CHAPTER 2
CURRICULUM CHANGE: A THEORETICAL FRAMEWORK

2.1 WHAT IS A THEORETICAL FRAMEWORK?

A theoretical system or theoretical framework is an *"explanation of a certain set of observed phenomena in terms of a system of constructs and laws that relate these constructs to each other"* (Gall *et al*., 1996, 8). Theoretical frameworks are considered an important component of research because they map a way for the researcher to conduct appropriate research by providing theoretical underpinnings which allow the researcher to *"formulate the initial research problem ..."* (LeCompte and Preissle, 1993, 151) and *"ask appropriate research questions, select an appropriate population of study, guide their choice of research design, and assist in the interpretation of the data and conclusions reached"* (LeCompte and Preissle, 1993, 153).

Because this study entails the implementation of the new science curriculum in Lesotho, the theory of curriculum change will be used in this study to bring forth what the relevant literature reveals regarding the lessons learned about effective curriculum change and factors affecting change. This is important because Fullan (2001) claims that the literature suggests that curriculum initiatives are seldom completely successful. It is imperative that developing countries like Lesotho are aware of the problems other countries faced when trying to design and implement their curricula, so that these developing countries can avoid the problems, if possible, or find a means of dealing with them in advance.

2.2   UNDERSTANDING CURRICULUM REFORM

A large body of curriculum-related theory has emerged in the last five decades, for historical reasons. The 1960's marked a time of radical change in curriculum reform in United States of America following Russia's launching of the first unmanned Soviet satellite to orbit the earth, Sputnik (Trowbridge and Bybee, 1990). The launch was said to have caused panic among Americans who feared that their nation was falling behind technologically. The American response to Sputnik was to establish a goal to produce more scientists who could master modern techniques developed from scientific principles. This resulted in major revisions to school science curricula. Associated with the reforms was a large amount of educational research and, as academics thought about the research results, theories relating to curriculum reforms were developed. So a large body of innovation literature was developed, from the 1960's. Researchers can benefit from looking at the ideas in the literature.

The 1970's saw a proliferation of curriculum developments in developing countries, following changes in the developed countries in the 1960's. These were mostly adoptions of what was thought to be good practice in developed countries, whose new curricula were used as a basis for reform, as was the case in Lesotho (Lewin, 1985).

2.2.1 Why it is important to understand the theory behind curriculum reform

Curriculum-related theories are developed after examining research, and can be used in order to develop models of change to try to explain why some initiatives are less or more successful than others. Lessons from these theories can be used by curriculum implementers to help and guide teachers to successfully implement the curriculum as intended. Innovators tend to overlook the complexity of educational change and that change involves multiple factors that interact and influence whether an innovation is successfully implemented (Fullan, 2001). Often the changes that teachers are expected to make are too radical, with ambitious objectives prescribing changes that deviate widely from the normal practices (Rondinelli *et al.,* 1990). As a result the intended curriculum is not implemented but instead a transformed form of what the developers had in mind is implemented (Hall and Hord, 2006).

Furthermore, implementers seem to ignore context-related matters when they design new curricula. Hawes (1979) warns that the following questions need to be addressed before one embarks on implementing innovations, "*to what extent are the real planning implications of curriculum development realized? If they are realized with their true implications in terms of money, manpower, materials and time, can realities be faced?*" (Hawes, 1979, 69). The implication of this quote to curriculum reformers like Lesotho is that there is need to look critically at their schools and take into consideration the diversity of their schools in terms of the schools' physical and human resources before innovators embark on extensive reforms. The reformers need to be aware that successful implementation depends on designing programmes that introduce innovations at a rate and scope appropriate for the people who are going to implement the innovation – the teachers – and successful implementation depends on supporting these teachers with effective developmental programmes and staff training.

2.2.2 What is meant by "curriculum reform"

Reform "*is an official change in the way something is done or organized*" (Oxford dictionary, 1995). According to Hall and Hord, change "*is a process through which people and organizations move as they gradually come to understand and become skilled and competent in the use of new ways*" (Hall and Hord, 2006, 4). Educational change involves change in practices which alter instructional programmes, in an attempt to provide better education for the clients (Carlson, 1971). It must be understood that change is not a linear process or just a sequence of events, but rather an interaction of various factors acting at different stages, so that whatever happens in one phase may impact on and alter what happens in another (Fullan, 2001). Implementers need to realize the fact that reforms are highly complex, and that there is no simple solution to guarantee successful implementation.

Fullan (2001) believes educational reform can happen in three areas:
1. in the use of new or revised materials,
2. in the use of new teaching approaches,
3. in the alterations of beliefs and understandings about curriculum and learning practices.

When teachers are required to change their roles and classroom practices, they may need to change previously held attitudes and beliefs before they can successfully implement the required changes. This has implications for the change in the kind of training and support teachers will need in order to meet these new challenges. To support teachers having to implement changes teachers will need information about the background to the new curriculum itself (its philosophical basis) as well as information on what the requirements are and what they are expected to do (Kennedy, 1996).

2.3 MODELS THAT EXPLAIN CURRICULUM INNOVATIONS

Models used to describe the change process help curriculum developers to understand factors which promote or inhibit change. This will put the developers in a better position to suggest approaches which will be more successful in promoting implementation (Havelock, 1971).

According to Chin and Benne (1969), cited by Nickols and Forbes (2001), three typical approaches have been used in educational innovations.

Power-coercive: In such cases change is accomplished through application of power, with those holding greater power enforcing compliance by those with less power. The so-called *Centre-Periphery model* is a good representation of a power-coercive approach because it represents a top-down movement of innovation. According to Whitehead (1980) it involves a passive diffusion of a centrally prepared innovation deemed necessary to the recipients. Typically the needs of the recipients are not taken into consideration when the innovation is developed. The curriculum innovations in Lesotho seem to follow the Centre-Periphery model. An already-prepared curriculum, developed by government educational sectors such as the *National Curriculum Development Centre* in the form of a syllabus document, was given to teachers to implement. Kennedy (1996) believes that it is in the interest of governments that control of content of the curriculum and the manner of its delivery are in their hands so that they can monitor progress.

Rational-empirical: In this strategy the agents introduce the innovation with the belief that it will benefit the teachers and since teachers are assumed to be rational people they are expected to adopt the proposed change (Nickols and Forbes, 2001). The rational-empirical strategy typically uses a top-down approach such as those used in the early stages of curriculum innovation in the USA and Europe in the 1960's. An example of such a model is the *Research, Development and Diffusion* (RDD) model. This model represents a perspective that sees the change process as a continuum of activities from research to practice (Havelock, 1971). Because research informs the change it is considered to have an empirical basis which is considered to provide a rationale for the change. According to Havelock (1971) this model usually involves formulation of an innovation by an "*originator*" (Havelock, 1971, 10-29[3]) who starts with identification of the problem, goes through the process of finding solutions to the problem through research, development and finally diffusion of the solution to the audience. Research, Development and Diffusion approaches to change often

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[3]   The pages in this book are numbered with a chapter number followed by a page number

use a centre-periphery approach, as the initiatives in most cases are taken by the researchers or developers with the receivers remaining mostly passive (Havelock, 1971). Guba and Miles (cited by Havelock, 1971) suggest that the process should not stop once diffusion has occurred. In reality a cyclical process involving *"design, evaluation, feedback and redesign"* is necessary (Havelock, 1971, 11-5) if the change is to be successfully implemented.

The limitation of the Research, Development and Diffusion model was that it assumed a passive diffusion of innovation to teachers, and this proved to be ineffective in initiating and sustaining change. In order to make the process more active and sustainable Havelock (1971) added another stage of *Adoption* to the Research, Development and Diffusion model. The adoption stage, which Havelock attributes to Clark and Guba, involves incorporation of the innovation into the formal system (Havelock, 1971). Guba and Clark (cited by Havelock, 1971) suggested three processes happen under adoption; *Trial* (which is referred to as *implementation* by some authors), *installation* and *institutionalisation*. During the *implementation* stage the new idea is tried, or put into practice. The next stage of adoption, *installation,* involves making the innovation permanent in the implementing institution, for instance by putting it in the examination. The last stage, *institutionalization,* involves building the innovation into the wider system *e.g.* make it a legalized part of the national examination (Havelock, 1971).

Normative re-educative: In this strategy it is believed that people can be re-educated to change from the norm to the new ways. This strategy acknowledges that peoples' behaviour is influenced by their socio-cultural norms and that through direct interventions by change agents people can change their attitudes, values and skills.

The first two approaches were looked at in more detail because they are similar to the approaches used in Lesotho curriculum innovations. So the following discussions are based on those approaches.

The disadvantage of the tendency of governments to centralize educational change, as evidenced by the studies cited by Kennedy (1996), is that centrally managed reforms impede the implementation of change and stifle the development and creativity of teachers. According to Pinto *et al.* (2005), the literature indicates that imposed innovations are often ineffective, and in most cases lead to failure if teachers do not accept or do not understand the innovations. Pinto *et al.* (2005) points out that innovation is more successful when teachers feel some sense of ownership of the innovation. Ware (1999) believes that as long as teachers see themselves as performers of someone else's plans, they will not find it easy to commit themselves to reforms. The implication is that if teachers are not made an active part in the development of the innovation it will not be easy for teachers to take ownership of the innovation, hence it will not be easy to make necessary changes.

Because of the problems experienced through using top-down models, and the experiences of past innovations, Keogh (1987) believes that involvement of the end-user is important in the development of innovations and curriculum materials as it could lead to acceptance and hence more effective implementation in the classroom. The *Periphery-Centre model* (Whitehead, 1980), *Social-Interaction*

model and the *Problem-Solving model* (Havelock, 1971) are models in which it is recognized that innovations should start with the needs of the schools and teachers when designing and implementing a new curriculum. In these models teachers are considered an important part of curriculum development teams. Teacher involvement in curriculum development is claimed to result in increased participation, relevance, ownership, and commitment, so that when things do not go according to plan there is less finger-pointing. Instead all stakeholders (curriculum developers, teachers, school authorities) tend to work towards finding solutions (Kennedy, 1996).

However, even these models are not without fault. They seem to assume that all teachers and schools will have the same needs, and that teachers will react in the same way to a reform. The models also seem to rest on the assumption that schools have well-qualified, motivated teachers, working with adequate resources, and that teachers and schools share the same enthusiasm (Lewin, 1992). The truth of the matter is that schools have different contexts.

According to Hawes (1979), to try to make implementation more meaningful it is important not to take these models as alternatives, but rather as mutually supportive of each other. Dalin and colleagues (cited by Kennedy, 1996) did a study in Colombia, Bangladesh and Ethiopia to find out what characterized successful schools engaged in major national reforms, and they found that both the "centre" and the "periphery" have important roles to play in promoting successful innovations. They therefore recommend appropriate mixing of the approaches. Kennedy indicates the need for appropriate linkage in the roles of the "centre" *e.g.* (a government/ ministry, curriculum development centre) to '*provide long term political support and the necessary pressure for systemic reform*" while the periphery (at the level of the school) "*designs or adapts materials, and conducts staff development and teacher training, both of which are carried out as 'close' to the classroom as possible*" (Kennedy, 1996, 79).

A lesson learned from examination of strategies and models used for innovation is that while there are some successes gained from using these models, they are not without problems. Guthrie (1986) warns that it is imperative that developing countries look critically at the models before they decide which to adopt, so as to enhance the benefit they can get from such strategies.

2.4 POSSIBLE FACTORS AFFECTING SUCCESSFUL IMPLEMENTATION OF REFORM

"Implementation" is explained as putting new ideas into practice (Fullan, 2001). It involves a transition period in which implementers in the context of the school (teachers) become increasingly "*skillful, consistent and committed*" in their use of an innovation (Klein and Sorra, 1996, 1057). If implementation is looked at as a continuum it can range from avoidance of the use of an innovation (non-existent use), to superficial, or partial use, to skilled, enthusiastic, and consistent use (Charter and Jones, cited by Fullan 2001).

According to Rondinelli *et al.* (1990), implementing change has proved difficult even in developed countries like America, with many highly skilled, motivated, and dedicated teachers who are also claimed to receive continuous professional development and support in terms of physical resources. Implementing innovations is likely to be much more difficult in developing countries which lack physical infrastructure, and the experienced professionals needed to ensure successful results (see section 2.5, page 29). Several factors have been identified that could explain why implementing innovation have not been successful, as discussed in the following sections.

2.4.1 Factors associated with curriculum change processes

Top-down management which imposes innovation on users: Curriculum innovations in developing countries tend to be large-scale, national initiatives, and imposed from the top by small groups of specialists (Lewin, 1992). This was the case in Lesotho where the *Science* panel members (a small team) were made up of subject specialists from the *National Curriculum Development Centre* and other members from the education sectors (Trial report, undated). The assumption is that implementation will be unproblematic and that the innovation will be implemented more-or-less as planned. One problem, as indicated by Sergiovanni (1998) cited by Rogan and Grayson (2003), is that changes and innovations implemented through bureaucratically structured education systems tend to be far removed from the realities of most classrooms in developing countries. Innovations often require skilled, well qualified teachers who can understand and internalize the new approaches, which is often not the case in real situations. As a result problems manifest themselves in the gaps between the *intended curriculum* (as expressed in policy document), the *implemented curriculum* (expressed by real life in schools and classroom practices), and the *attained curriculum* as expressed by learners' experiences (Fogleman and McNeil, 2005).

Hall and Hord (2006), however, believe that top-down management can work as long as it is accompanied by continuous communication, ongoing teacher development programmes, continuous monitoring and feedback, and realistic timelines for implementation.

Lack of explicitness regarding the changes required: Lack of clearly stated, known and agreed upon goals of an innovation is one of the reasons that led to failure of many curricula in the 1960's (Yager, 1992). According to Fullan (2001) the extent to which an innovation will be implemented as planned depends upon the extent to which users are clear about it. Ogborn (2002) warns that the receivers of innovations will make their own sense of what is been communicated to them, if communication is not clear. Appropriate policy documents play an important role in helping teachers understand the various components of an innovation such as its "*philosophy, values, assumptions, objectives, subject matter, and implementation strategies*" (Fullan and Promfret, 1977, 364). Lack of such information denies teachers an understanding of what they have to do, and thus inhibits successful implementation of the innovation.

Reforms which are too ambitious and which ignore classroom realities: Some of the problems of implementation seemed to have originated from the problem of design (Rondinelli *et al.*, 1990).

Selecting objectives that are feasible and sustainable within the constraints of available human, financial and technological resources would be the first step that would lead towards assuring effective implementation (Rondinelli *et al.*, 1990). However, this was not found to be the case in most innovations carried out earlier in many parts of the world. A review study of innovations by Fullan and Promfret (1977) found that many curriculum innovations involved as their main objective an *"increase in student autonomy and control over their classroom learning situations and … foster learner-directed inquiry-modes"* (Fullan and Promfret, 1977, 337). This requires learners who can think independently and be willing to seek additional information. Teachers are asked to think of learners as being capable of making their own choices, as I indicated in Chapter 1, section 1.3.2. This implies that student/teacher roles have to change with the teacher being more of a facilitator than a director of learning. Such demands are often unrealistic in real life.

Most of the innovations reviewed by Fullan and Promfret (1977) were found to be highly ambitious and unrealistic as they introduced new processes to teachers who had little or no experience in the new approaches which were required. Teachers were expected to develop practices that varied significantly from the way they taught, and that were more complex than what they were used to doing daily, and in most cases different from the kind of professional training they had gone through (Ball and Cohen, 1999). According to Ball and Cohen

> *"they must do so with materials that often under-support the goals towards which they are to work, in the face of assessments that are weakly aligned with materials and goals, and without adequate opportunities to learn"* and all *"these encompass an ambitious set of aims."* (Ball and Cohen, 1999, 1)

The above quote suggests how ambitious and complex approaches like learner-centredness may be. They look attractive on paper but are not practical in real situations. Carless (1997) and Jones and Eick (2007) suggest that less ambitious approaches (looking at achievable goals) and more gradual implementation are more likely to lead to feasible change.

Lesotho could easily fall into the above-mentioned trap, as the new curriculum is meant to move from teacher-centred pedagogy to learner-centred learning, with more involvement of learners in the learning and more concern for the development of skills and appropriate attitudes. But to be able to achieve all these requirements needs well-qualified, motivated teachers working with adequate resources, and who understand and have internalized the needs of the new curriculum. The implication of this is that if change facilitators had been aware of the problems brought about by such ambitious innovations, they could have avoided them and could have considered the context of the schools where innovations would be implemented, and attempted smaller, less ambitious improvements.

Mismatch between innovations and mode of assessment: Often lack of alignment has been observed between intended curriculum changes and other system components such as teacher education, and assessment or examination programmes (Fogleman and McNeill, 2005). Lewin (1995) cites a study in which examination papers from eight countries in Africa were analysed, and it was found that examinations were still dominated by recall questions and that there were few, if any, questions that were meant to measure affective outcomes as required by the new curriculum in those countries

(Lewin, 1995). Even the countries that claimed to have reformed their examination and assessment systems so that examinations reflected more of the curriculum objectives were found not to have changed sufficiently to reflect the requirements of the new goals (Lewin, 1995). The content of examination items rarely changed, and their styles and quality often fell a long way short of comprehensively assessing key aspects of new science curricula (Lewin, 1995). As a result, backwash from examinations was found to be undermining instead of reinforcing fundamental changes (Lewin and Stuart, 1991).

What countries embarking on curriculum reform have to learn from these experiences is that attention of reformers should be focused holistically on the design of the curriculum from teacher training down to the mode of examination. According to Lewin (1995) curriculum reform can be reinforced if changes in the examination items closely reflect learning goals emphasized by the curriculum. This claim is supported by the changes made to the Israeli education system in the 1960's and 1970's. Because they realized the importance of assessing all objectives which appeared in the curriculum, curriculum developers were allowed to develop their own examination that would align with the curriculum (Sanders, 1993). They developed an examination format that ensured that skills were taught, and that meaningful practical work was done (Sanders, 1993).

In-service training that does not address the concerns of teachers: Fuller (cited by Hall and Hord, 2006), using her experience as an educator, came up with a model that could be used to explain teachers' responses when they are first confronted with innovations. According to Fuller (1969), when people are first confronted with change they approach it with mixed feelings irrespective of how good and valuable the change is. There are several reasons for this. Firstly, they are uncertain about the demands of the change. Secondly, they often doubt their ability to succeed in the implementation of the new ways. Thirdly, they may be "grieving" the loss of old ways of doing things (Hall and Hord, 2006). Because of the above-mentioned feelings, when teachers interact with the innovation they may accept, reject or modify some parts to make it suit their particular context (Pinto *et al*., 2005). The innovations get transformed in the process, as "*the new and old overlap to create a zone of turbulence and challenge*" (Pinto *et al*., 2005, 39).

Fuller came up with a useful model relating to concerns teachers in a training programme go through, and according to Hall and Hord everyone goes through the same stages when they are confronted with an innovation (Hall and Hord, 2006). Fuller (1969) originally put the concerns into three stages *pre-teaching phase concerns, early teaching phase concerns* and *late concerns*. But Hall and Hord (2006) developed the model by adding additional stages and sub-stages. These stages may not be helpful in designing my research, but they will be very helpful in the analysis of the data as they will help me to understand the position of the science teachers in Lesotho.

The stages of concern do not necessarily follow a particular sequence, and teachers do not necessarily go through each stage. However, Fuller (1969) found that the concerns of inexperienced teachers seemed to occupy the "self and task" stages while those of experienced teachers were in the "task and impact" stages. Empirical evidence from the study of Pigge and Marso, cited by Stronkhorst and van

den Akker (2006) indicates that teachers concerns for their own survival decrease as they become more successful with their teaching efforts, and that this shift leads to more concerns about the actual teaching.

Table 2. Stages of concern (based on Hall and Hord, 2006)

Stages of concern		Expression of concern
Unrelated concerns	Awareness	Teachers' concerns are not related to teaching but focus on outside things.
Self concerns	Informational	Teachers would like to get more information about the innovation.
	Personal	Teachers show concern about whether they will cope with the demands of the innovation.
Task concerns	Management	Teachers' concerns start to focus on how best to put the changes into practice.
Impact concerns	Consequences	Teachers start asking questions about the effects of the innovation on clients.
	Collaboration	Teachers wonder about how they will collaborate with colleagues in the use of the innovation.
	Refocusing	Teachers concerns focus on finding more ways of improving on the innovation and presenting it the best way they can.

The implication of "stages of concern" is that change facilitators have to be aware that teachers may have different concerns as a new curriculum is implemented. At the start of the innovation most tend to have concerns at the "self" (informational and personal) stage. This includes even the experienced teachers, as changes make them novices again (Fogleman and McNeil, 2005). Hall and Hord (2006) warn that change facilitators should be understanding and empathetic for teachers'concerns, and their intervention strategies should be aligned with teachers' concerns. Unfortunately this is where the root of the problem lies, because if change facilitators do not know what the teachers' concerns are, then their in-service training will not necessarily meet the teachers' needs and, as Fuller (1969) points out, teachers will find the training irrelevant as it does not answer the questions they are asking.

Inadequately trained facilitators: Inadequately trained change facilitators can seriously impact on how information is passed on to the implementers. For successful implementation, changes have to be introduced to the users effectively (Fullan, 2001), and this requires knowledgeable and experienced change facilitators. According to Hall and Hord

> " *a major reason that widespread change often occurs only modestly across a school is that implementers, change facilitators, and policymakers do not fully understand what the change is or what it will look like when it is implemented in the envisioned way.*" (Hall and Hord, 2006, 11)

However, Fullan calls for empathy towards people in authority positions who are given the responsibility of leading implementations they may not understand. Their lack of understanding may be because, one, the innovation was not well developed; two, they may not have been involved in deciding on the change; and, three, they may not have received adequate orientation or training themselves (Fullan, 2001).

2.4.2 Teacher-related factors

According to Jita (1998) we should not limit our understanding of resources to financial or material resources but should include other resources that influence classroom practices such as

> "*human resources (teachers, learners and parents), knowledge of (science, science education and the transformation agenda), time (deployment of teachers, learners and parents), sense of mission and commitment (among educators, learners and parents)*" as well as "*textual material (especially textbooks and syllabus documents)*" (Jita, 1998, 52).

Teachers are considered to be key to the successful implementation of new curricula, as they are the means used to turn innovations into classroom realities (Pinto *et al.*, 2005). Teachers are expected to adopt the new ideas and implement them in their teaching *i.e.* change in curriculum requires change in teachers' practices (Fullan, 1991). These demands put strain on teachers as it requires them to change their practice and resume the role of "novice" again (Fogleman and McNeil, 2005).

Factors affecting behaviourial change in teachers: If we view the changes that teachers are required to make in their practices as behaviours, then examining theories of behavioural change, and factors affecting such changes, can be extremely helpful in identifying factors which might inhibit curriculum innovation (Sanders, 2006a). One such theory is the Theory of Planned Behaviour (Ajzen and Madden, 1986).

The Theory of Planned Behaviour emphasizes the influence of traditional norms (accepted beliefs and practices), as well as individual's beliefs and attitudes, on their intentions to change. Their intentions, in turn, affect their behaviours. Another factor that can influence teachers' intention to change is their perceived behavioural control. Perceived behavioural control is concerned with the extent to which people believe they can successfully perform certain behaviours (Sanders, 2006a).

Perceived behavioural control has much in common with the concept of self-efficacy. Self-efficacy refers to how teachers assess their competencies according to the standards teachers have set for themselves, such as attainment of their goals exhibited through student performance, and feedback from the students, peers and parents (Stein and Wang, 1988). Stein and Wang (1988) found that teachers' perceptions of their self-efficacy are related to successful implementation of an innovation as positive perceptions are associated with increased student learning and higher percentages of programme goals being achieved. They found that teachers' efficacy has been correlated with their capabilities, willingness, commitment, and motivation to implement innovations (Stein and Wang, 1988). The sense of achievement of goals develops a positive perception of self, which influences teacher motivation and in turn influences future behaviour and learning of students (Stein and Wang, 1988).

Teacher self-efficacy regarding implementing an innovation has important implications for teachers who are expected to make changes, because teachers will have different beliefs concerning constraints imposed by the school such as covering the syllabus and preparing for examinations. This creates a tension between the need to cover the syllabus and teaching for understanding.

Perceived value of the innovation: "Perceived value" refers to how teachers perceive various components of the programme they are going to implement (Stein and Wang, 1988). If the goals and values of the programme are not seen to be in line with those of the teacher then the chances of the innovation being superficially implemented, or not being implemented at all, are very high. On the other hand, if the suggested values are found to be congruent with teachers' beliefs then they are more likely to be implemented. According to Stein and Wang (1988) perceived values of innovations are found to be related to:

1. whether teachers believe the programme will work and have a positive impact on their students'
2. whether the proposed changes could lead to the teacher's professional growth, and
3. the values the community places on the innovation.

In addition to perception of self-efficacy and perceived values of the innovation suggested by Stein and Wang (1988) two other factors are found to contribute to teachers' failure or success in implementing an innovation, as indicated in the following paragraphs.

Inadequately qualified teachers and the level of training: According to Rogan and Grayson (2003) there are other factors which influence whether teachers change and how fast they change, such as the teachers' content knowledge, and training. Empirical evidence from a study done by Bajah, 1991 (cited by Lewin, 1995) indicates that well-trained teachers were better able to understand the complex spiral structure of their science curriculum, while the spiraling was found to be a confusing repetition of topics by the under-trained teachers.

Training of teachers is a crucial step for successful implementation, so that teachers understand what the changes are and how they can put them into practice (Rogan and Grayson 2003). The study by Stein and Wang (1988) showed that teachers can successfully implement required changes if they are given appropriate training that provides necessary knowledge and skills development. Training also helps foster teachers' interest and commitment to continue using gained expertise. Teachers require training in the skills required by new practices and "*time and space are important as teachers adjust their attitudes and beliefs and move through the psychological processes associated with change*" (Kennedy, 1996, 81). Beeby (1966) warns that it is important to take teachers level of change into consideration. In Beeby's experience teachers cannot all be expected to reach the same level of development even when they are given training and support. Beeby (1966) put teachers into four progressive stages moving from the lowest to the highest level of qualification. He believes that when given training, teachers in each stage can only reach a certain level of change, and that only a few of the very good teachers can manage to reach the highest level of attainment. The implication of this is that expecting teachers at lower levels of qualification to implement learner-centred approaches is not a realistic demand for teachers who lack the knowledge and the skills.

Teachers should also be given continuing support and constant monitoring of their implementation progress (Stein and Wang, 1988). However, research (Lewin, 1992; de Feiter and Ncube, 1999; Ware, 1999) indicates that teachers often receive short in-service training to inform them about innovations in the form of workshops which have very little impact on classroom practices. A study in Malaysia

(Sharifah *et al*., cited by de Feiter and Ncube, 1999) found that although teachers in the study seemed happy with content of the in-service education provided, it had little impact because the course was too short to be effective.

Successful implementation depends on the existence of a well-trained workforce (Lewin and Stuart, 1991). However, Ware (1999) indicates that there is an insufficient supply of adequately trained science teachers in developing countries. The situation is further compounded by the large number of science teachers who leave teaching posts every year (Ware, 1999).

Lack of appropriate support material for teachers: Teacher support materials serve as a compass that gives teachers direction on how to enact the curriculum (Schneider and Krajcik, 2002). According to Collopy (2003) teacher support materials are an integral part of teachers' daily work as they support classroom instruction. Stronkhorst and van den Akker (2006) point out that curriculum materials can play an important role in implementation as they clarify to teachers the implications of innovations and how they can be implemented. This is very important in the early stages of implementation. Having a clear direction on how to go about implementing the curriculum helps reduce early implementation concerns of teachers (Stonkhorst and van den Akker, 2006). Ball and Cohen (1999) indicate that support materials can be educative, as they provide support for teachers to think about the context of their classrooms, and to plan and structure students' activities.

Ottevanger (2002) sees teacher support materials as catalysts of curriculum change. In chemistry catalysts are important as they reduce the activation energy needed to start chemical reactions. In a similar manner, well-prepared teacher support materials can catalyse implementation by reducing the load and effort expended by teachers as they make the changes expected of them. The support materials can help teachers overcome the barrier of uncertainty, reduce the amount of work involved in implementing the new approaches, and reduce stress levels. They can also orientate teachers to new subject matter and new teaching methods (Ottevanger, 2002).

Suitable policy documents, textbooks, and teachers' guides can provide support for teachers, but policy documents are often less accessible for teachers than the other two resources. According to Jita (1998) carefully constructed syllabus documents make teachers' work easier, facilitating changes in schools. In a study done by van den Akker and Keursten it was found that use of "*specially designed teacher materials with concrete procedural suggestions*" on how to execute the innovation played an important role as they led to a higher degree of implementation (cited by van den Akker and Voogt, 1994, 509). The problem, however, is that few reform-based curriculum materials have been explicitly designed to support teachers' learning.

Although textbooks are support materials for learners as indicated below, they can also serve as support documents for teachers. Ensor *et al*. (2002) and Jita (1998) claim that textbooks are important support documents for teachers, as textbooks help them plan their lessons and construct questions, and provide work for their learners.

When the new *Junior Secondary Science* curriculum was implemented in Lesotho prescribed science textbooks were distributed to schools along with syllabus documents as support materials meant to guide teachers through the change process.

2.4.3   Physical resources

Lack of support materials for learners: According to Carless (1997) for an innovation to be successful it has to be well resourced with good quality students' materials. Textbooks play an important role in promoting student involvement in lessons, and have a major impact on achievement in most subjects as they serve as the main source of authoritative information accessible to most learners (Lewin and Stuart, 1991). According to Ball and Cohen (1999) textbooks can mediate how students engage with the content to be learned. Research has shown that presence of appropriate textbooks, although costly, has positive implications for students' learning (Walberg, 1991; and Montero-Sieburth, 1992). However, if materials are not of good quality, or "*do not accurately reflect the principles of the innovation, their production may be counter productive*" (Carless, 1997, 361). Lack of appropriate resources, mainly textbooks, has been identified as an implementation problem in many developing countries (Guthrie, 1990; Walberg, 1991; Tabulawa, 1997). In South Africa a review of the new curriculum implemented in 1998 revealed that in some cases old books which were not designed for the new curriculum were being used (Chisholm *et al.* 2000).

Lack of equipment: Guthrie (1990) asserts that in developing countries teachers have often been held responsible for the failure of an innovation, and argues that focus should rather be directed at the context and local conditions which make implementation difficult, even for good teachers. Rogan and Grayson (2003) claim that the lack of resources or the poor quality of resources, have often been identified as undermining the effort of even the best teachers, and can seriously hinder the implementation of the new ideas. The results of studies done in Nigeria by Adeniyi, cited by Walberg (1991) and in Botswana (Tabulawa, 1997), show that implementation was unsuccessful in those countries because of inadequate resources, amongst other factors.

2.5 CURRICULUM CHANGES IN DEVELOPING COUNTRIES

There is lot of literature on curriculum innovation in developing countries (Beeby, 1966; Guthrie, 1990; Walberg, 1991; and Tabulawa, 1997). Most of these reforms were adoptions of what seemed to be "ideal" science education systems from developed countries. Little effort was made to look at the feasibility, appropriateness or sustainability of such systems in the context of developing countries (Stronkhorst and van den Akker, 2006). These reforms did not live up to the expectations of their reformers. In some cases they were superficially adopted, and in others not successfully adopted at all, as illustrated by results of the studies done in Africa, discussed next.

In a study done by Tabulawa (1997) in Botswana, the Education Department had advocated that teachers should shift from their usual practices as providers of information to a learner-centred approach. In this study Tabulawa found that teacher-centred teaching persisted with teachers

emphasizing "correct" answers, and ignoring wrong answers. Mass teaching occurred, with teachers asking close-ended questions which were said to alienate students. Most importantly, students and parents expected teachers to impart knowledge to the learners in preparation for the examinations. This rendered dysfunctional the interactive, flexible practices that characterize learner-centred teaching, which was the intention of the reform. Tabulawa attributed the reasons for failure to the imported "bureaucratic-authoritarian" model of education imposed on Botswana prior to independence. This was further compounded by lack of adequate human resource development and lack of physical resources which seemed to have been overlooked by the reformers (Tabulawa, 1997).

Similar results were obtained in the studies done in Nigeria by Adeniyi, cited by Walberg (1991) where implementation was found to be unsuccessful because of foreign language barriers, inadequate resources and lack of trained science teachers (Walberg, 1991). Inadequate training of teachers to meet the needs of the innovation in developing countries seems to be a common problem (Beeby, 1966; Guthrie, 1990).

2.6 CONCLUDING REMARKS

This chapter provided an overview of the models that explain curriculum innovation and a theory of curriculum reform, and how understanding these may help countries intending to implement innovations.

What became evident from the literature is that implementation of an innovation is not an easy task anywhere, but is much more problematic in developing countries. Several factors have to be taken into consideration before embarking on an educational change, as they can hinder change or make it successful. This information will be helpful in the analysis and intepretation of data as I am looking at factors affecting the implementation of the new curriculum in Lesotho.