responses can be used to modify the criterions and other aspects of the CD&E.

CONFIDENTIALITY

The data from this investigation will be for scholarly purposes only and none of these will be used for commercial use.

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. If you decide not to participate in this study, your decision will not affect your future relations with the researcher, researcher's affiliation institution (University of Botswana) and associated institutions. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without penalty.

Any refusal to observe and meet appointments agreed upon with the central investigator will be considered as implicit withdrawal and therefore will terminate the subject's participation in the investigation without his/her prior request.

AUTHORIZATION

You are making a decision whether or not to participate in this study. Your signature indicates that you have read and understood the information provided above, have had all your questions answered, and have decided to participate.

Name of Research Participant (please print): _____

Date: _____

Signature of Staff Obtaining Consent: _____ Date: _____

_____ _____

YOU WILL BE GIVEN A COPY OF THIS CONSENT FORM TO KEEP.

If you have any questions concerning this study or consent form beyond those answered by the researcher, including questions about the research, your rights as a research participant; or if you feel that you have been treated unfairly and would like to talk to someone other than the researcher, please feel free to contact the Office of Research and Development, University of Botswana, Phone: 355-2900, E-mail: research@mopipi.ub.bw, Tele-fax: [0267] 395-7573.

Appendix F

Permission letter Regional Office

P O Box 50
Moeng

6th March 2015

The Director
Kgatleng Regional Office
Box 199
Mochudi

Dear Sir

RE: Request to Administer Questionnaire in Schools in and around Mochudi

This letter serves as a request to administer a teacher questionnaire in Junior Secondary Schools in and around Mochudi.

I am a final year Masters in Education Degree (MEd) student currently pursuing at the University of Botswana and would like to assess the extent of junior secondary school teachers' involvement in curriculum development. This is in fulfilment of the requirements of the Med programme.

Thanking you in anticipation.

Yours faithfully

Pelonomi C. Rebaone

(TSM #: 115299 Cell #:76780937)

Appendix G

Permission letter Ministry of Education and Skills Development

P O Box 50

Moeng

6th March 2015

Chief Education Officer
Ministry of Education, Department of Secondary Education
Bag 005
Gaborone

Ufs: School Head, Sedibelo JSS

Dear Sir

RE: Request to Administer Questionnaire in Schools in and around Mochudi

This letter serves as a request to administer a teacher questionnaire in Junior Secondary Schools in and around Mochudi.

The researcher is a final year Masters in Education Degree student. I am currently pursuing my masters at the University of Botswana and would like to assess the extent of teacher involvement in curriculum development. This is in fulfilment of the requirements of the MEd programme.

Thanking you in anticipation.

Yours faithfully

_____

Pelonomi C. Rebaone

(TSM #: 115299 Cell #:76780937)

Appendix H

Permission letter Schools

P O Box50
Moeng

6th March 2015

School Head
.....
.....

Dear Sir

RE: Request to Administer Questionnaire in Schools in and around Mochudi

This letter serves as a request to administer a teacher questionnaire in Junior Secondary Schools in and around Mochudi.

The researcher is a final year Masters in Education student. I am currently pursuing my masters at the University of Botswana and would like to assess the extent of teacher involvement in curriculum development. This is in partial fulfilment of my Med qualification.

Thanking you in anticipation.

Yours faithfully

_____

Pelonomi C. Rebaone

(TSM #: 115299 Cell #:76780937)