CHAPTER 3

THE STRUCTURE, NATURE AND INTRODUCTION OF THE NEW BASIC EDUCATION CURRICULUM (BEC) IN MOZAMBIQUE

3.1   INTRODUCTION

Chapter two of this study embraced a theoretical and conceptual exposition of the premises that underpin curriculum development and the associated approaches. Chapter two, therefore, provides the basic background required to understand and interpret the present chapter which, in turn, provides an overview of the nature, structure and implementation of the new basic education curriculum in Mozambique. It also reviews the policy and implementation strategies involved in setting up the curriculum, with particular reference to resources, management, monitoring and support at local and national levels.

This chapter reviews the overall process of curriculum development, with special reference to the main conceptual features and practical initiatives within the scope of the new curriculum, and more particularly, the *intended curriculum*. Thus, chapter three explores the possibility of effective implementation of the new curriculum in light of contemporary and pertinent lessons drawn from relevant literature. This preliminary information is taken into consideration in analysis and discussion of results of the empirical investigation in chapter 6. Therefore, by comparing the *planned curriculum* and the *actual school curriculum* it offers valuable opportunity for critical evaluation of the first year of implementation of the new curriculum, and therefore for the articulation of pertinent recommendations with a view to further successful implementation in years to come.

3.2   THE STRUCTURE OF THE NEW CURRICULUM

The basic structure of primary education remains unchanged: seven grades divided into Lower (Grades 1 to 5) and Upper Primary (Grades 6 and 7) levels. This basic trajectory is now subdivided into three learning cycles: Cycle One (Grades 1 and 2); Cycle Two (Grades 3 to 5); and Cycle Three (Grades 6 and 7).

The introduction of the substructure of learning cycles within the general preexisting structure is explained in section 3.3, with particular reference to the introduction of semi-automatic promotion within the ambit of learning cycles. Other changes to the structure of the former basic education curriculum are explained in sections 3.3.3 and 3.3.4.

3.3 POLICY THAT INFORMS AND INNOVATIONS SUBSUMED BY THE NEW CURRICULUM

The new Basic Education Curriculum is intended to capture and entrench the objectives of Basic Education into the Education System of Mozambique as defined by the National Education System Act (Act 6 of 1992). It is also supported by the National Education Policy and Strategies for Implementation defined by Cabinet Resolution 8 of 1995, which states *inter alia*:

> Primary Education is the backbone of the educational system. It derives this important position from the role which primary education plays in the process of socializing children, in transmitting essential knowledge such as reading, writing and arithmetic, and in transmitting experiences and values which are commonly accepted by our society.

The Basic Education Curriculum Plan, known as PCEB (2003: 24-40) seeks to make primary education more relevant by introducing innovations in the New Basic Education Curriculum, as discussed in detail in the following sections.

3.3.1 Learning cycles in the structure of the new basic education curriculum

These are learning units, divided into three stages, aimed at developing skills and specific competences.

- The first learning cycle (Grades 1 and 2) is intended to develop skills and competences in reading and writing, numeracy involving basic calculations: addition, subtraction, multiplication and to division; observation (e.g length estimation); basic personal hygiene and sociability rules, self-respect and preservation of environment.
- The second learning cycle (Grades 3 to 5) is intended to deepen the knowledge, skills and competencies acquired in the first learning cycle, as well

as to introduce new subjects such as social and natural sciences, including the ability to calculate surfaces and volumes.

- The third learning cycle (Grades 6 and 7) is meant to broaden the knowledge, skills and competencies acquired in the previous learning cycles and to prepare the learner for more advanced learning towards a paid occupation. English is introduced in this learning cycle.

As noted in section 3.3.7, grades are not repeated within a cycle in that progress to the end of the cycle is automatic, whereas previously the learner faced a pass/fail barrier at the end of each grade (see section 3.3.7)

3.3.2 The Integrated Basic Education Curriculum

The Integrated Basic Education Curriculum in Mozambique is the complete primary education cycle of seven grades, articulated in terms of structure, objectives, contents, didactic resources and classroom practices, devised with a view to articulated development of knowledge, skills and values in all learning areas in conjunction with extracurricular activities. The implementation of new curriculum is supported by a school evaluation system that integrates the summative and formative components. The hidden curriculum is also taken into consideration. The interdisciplinary approach has been adopted as a strategy to integrate the new curriculum expressed by Barnes (1982:124) as *integration in correlating distinct subject-matters*.

3.3.3 Curricular areas in the structure of the new curriculum

Curricular areas subsume subjects that are grouped together for the same purposes or for related purposes. This concept was developed as a corollary of developing an interdisciplinary approach to school subjects instead of adopting conventional individualized approach. The purpose of the interrelated approach was to enable and supplement mutual support. According to Rasool (1999:179) curricular areas are "learning areas organized so that learners go beyond isolated facts, make connections across disciplines and help shape a more holistic view of life". With this in mind, the curricular areas were devised to ensure that schools offer learners a wide vision by integrating knowledge.

The integrated Basic Education Curriculum comprises three comprehensive curricular areas, namely:

- Communication Skills and Social Sciences
- Mathematics and Natural Sciences
- Practical and Technological Arts

The curricular area of Communication Skills and Social Sciences includes the following subjects: Portuguese Language, Mozambican Languages, English Language, Music Education, Social Sciences, Civic and Moral Education. The curricular area of Mathematics and Natural Sciences comprises no more than these subjects, while Practical and Technological Arts consists of crafts, visual arts and physical education subjects.

3.3.4 Mozambican languages in the new curriculum

The introduction of indigenous languages in the education system is intended to give the learners the opportunity to start their learning, reading and writing, as well as basic arithmetic, in their home language with a view to preserving and promoting the value of cultural identity, to promote awareness and respect fort their rights, and to reduce the gap between home language and medium of instruction at school.

The curriculum envisages the introduction of Mozambican languages in school according to the following programme:

- Introduction in a *Mozambican Language* for the first two school years, with a gradual shift to *Portuguese* after that period. Meanwhile *Portuguese* is taught as a subject from the beginning of schooling.
- Introduction in *Portuguese* with a *Mozambican Language as resource*
- Introduction in *Portuguese* with a *Mozambican Language* as a subject

The bilingual programme was introduced in linguistically homogenous areas and was not to be compulsory.

3.3.5 Curriculum innovation

The new school curriculum comprises a Core Curriculum and a Local Curriculum. The former is centrally planned by INDE and constitutes 80% of the curriculum, while the later is planned locally and constitutes 20% of the curriculum. The overall amount of time allocated to Core and Local curriculum is calculated on the basis of the allocated time for each subject for the duration of a year according to the Study Plan. The Local Curriculum can be an extension of the content of the core curriculum, or an addition of new topics and skills required by the community. Skilbeck (1998:134) contends in regards to the need for power devolution in matters of curriculum policy that local curriculum "is an emerging challenge to schools to take a more creative and energetic role in determining what is to be taught as well as how to teach it".

3.3.6 New distribution of teachers according to the new Basic Education Curriculum

As with the old curriculum, the new Basic Education Curriculum requires that each class at the lower primary level (Grades 1 to 5) be taught by a single teacher. In contrast, whereas at the upper primary level (Grades 6 and 7) each of seven subjects was taught by a single teacher under the old dispensation, the new dispensation comprises eleven subjects and each class will be taught by 3 or 4 teachers, which means that each teacher has to teach more than one subject.

3.3.7 Semi-automatic promotion or normal progression

Under the new dispensation learners do not repeat grades within cycles (see above), but move automatically to the next class. The study carried out by Assis *et al.* (1999) in the context of Educational Assessment in Mozambique shows that student performance does not necessarily improve with repetition. Conversely, the risk to fail again and to drop out is high due to lack of motivation that results from failure.

The above findings agree with most educational researchers e.g. Lorence *et al.* (2002:14) who contend that "grade retention practices are ineffective in remediating the academic performance of low-achieving students". In this regard, Manacorda (2006:2) notes that "in many developing countries grade retention policies are often

accompanied by low enrollment and high drop out". Mozambique is no exception: before introducing the new curriculum the repetition rate, for instance at EP1, averaged 25%, while the drop-out rate at this level was estimated at 15% (ESSP, 1999-2003).

As noted by Bennell (2002:1183), "the repetition rate is a particularly good indicator of the quality of education that is offered." The issue of quality became one of the big concerns in Mozambique. It was realized that efforts to ensure access to schooling for increasing numbers of children with a view to achieving Universal Primary Education (UPE) by 2015 would only succeed if the quality of education improved over time, while, at the same time, large numbers of new schools and classrooms were built. The new Curriculum of Basic Education in Mozambique is part of a strategy to ensure the desired quality. It, therefore, implies a new curricular organization, new content (learning experiences), innovations in teaching and learning methodologies and new methods of performance evaluation (including semiautomatic progression), all of which are now under discussion.

It is critical to note that semiautomatic progression is not a panacea for the high failure rate in Mozambican schools. It is at least a partial remedy, however, in that it allows a reasonable amount of time (within particular cycle) for poor academic performance to be brought up to standard in spite of differences in students' rate of learning. This principle (latitude for differences) is in line with Broussard (2002:71), who asserts that "each student is different, and …each situation is unique and must be handled with lots of thought." Semiautomatic progression is by no means widely accepted since it is considered to be promotion that is not supported by relevant performance since students will pass regardless of teachers' or students' efforts, or lack thereof. Concern about this principle is not confined to Mozambique but is felt in other parts of the world on remarkably similar grounds voiced not only by parents and the public at large, but even by some scholars.

Encapsulating the arguments against automatic progression and in favor of grade repetition, Manacorda (2006:3) notes the following:

> (1) Grade retention might reinforce a student's knowledge or discipline, with potential beneficial effects on his outcomes; (2) additional

exposure to teaching (repetition) might strengthen a student's background making him more apt- and hence presumably more likely- to pursue higher levels of education; (3) experiencing the penalty of repeating a grade might also make a student less likely to want to experience this again, hence creating an incentive for him to improve his school performance, possibly because of the increasing marginal cost of repeating an additional grade (this is the strongest argument of grade repetition); (4) repetition might also potentially help improve the quality of the match between the school and student. This might happen if a child's development makes him more apt to attend a certain grade at a later age or if changing peers (and possibly teachers) leads to an increase in a child's productivity.

Meanwhile, Assis *et al.(*1999) like Lorence et al. (2002) and other researchers argue in favour of automatic progression asserting as noted by Manacorda (2006:4) that: (1) "there is a widespread view among psychologists and members of the pedagogical profession that early grade failure does not lead to any improvement in school", but predisposes learners to drop out, with negative or non-positive consequences for their socio-emotional adjustment; (2) grade retention causes: (a) low self-esteem, probably because students are marginalized or shamed or stigmatized by peers, teachers or family to punish their failure; (b) lower expectations held by the student or those around him/her; or (c) the disincentive of "the cost of having to readjust to a new class (and possibly a new teacher) as a result of repetition"; (3) grade failure may worsen a student's school outcomes.

The researcher cannot support either of these arguments, which hinge on passing or failure. Rather: "The prime task of the education service is to promote **learning**, whether this is of young children, adolescents or adults." (Bush, 2000: vii). It is essential, therefore, to ensure that students are promoted because they have acquired the knowledge and the skills specified in their education curriculum. Automatic school progression is only meaningful in a supportive learning environment created by committed teachers who enable students at risk of academic failure to enhance learning outcomes. Incidentally, Waxman and Chang (2006:14) aptly note that:

> The educational failure of students is indicative of the failure of the school to teach and connect to students' lives in meaningful ways. Re-examining the classroom learning environment may assist educators in

reorganizing the ecology of the classroom as an environment that can provide success for all students.

Ultimately it serves no purpose to pass students who have not gained the requisite knowledge and skills, unless pedagogical measures are taken to fill their gaps and improve their capacity to learn (e.g. by improving learning environment). The argument that repetition is a punishment that works as an incentive for more commitment to learning and hence improved performance does not take into consideration that "student achievement can only be enhanced when the nature of the pedagogy required is targeted with precision and implemented with rigour, and with assessment for outcomes that is in tune with the entire process" (Lovat & Smith 2003:74). Furthermore, as Dool Jr (2002:54) emphasizes, "in this new era control (discipline) is seen as being embedded within, not as lying outside or imposed on…" Thus, the student's attitude to learning should be shaped by the interaction between student and teacher through continuous and formative assessment. If the school learning conditions do not enable effective support for all students, efforts should be made to create such conditions. Grade retention and automatic progression will make little difference on their own without supplementary pedagogical measures ensuring learning effectiveness, which leads to enhanced student performance.

3.3.8 Learner - centred approach to teaching and participatory methods

A student-centred learning approach is intended to encourage students to take more responsibility for their own learning (Scott, Buchanan & Haigh, 1997; Middlewood & Burton, 2001). Traditionally, before the new curriculum, teaching in Mozambique tended to be very formal and teacher centered. According to Assis et al. (1999:2), the curriculum had the problem of "focus(ing) mostly on memorization and mechanized procedures rather than challenging pupils to demonstrate all their skills and abilities". Conversely, the new curriculum encourages a learner-centred approach. For example, as observed by Terwel (1999:197) who states that:

> As a consequence of many years of study, researchers now know that learning through interaction is a promising option. Under certain conditions and certain purposes, forms of cooperative learning have proved to be motivating and effective.

As noted by Scott, Buchanan and Haigh (1997), therefore, the new approach encourages leraners to take more responsibility for their own learning. Van der Akker (2004) warns that learner-centered approach requires exceptionally specialized knowledge of particular disciplines and a flexible pedagogical repertoire in order to respond adequately to learners' views, questions and interests. The effectiveness of the new curriculum hinges critically on fulfillment of this condition. Accordingly (ESSP, 1999-2003 and ECSSP, 2006-2010/2011), the Mozambican Ministry of Education and Culture will assign without fail the highest priority to preservice and inservice training and on building institutional infrastructure for such training and pedagogical support.

3.3.9 Brief comment on structure, policy and innovations of the New Basic Education Curriculum in Mozambique

As noted in chapter one, the structure, policy and innovations of the new Basic Education Curriculum in Mozambique were defined on the basis of consensus building following a consistent and coherent policy dialogue. This policy dialogue involved not only specialists in education, high-ranking personnel in educational administration and teachers, but also relevant stakeholders, parents and members of general public. In concert with Fullan (2001:49), the researcher concludes from the structure policy and innovations introduced with the new curriculum that Mozambique reveals "an understanding of how to get started" on the complex process of curriculum change, but on further consideration it must also be concluded that the Mozambican authorities have yet to understand "how to keep going". The implementation strategies discussed in the next section are an important indication of such understanding. However, it should be realised that despite considerable efforts to the contrary many disserting voices will raise the objection that they were not consulted about the process of curriculum implementation. And in fact, the findings of this study — presented in chapter five and discussed in chapter six — show that a further commitment of time and resources and is required to advocate innovations and improve the capacity of teachers and principals so that they can not only "get started" but "keep going" as part of an essentially indivisible process, to which end sustainability has to become a prominent and continuous focus of attention. Effectively maintenance of the process of curriculum change should be treated as constant renewal on par with initial impetus of start-up or "getting started". Adherence

to this principle in practice will ensure that schools become dynamic units of curriculum change, thus attaining the curriculum objectives.

3.4   CURRICULUM IMPLEMENTATION STRATEGIES

3.4.1   Resources required for Implementation

Critical resource requirements to be prioritize in curriculum implementation strategies were: building and extension of primary-school facilities, upgrading of teacher competence in-service and teacher education (initial teacher training), mainly for the following reasons:

- The education offered at most primary schools does not extend to Grade 7. After Grade 5, therefore, have to move to another school or district. The authorities are gradually upgrading schools' capacity so that learners can complete their primary schooling at same establishment without interruption.

- About 50 000 serving teachers who received short training in a cascade model to implement the new curriculum should receive in-service-training to upgrade their competence.

- The programmes of institutions for primary teacher education were reviewed and new courses were introduced to cover the new subjects introduced by the new curriculum.

In 2002, following approval of the new curriculum framework and preparation of draft syllabi were piloted in 29 schools around the country, with due attention to their setting in urban or rural areas. At same time, private publishing houses were commissioned competitively to produce textbooks and teacher's guides.

In-service training and structural preparation of the school organization for the new curriculum were undertaken at this time. In this regard, Skilbeck (1988:144) concludes from empirical research:

> The chief failing of curriculum development during the past 30 years has been the uncertainty or confusion over teacher roles and

responsibilities and the reluctance or inability to orchestrate change through the active engagement of the teaching profession and the institution of the school.

In similar vein Wenglinsky (2002:24) concludes:

> Schools that lack a critical mass of active teachers may indeed not matter much; their students will be no less or more able to meet high academic standards than their talents and home resources will allow. But schools that do have a critical mass of active teachers can actually provide a value-added; they can help their students reach higher levels of academic performance than those students otherwise would reach. Through their teachers, then, schools can be the key mechanisms for helping students meet high standards.

The considerations above rightly corroborate the principle that teachers hold the key to successful implementation of the new curriculum, which means that their preparation and support must not be neglected (PCEB, 2003).

3.4.2 Curriculum change management

Since the National Institute of Education development (INDE) was mandated to oversee the envisaged curriculum transformation (see earlier) its duties included coordination of the process and ensuring that the design and development process proceeded on a consultative basis. In this regard, the directorate of INDE functioned as the Coordinating Commission for Curriculum Transformation and was assisted at central government level, by a number of management and task force committees, including: the Steering Council for Curriculum Transformation, the Steering Committee for Curriculum Transformation; the Consultative National Forum for Curriculum Transformation, the National Group for Promotion for Curriculum Transformation and Specialist task forces, including the Council for the Evaluation of School Textbooks. The Provincial Group for the promotion of Curriculum Transformation was created at the provincial level. These management bodies were constituted and tasked as follows.

Membership of Steering Council for Curriculum Transformation: Minister of Education, Deputy Minister of Education, Permanent Secretary, Provincial and National Directors of Education. Mandate: Ensure political and technical guidance

and support for the overall process of curriculum transformation.

Membership of Steering Committee for Curriculum Transformation: Directorate of INDE (Project Director — Director of INDE, Head of pedagogical Issues, Head of Teacher Training Issues, Head of Administrative Issues and Coordinator of Assessment Team); National Director of Primary Education, National Director of Technical and Vocational Education, National Director of Secondary Education, Director of Human Resources, Director of National Institute of Teachers Upgrading (IAP) and Heads of Provincial Departments of Pedagogical Issues.

The main tasks of this Steering Committee were to analyze and approves the contributions and suggestions of the National Group for the Promotion of Curriculum Transformation, drafting guidelines for the curriculum transformation process, especially for in-service teacher training and to report to the Steering Council for the curriculum transformation process.

The Consultative National Forum for Curriculum Transformation included members of the Steering Council for Curriculum Transformation, members of the Parliamentary Commission on Education, Gender and Environmental Issues, the Chancellors of Private and Public Universities, representatives of the main religious communities and two prominent political and social figures representing each province, representatives of the main NGOs, and entrepreneurial organizations and Mozambican Unions. It was incumbent on the Consultative National Forum to define the students' learning needs and to scrutinise all drafts of curriculum transformations guidelines with a view to improvement.

The National Group for the Promotion of Curriculum Transformation: Pedagogic advisers, inspectors of education, heads of schools piloting the new curriculum, heads of teacher training institutions, heads and teachers of selected schools on the basis of their successful leadership and pedagogical practices.

The main functions of the National Group were: (a) to promote the process of curriculum transformation in all provinces; (b) strengthen and enabling the provincial department for pedagogical issues with appropriate strategies for each of the phases

of curriculum transformation and respective activities; (c) conduct capacity building towards curriculum transformation management; (d) select and ensure the participation of a group of teachers in the process of writing curriculum resources materials; (e) ensure consultation on critical issues regarding the process of curriculum transformation in school circles, known as Pedagogical Influence Zones (ZIPs) and communities around the schools, including parents; (f) submit the respective suggestions to Steering Committee of Curriculum Transformation; and (g) monitor and support pilot schools and (h) and introduce the new curriculum nationwide.

The specialist task forces were technical working groups consisting of specialists in different academic disciplines such as Linguistics, Literature studies (Portuguese), Sociology, Psychology, Teaching Methodologies, Ethics, Mathematics, Natural Sciences, Physical Education, Music and Arts. Some were members of INDE subject related working groups, others were primary education teachers under the supervision of professors of acknowledged competency from the Pedagogical University and Eduardo Mondlane University. The specialists' task forces were structured and organized in accordance with the subjects forming part of the new curriculum, articulated vertically to guarantee the sequence of contents, and horizontally around learning cycles to ensure interdisciplinary integration.

The first groups were known as subject panels and the last groups as learning-cycle groups. While each subject panel joined together all specialists or teachers of the relevant subject (from Grade 1 to 7), the learning-cycle groups joined together the leaders of different subjects for each cycle. These groups were mandate to produce the framework of the new curriculum (Integrated Curriculum Plan for Basic Education) and the syllabi for subjects and learning cycles in light of recommendations of the Consultative National Forum for Curriculum Transformation.

As the name indicates, the Council for Evaluation of School Textbooks was set up to assess the quality and validate the proposal of school textbooks, including the teacher guides for the new curriculum, produced by private publishers with involvement of teachers and Mozambican specialists.

Each of the 11 provinces, including Maputo City, appointed a Provincial Group for the Promotion of Curriculum Transformation. Each group consisted of 30 members, including provincial pedagogical advisers and inspectors, selected heads of schools and of teacher training institutions, trainee teachers, primary teachers, and coordinators of ZIPs, all of whom were selected on the basis of their leadership and acknowledged pedagogical practice. The provincial groups were led by the provincial Head of Pedagogical Issues.

The main task of provincial groups was to promote and support the activities of Curriculum Transformation at provincial level, in alignment with the role of the National Group for the Promotion of Curriculum Transformation, with which they were integrated.

3.4.3   Monitoring and support of curriculum change process

Basically, the bodies of curriculum transformation management, especially at the provincial level, had the obligation to monitor and provide the necessary support to schools in the process of implementing the new curriculum. Other than the curriculum design and development roles, INDE had to fulfil the educational research function, for which it has set up the monitor group, known as an ethnographic group, and supervision group to coordinate the overall process of curriculum transformation.

3.5   NATIONWIDE IMPLEMENTATION OF NEW CURRICULUM

As indicated earlier, the implementation of the new curriculum from national to local level reflects generic characteristics of managerial and systems approaches of curriculum and of the curriculum development model proposed by Tyler (1949).

The main weakness of the nationwide curriculum transformation process, was the fact that it was conceived and executed as a specific project to be completed within a finite period, which meant that at the end of the projected period the implementation structures lost impetus or became defunct whereas as noted earlier (*cf*. 3.3.9), curriculum development has to be constantly maintained actively supported to ensure its effectiveness (Bradley, 2004; Kelly, 2004; Erickson, 2007).

Moreover, when the active involvement of top political decision-makers (e.g. Minister of Education) is inevitably interrupted by the vicissitudes of high office the coherence and sustainability of curriculum change is seriously disrupted. In Mozambique the terms of office of a cabinet minister and the head of the local UNESCO office who were involved in the design of the curriculum terminated and they were replaced in due curse. Provincial directors were also replaced with considerable loss of momentum and later on also a new Representative and Head of the Local UNESCO Office. Note that the change of Minister was a followed by a change of Provincial Directors, who in turn made significant modifications in the composition of the management structures at provincial level. Despite some progress made with the process of curriculum change, considerable loss of momentum occurred while the new appointees were acclimatising to the enormous demands of curriculum implementation. This situation accords remarkably with the reflections of Peretz (2003:57) on curriculum transformation as a participatory process involving diverse forces:

> Closer and positive interactions between these diverse forces (powerful individuals, such as Ministers of Education, and forces in society, such as teacher or parent unions) have a synergetic effect that raises the chances of reform to succeed. Synergy between the various factors has a powerful effect on both policy adoption and implementation. On the other hand, any disruption in the positive interactions between these forces might cause the decline of the reform. The careful examination of changes in the power structure might lead to a better understanding of successes and failures of curriculum reform efforts.

It appears essential that the curriculum management bodies indicated above should be revitalized to ensure synergy and proper coordination of the general effort to implement the new curriculum. It also appears that teacher training is out of step with curriculum change and needs to be updated to meet implementation needs with the aid of in-service initiatives which are a critical requirement for appropriate capacity building. Schools therefore must be supported so that they can organize themselves to facilitate local teacher development groups and effective cooperation in making and using new curricula. Such initiatives are detailed in chapter five and six. In this regard Mohamed (1999: 168) observes:

> The fact that there are obstacles to the implementation (and these are

admittedly many), is not reason to fall into despair or cynicism. The obstacles need to be turned into challenges to be overcome. Looking for possible solutions increases the chances of finding them. Seeing failure leads more easily to self-fulfilling prophecies of failure.

Despite implementation problems the process has made tangible progress exemplified by learners improved performance. Table 3.1 shows the relative improvement since introduction of the new curriculum in 2004. The national examination held at the end of Grade seven (final stage of primary education) is the critical indication in this regard.

Table 3.1: Upper-primary students' achievement in three provinces of Mozambique over the period 2002-2006

Year	Province	Pass Rate	
		Grade 6	**Grade 7***
2002	Niassa	69%	59%
	Sofala	67.5%	58.9%
	Maputo City	62.9%	66.7%
2003	Niassa	61.2%	51.1%
	Sofala	71.8%	54.6%
	Maputo City	65.5%	60.1%
2004	Niassa	87.3%	79.5%
	Sofala	89.1%	77.5%
	Maputo City	94.4%	82.0%
2005	Niassa	86.3%	66.6%
	Sofala	88.5%	77.2%
	Maputo City	93.1%	79.5%
2006	Niassa	83.9%	70.3%
	Sofala	86.8%	74.9%
	Maputo City	90.3%	`82.0%

Source: Mozambique Directorate of Planning in Ministry of Education and Culture

*End of learning cycle and of the Basic Education stage as a whole in Mozambique with National Exam.

The table above shows that even at Grade six, to which progression is largely automatic, a marked improvement became noticeable since introduction of the new curriculum in 2004. A similar improvement is noticeable for Grade seven, exit level of primary schooling which ends in a national examination. Before the introduction of the new curriculum the rate of approvals was around 70%. Note that the minimum average for Portuguese and Mathematics was at least 9. Before the new curriculum was introduced learners who passed the primary end examination (Grade seven) achieved 60% to 70%. The performance in Niassa province was the lowest at the time but it has improved continuously, since the introduction of the new curriculum although it is still lagging behind the other two provinces performance reflected in

table 3.1. The improved performance levels recorded for the relevant provinces since 2004 indicate lower levels of school wastage (repetition and dropout), which is cause for satisfaction although generally speaking then as Bennell (2002) notes, performance still leaves much to be desired: repetition rate is a particularly good indicator of the quality of education that is offered.

It seems justifiable, though, to conclude from the table 3.1 that the new curriculum may succeed if the shortcomings are overcome. To that end more effort is needed to improve on the gains made so far, while taking steps to overcome the obstacles to improved outcomes and effective curriculum change. The obstacles to these objectives will be indicated by analysis and discussion of the research findings in chapter six. Thus, as noted earlier, the study may offer a valuable opportunity for critical evaluation of the new curriculum by comparing the *planned curriculum* with the *actual (curriculum)* over the course of the first year of implementation. It also provides a basis for pertinent recommendations with a view to further successful implementation in years to come. Critical consideration of these recommendations and judicious implementation may contribute significantly to learners' academic performance and overall achievement at school.

3.6   CONCLUSION

Looking at overall process of the new Basic Education Curriculum development in Mozambique, we may conclude that it reflects a world trend towards democratization and improvement of quality of education. Curriculum change is an important component of education change undertaken in Mozambique as a democratic and participatory curriculum process under leadership of the INDE, involving not only educationists and teachers, but also key stakeholders such as religious organizations, unions and employers. A big challenge that emerged with this process is the feasibility of effective implementation of the new curriculum. As noted with emphasis, the pedagogical innovations included in the new curriculum will certainly require sufficiently expanded capacity if they are to succeed. What extent are manifested this capacity and will in Mozambican schools? Which factors influence them? These are fundamental issues of this research to explore following the findings presented in chapter five and discussed in chapter six (e.g. relevant determinants of successful curriculum implementation). It is important to note that

these findings refer to first year of the new curriculum implementation and in many aspects may not reveal any significant progress. However, they include important data to assist future implementation. Of course, effective implementation requires enough time and informed support. According to Fullan (2001) as well as Hall and Shirley (2001) the implementation of most educational changes is inordinately time consuming. For example, by moderate complex changes take three to five years, while the more complex changes may take five to ten years.

The next chapter, chapter four, deals with research strategies and techniques applied during the investigation to produce the findings presented in chapter five and discussed in chapter six.

CHAPTER 4

RESEARCH STRATEGIES AND TECHNIQUES APPLIED DURING THE INVESTIGATION

4.1 INTRODUCTION

The stated aim of this research, indicated in chapter one, was to trace the progress made with implementation of the new curriculum for basic education in Mozambique during the first year after its inception. The focus of the study was *classroom practice* within the context of Basic Education Curriculum change, examining the *overall school conditions* influenced by endogenous and exogenous *school factors*. The purpose of Chapter Four is to discuss the research strategies and techniques applied during the investigation, and to provide useful insights into the quality of efforts invested in the study, and to what extent the findings of this investigation are reliable, valid and objective (Lincoln & Guba, 1985; Whipple, 1998).

Thus, Chapter Four indicates the main quantitative and statistical methods used in the study. It includes some background information on the socio-geographical characteristics of the country. This information is included to offer readers, especially those who are not familiar with Mozambique, an overview of its geographical features, the location and the characteristics of the provinces where the research occurred. Moreover, this chapter presents justification for applying a quantitative strategy to conduct the investigation, validation of the content of the questionnaire, substance and procedures of the survey, and the pilot application of the questionnaire. The subject matter of this chapter includes the research sample, statistical techniques and the calculations applied during the investigation (frequency analysis and factor analysis of the responses, the varimax rotation method, calculation of the chi-squares and statistical significance values, using the chi-square critical values table) and the application of the questionnaire.

This study consisted mainly of a survey of educators' and learners' opinions regarding implementation of the new Basic Education Curriculum in Mozambican schools.

Three provinces participated in the investigation namely, Niassa in the northern region, Sofala in the central region and Maputo city, which has the status of a province, in the southern region.

Figure 4.1: Map of Mozambique
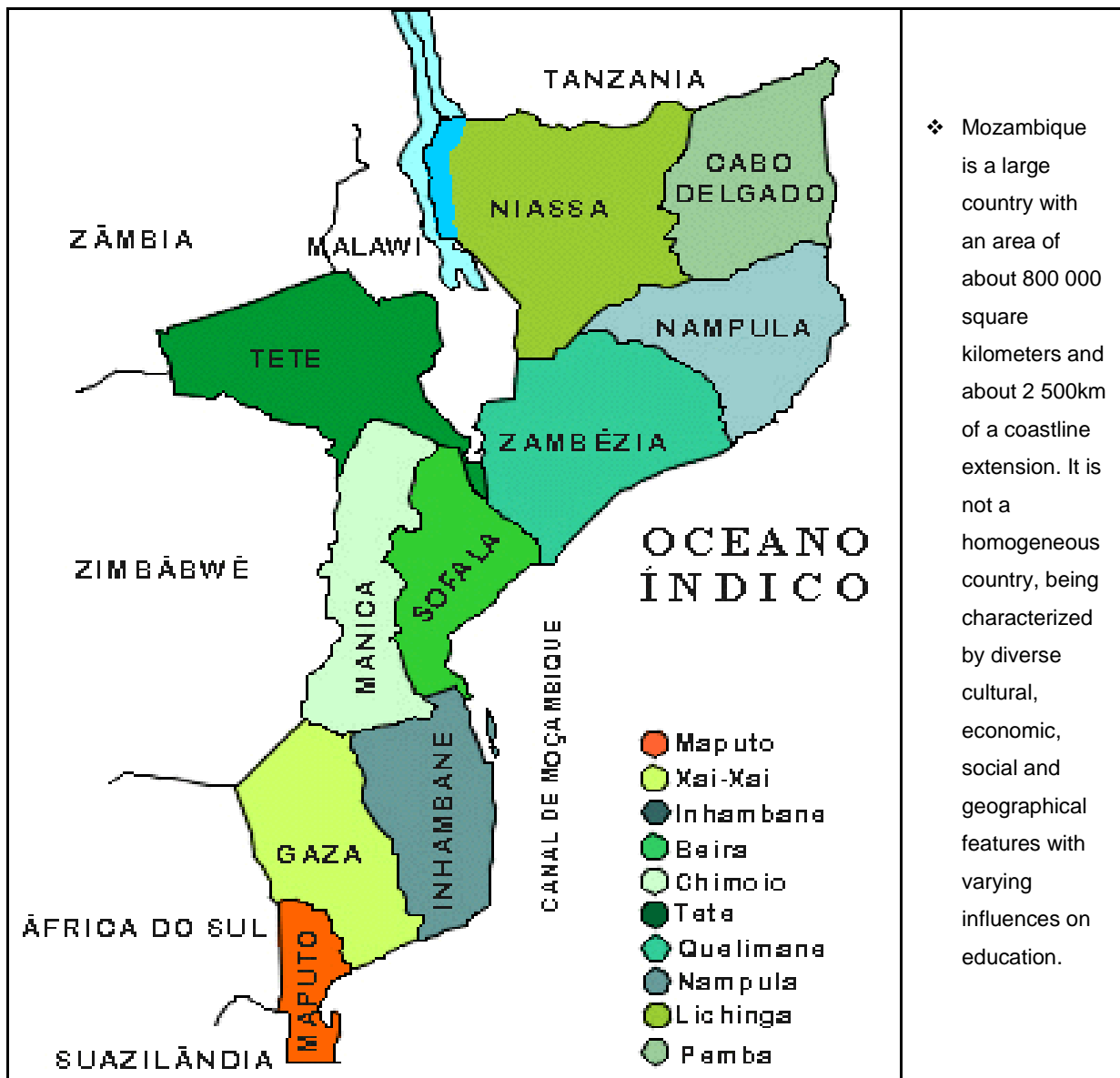
The three provinces were selected for the following reasons:

- Niassa, the largest province in Mozambique, is the least populated and the most isolated province in the country. Available data from the 1997[4] general population and housing census presented the following important figures for

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[4] When the study was undertaken, the available data were provided by the 1997 general census. However, the last general census was carried out in 2007. The definitive results of the 2007 general census will be available in 2009.

Niassa:

- It had about 800 000 inhabitants distributed over an area of 122 176km^2. The population distribution is uneven within the province. Thus, 65% of the population are concentrated in 6 districts out of the 16 that make up the province, namely: Lichinga City, 11.3%, Cuamba 16.7%, Mandimba 11.1%, Mecanhelas 10.1%, Lago 7.4%, Lichinga 8.3%. Niassa faces serious communication and socioeconomic development problems.

- As with the wider population of Mozambican, the population of Niassa Province is predominantly young. Almost 47% are not more than 15 years old, while people 65 years and older account for 2.5%. The illiteracy level of the resident population is very high. According to the census of 1997, illiteracy accounts for 69% of the population. Of this number 84% are female and 52.2% are male.

- Niassa Province has a variety of ethnic groups of which 48% from the Emakhua group. Members of this group are also found in the northern provinces of Cabo Delgado and Nampula, but also in the central of Zambezia. About 37% belong to the Ciyao group, and 8.4% belong to the Cinyanja group. The rest of population consists of minority groups under 1% each.

- The analysis of available data from the Directorate of Planning of the Ministry of Education referring to the 2003 school year in Niassa Province showed that:
    - Only 32.8 % of the total number of students (10 064) who were attending the 6th Grade were female.
    - Over 50% of students (10 064) who were attending 6th Grade were between 14 and 17 years old.
    - Only 2.4% of students who were attending 6th Grade were 11 years old (this age is theoretically the average age of 6th Grade students). Out of these only 0.9% were female.

- The female teachers for upper primary level (6th and 7th Grades) accounted for 8.2% of the total number of teachers (637) at this level.

- Of the total number of teachers referred to above, 40.1% were unqualified.

These figures are a typical reflection of the qualifications of teachers and the school attendance figures of the learners living in the province. They are also a good example of how the curriculum is perceived in the most rural, remote and furthest areas from the decision-making centres.

- Sofala Province is located in the central region of the country. It had about 1 300 000 inhabitants distributed over an area of 75 450km^2. Sofala has 13 districts with varying population numbers. Close to one third of the population of Sofala live in the provincial capital, Beira. Other relatively heavily populated districts are Buzi (11%), Nhamatanda (10.7%) and Dondo (9.1%).

  - The population of Sofala Province is also predominantly young. Close to 44% are not more than 15 years of age, while only 2.7% are 65 years and older. The illiteracy rate of people living in the province is also high. Based on the 1997 census, 56.2% of the population were illiterate. Almost 75% of illiterates were female while 35.9% were male.

  - The ethnic composition of Sofala is as follows: 46.9% belong to the Cisena group, about 33.5% to the Cindau group and 2.7% to the Echuwabo group. The main body of this group is situated in the central province of Zambezia.

  - Analysis of the available data provided by the Directorate of Planning of the Ministry of Education as at 2003, for Sofala Province showed that:
    - Only 36.4% of the total number of students (16 325) who were attending 6th Grade were female.
    - About 50% of students (16 325) who were attending 6th Grade were between 14 and 17 years old.

- About 8% of students who were attending 6th Grade were 11 years old, and of these only 3.7% were female.

- The female teachers for upper primary level (6th and 7th Grades) accounted for 24.4% of the total (3070).

- Of the above total of teachers, 24. 9% were unqualified.

The socio-demographic and geographic characteristics described above made Sofala province a good sample of central region.

- Maputo City is the capital of the Republic of Mozambique. It had about 966 800 inhabitants in 1997 and covered an area of 355 square kilometers. The population of Maputo City is also predominantly young. Forty percent are below 15 years of age, while only 2% of the population are 65 years and older. The illiteracy rate of people living in Maputo City was relatively low compared to. Niassa and Sofala. According to the 1997 general census the illiteracy rate stood at 15%. However, as in other parts of the country, the illiteracy rate is higher among females than males. Thus, close to 23% of the female population were illiterate as opposed to 7.1% of males.

Maputo is a cosmopolitan city with inhabitants who come from all parts of the country. However the majority groups are Changana (about 35%) and Ronga (about 21%).

The analysis of available data according to the Directorate of Planning of the Ministry of Education for Maputo City as at 2003 showed that:

- Of the total number of students (24 441) who were attending the 6th Grade, 51.7% were female.

- Over 50% of students (24 441) attending 6th Grade were between 14 and 17 years old.

- About 10% were attending 6th Grade were 11 years old and only 5.4% of these were female.

- The female teachers for upper primary level (6th and 7th Grades) were 61.5% of the total number of teachers (3022) at this level.

- Of the above total of teachers, 7.9% were unqualified.

The characteristics of Maputo City justified its selection as sample in this study.

The 6th Grade is the first stage of the third learning cycle of primary schooling, which has been taught, so far, by one teacher for each subject. In accordance with the new curriculum, three or four teachers should teach all subjects prescribed for the third learning Cycle. It means that the same teacher should teach at least two or three subjects. This is a challenging change for teachers who have been teaching only one subject up to 2003. This will also require an appropriate new pedagogical school organization, which is not always easy to achieve.

4.2 JUSTIFICATION OF THE USE OF A QUANTITATIVE RESEARCH STRATEGY DURING THE COURSE OF THE INVESTIGATION

4.2.1 Introduction

Before justifying the decision to apply a quantitative research strategy for the investigation, it seems pertinent to highlight briefly the old, but intensely ongoing, debate on qualitative versus quantitative research methods for the social sciences, including the education and more specifically the curriculum. As William (2006) points out, this debate has been pursued more persistently and fervently than any other methodological issue relating to social research. Three main groups have emerged from the debate. The first are in favour of qualitative and against quantitative research (Epstein, 1988; Sherman & Reid, 1994). Conversely, the second are in favour of quantitative and against qualitative research (Haworth, 1984; Reid, 1987). The third group are in favour of combining both qualitative and quantitative methods, advocating a "mixed methods" approach (Taylor, 1977; William, 2006).

According to Neill (2007), Lincoln and Guba (1985), and Marshall and Rossman (1980), the heart of the quantitative-qualitative debate is philosophical, reflecting different epistemological and ontological assumptions, which will become evident in the following discussion. Concerning epistemological assumptions, for instance, the apologists of qualitative inquiry argue that the best way to understand any phenomenon is to observe it in its context. They aver that human behaviour is significantly influenced by the environment in which it occurs. It is fluid, dynamic, situational, social, contextual and personal. Therefore, the human behaviour must be studied holistically (i.e. in context), rather than being manipulated by numbers. The

apologists of quantitative research assert that human behaviour is regular and predictable and susceptible to generalization, while the advocates of the mixed research admit that behaviour is only partly predictable and susceptible to generalization. Regarding ontological assumptions, for example, the defenders of qualitative research assume that the realities are multiple, constructed and holistic, while the apologists of quantitative research emphasize that the reality is single, tangible and fragmentable. That is to say, the defenders of qualitative research assert that each of us experiences a different reality from our point of view. The researcher is the gathering instrument and the data are in the form of words, pictures or objects. So, in conducting research it should be realized that the perceptions about reality are subjective, personal and socially constructed. They refuse the idea that social sciences such as education, including curriculum development, can be studied by using the methods applied in natural or physical science. The apologists of quantitative research argue that different observers agree given the objectivity and measurability of tools used, such as questionnaires or equipment to collect numerical data of what is observed. They argue further that both the natural and social sciences endeavour to create testable and confirmable theories that explain phenomena by showing how they result from theoretical assumptions. The apologists of quantitative research criticize qualitative research for employing an inside perspective, which makes it a highly personal and subjective research. In contrast it can be argued that the aim of qualitative research is to produce a complete and detailed description, making the qualitative data meaningful, although time consuming, and less generalizable. Meanwhile, the purpose of quantitative research is to classify features, count them, and construct statistical models in an attempt to explain what is observed. It is assumed that quantitative data are more efficient with testable hypotheses, in spite of the fact that it may miss contextual detail. It is also noted that for qualitative research, the investigator may only know on the surface what he/she is looking for at the outset. Conversely, the quantitative researcher implies that the researcher knows clearly and deeply in advance what he/she is investigating. Moreover, it is believed that the qualitative research is advisable at the inception of research projects, while quantitative research is recommended for the latter stages of research projects.

Thus, the contention that one methodology is better than another in any final sense appears to be wrong. Trochim (2006) observes that the qualitative versus quantitative debate is "much ado about nothing". He notes that to state that one research method is better than another is simply a fallacy, since both are employable to address almost any conceivable research topic. He adds that, on the one hand, all qualitative data can be coded in meaningful numerical values, that is, quantitatively. On the other hand, without understanding numbers themselves, one cannot interpret or explain them. That is, all numerical information implies numerous judgments about the meaning of those numbers or figures. Whipple (1998:2) emphasises that:

> Every discipline and methodology has its uses. The implication that one is better than another is like saying that one's sense of taste is in some way superior to sight, touch or hearing. You can't taste the way something sounds or hear the way something looks. It is the same with research.

In view of the debate on qualitative and quantitative methods in social science research, specifically regard to curriculum in the educational field, the researcher concluded that both methodologies have advantages and disadvantages. In many studies, both qualitative and quantitative methods can be applied simultaneously. Whipple (1998) notes that once the study field or subject is selected and, more specifically, the research questions are posed, the appropriate research methodology is determined in accordance with the properties of the population under investigation.

4.2.2 Justification of the quantitative design

This research was undertaken based on a national sample taken from representatives of the selected three provinces, well isolated from each other; namely Niassa to the north, Sofala at the centre and Maputo City to the south of the country. Simultaneously, there was a need to ensure that the sample is large enough, involving a reasonable number of participants in proportion to the population number for each target group: principals, teachers and learners from schools teaching Grade 6 (see paragraph 4.4).

The aforementioned premises led the researcher to adopt a survey questionnaire in view of the need to gather opinions from a large sample of principals, teachers and learners from the selected three provinces. The object of opting for a large sample

was to conduct factor analysis so that the opinions could be clustered to form group factors that as observed by Reymont and Joreskog (1993:71) "[…] will usually account for approximately the same amount of information as do the much larger set of original observations."

Financial restraints also suggested the use of a quantitative design during the collection of data, to save on travelling expenses and the need for accommodation during field work. The survey questionnaire was designed to be applied by research assistants. Colleagues at the school inspectorate, and pedagogic supervision at provincial level voluntarily collaborated in the process of data collection.

Among other aspects discussed with these colleagues beforehand, it was emphasised that all questions were to be properly answered by all participants, especially by the learners, and that all completed questionnaires would be returned after being computed.

Time constraints also led to the selection of the quantitative research strategy for this study. Applying survey questionnaires for data collection takes less time than using qualitative methods.

Furthermore, a survey questionnaire was used in light of the observation by Gorard (2003:93):

> If the respondents complete the survey from themselves there are several key advantages. There is much less of the reactivity effect or interviewer bias that can be created by the presence of someone who has a vested interest in the results. It can be arranged that the responses are not only confidential (which is standard practice) but also anonymous (so that even the researcher does not know to whom each returned form belongs). This can help create an atmosphere of trust, and therefore lead perhaps to more truthful answers.

In the cover letter (see Appendix A) of the survey the respondents were informed about its purpose and content. It was emphasized that participation in this research project is voluntary and confidential. Thus, the forms did not require the identification of respondents and the answers were given by crossing the boxes that best described the respondent's opinion. There was no possibility of recognizing who

completed the form through his/her handwriting. The research sample is provided in section 4.4.1.

4.3   THE CONTENT VALIDATION OF THE QUESTIONNAIRE

The questionnaire that was used in this study consisted of items adapted from Bernhardt's (1999) survey questionnaires. These questionnaires ideally fit the curriculum design, development and implementation components, because they were originally conceived for the school portfolio, providing valuable insights into a comprehensive framework for school improvement, which is the essence of curriculum change or educational change, broadly speaking. The questionnaire items include major elements of change towards school restructuring and reculturing, such as effective leadership, communication, dealing with parents and the community in general, building of consensus among members for solutions to problems raised in the process of overall school improvement and innovative classroom practices. Therefore, it covers all the main components dealt with in the theoretical framework of this research, revealing a high content validity.

The researcher asked for and obtained copyright permission from Dr. Victoria L. Bernhardt to adapt the questionnaires (see Appendix C). The survey questionnaire was adapted for two reasons:

- The researcher found the Bernhardt survey questionnaires well-suited for the research questions concerning implementation of the New Basic Education Curriculum in Mozambican Schools.
- These instruments had been piloted and used successfully before, therefore valuable hindsight was gathered for the investigation.

Pallant (2005:3) suggests that "the data are only as good as the instrument that you used to collect them and the research framework that guided their collection."

The questionnaire was adapted to meet principals', teachers' and learners' circumstances (e.g. training, appointment or staffing arrangements, qualifications, as well as the curriculum framework, and the subject content devised for Mozambican learners). Moreover, since Portuguese is the official language, the medium of instruction and the main vehicle of communication in Mozambique, the adapted

questionnaire, originally in English, was translated into Portuguese (see Appendices B and C).

Given the lessons learned from the literature about curriculum implementation around the world, the research questions and the conceptual framework discussed in Section 1.4 were taken into consideration in the process of designing the questionnaire so that it (the survey questionnaire) would reflect the purpose of the study.

Thus, the questionnaire attempted to capture respondents' opinions concerning the seven basic contextual conditions for effective change and, in particular, for successful curriculum implementation (see section 1.6). According to Giacquinta (1998:172-173) the basic contextual conditions are: members' clear acceptance of and commitment to the need to achieve new goals and role expectations; members' ability to fulfil the new role expectations; accessibility of adequate resources; compatible organizational or social envelope surrounding the innovation. Others include the deliberate process of role **resocialization** and considerable time, coordination, support, and encouragement, as well as school leadership in assuring the presence and maintenance of these conditions. These factors are discussed in the theoretical framework in the light of research findings regarding curriculum implementation towards school improvement.

Therefore, the adaptation of the Bernhardt (1999) survey questionnaires implied:
- Formulation of the cover letter.
- The entire design of section "A" requiring biographical information.
- The selection of questions for each target group in the context of the study, including modification or suppression of some questions, to serve the purpose of the study.
- Clear and concise indication of the purpose of questions addressed to each target group;
- Organization and redesign of staff survey into sections "B" and "C" (i.e. principals' and teachers' questionnaires).
- The translation of the adapted designed instrument from English into Portuguese.

Thus, as an integral part of the survey questionnaire (see above) a cover letter was prepared requesting the collaboration of the participants and explaining the purpose of the research (see Appendix A). Furthermore, the survey questionnaire consisted of the following four sections:

Section A: Biographical information

Section A covered items 1 to 9. These items addressed the role and gender of the respondents, and the province where schools of participants were located. Additionally, it gave details of principals' and teachers' academic and pedagogical qualifications, number of years served in school management and the specific preparation for this responsibility, as well as teaching experience at upper primary level.

Section B: Attitudes of school principals regarding the impact of school leadership on principals' relationships with teachers, other staff members, students and parents

Section B comprised items 10 to 23, which elicited information regarding the impact of school leadership on principals' relationships with teachers, other staff members, students and parents. It also has the object to determine whether all school members clearly understand and are committed to realising the envisaged new goals and role expectations in the context of the new curriculum. A further object was to determine the status of coordination and management of implementation of the new curriculum and of the school restructuring and reculturing project of introducing organizational measures to meet the requirements of the new curriculum, including sharing and cooperative work schemes, et cetera).

Section C: Attitudes of teachers about school environment, organization, new curriculum and teaching as well as student learning

Section C covered items 24 to 43 and explored teachers' beliefs and attitudes about school environment, organization, new curriculum and teaching as well as student learning; teachers' ability and confidence to fulfil the requirements of the new curriculum (need for capacity building); and collaboration with parents and other stakeholders.

Section D: Effects of the curriculum on learners and learning

Section D included items 44 to 118 and addressed student beliefs and attitudes about school and learning, students/teachers relationships, students' expectations, students' learning resources and outcomes achieved by students. In brief, it covers the extent to which the new curriculum enables an effective and relevant learning environment for pupils.

4.3.1   The research sample

The research questionnaire was applied to a sample of 3 050 respondents of which 124 were principals, 221 teachers and 2 705 learners (see Tables 5.1, 5.11 and 5.24).

The participating teachers were all those who taught Grade 6 in the schools where the survey was undertaken. The principals were those managing these schools. The learners were those attending Grade 6 in these schools, provided the sample contains a fair and balanced representation of the full spectrum of students achievement levels regardless of gender. The total number of participants in each school was proportional to the total number of learners attending Grade 6 in that school.

The participants were of both sexes. Details of this participation are given in Chapter 5, sections 5.2, 5.3 and 5.4.

4.4   STATISTICAL TECHNIQUES AND CALCULATIONS APPLIED DURING THE INVESTIGATION

4.4.1   Descriptive and frequency analysis of the responses

The analysis of the data commenced with a simple descriptive and frequency analysis of the responses. As noted in section 5.1 of this thesis, basically the frequency analysis was undertaken to determine how many respondents of the different categories (principals, teachers and learners) gave each alternative response to a particular question in the scope of the research (Runyon & Haber,

1980; Howell, 1992). The reliability of a scale of questionnaires for each target group was also determined in order to find out how free they are from random error (see Appendixes D1, E1 and F1). The internal consistency expressed as a Cronbach alpha coefficient, was also calculated, taking into account that:

- The Cronbach alpha coefficient can be interpreted as the percent of variance on the observed scale that would have explanatory value on the hypothetical true scale composed of all possible items in the universe. Alternatively, it can be interpreted as the correlation of the observed scale with all possible other scales measuring the same thing and using the same number of items.

- By convention, a lenient cut-off of 0.60 is common in exploratory research; alpha should be at least 0.70 or higher to retain an item on an "adequate" scale; and many researchers require a cut-off of 0.80 for a "good scale.[5]"

Furthermore, in the interpretation of the Cronbach alpha coefficient, it was also considered that its value is very sensitive to the number of items involved in the measuring operation. Incidentally, Pallant (2005:90) notes that:

> With short scales (e.g. scales with fewer than ten items), Cronbach values are usually quite low (e.g. 5), in which case it may be more appropriate to report the mean inter-item correlation for the items. Briggs and Cheek (1986) recommend an optimal range of 0.2 to 0.4. for the inter-item correlation.

4.4.2 Factor analyses of the responses

One of the objectives of the questionnaire was to elicit the opinions of respondents regarding curriculum implementation in general, and to cluster and categorize the opinions in terms of curriculum implementation principles and practices. One way to achieve this is to conduct a factor analysis on the data.

The Statistical Package for Social Sciences (SPSS 11.5) was used to undertake a statistical technique ***principal component factor analysis*** to investigate the interrelationships between a set of variables contained in data defined for the survey questionnaire applied in this study for each of the above mentioned targeted group.

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[5] Garson, G. David (copyright 1998, 2007). Reliability Analysis.
http://www2.chass.ncsu.edu/garson/pa765/reliab.htm.Retrieved date: 2007/10/11

Similarlly, a Keiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test concerning the questionnaire items for each target group (Principals, Teachers and Learners dealing with Grade 6) involved in this study were calculated to:

- determine to what extent the variables belonged together (were associated); and
- verify if they were adequate for factor analysis.

According to Field (2000) the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy indicates whether a sufficient number of items are actually predicted by each factor. The results of the KMO statistic may be classified as:

- *mediocre* if the values are between 0.5 and 0.8;
- *good* if the values are between 0.8 and 0.9;
- *great* if the values are 0.9; and
- *superb* if the values are above 0.9.

According to Hinton et al. (2004:342), "as rule of thumb, if the KMO test comes out at 0.5 or higher, we can continue with the factor analysis as our data is suitable for it."

Merkle *et al.* (1998) and Yeung, Wong and Chan (2002) suggest that Bartlett´s Test of Sphericity determines whether the original variables are correlated highly enough to provide a reasonable basis for factor analysis and it should be significant at $p < 0.05$.

After establishing that the basic requirements for factor analysis were fulfilled, this technique was employed. The factor analysis helped:

- to examine to what extent the respondents grasped the meaning of the items in each section of the survey questionnaire; and
- to identify the main factors that may enable successful implementation of the new curriculum.

The factor analysis collects the responses of the respondents into broad categories or clusters rendering assistance to the interpretation of the data. This process is

known as the **first-order** investigative factor analysis or exploratory factor analysis. Stapleton (1997:2) explains that:

> exploratory factor analysis is used to explore data to determine the number or the nature of factors that account for the covariation between variables when the researcher does not have, a priori, sufficient evidence to form a hypothesis about the number of factors underlying the data.

The first-order investigative factor analysis determined the related variables that could be clustered and therefore retained as a combined variables or factor. There was also sufficient evidence to form a hypothesis about the number of factors underlying the data.

A second-order or confirmatory factor analysis was then conducted to asses the validity and reliability of the number of factors isolated by way of the first-order investigative factor analysis. Cramer (2003:28) explains the purpose of confirmatory factor analysis as follows:

> Whereas exploratory factor analysis is used to determine what is the most likely factor structure for the relationships between a set of variables, confirmatory factor analysis is used to test the probability that a particular or hypothesized factor structure is supported or confirmed by the data.

Gorusch (1983:27), who notes that the concept of confirmatory factor analysis is an underlying maximum likelihood factoring stresses that a "confirmatory factor analysis tests hypotheses that a specified subset of variables legitimately define a pre-specified factor." Harman (1976:97) states that:

> Lawley (1940, 1942) made a fundamental contribution to factor analysis by providing a statistical basis for judging the adequacy of the model […], with a specified number of factors, to explain an empirical correlation matrix. His statistical test for the number of common factors is dependent upon a particular type of factor solution, namely, maximum-likelihood estimates of the factor loadings.

However, in accordance with Cramer (2003) and Garson (2006), the actual confirmatory factor analysis can be conducted using one of several structural-equation modeling computer packages such as AMOS or LISREL. In this report, the

confirmatory maximum likelihood factor analysis was alternatively applied due to technical constraints (see section 5.6). The researcher used the following criteria in selecting the number of factors retrieved from the factors analysis: **eigenvalues, Cattell's scree test** and **inter-item correlations**. The first two of these will now be discussed.

As noted above, after the first-order investigative factor analysis, some decisions should be made prior to undertaking the research. According to Field (2000: 459), "*one important decision is the number of factors to extract*". Cliff (1987:311) points out that

> […] the most frequently employed procedure for deciding on the number of relevant components of factors is undoubtedly the '**eigenvalues greater than unity**' rule.

Accordance to Johnson and Wichern (2002:441) "a useful visual aid to determining an appropriate number of principal components is a scree plot". Cliff (1987:313) emphasizes that "a more dignified term that carries an air of formality and statistical expertise is the 'scree test'." It is necessary to note that these authors use various names for the common criteria, also known as Cattell's scree test or simply Cattell's criteria. According to Green and Salkind (2005:313), it is of paramount importance to take into account that:

> Factor analysis requires two stages, factor extraction and factor rotation. The primary objective of the first stage is to make an initial decision about the number of factors underlying a set of measured variables. The goal of the second stage is twofold: (1) to statistically manipulate (i.e., to rotate factors) the results to make the factors more interpretable and (2) to make the final decisions about the number of underlying factors.

Garson (2006), a staunch supporter of factor rotation, emphasizes that factor rotation is widely used to make the output more understandable and facilitate the interpretation of factors.

4.4.3 Varimax rotation method

The Varimax rotation method is most commonly applied to intercorrelating data sets. It establishes a clear pattern of loading, that is, it determines factors that somehow

are clearly characterized by high loadings for some variables and low loadings for others. The varimax rotation method shows which variables belong to which factors. Cureton and D'Agostinho (1983:3) note that

> the factors are actually hypothetical or explanatory constructs. Their reality in the individuals of the population or sample is always open to argument. At the conclusion of a factor analysis we can only say of the factors that if they were real, then they would account for the correlations found in the sample. The converse does not necessarily follow, and different sets of factors can account for the same set of observed or counted or measured variables and their intercorrelations.

Furthermore, Cureton and D'Agostinho (1983:3) argue that: "If the variables are the items of an opinion questionnaire, the common factors will be the main underlying attitude."

4.4.4 Calculation of the chi-squares values and significance values

Before discussing the calculations of the chi-square values and ascertain the correspondent significance values or probabilities (p), the next section gives a brief description of the concept of the chi-square.

Chi-square is a statistical test of significance used to compare the observed data [f_o's] with the expected data [f_e's]. It is denoted by the symbol χ^2, pronounced "kye square", (i.e. using the square of the Greek letter Chi).

Sirkin (1995:353) points out that:

> What the chi-square test does is to look at the deviation between each f_o and its respective f_e. The greater the deviation between f_o's and f_e's , the larger the chi-square.

Chi-square works also by testing the null hypothesis, i.e. examining the hypothesis that there is no difference or no effect between groups with regard to some measured characteristics or properties. In other words, it used to compare proportions or ratios, determining whether the proportion of occurrences of some characteristics or properties in one data sample is significantly greater or not than the proportion of the

same characteristics or properties. An illustrative example is given following the method of chi-square calculation discussed below.

The chi-square (x^2) value can be calculated by applying the following formula:

$$\sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i} \quad (^6), \quad \text{where:}$$

O_i = Observed frequency in a cell

E_i = Expected frequency in a cell

k = Maximum number of cells of each category

Applying this formula obviously means that both the observed and the expected frequency must be known. The observed frequency (*O*) becomes known during data collection. The expected frequency is determined on the basis of previous experiences. The following mathematical formula is also applied for calculation of expected frequency:

$$E_{ij} = \frac{T_i \cdot T_j}{N} \quad (^7), \text{ whereby:}$$

- E_{ij} is the expected frequency for the cell in the row *i-th* and the *j-th* column.

T_i is the total number of subjects in the *i-th* row.

T_j is the total number of subjects in the *j-th* column.

N is the number of subjects in the whole table.

An illustrative example is given in Table 4.1 of the statistical technique used to calculate the chi-square and significance values.

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[6] **Source**: Based on the formula used by Sirkin (1995:359), by Frank and Althoen (1994:625) and by Runyon and Haber (1980).

[7] **Source**: Based on the formula used by Sirkin (1995 :347) and Frank and Althoen (1994:642).

Table 4.1: Comparison of opinions expressed by students from the three provinces who participated in the study about safety in their schools

			Strongly Dis-agree	Dis-agree	Neutral	Agree	Strongly Agree	Total
			I feel safe at this school					
Province	Niassa	Observed Number (O)	24	10	19	80	251	384
		Expected Number (E)	33,9	33,2	34,5	104,9	177,4	384,0
		% within province	6,3%	2,6%	4,9%	20,8%	65,4%	100%
	Sofala	Observed Number (O)	84	77	83	424	651	1319
		Expected Number (E)	116,5	114,1	118,5	360,3	609,5	1319,0
		% within province	6,4%	5,8%	6,3%	32,1%	49,4%	100%
	Maputo City	Observed Number (O)	131	147	141	235	348	1002
		Expected Number (E)	88,5	86,7	90,0	273,7	463,0	1002,0
		% within province	13,1%	14,7%	14,1%	23,5%	34,7%	100%
Total		Observed Number (O)	239	234	243	739	1250	2705
		Expected Number (E)	239,0	234,0	243,0	739,0	1250,0	2705,0
		% within province	8,8%	8,7%	8,7%	27,3%	46,2%	100%

The table shows how many participating students from the three provinces expressed opinions regarding safety at their schools: hypothetically the observed number (O) as well as the expected number (E) of students should correspond to each opinion. As noted above, the observed number of students presents no difficulty, since it is immediately obtained by counting the participating students in the research. The expected number is determined from previous experiences. The software applied for the study (SPSS 11.5), once the observed data are introduced, automatically indicates the corresponding expected data, which we may check by using above-mentioned the formula $E_{ij} = \dfrac{T_i \cdot T_j}{N}$, as follows:

Province	Strongly Disagree	Disagree	Neutral	Agree
Niassa	$E_{11} = \dfrac{384.239}{2705}$	$E_{12} = \dfrac{384.234}{2705} = 33,2$	$E_{13} = \dfrac{384.243}{2705} = 34,5$	$E_{14} = \dfrac{384.739}{2705} = 104,9$
Sofala	$E_{21} = \dfrac{1319.239}{2705}$	$E_{22} = \dfrac{1319.234}{2705} = 114,1$	$E_{23} = \dfrac{1319.243}{2705} = 118,5$	$E_{24} = \dfrac{1319.739}{2705} = 360,3$
Maputo City	$E_{31} = \dfrac{1002.239}{2705}$	$E_{32} = \dfrac{1002.234}{2705} = 86,7$	$E_{33} = \dfrac{1002.243}{2705} = 90,0$	$E_{34} = \dfrac{1002.739}{2705} = 273,7$

| Strongly Agree | $E_{15} = \dfrac{384.1250}{2705} = 177,4$ | $E_{25} = \dfrac{1319.1250}{2705} = 609,5$ | $E_{35} = \dfrac{1002.1250}{2705} = 463,0$ |

Table 4.2: Summary of results of expected frequencies of opinions expressed by participating students from three provinces about safety in their schools (calculated by using the relevant formula for each province)

Provinces	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Niassa	33,9	33,2	34,5	104,9	177,4
Sofala	116,5	114,1	118,5	360,3	609,5
Maputo City	88,5	86,7	90,0	237,7	463,0

The results presented in Table 4.2 are consistent with the expected numbers or frequencies indicated in Table 4.1 computed automatically using Statistical Package for Social Sciences (SPSS 11.5) software.

Now that the observed and expected frequencies are known the chi-square values can be calculated according to the relevant formulas (see above). Table 4.3 presents the calculation of chi-square values. The respective main data are shown in bold.

Table 4.3: Chi-Square values comparing opinions expressed by participating students from three provinces about safety in their schools

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	**Total**
Niassa	2,89115	16,21204	6,96376	5,91048	30,53529	62,51272
Sofala	9,06652	12,06319	10,63502	11,26197	2,82567	45,85237
Maputo City	20,4096	41,93875	28,9	5,47201	28,56371	125,28 407
x^2	32,36727	70,21398	46,49878	22,64446	61,92467	**233,64916**

Lowry (2007:5)[8] writes the following on degree of freedom:

> Degree of freedom, **df**, is simply an index of the amount of random variability, mere chance coincidence that can be present in a particular situation. Its closest literal translation would be something along the line of "degrees of arbitrariness".

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[8] Lowry, Richard (2007). Chi-square procedures for the Analysis of Categorical Frequency Data. Part 1. Available from http://faculty.vassar.edu/lowry/ch8pt1.html . Date retrieved : 10/5/2007.

Degrees of freedom (df) are therefore the number of values that are free to vary after restriction has been imposed on the data and according to Sirkin (1995:351-352),

> for any size table, we may obtain the degrees of freedom from the following formula:
> df =(number of rows - 1). (number of columns – 1).

Looking at the example given in Table 4.1, we see that there are three rows and five columns. Thus, the df = (3-1) x (5-1) = 2 x 4=8.

As we have already calculated the degrees of freedom, we may use the table of critical chi-square values, as indicated above. Traditionally or conventionally most scientists assume that the difference between two groups is of such magnitude that it would occur randomly less than 1 out of 20 times (p<0,05). This cut-off value (*p*<0,05) is also known as the *beta confidence level.* In the present case, both groups vary significantly, that is, the null hypothesis (H_0) of no difference is rejected.

Traditionally,if greater confidence in the results is desired, then most scientists choose probability levels below 1 in 100 (p <0, 01) or 1 in 1000 (p <0, 001). This cut-off value (*p*<0,001) is also called the *alpha confidence level.*

Vaughan (1998:126) asserts that:

> The 0.05 level is common in statistical tests because most researchers agree that a sample outcome that would occur only 5% of the time (or less) if the hypothesis is true is unusual enough to warrant rejection of the hypothesis. However, other levels of significance may be chosen instead.

4.4.5 Using the chi- square critical values table (Distribution of chi-square probability)

The following procedure described by Bohrnstedt and Knoke (1988:121) was employed to estimate the levels of significance according to the calculated chi-square values as shown in the Table 4.4:

1. Choose a probability level for rejection of the null hypothesis (α level).
2. Calculate the degrees of the freedom in the table.
3. Enter the chi-square table at the corresponding row and column and observe the entry. This value for x^2 tells you how large the

x^2 calculated from the data table must be in order to reject the null hypothesis, while running a chance of α of making a Type I or false rejection error (i.e., rejecting a null hypothesis which really is true- no relationship exists in the population).

Table 4.4:   Partial chi-square critical values table

Degrees of freedom (*df*)	Level of significance (α)			
	0.050	0.010	0.005	0.001
1	3.84	6.64	7.88	10.83
2	5.99	9.21	10.60	13.82
3	7.82	11.34	12.84	16.27
4	9.49	13.28	14.86	18.47
5	11.07	15.09	16.75	20.52
6	12.59	16.81	18.55	22.46
7	14.07	18.48	20.28	24.32
8	15.51	20.09	21.96	26.12
9	16.92	21.67	23.59	27.88
10	18.31	23.21	25.19	29.59

Source: Extracted from Appendix B of Bohrnstedt and Knoke (1988:475)

Thus, the values of x^2 in the chi-square table referred to in step 3 are called critical cut-off values of x^2. In the example of a comparison of opinions expressed by participating students from the three provinces selected for the study about safety in their schools, we obtained a x^2 value of 233.6 (see Table 4.3). For $df = 8$ and $\alpha = p = 0.005$, we should have a x^2 equal to or greater than 21.96 in order to reject the null hypothesis. This means that in the chi-square critical values table with $df = 8$, a x^2 of **21.96** cuts off at 0.005. In other words, having a x^2 value larger than the critical value indicated in the chi-square critical values table, (i.e. 233.6>21.96), the null hypothesis is rejected, meaning for the current example that there is a significant difference between the three selected provinces regarding participating students perception of safety at their schools. Vaughan (1998:126) stresses that:

> In testing a hypothesis about categorical data, for example, we calculate a value of the test statistic chi square (x^2) from the sample data. Then we can refer to a table of the chi square probability distribution to find out whether the probability of a value x^2 like ours is less than or greater than alpha.

It is important to note that "the value of χ^2 is sensitive to the number of observations. The greater the number of observations, the greater the likelihood that the result will be considered significant."[9]

The completed exercise above to calculate chi-square and the relevant critical value corresponding to *p* can be simplified by using appropriate statistical computer software. In the present case the chi-square value was calculated with the aid of SPSS 11.5, which allows automatic computation of data to determine the chi-square value, degree of freedom (*df*) and the corresponding *p* value, that is, the asymptotic significance. For the above example, Table 4.5 is illustrative.

Table 4.5: **Chi-Square tests on comparison of opinions expressed by participating students from the three provinces selected for the study about safety in their schools**

	Value	Degree of freedom (df)	Asymptotic Significance (2-sided)
Pearson Chi-Square	233,633[a]	8	0,000
Likelihood Ratio	230,432	8	0,000
Linear-by-Linear Association	159,591	1	0,000
N of Valid Cases			

a.   0 cells (,0%) have expected count less than 5.
      The minimum expected count is 33,22

The interpretation of the chi-square test table is done by focusing on the row displaying the Pearson chi-square value, degree of freedom (*df*) and asymptotic significance (asymp. sig.).

The values reflected in Table 4.5 (chi-square value = 233.6, the degree of freedom = 8), are the calculated values (see Table 4.3). The p-value of 0.000 indicated in Table 4.5 is an exact probability of obtaining a value greater than or equal to 21.96. **It is important to note that the probability in the SPSS output is not in fact zero. It is merely zero to the three decimal places displaced[10]**. This is due to rounding when the number is displayed. In fact, the probability is less than 0.005, that is, a risk probability below 5 chances in a thousand (*p*<0.005), indicating that null hypothesis is

[9]   http://music-cog.ohio-state.edu/Music829C/chi.square.html. p.2- Date retrieved:2007/10/5.
[10]   Source: Chi-square. Retrieved from http:www2.yorksj.ac.uk/apps/_Uploads…at 10/28/2007.

rejected: **the three selected provinces vary significantly regarding participating students' perceptions of safety at their schools.**

4.5   APPLICATION OF THE QUESTIONNAIRE AND TIME FRAME

The survey questionnaire in Portuguese (before being used in the main study) was piloted and checked for validity by the researcher in February and March 2005. The pilot study, which involved a small representative sample of the upper primary schools in three selected provinces, was done to ascertain whether the interpretation and understanding of the questions as well as the objectivity and clarity of the research instruments were still the same as the original version adapted from English.

Then, from April and June 2005, the questionnaire was applied to the research sample with the request that respondents complete the relevant sections with due cognisance of the research objectives (see subsection 4.4.1). The three categories of respondents (principals, teachers and learners) had to complete different sets of questions as explained in section 4.3.

Six research assistants were trained in each province in anticipation of the magnitude of the data-collection task. The assistants rendered invaluable support during the project. The respondents were recruited at the researchers' request which was supported by the provincial Directors of Education and Culture, based on the pertinence, opportunity and the importance of the research theme for the education system in Mozambique. The participation was voluntary and relied on participants' awareness and understanding. Moreover, as usual in Mozambique, participation as informant in this kind of research did not depend on material inducement of any kind.

Within the period of survey application indicated above, the research assistants negotiated with the relevant schools' leadership in each province and established a calendar and timetable to conduct the survey in their schools. Thus, it was ensured that the forms were distributed, completed and collected by the researcher assistants on the same day as agreed. The researcher made the forms available to the team of provincial assistants. Envelopes indicating the name of the school and the category of participants (principals, teachers or learners) were used for collection purposes.

The Provincial Chief Inspectors of Schools undertook to send the completed forms to the researcher. For data entry and processing, to which end, the researcher sought (and gained) the collaboration of the computer section of INDE.

The respondents were also requested to analyze critically the implementation of the New Basic Education Curriculum in Mozambican Schools. It was emphasized that their sincere opinion would enable a rigorous analysis of the new curriculum implementation process. The respondents were clearly informed that it was not a simple academic exercise, but above all, an act of reflection, aimed at identifying factors conducing to the success or failure of endeavours to implement the new basic education curriculum. The findings emanating from said reflections would allow timely measures to ensure the success of said endeavours.

Informed consent to participate in the research was obtained at provincial level from the Provincial Directors of Education and Culture. The respondents were asked to cross (X) the box that best described their opinion, using the rating scale given in the form to the right of each question (Likert-type scaling). Principals and teachers took an average of one hour to complete this task while learners took about two hours.

It is important to note that the majority of learners who were involved in the study were minors (less than 18 years old). The content of the questionnaire was related to their normal daily school activities. The principals and teachers were sensitized and prepared for their active collaboration in the research, including the selection and orientation of learners to take part in this study. The principals and the teachers decided on the opportune timing of learners' participation to avoid disruption of the normal school routine.

Thus, taking into account the nature of this research, consent for learners' participation was obtained through the school leadership, including the Parents School Commission. The purpose of the questionnaire and the application of the findings were explained to the learners. The questionnaires were processed and completed so that they would not consider it a test (assessment). It is also important to note that the privacy and confidence of all respondents were treated with due respect. In Mozambique, up to the introduction of the new Curriculum for Basic Education, the only medium of instruction was Portuguese. Teachers were normally

used as enumerators to interpret or translate problematic questions into the local language for learners, especially in the rural areas. However, for purposes of this study, and in order to avoid misinterpretation of questions in such cases, enumerators were trained to administer the questionnaire and the questions were translated into the appropriate language beforehand.

4.6   RELIABILITY AND VALIDITY

Huitt (1999:1) notes that "the collecting of quantitative data (measurement) and doing research always raises the issue of reliability and validity". The same researcher distinguishes reliability from validity by asserting that while the first is relates to the consistency of collected information (i.e. about the question: can we trust the data or findings?), while the second deals with the accuracy of information (i.e. with the question: are the data measuring what they are intended to measure?) In short: do they measure 'precision' (Winter, 2000), referred to by Hoepfll (1997) as 'credibility' and 'transferability'? According to Huitt (1999), the research study is reliable when its replication produces analogous results, which implies that a measurement (test score) can be reliable but not necessarily valid. However, that it has to be reliable to be valid. Golafshani (2003:599) corroborates this statement, when he observes: "although the researcher may be able to prove the research instrument repeatability and internal consistency, and, therefore reliability, the instrument itself may not be valid."

In the present study the main concern regarding reliability was to ensure the trustworthiness of the data as research instruments and of the findings while the concern regarding validity was to determine the accuracy of the data and findings in terms of precision, credibility, transferability and prediction. Therefore, a pilot study was conducted with a small representative sample of the upper primary schools in each of the three selected provinces to ascertain that the definitive interpretation and understanding of the questions (items or variables) were still the same original English version. Thus, to ensure objectivity and clarity of items the pertinent improvements were made by the researcher, before applying the main survey under present research. Respondents were assured of anonymity to encourage the respondents to be frank and accurate in their responses, as Houser (1998) observes

to avoid bias caused by desire to give socially acceptable answers, to present themselves in a positive light or what they seem to be researcher's expectations concerning their self-report. Moreover, the reliability analysis (Appendices E1, F1 and G1) shows that:

- The principals' questionnaire contained the correct number of 14 items. The Cronbach alpha value was 0,8418, value above 0,7, indicating that the scale can be considered reliable for the sample concerned.

- The teachers' questionnaire contained the correct number of 20 items. The Cronbach alpha value was 0,9142, value above 0,7, indicating that the scale can be considered reliable for the sample concerned.

- The students' questionnaire contained the correct number of 75 items. The Cronbach alpha value was 0,9257, value above 0,7, indicating that the scale may be considered highly reliable for the sample at issue.

The following facts are apparent from the column labeled **"Corrected-Item-Total Correlation"** (Appendices D1, E1 and F1):

- Regarding principals and teachers, no value may be taken as low value (i.e. less than 0, 3), indicating good degree to which each item correlates with the total score.

- Concerning students, however, 11 items, namely I9.3V46, I9.11V5, I9.28V1, I9.28V2, I9.28.V4, I9.28.V5, I9.28.V6, I9.29.V4, I9.30V2, I9.31.V2 and I9.32.2 are items with low values, i.e. less than 0.3, indicating that the items are measuring something different from the scale as a whole (Pallant, 2005:92). Nevertheless, considering the number of items comprising the research instrument relate to students (75), the consistency of the data remains valid.

- The accuracy of the significance level was determined from the findings by using package software applied in this study as well as the manual calculation based on pertinent formulas (see example in 4.5.4). The two strategies lead to results, which ensure their validity. Finally, the triangulation involving quantitative analysis, factor analysis and the exploration of the relevant literature on curriculum implementation corroborate the data and findings of the study, thus ensuring its reliability and validity as shown in Chapters five and six of this report.

4.7   SUMMARY

Chapter Four contained a discussion of the research strategies and techniques applied during the investigation, producing useful insights into the quality of effort invested in the study and the reliability and validity of the findings of the research. The next chapter will report the main findings of the study with due reference to the strategies and techniques expressed in Chapter Four.