

An Exploration of Mathematics Learner Transition from Primary School to Secondary School

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Declaration

I, Swasthi Sukhdeo here by declare that this research was carried out by myself. The work entailed here in is solely mine.

SWASTHI SUKHDEO

Abstract

This research study explores six primary school learners' transition to secondary school and the influences that this may or may not have had on their mathematical performances. The study was carried out over a seven month period, that being the latter part of their final primary school year until the end of the first term of high school (October 2010 to April 2011). Various data collection methods were employed to retrieve information and much literature was used to inform this study. In the chapters to follow there are detailed descriptions of various stakeholders in the transition process as well as the factors that affect mathematics learning. The analysis of data reflects the findings of this study and discusses some of the implications regarding mathematics teaching and learning that should be considered during the transitional period from primary school to secondary school.

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Chapter 1

Introduction

1.1 Focus and purpose of the study

Tertiary institutions often blame the poor academic foundations that learners have in mathematics on secondary schools and educators, and they in turn blame primary schools and their educators. While the education fraternity is caught up in this spiral of blame, the learners continue to perform poorly in mathematics. This study examined primary school mathematics experiences in comparison to high school mathematics experiences in order to gain some insight into the transition from primary school to secondary school and some of its processes. This encompassed an investigation into some of the factors involved in this transition process and how they affected mathematics teaching and learning, to determine possible reasons for the decline in learner performance in mathematics as learners progress from their junior years of schooling into the senior phase.

This research attempted to investigate factors that influence movement from primary school to secondary (high) school. Furthermore, the study embarked on a process to tap into the learners' experiences during this transitional period in order to determine factors that affect mathematics learning either positively or negatively. In addition, this study was aimed at aiding learners in transition, as well as trying to bridge the gap (if it existed) between primary and secondary schools. The study drew from various sources of information, related literature as well as its own findings, for the purpose of exploring possible ways forward in terms of dilemmas surrounding the transition process. Three critical research questions also formed the foundation of the study.

These were

1. How do learners experience their mathematics learning in the primary school phase as compared to the high school phase?
2. Does the transition process influence the learners' mathematical performance?
If so, how?

3. What are the contextual factors in the transition process and how do these factors affect the learner's progress?

These questions indeed gave direction to the study and provided a basis upon which several arguments were built around.

1.2 Rationale behind this study

There is a general view that the performance of mathematics learners in examinations is more often than not poor. Research and overall analysis of learner results in recent years indicates that the above statement is true. Results of international comparative surveys, such as the Third International Mathematics and Science Survey (TIMSS), raised concerns in many countries regarding learner progress in mathematics (Mackay, 2006). According to Mackay (2006, p: 105) *“Changes at the transition to secondary school have been shown to be the cause of a number of negative effects on pupils, such as a drop in performance and decrease in self-esteem.”*

The above statement also seems to be true for many South African learners. In addition, many learners are found to cope with primary school mathematics, yet struggle with high school mathematics. This research project probed into this area to gather information on what happens to mathematics learning in the transitional period. Several factors emerged which seem to have affected and influenced mathematics learning, and these are discussed in Chapters 5 and 6.

South Africa is a rainbow nation embroiled in the complexities of diversity and multi-culturalism, in addition to its own transformation. The power struggle and South Africa's historical shift from an era of apartheid to the present democracy has also played a role in learner performance in mathematics. The majority of South African's learner population comes from the previously disadvantaged sector. Mark Saul, a professor from the United States of America who visited South Africa to lead a mathematics summer camp for South African teachers and learners, wrote about his impressions of how mathematics education has evolved

against the backdrop of apartheid, and how mathematics continues to grow under the new government.

According to Professor Saul (2001), even years after the Bantu Education Act but before the breakdown of the whole system, it became clear that South Africa was suffering from a lack of skilled workers, of programmers and other professionals. He believed that this was not just the result of a brain drain, but also the result of starvation of the minds of five-sixths of the population. He also acknowledged that apart from the political and moral failure of apartheid, the system contained the seeds of its own destruction, and that failure of the educational system was part of the failure of the larger system that spawned it. Further into the article he states:

“Perhaps most important, we have students who are learning the dead-end mathematics of skill without concept. We have much to share with our neighbours in South Africa, and perhaps each of us has much to learn from the other.”

Although this article was written in 2001, seven years after the abolishment of apartheid, it indicated the slow rate of progress in educational change. To date (2011) very little has changed in rural public primary and high school mathematics learning. There continues to be a shortage of human and physical resources and our learners seem to still “learn the dead-end mathematics of skill without concept” (Saul, 2001). These are some of the important components that may affect the transition process. The lack of these resources is also an indication of a lack of support system during transition.

In addition to a transition in education, many of learners have also had to endure the transition from primary school to secondary school with minimal support from the Department of Education. Taylor (2007, p: 13) depicts the general relationship between a learner’s performance in relation to their socio-economic background (Table 1).

Table 1: Distribution of high schools by performance in Senior Certificate; 2004 (Simkins, 2005 cited in Taylor 2007)

	Privileged schools	African schools	Sub-total	Proportion of total	<i>Proportion of HG mathematics passes</i>
Top performing	380	34	414	7%	66%
Moderately performing	254	573	827	14%	19%
Poorly performing	600	4 277	4877	79%	15%
<i>Total</i>	<i>1234</i>	<i>4884</i>	<i>6118</i>		

HG = higher grade.

Table 1, shows the percentages of top, moderately and poorly performing privileged schools in comparison to African (less/under-privileged) schools. During apartheid schools were administered according to race group, with Whites, Coloureds, and Indians seen to be relatively more privileged than Blacks. The White schools were significantly more privileged than those for any other group. The above table illustrates the fact that the smallest (privileged) population group still had the largest top-performing rate. It becomes, to a large extent, conclusive that an individual's social and economic capital often plays a significant role in their achievements and performances.

Transition of any sort is a fairly discomfoting experience for many people. The simple reason is that it is in human nature to be adverse to change. In addition to this adverse emotion, learners have to physically endure the change from a primary schooling environment to a secondary one. This may not necessarily mean that they are moving to a better and more comfortable environment. The movement from a primary mathematics classroom to a secondary mathematics classroom is especially more unsettling as high school mathematics is seen as more difficult and demanding. The heightened awareness in this regard promotes fear and unnecessary anxiety towards mathematics learning. The compounding issues around the lack of resources and departmental (government) support would also seem to compromise learners' progress and the quality of education they may receive.

According to Taylor (2007, p: 13):

“Measuring quality through performance in mathematics in no way implies that the production of good mathematics passes should constitute the main goal of schools. Mathematics is merely used as a proxy for quality, and it is assumed that good language, reading and writing skills underlie performance in mathematics.”

Taylor implies that high pass rates in mathematics do not really mean that learners are receiving a quality education, and nor should schools make this their goal. An excellent example of his articulation is evident in South Africa’s 2008 National Senior Certificate (NSC) examinations. Despite the seemingly good pass rates (the large number of A symbols) in mathematics, tertiary institutions were horrified with the poor literacy levels and lack of conceptual understanding students had in mathematics. High schools once again came under criticism for “teaching to be tested for an examination” (Taylor, 2007, p.14). That meant that skills were drilled into learners without them understanding the concept, purely for examination testing. Ironically, Taylor (2007) presented this argument at a conference in June 2007 and this argument was authenticated by the November 2008 mathematics results. This aspect is discussed in greater depth in Chapter Two.

There seems to be a hierarchy, to a certain degree of blame placed on the various bodies that constitute the overall education system in South Africa.

Figure 1: The hierarchy of blame

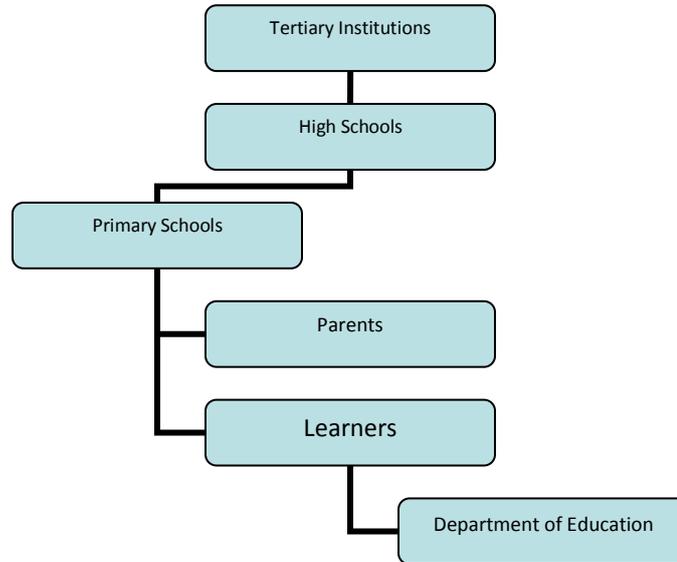


Figure 1 illustrates a ‘chain of blame’ from the higher education bodies all the way down to the Department of Education (DoE). Higher education has to deal with the final product of the schooling system, and they feel that high schools do not prepare learners enough. By the same token, high schools blame primary schools for the learners’ lack of foundations, parents for a lack of interest and support, and learners for a poor attitude and work ethic. However, they all in turn blame the DoE for not providing efficient support material and proper guidance in education.

As a teacher of mathematics I have also noticed that the failure rate of learners in high school across the different grades rises steadily each year. When high school mathematics educators and subject heads are questioned in this regard, the response is that the foundations are weak and learners’ prior knowledge is generally lacking in those who complete primary school. In addition, there seem to be other compounding issues such as quality of education, lack of resources and continuous curriculum changes. These are some of the issues that Saul (2001) has highlighted.

From anecdotal evidence it appears that basic foundations of mathematics (primary school level) seem to be lacking, hence we assume that it is for this reason that learner performance is poor. Poor performance, in addition to several other factors, seems to create fear, anxiety and dislike for the subject in many learners. As a teacher of mathematics I am faced with the challenge of dealing with anxious, disillusioned junior secondary learners every year. Each year it seems to be getting worse. Learners are less prepared to work, they lack understanding of basic mathematical concepts, and learning morale is low despite completing primary school mathematics. Some learners enter high school with very good grades in mathematics from primary school, and begin to struggle with basic concepts in high school. Parents are also very concerned - they always point out that their child performed so well in primary school mathematics, yet in high school they struggle to pass. This research therefore attempted to explore what happens in the transition from primary school to high school in terms of mathematics learning. What are the factors that contribute to the decline of learner performances and what are the reasons for mathematics-anxious learners?

In Chapter 2 a range of local and international literature is reviewed, forming a backdrop to the transition process and the factors affecting mathematics learning in this study. This chapter highlights issues around the transition process and mathematics performance in several studies, indicating that this is not unique to South African schools. It sets the stage for what could be expected in our schools.

Chapter 3 focuses on the analytical tools that are used to synthesise this study. The two theoretical frameworks are described in great detail in order to show correlation and to form the basis of various arguments.

Based on the type of study and chosen framework, Chapter 4 discusses the method and methodology adopted by this study. Using the frameworks and the literature reviewed as well as the methodology, Chapter 5 provides a critical analysis of all the data collected. Finally, Chapter 6 provides a brief summary of the findings, discusses some of the shortcomings of the study and makes recommendations for future research.

Chapter 2

A review of related literature

2.1 Introduction

This literature review focuses specifically on issues raised internationally and locally regarding the differences that mathematics learners experience between primary and secondary school, and the spiralling effects this has on learners' performances in this period of transition. The literature presented reflects teachers' values, beliefs and practices as well as how learners perceive themselves and mathematics, their teachers and the learning material. The views, thoughts and ideas of several authors and researchers regarding the reasons linked to poor learner performance in mathematics are highlighted.

2.2 Transition from primary school to secondary school

I specifically address the different transition processes that a learner will undergo in the course of becoming a university graduate. All processes of transition bring with them some anxiety, and this is discussed at length in this chapter.

From the very beginning of our human existence we have endured, to varying degrees, a range of transitional experiences. Almost all of us make the transition from home to playschool or preschool, and later from school to the workplace, and many of us become familiar with career changes and adulthood. Whilst these experiences can have a great impact on an individual's life and have been explored in many studies, the transition to high school or the point at which we leave primary school is also a transitional experience that requires exploration, especially regarding learner performance.

Many students that make the transition to high school each year perceive this as a momentous step during their formal education. However, adolescence can be a confusing time for students due to the many physiological and psychological changes that occur in the human body, thus causing a shift in the focus of academic studies.

The transition process is a highly individualised experience. In order to assist learners to make a smooth transition, it is necessary that learners' needs during this transition process are understood. This may inform curriculum reformers as to what each learner needs to know about before they enter high school. Middle schooling programmes, orientation days and older siblings or close friends may allay some of the fears that some students may have regarding the transition to high school, but not all uncertainties will be able to be addressed and overcome. In any event, not all problems may relate to the child directly.

Learners' that are in transition from primary school to secondary generally seem to be apprehensive and anxious and share many concerns about the transition process. According to Rice, Frederickson and Seymour (2011), the period of transition from primary school to secondary school not only involves school environmental changes but it simultaneously involves changes in, social interactions, and academic expectations. Adjusting to these changes between the different phases of school environments, as well as adjusting to the new institutional and social systems at secondary school, can become somewhat distressful and challenging for many involved in this process. As literature indicates, most learners' anxiety about transition, emerge to be relatively short-term and generally fade as the first term of secondary school progresses (Murdoch, 1966; Stradling & MacNeil, 2000; Youngman & Lunzer, 1977). Once again literature points out that transition can adversely affect learners' emotional and psychological adjustment and this is often reflected within a range of school behaviours which includes poor attendance, lower grades, and behavioural problems (Galton, Morrison, & Pell, 2000; Harter, Whitesell, & Kowalski, 1992; Sirsch, 2003; Smith, Akos, Lim, & Wiley, 2008).

These studies also state that commonly reported reservations about transition generally involve the new school environment (e.g. size of school, getting lost), travelling to and from school, being separated from current friends, homework, higher academic expectations, older pupils, and bullying (Brown & Armstrong, 1982; Lucey & Reay, 2000). In a survey of Scottish pupils, Zeedyk, Gallacher, Henderson, Hope, G., Husband, & Lindsay (2003) found that the most commonly endorsed concerns were; bullying, getting lost, an increased workload, peer relationships, and new

environments and routines, with fears of bullying by far the most commonly reported concern. These frequently reported concerns therefore reflect the major institutional and social changes associated with the transition to secondary school and refer to changes in the organizational structure of the school environment as well as to changes in the social role and expectations of secondary school pupils. Some pupils may therefore be particularly vulnerable to school disengagement and adjustment problems during the transition to secondary school (Rice *et al.*, 2011). Demographics and personal characteristics appear to be closely linked to poor transition. Younger learners as well as learners' who are less academically inclined are more likely to adjust inadequately to new school reforms. Rice *et al.* (2011) argue that the development of programmes that promote a positive transition to secondary school is imperative because poor transition can result in poor adjustment and may impact on future academic attainment. Learner's who are unsuccessful in making the adjustment to the challenges posed at secondary school level, may face the danger of becoming de-motivated and potentially disengaged from schooling. The implications of such phenomena may extensively hamper a learner's ability to full fill their academic and personal potential. Poor transition at secondary school can impact disastrously on learners' adjustment (depression, self-esteem) and academic attainment beyond the school years (West, Sweeting, & Young, 2008).

Rice *et al.*, (2011) thus informs that intervention efforts focusing on the primary–secondary transition are warranted as: the transition period involves stresses and anxiety for all learners, even those who adjust well to secondary school; a poor transition is associated with concurrent psychological problems; and a poor transition can set in motion chains of events that impact on future attainment and adjustment.

It may be that primary and secondary school teachers also contribute to these feelings of confusion. While the uncertainty that these students feel prior to their transition can cause a great deal of nervous anxiety, it is also important to note that these fears and uncertainties will impact on academic performances during the transition, especially in learning areas such as science and mathematics which are more demanding disciplines. In these subjects learners may now be exposed to new, unfamiliar terminology, language and style of presentation. When learners are not able to grasp

concepts, their fears and anxieties are heightened and impact negatively on their performance. The possibility that secondary school educators may have a different style of teaching, due to the fact they are addressing a more mature group of learners, may also be a factor to be considered in this process.

While transition programmes provide some idea of the culture of the high school, there are only so many things that can be demonstrated through such a mock situation. It seems that the only way to really experience what the transition to high school is like is to actually go through the experience. As Measor and Woods (1984, p. 170) state, *“it would be a mistake to aim for an entirely smooth, continuous transition, particularly in the terms of the social culture”*. They argue that schools:

“... should not try to do too much, that there are some things pupils need to learn for themselves. What is needed, we suggest, is a supportive framework within which those lessons are learnt” (Measor & Woods, 1984, p: 43).

The New Zealand Ministry of Education (Research Division, 2008) also studied their students' transition from primary school to secondary school (i.e. from Year 8 to Year 9). This research highlighted some pertinent issues about the different transitional points in a student's education. It also included the complexities of the primary to secondary schooling transition. The aim of the study was to identify the factors that may facilitate or hinder the transition from one environment to another. The study involved an examination of overall learning and achievement, social development and adjustment, as well as attitudes towards school, learning and achieving. The main idea of this project was to try to contribute to an enhanced high school experience and increased success for students in the classroom.

The study found that students within a short period of time are able to make the adjustment from primary school to secondary environment. It was not the disaster that parents and students often perceived them to be. By the end of the first year of high school students have made the adaption and had reported many positive experiences at school. The research programme also investigated if transition affected achievement at high school. The students were assessed in mathematics,

reading and writing during different phases of the study using asTTle (Assessment Tools for Teaching and Learning). The test results for the majority of students indicated sound or good achievement gains. The progress patterns of high achievers in mathematics and reading were more consistent than that of the low achievers. Although students initially displayed positive attitudes towards mathematics, reading and writing, their overall attitudes in these learning areas declined as they progressed from one year (grade) into another. The study also discovered that students in general, became less engaged in areas of learning and more critical of their teachers and some of the teaching they experienced.

Transition from primary school to secondary schools in South Africa generally occurs between the ages of 13 and 14 years. Here it is generally a move from grade seven into grade eight. This is also a period when children experience physiological, emotional and social change associated with adolescence. Attard (2010) also found that learners encounter changes at social, organizational and academic levels during the transitional period from primary school to secondary school. She cites an Australian study by Kirkpatrick (1992) that indicated that learners did not find the academic work in the first year of high school difficult. It was actually easier than that of their final year in primary school. Nevertheless these learners still experienced difficulty in adjusting to a new academic environment. The transition to secondary school often results in some level achievement loss, a phenomena experienced by many throughout the world (Attard, 2010).

Many learners enter into high school with various perceptions and preconceived ideas of how demanding and challenging high school curriculum is. The disinterest and decline in mathematics engagement is based on negative attitudes and misconceptions that learners have about mathematics. The belief that mathematics is difficult and only a select few have the ability to achieve creates feelings of fear and anxiety of failure. It also increases disinterest and dislike towards mathematics. Attard (2010) in her study of students experiences of mathematics during transitions discovered that two fundamental factors that

affected mathematics learning (engagement). These were differences in pedagogy and the teacher/student relationships that are formed.

The changes that learners experienced in pedagogy was based on the mathematics content, the mathematics content, assessment practices, work load, teaching practices, integration and the use of technology. Although learners did not find the content itself to be difficult but rather the presentation of the content and the volume of the work was demanding. The pace of work at high school was more rapid and learners felt the pressure to complete tasks within specified time frames. Despite claiming the content was familiar and workable there still existed a negative engagement in mathematics. Attard (2010) also found that with time, learners became less concerned about the work load and more concerned about the assessments. These were much different from that of which they were accustomed to in primary school. In high school, the assessment tasks were more competitive, highly individualized and more demanding. As a result it created a lower engagement with mathematics. The use of technology (computer aided lessons) to access lessons worksheets and assessments heightened individual learning and feelings of learning in isolation. Attard (2010) confirms that different pedagogies experienced by learners during the transitional period did have some effect on their engagement in mathematics but was not the most influential factor affecting mathematics learning. The more influential factor was the relationships that formed between the teacher and learner.

Attard's (2010) study also revealed that the relationships that learners cultivate with their mathematics educators play a significant role in the engagement of mathematics. The strong teacher student relationships that learners generally experience in primary school seemed to be some what different or lacking at high school level. At high school, learners found mathematics learning to be more individualistic and less cooperative or collaborative and this seemed to demotivate them. In addition, learners felt that some of their educators' experienced difficulty in explaining certain mathematical concepts to them. Sometimes it came across that the educator him/herself was not sure about the content matter. Attard (2010, p: 59) maintains that, " ... a positive pedagogical

relationship includes a strong knowledge of how students learn and a strong content knowledge. If teachers are not trained in mathematics, this may not always occur. It can be argued the apparent lack of appropriately qualified mathematics teachers could be a result of students' disengagement in mathematics with fewer students choosing to continue its study." Unfortunately, South African schools are also under resourced in terms of specialized educators and often employ unqualified mathematics educators to teach the junior grades. Furthermore, many qualified mathematics educators are also not fully trained in some of the new aspects recently introduced within the mathematics curriculum. Hence, they may show signs of a lack of strong content knowledge which may result in a lack of confidence. To maintain interest, motivation and engagement in mathematics during the transitional period, learners need to develop positive student/teacher relationships in order feel confident about their mathematics educator as well as the content transmitted.

New Zealand schools have managed primary school to secondary school transition in several ways by placing emphasis on orientation and support. McGee, Ward, Gibbons, & Harlow, (2003) in their report to the ministry of education indicated that the Education Review Office (1994) expressed that many schools began orientation programmes with introductory activities in the year before the transition occurred while others focused on the first weeks or even the first year in the new school. Several secondary schools operated a Peer Support programme where a senior student met with a group of about five junior students on a regular basis. These senior students were trained as mentors with a teacher who was responsible for the programme. Subsequently, the training and teacher support was ongoing as the programme progressed. Primary and intermediate schools were expected to forward achievement information to secondary schools. These were used to supplement secondary school diagnostic testing of new students for appropriate placement. However junior schools did not seem to require feedback about the success of their students who progressed to secondary schooling. Such information may no have seen as important but has been used successfully to modify and develop teaching programmes in order to raise achievement standards at primary schools. Students were also given timetable and map support. It was found that the adjustment phase

within the secondary school was shorter than what most literature suggested. Although transition was generally perceived to be readily accommodated, each student had their own personally stressful experiences associated with transition. The report also indicated that many of the students acknowledged the challenges associated with transition. However they readily suggested supportive measures within schools to counteract stressful situations. These included peer support programmes, home-room time, and easy access to form deans. Some expressed that attendance at a middle school exacerbated any problems. Others attributed easy transition to a common outdoor experience for all Year 9 (first year at high school) pupils in the first week of their secondary schooling helped.

In South Africa, learners may not always transcend from primary school directly into high school. This depends on circumstances, population, contexts, availability and accessibility to various stages of schooling. In some parts of Africa (desolate, rural) there are combined schools whose grades range from grade R (school readiness) to grade 12 (final year of high school). Here no transition is involved. However, there also exist cases of middle schooling (the intermediate phase, grade 4 to 6). Transition now occurs between junior school and middle school and again between middle school and secondary school. So the challenge remains for middle school educators to help the young learners make a smooth and successful transition into high school. To facilitate a smooth transition, the transition needs of students, how to respond appropriately to those needs, and to have all middle schools involved in this process should be considered (Mizelle & Irvin, 2000). Middle school educators are encouraged to respond to these needs for exemplary middle to high school articulation practices for all young learners. As students make the transition into high school, many experience a larger, more impersonal, more competitive, and grade-oriented environment than they experienced in middle school (Eccles, Midgley, & Adler, 1984). They are also exposed to greater diversity of teachers and peers, and they have more choices to make in their curricular and extracurricular activities. Often in this environment, grades tend drop, and school attendance becomes irregular. Learners may even develop a negative view of themselves which creates increased dependency on peer friendships. Studies indicate that transition from middle school to secondary school also invokes feelings of excitement and concern about going to high

school. They look forward to more freedom, more choice, the opportunity to participate in more extracurricular activities, and the opportunity to develop friendships. However, they also admit to being *nervous* and *scared* about older students teasing them; getting lost in their larger, unfamiliar school; and making bad grades (Cognato, 1999; Maute, 1991; Mizelle, 1995; Phelan, Yu, & Davidson, 1994; Wells, 1996).

A variety of studies in USA schools also indicated that providing students with a challenging and supportive middle school experience was advantageous factor that favoured successful transition into high school (Belcher & Hartley, 1994; Mizelle, 1995; Oates, Flores & Weishaw, 1998). The middle school experience of more hands-on, life related learning activities, integrated instruction, and co-operative learning groups, enabled a more successful in their transition to high school than were students from the same school who did not have a middle school experience which copies organisational features of secondary schools. Organisational changes were utilized in order to help facilitate and increase the level of student engagement. Lounsbury (1996) cited in McGee *et al.* (2003) suggested that to facilitate successful transition, all options needed to have many of the following characteristics worked into an organisational school framework: teaching of a core curriculum; high expectations for all students; empowering teachers to make curriculum decisions; teachers trained and committed to work with adolescents; fostering of health and fitness of students; re-engaging families in the education of their children; connecting schools directly to their communities; a shared vision of education; an adult advocate for every student; a challenging, integrative and exploratory curriculum; varied teaching and learning styles; flexible organisational structures; and less emphasis upon formal tests and examinations and more on formative assessment (McGee *et al.*, 2003).

In other parts of Australia, policy stated that schools should be structured for gradual transition from one class with one teacher to a number of classes with several teachers who are specialist subject teachers in the senior secondary school (Bezzina, 1988). In Australia the most urgent issue around the transition point between primary and secondary education was that students became less interested and less engaged with their academic achievement. This is an equally sore point in many South African schools.

2.3 Transition from secondary school to tertiary institutions

For many high school learners, acceptance to and attendance of any tertiary institution is an equally momentous event in their life. However, in addition to the same uncertainty as was experienced in the primary to secondary transition, this also entails a greater degree of responsibility and accountability. Most students enter post-secondary educational settings shortly after they complete their high school studies, while some go to college years after they have graduated from high school. The educational reference points for both groups are still based in their high school experiences. This can create problems for students because of the differences between the environments and demands of the high school and tertiary learning settings. According to Weinstein (1988), research indicates there are differences in six distinct categories: academic environment, grading, knowledge acquisition, support, stress and responsibility. Although these categories may draw a parallel between high school transition and tertiary transition, we must bear in mind that the high school learner is not as experienced and mature as the tertiary student in terms of coping with the demands of varying circumstances. In addition, the tertiary student has support structures and facilities available to help with the transition process. The different categories are discussed below. We must, however, consider that these will be more difficult and demanding for a high school learner.

Academic environment: This category includes differences in operational and logistical variables. Here the lecturers are not trained to teach but to lecture or facilitate. Students are held responsible for what they should have learned at high school. The method of instruction is mainly by lecture, although in mathematics classrooms varied formats may be used. Class discussions are often aimed at raising many questions, and it may often seem as if there is no clear right or wrong answer since there can be several methods to approaching the same problem. The emphasis is largely based on understanding the theory and its application. Tasks given are less structured and less concrete. Effective use of the library becomes a vital part of the student's life. Assignments may complement but do not necessarily duplicate lectures. Classes meet less frequently or for fewer hours per week. In addition, tertiary institutions are generally much larger establishments with a greater number of

students on campus. As a result there are more social distractions. Similarly, high schools are much larger institutions than primary schools, and learners are continuously moving from class to class for different lessons.

Grading: This category varies drastically with regard to how grades are earned. Much more hard work is required to attain a grade of A or B, not just the mere or simple completion of assignments. Often exam questions are more difficult to predict. Essay exams are more commonly used, but not in the mathematics courses. Furthermore, students' progress is not closely monitored as compared to high school. Similarly, the high school curriculum is more structured and demanding compared to that in primary schools, and high school examinations are lengthier and relatively more difficult.

Knowledge acquisition: This category includes differences in how students study and acquire knowledge and expertise. For maximum knowledge acquisition students need to read extensively and develop their comprehension skills. Good listening skills (to identify main ideas) and effective note-taking skills need to be cultivated, as few visual or study aids are provided. Students are expected to work independently and seek additional and supplementary sources of information. They are also expected to recognise the need and initiate requests for additional help.

Support: This category consists of the amount and type of support the student receives. At this stage relationships with friends and family may change. There are less external interferences and more individual accountability. The learning environment may seem impersonal as there is minimal contact with instructors, less individual feedback and little direction given. Academic competition is much greater and behavioural problems are not tolerated. Learners are expected to be more responsible as work requires more practice.

Stress: This category includes the differences in the concerns and perceived pressures the student experiences. At tertiary level the workload is increased and the pace is much faster. It also becomes more difficult to earn high grades or symbols. Students are more independent and are accountable for their behaviour. They also experience

new and often increased social pressures. They are at a point in life where they need to know exactly what they want from college (tertiary education), classes, life, etc., in order to make informed decisions. Some are also burdened with increased financial responsibility.

Responsibility: This category is associated with the changes in the student's role from high school to tertiary level. Students are now faced with an increased number of choices and decisions, and are also responsible for managing their own time and commitments and establishing and attaining their goals. Self-evaluation, interest in learning and a motivation to succeed need to be self-generated. All of above categories are also evident in the lives of learners who move out of primary school and take that step into high school.

According to Tall (2008), transition from secondary to tertiary education is generally marked by a physical separation of the student from their home, parents (extended family, clan, community, care givers), siblings and friends. The student under transition has to abandon most aspects of his/her life in a specific community in order to assume new roles to become functional in the tertiary setting. Apart from the social and cultural changes, the changes that affect the transition to tertiary mathematics are numerous.

Firstly, changes in teaching and learning styles, type of mathematics taught, levels of conceptual understanding, and the amount of advanced mathematical thinking are required. Secondly, students are exposed to routine use of abstract concepts, ideas and abstract reasoning. They also encounter increased emphasis on multiple representations of mathematical objects, with a central role for proofs and precise mathematical language. In addition, students experience numerous didactical differences in approaches to teaching, a large variety in individual instructors' teaching styles, and changing features of knowledge and knowing. Furthermore, students in transition also undergo personal changes requiring an adjustment of learning strategies, time management skills and a shift to more independent living and studying. These are very similar experiences to those that high school learners in transition endure.

A report *Tackling the Mathematics Problem* compiled by the Institute of Mathematics and its Applications, the London Mathematical Society and the Royal Statistical Society (1995), states that:

“There is unprecedented concern ... about the mathematical preparedness of new undergraduates ... The serious problems perceived by those in higher education are: (i) a serious lack of essential technical facility – the ability to undertake numerical and algebraic calculation with fluency and accuracy; (ii) a marked decline in analytical powers when faced with simple problems requiring more one step; (iii) a changed perception of what mathematics is – in particular of the essential place within it of precision and proof.”

This report evidently acknowledges how ill-prepared students are when they arrive at tertiary institutions. The same report also voices concerns about observation of a qualitative change in the mathematical preparation of incoming undergraduates. Apart from students being less well prepared, many ‘high attaining’ students are seriously lacking in fundamental notions of the subject. Tall (1991, p: 252) states that:

“Advanced mathematics, by its very nature, includes concepts which are subtle at variance with naïve experience. Such ideas require immense reconstruction to build the cognitive apparatus to handle them effectively. It involves a struggle ... and a direct confrontation with inevitable conflicts, which require resolution and reconstruction.”

Tall (1991) also explains that students who enrol for tertiary mathematical courses often experience conceptual obstacles that make their pathway very difficult to travel successfully.

Drawing from some of the related literature, it becomes evident that high schools are faced with similar challenges to tertiary institutions in the area of transition. High schools echo the same sentiments and voice the same concerns when learners leave primary school and enter high school. However, at this early stage of the high school learner’s life they are not as capable, mature and responsible as tertiary students are in order to deal with this ‘big change’.

2.4 Factors that affect or influence transition from primary school to high school

Ryan and Williams (2007), cited in Anderson (2007), state that there is a growing body of evidence that the mathematical performance of students plateaus between the ages of 11 and 14 years. Possible factors for a lack of progress range from the physical and social environment to inadequate assessment practices and inappropriate pedagogy. Some ideas about factors that contribute to poor learner performances drawn from available literature are outlined below.

2.4.1 Standard of education

The quality of South African education has often been questioned. Researchers have tried to investigate the extent to which curricular and pedagogical inputs have made an impact on the quality and outcomes of primary education?

The shift in educational regime in 1994 led to the introduction of outcomes-based education and Curriculum 2005. The main focus of Curriculum 2005 was to redress the inadequacies of the education system of the apartheid era. Hence Curriculum 2005 was born. It aimed at restoring social justice, human rights, equity and development as well as a learner-centred approach to learning. The main objective of outcomes-based education was to improve the quality of teaching and learning by scaffolding activity-based practices instead of rote learning sequences. To guide these practices, critical and developmental outcomes were derived from the Constitution in 1995 and were translated into learning outcomes contained in the curriculum. These outcomes described the kind of citizen the education system aimed to produce. The critical outcomes envisage learners who will be able to:

- 1 Identify and solve problems and make decisions using critical and creative thinking.
2. Work effectively with others as members of a team, group, organisation and community.
3. Organise and manage themselves and their activities responsibly and effectively.
4. Collect, analyse, organise and critically evaluate information.

5. Communicate effectively using visual, symbolic and/or language skills in various modes.
6. Use science and technology effectively and critically showing responsibility towards the environment and the health of others.
7. Demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation.

The developmental outcomes envisage learners who are also able to:

1. Reflect on and explore a variety of strategies to learn more effectively.
2. Participate as responsible citizens in the life of local, national, and global communities.
3. Be culturally and aesthetically sensitive across a range of social contexts.
4. Explore education and career opportunities.
5. Develop entrepreneurial opportunities

Curriculum 2005 was introduced in 1997, and envisaged the results of its implementation in 2005/2006. However at the inception it was criticised as excessively complex as it entailed developing own curricula and teaching resources and it was also largely activity based. The implication was that it could only be successful in well-resourced schools with qualified teachers and small classroom population. On the flip side, poorly-qualified teachers in rural schools would be helpless when faced with the demands to create their own curricula and resources. Curriculum 2005 was accordingly reviewed and revised to address these criticisms. (DOE 2000; DOE 2002; Chisholm 2003). The Revised National Curriculum Statement (RNCS) for schools from Grades R – 9 (DoE 2002) was a revision of Curriculum 2005. This was only implemented in 2004. In 2008 the Revised National Curriculum Statement evolved into the National Curriculum Statement (NCS) for Grades 10-12. Currently, in 2012, two National Curriculum Statements, for Grades R-9 and Grades 10-12 which are combined into a single document known as NCS Grades R-12.

The continuous transformation in the South African education system has indeed had some negative impact on the delivery of education in the classroom. The quality of education has been to a large extent compromised based on the lack of resources and

re-training of educators. Teacher confidence and morale regarding subject knowledge and content has also declined.

According to Botha (2000) the quality of mathematics education in South Africa is greatly inadequate compared to international standards. This is compounded by other personal issues such as negative self-concept and mathematics anxiety and more general issues such as lack of resources and shortage of well-trained teachers. Learners are still exposed to memorising mathematical knowledge rather than making meaningful learning. This contributes to the poor quality and lack of effectiveness in mathematics education in South Africa. He also states that South African learners lack problem-solving abilities and creativity, and hence their poor performance in this subject creates anxiety.

More recently, in early 2009, Aslam Mukadam, the coordinator of an organisation called Concerned Mathematics Educators, criticised the current state of mathematics education in South African high schools in a letter addressed to National DoE. According to Mukadam:

“... we found that the final examination in Mathematics was watered down and has therefore widened the gap between school and university for the top learner. The type of questioning was unchallenging for talented and competent learners and if this standard is going to be used as a benchmark for future examinations, it will not adequately prepare young learners to study Mathematics related courses at university level.”

This letter expresses Mukadam’s dissatisfaction with the current state of educational affairs.

Based on South Africa’s history of apartheid and inequities between the different races, Mukadam resonates with Botha’s (2000) views about the lack of physical and human resources. Mukadam writes:

“Furthermore, the 2008 exam clearly illustrates that more affluent schools performed much better than those in lower income areas. In order not to further disadvantage the poorer communities which are already adversely affected by the lack of qualified educators and adequate resources, we suggest

that an interim solution would be to tweak the assessment system until such time that enough adequately trained educators become available. It is important therefore, that we create the opportunity for learners with lesser mathematical ability to write Papers 1 & 2 which will test basic understanding of mathematical principles, without the rigorous conceptual demands. In this way learners with lesser mathematical ability will not be disadvantaged for not being able to answer the higher level questions currently in Papers 1 and 2. However, the standard set in these papers will still enable them to register and cope at Universities of Technology to further their studies in careers requiring basic mathematical knowledge.”

Once again he highlights the lack of physical and human resources and the quality of education in South African public high schools. Mukadam further suggests that:

“It is imperative that we address the Mathematics issue more holistically by taking cognizance of the fact that not all learners have the same capabilities, and more importantly, creating an assessment system which considers the diversity of our learner populace. We feel that the structure and assessment system in this ‘one-size-fits all’ Mathematics curriculum is making Mathematics less accessible for the weaker learner and is not adequately preparing the top learner.”

He boldly expresses that the education system is flawed.

The changes in the South African education system seem to have attracted an enormous amount of negativity regarding its quality of education. In an article in *The Times* newspaper Ncana and Swart (2009) quote the higher education body chairman, Theuns Eloff, as saying that:

“... curriculum has failed to produce competent pupils. As university managers we are concerned that the ability of learners from high school to read, comprehend and write is declining and they are bad spellers ...”

This article also indicated that universities that conducted competency tests in English and Afrikaans and in the dominant languages of instruction have reported a decline in standards. Eloff also told *The Times*:

“One of the unintended consequences of the OBE [outcomes based education] is that we stopped having comprehension tests and reading and spelling. You don’t learn to spell and comprehend, and that is nonsense...”

The education system and type of education received is once again criticised. There is an indication that the standard of education in South Africa is declining. Although our learners matriculate, many are not actually literate.

In an article by Carol Paton that appeared in the *Financial Mail*, the quality of education was also questioned. Paton (2009) quotes the Vice-Chancellor of North-West

University, Nan Yeld:

“The whole curriculum is not being taught. The studies - one by the national benchmarking test (NBT) project commissioned by Hesa and another by historically Afrikaans universities, in which Eloff is involved - were done so that universities

could establish what kind of support they need to offer students. However, they have also indicated that strong conclusions can be drawn about the schooling system and the National Senior Certificate (NSC):

- *The maths pass rate and grades in last year's NSC exams were unrealistically high;*
- *SA students' foundation skills of numeracy and literacy are disastrously weak; and*
- *In both maths and language, the problem is getting worse, not better.”*

Again, the schooling system is criticised. High pass rates at matric level seem to be unrealistic, yet these same learners lack the ability to cope with tertiary education. However, Yeld (in Paton, 2009) says the problem is more fundamental:

“At the top end it was too easy, but this does not explain the problem entirely. We believe that the whole curriculum is not being taught, but only the bits that the

teachers can manage. The curriculum is excellent, but I don't think the system can deliver it - it makes too many demands on parents, on teachers, and so on."

Paton explained that this was why the national benchmarking test, which also tested only the NSC curriculum, got such different results from the NSC exam. Apart from the problem of the final NSC exam (introduced for the first time in 2008), Yeld also indicated that there was a long-term decline in mathematics skills coming out of schools.

Further into the article (Paton, 2009), Eloff was quoted again:

"There has been a clear regression over the past five years. At North-West University, the pass rate has declined by 13%. This test shows that things have gone backwards. Though things did get worse this year, the NSC is not to blame. The NSC was the final straw. The problem lies in our schools at the primary level. They are not learning to spell using syllables, they don't do comprehension and they don't drill times-tables. These things have an accumulative effect."

From the above views and comments it would seem that tertiary education is experiencing great difficulty in coping with the products of the current South African schooling system.

According to Paton (2009), the DoE responded to both reports in Parliament's Portfolio Committee on Basic Education by indicating that they were mortified at the negative publicity generated and what seemed like finger-pointing by higher education. They did concede that although there had been a problem with the mathematics paper, the curriculum and the exemplar papers had been reviewed by bodies such as Cambridge International Examinations, the Scottish Qualifications Authority and the Board of Education in New South Wales. However, this does not shed light on what happens at school level.

Drawing from the above articles and various bodies in the education system, higher education seem to blame the curriculum and poor standard of mathematics teaching in

most high schools. This may be directly associated with the continuous changes in the school curriculum and availability of skilled/trained educators as well as the amount of responsibility parents are willing to take on.

2.4.2 Mathematical myths

Mathematic myths develop negative misconceptions within learners and teachers of mathematics. Zaslavsky (1994) claims that mathematics and the way it is taught in schools are responsible for many of these misconceptions. She identifies some of the following myths as: every mathematics problem has just only one answer; mathematics is hard, only a genius can understand it; never count on your fingers or use hands-on materials to help solve the problem; and you must to follow the procedures the teacher and the textbook provide you.

These are general misconceptions that teachers and learners of mathematics have subscribed to, which may not be so predominant today - but some still believe in them. Tobias (1978) points out another myth: that either a person has or does not have a mathematical mind. Tobias (1978, p: 25) articulates the thought process a learner may experience:

“Since only a few people are supposed to have this mathematical mind, part of our passive reaction to difficulties in learning mathematics is that we suspect we may not be one of ‘them’ and are waiting for our non-mathematical mind to be exposed. It is only a matter of time before our limit will be reached, so there is not much point in our being methodical or in attending to detail. We are grateful when we survive fractions, word problems or geometry. If that certain moment of failure hasn’t struck yet, then it is only temporarily postponed.”

Mathematics is often about difficult problems and procedures, including a degree of abstractness. This does not mean that only a select few are capable at doing mathematics - what it does mean is that it requires extra attention and dedication.

This belief that aptitude for mathematics is in born, seems to be most naturally accepted by most people of the world. This stems from incidents that some people

just *are* more talented at some things (art, music and sport) and to some degree it seems that these talents must be inborn. Students therefore find it easy to relate to the idea that proficiency mathematics requires a *math brain*, one in particular which most feel that they do not have. Mathematics is without a doubt in born, however it is inborn within all of us. It is indeed a human trait, shared by the entire race. The potential to reason with abstract is dominant within every child, woman and man only yet to be realised. The notion of having a special genetic make-up to do well in mathematics is no more than just a myth.

Another mythical idea about mathematics is that the most important factor in mathematics engagement is to get the 'right answer'. In mathematics teaching and learning, what actually matters is the understanding of the concepts taught and its appropriate application which would eventually enable the right answer.

Mathematics learning is based on the construction of meaning from mathematical theorems and their application. It is important for the mathematics learner to be methodical and complete in their tasks. The continuous practice and interaction with a variety of different applications based on the same concept develops conceptual understanding and increases mathematical ability.

Many people seem to believe that to *be good at math you have to be good at calculating*. Fortunately, this is not necessarily true. Often learners (even some adults) count on their fingers and invariably, they feel somewhat ashamed about it, and try to do it furtively. According to Smith (1995, p: 6), "*this is ridiculous. Why shouldn't you count on your fingers? What else is a Chinese abacus, but a sophisticated version of counting on your fingers?*" In many an instance, people who are skilled at using the abacus can out-perform anyone who calculates figures mentally. Smith (1995) expresses that modern mathematics is a science of *ideas*, not an exercise in calculation. He also points out that it is a standing joke that mathematicians can't do arithmetic reliably, and he often admonished his students to check the calculations on the chalkboard because he is sure to get them wrong if they don't. The implication here is , "*being a wiz at figures is not the mark of success in mathematics. This bears emphasis: a pocket calculator has no knowledge, no insight,*

no understanding – yet it is better at addition and subtraction than any human will ever be. And who would prefer being a pocket calculator to being human?” (Smith, 1995, p: 6). This myth is based on the type of teaching strategies that emphasize finding solutions by rote.

The idea that mathematics requires logic, not creativity is certainly not true. The reality is that mathematics does require a certain degree of logic in order to bestow meaning. It is acceptable that we all would like our findings and constructs to make sense, to be meaningful. This can only be achieved if they are in keeping with the principles of logic that govern us. Mathematics however is exceptional in that it requires a superior sort of logic almost to the level of an art form, but this is because logic itself is a kind of structure – an idea – and mathematics, (Smith, 1995) is concerned with precisely that sort of thing. According to Smith (1995) it is simply a mistake to suppose that logic is what mathematics is all about, or that being a mathematician means being uncreative or unintuitive, for exactly the opposite is the case. Some of the great mathematicians, indeed, are poets or artists in their soul. No one could argue that their poetry or music is a cold, unfeeling enterprise of mere logic and calculation.

Taylor and Brooks (1986), as cited in Kidd (2003) note the infamous myth that males are better than females at mathematics. Although extensive research has been carried out in this area, there have not been any conclusive findings to date. However, presently this myth holds little value as there has been increased competition from females in the once male-dominated field of mathematics and science.

Men are naturally better than women at mathematical thinking is an unfounded statement that lacks evidence to be proven true. Special vigilance is required when it comes to this myth, because it can find insidious ways to affect one’s attitude without ever drawing attention to it self. According to Smith (1995), Dr Smith found that some of his female students confiding in him that it seemed to them a little *unfeminine* to be good at math despite the fact that they did not believe in a gender gap when it comes to ability . Smith (1995, p:8) explicitly states that , “*is no basis for such a belief, and in fact a sociological study several years ago found that female*

mathematicians are, on average, slightly more feminine than their non-mathematician counterparts”.

Tragically, the legacy of generations of gender bias, like our legacy of racial bias, continues to hamper many individuals vision in this regard without them even realising it. Smith also emphasizes that it is the responsibility of every student, parent, and educator eradicate such error of thought, and to combat it with reason and understanding wherever and however it may surface. Globally, thousands of contemporary women rank high in school and university mathematics departments in addition to, female mathematicians who are partners in creating the rich tapestry of mathematics.

Some of these myths can be damaging to the ability to learn mathematics effectively. One of the most influential factors in primary school to secondary school transition is learners’ perceptions of the subject of mathematics. It is the seeds of these myths and misconceptions that fester within the minds of learners (especially in low achievers) and fuels disinterest and eventually disengagement in mathematics. If these misconceptions are not ironed out, many learners may choose *not* to do mathematics or in the case of South African schools opt to do Mathematical Literacy. Teaching habits that reflect such myths have the potential to create anxiety within learners of mathematics. Teacher perceptions and personal beliefs about mathematics play a significant role in promoting or reducing anxiety around mathematics as well in boosting the learners’ confidence in engaging with mathematical activities.

2.4.3 Mathematics anxiety

Elliott (1983), as cited in Kidd (2003), states that there are three types of mathematics-anxious people – the mathematics memoriser, the mathematics avoider, and the self-professed mathematics incompetent. A mathematics memoriser uses algorithms to solve problems. If an algorithm is not identified, s/he assumes that the problem is unsolvable. This constant searching for an algorithm does not allow for creative thinking. Negativism is married to the mathematics avoider. S/he has failed in mathematics in the past and therefore predicts future failure. Motivation and drive are buried under the negativism, resulting in poor performance or failure yet again.

Low self-esteem can be linked to the self-professed mathematics incompetent. Continuous encounters with problems that cannot be solved deeply affect the egos of some. These learners begin to believe that they are the only ones to blame. They do not acknowledge the possibility that other people or instances might be the reason for their anxiety. As confidence decreases, anxiety is created.

Mathematics anxiety includes tension, panic, helplessness, fear, distress, shame and the inability to cope. Arem (2003) explains that mathematics-anxious people are often disorganised, confused and insecure and may experience shortness of breath, muscle tightness or physical sickness. These are some of the compounding issues that hamper motivation and self-confidence, which negatively impact on mathematics learning.

2.4.4 Teachers' perceptions

The teachers' epistemological beliefs and perceptions on mathematics teaching impact directly on the learner. According to Bandura (1977), one's self-efficacy beliefs influence choice of activity, task perseverance, level of effort expended and ultimately degree of success achieved. Hackworth (1985), Williams (1988) and Taylor and Brooks (1989) maintain that negative classroom experiences (especially those which directly involve the teacher) could be the main source of mathematics anxiety. It is not uncommon for these experiences to begin in junior/elementary school and filter through to secondary school. Hofer (1999) and Hoy and Woolfolk (1990) also note that researchers have found consistent relationships between characteristics of teachers and the learning behaviour of students. A teacher's sense of self-efficacy is not an exception to this rule.

In her study Esterly (2003) quotes a range of literature by Armor (1976), Aston, Webb and Doda (1983), Midgley, Feldlauger and Eccles (1989) and Gibson and Dembo (1984), who have found a positive relationship between teacher attributes and beliefs, and student motivation. We can therefore assume that more often than not attitudes portrayed by the teacher are generally adopted by the learner. It may be important at the time of transition that high school educators reflect and cultivate positive healthy relationships with their learners.

Mji and Makgato (2006) cites DoE(2001a) mathematics and science audit which reveals that more than 50% of mathematics and 68% of science teachers have no formal training in the subjects they teach. According to a study conducted by Attard (2009, p: 5), the learner participants in the upper primary school indicated that, “A good maths teacher makes sure that everyone has a fair go. She knows the people that do get it. She is someone that knows maths.” Learners also expressed that the qualities of a good mathematics teacher included being is passionate about mathematics; knowing their learners; provides proper explanations; renders assistance by scaffolding rather than providing answers; encourages the students to have positive attitudes towards mathematics; and shows an awareness of each students prior knowledge. These learners also expressed situations of frustration and boredom of having to sit through mathematics lessons that covered previously learned concepts. Attard (2009) found that although the learners did not necessarily always experience good teaching, their negative experiences resulted in an awareness of what good teaching should entail. This implied that as children mature they become more critical of their learning experiences and this could be a contributing factor of lower levels of engagement with mathematics. Drawing from this study, we can see the importance of learners having qualified mathematics educators especially at the time of transition. During this period, the need for feelings of security and stability of being in the hands of a capable mathematics educator is essential as this will help learners cultivate positive attitudes in the subject. This is human resource is sorely lacking in many high school mathematics and primary school departments. Sadly many heads of these institutions are under the misconception that anyone can teach junior mathematics.

2.4.5 Teaching methods

Costello (1991) and Willis (1998) claim that school mathematics is generally taught in a narrow way, with no concern to its historical and cultural setting. Vithal, Adler and Keitel (2005), in their South African research on mathematics education, believe that culture (capital) and history (habitus) have a definitive place in mathematics teaching. Bishop (1991) and D’Ambrosio (1999) contribute to this discussion by acknowledging that mathematics is embedded in cultural practices such as counting, measuring, comparing, classifying, playing, locating, designing and exploring.

Culture and history can be seen as a manifestation of cognition (Pinxten, 1994). It is the individual's cultural heritage, life history and experiences that have developed through cultural psychology (De Abreu, 1998). As a result, the mathematics can be "unfrozen" (Gerdes, 1985, 1988, 1994, cited in Vithal, Adler & Keitel, 2005), which implies that mathematics might be more accessible when seen in relation to one's history and culture. In this way a better understanding may be developed as learning is related to associational life.

One of the specific outcomes of the South African outcomes-based education curriculum is that it should:

“Demonstrate an understanding of the historical development of mathematics in various social and cultural contexts. Critically analyse how numerical relationships are used in social, political and economic relations; Analyse natural forms, cultural products and processes as representatives of shape, space and time.” (DoE, 1997)

However Vithal *et al.*'s study found that teachers were hesitant to implement ethnomathematics in their classrooms for various reasons (such as a lack of confidence) and were afraid of experimenting. In addition, these researchers found that the process was long and time-consuming since it involved using a variety of teaching methods. Furthermore, contextual factors such as lack of resources, overcrowding and appalling classroom conditions hampered the process. Moreover, educators felt that there was little or no time to implement ethnomathematics as they needed to complete the matric syllabi in time for the final examinations.

Zaslavsky (1981) contends that one of the major problems that teachers face is how to respond to learners with diverse and conflicting needs. The question asked is how does the mathematics curriculum respond to the needs of learners from diverse backgrounds? The challenge lies in how equity can be ensured in the learning and teaching of mathematics. At the time of transition learners from various different primary schools and diverse social and economic backgrounds are grouped together in a high school classroom. Depending on their contexts and circumstances, they bring with them their relative knowledge of mathematics. The educators often

encounter disparities and sometimes a lack of foundational mathematical knowledge among the learners. It then becomes the teacher's responsibility to rectify the situation by trying to bring the learners up to par.

According to Attard (2009), most of the lessons or activities cited as being a favourite or the most fun were those that included physical activity, active learning situations involving concrete material, or games. She uses area and perimeter, a topic which are taught in grade six up to ten. Practical assessments and activities can be very easily centred around such topics which generates interest and enthusiasm for the subject. The participants responded to this activity as :

"I thought it was really good because you could use your imagination and make up whatever you wanted so you were almost making your own maths tasks."

"Cause you got to make your own rooms, got to put a pool in the backyard and it was also fun measuring the perimeter and the area." Cited in Attard (2009, p: 5)

When learners are entrusted with some control over the outcomes of the learning process, it gives them with a sense of ownership. When they were given the choice to either work independently or cooperatively with a peer they will execute the task responsibly. *"Excellent teachers of mathematics plan for coherently organised learning experiences that have the flexibility to allow for spontaneous, self-directed learning"*, Attard (2009,p.5).

When games are incorporated within the lesson, learners to interact with each other whilst practicing a learned skill or concept. The inclusion of games in mathematics lessons appears to be particularly motivating for this group of students as the social element of learning is documented as critical to students in the middle years (Boaler, 2000). Learner also enjoy being able to relate their mathematics learning to practical real life situations. *"The incorporation of tasks that mirrored real situations appears to have been a strong factor in engaging students in mathematics tasks as were the tasks that required the students to take the mathematics out of the classroom and into the school playground"*, Attard (2009, p:6)

We must also bear in mind that (sometimes) lessons, that may stimulate and seem to engage learners interest may not necessarily achieve the desired outcomes of the

concept expected to be taught. However this may renew or rekindle the flame the learners' desire to learn mathematics. Another important point to be considered, especially in the context of South African public high schools, it may be a challenge to implement novel methods of teaching in over crowded classes that lack basic resources. Ideally, a child's learning experiences of mathematics should be a combination purposeful learning and a satisfying classroom experience. However, this may not always be possible. The lack of there of is sometimes a contributing factor that hampers learners' progress in mathematics during transition. At this point in time, if learners lose sight of purposeful learning or endure negative classroom experiences, they may become disengaged with the mathematics.

Teachers need resources and developmental support for effective delivery of their subject. In their book *The teaching gap*, Stigler and Hiebert (1999, p: 152) explain that

“teaching is a difficult and demanding job. Teachers are isolated from the colleagues and rarely have the opportunity to participate in professional life outside the classroom. They are pressed by administrators and reformers to take on new responsibilities, to teach in new ways and show better results. But they are given few resources to meet these demands.”

This is also true in many South African schools. The vast majority of schools in South Africa are under-resourced, and it is extremely difficult to find mathematics specialists for primary or high schools. At high school level mathematics becomes more demanding, more challenging and more abstract. It is often very difficult to teach without textbooks, worksheets, overhead projectors and other technology. In addition, only a few educators were work shopped on the new General Education and Training (GET) and Further Education and Training (FET) mathematics curriculum (which was done without any depth). Since that training, several other changes have consequently been implemented.

It is probably this isolation and lack of interaction between teachers in primary and secondary schools that contribute somewhat to the lack of continuity in the curriculum when learners move from primary to secondary schools. While

Curriculum 2005 envisaged some linking of the phases of schooling, it has not really happened as yet.

2.4.6 Grouping (streaming) learners

‘Setting’ (grouping according to ability) is becoming increasingly prevalent across the curriculum. However, mathematics has been widely considered to be particularly unsuited to mixed-ability teaching, according to a 1979 United Kingdom Department of Education and Science report. Data (*The Guardian*, 8 June 1996) indicate that 94% of learners are taught mathematics in graded classes in the secondary schooling years. The notion of ‘ability’ is seen to be particularly salient in relation to mathematics, and a learner’s ability can be taken to be measurable and stable over a period of time (Ruthven, 1987).

According to the Committee of Inquiry into the Teaching of Mathematics in Schools (1982), these perceptions influence classroom practice and students have different abilities in the subject; many may never progress beyond the basics. Therefore in most high schools learners are generally categorised according to their ‘ability’ in mathematics, and the education they receive will be heavily dependant on where they have been ranked. Critics of ability grouping (Hargreaves, 1976; Lacey, 1970; Ball, 1981; Davies, 1975) all argue that categorising learners as ‘high’ or ‘low’ ability is most likely to lead to their achieving accordingly.

In a highly influential study, Boaler (1997) found that many of the learners in top sets (high- ability grouping) were disadvantaged by features of the learning environment. She discovered negative consequences of being taught in top sets, since teaching was highly procedural and sustained a fast pace. Since mathematics is perceived to be abstract, difficult, hierarchical and highly structured, success in this subject seems to indicate higher intelligence (Ernest, 1998). This perception is reinforced in many high schools, where teaching strategies involve the handing down of a range of techniques that are known to the experts. Learners are taught a series of steps and it becomes their task to become fluent at applying them to achieve the correct answer to closed questions. Hence this stifles learners’ creativity and originality (Ernest, 1991), and

can be disempowering to learners who are given little opportunity to produce and make meaning of the mathematics for themselves (Burton, 1987).

Many learners feel alienated in such classrooms as it strips the subject of meaning and limits their access to understanding. Learning mathematics can sometimes become learning in isolation for some learners. When learners are placed in streamed classes there is an expectation that they should be able to follow the pace of lessons and respond appropriately. Some learners who sit at the margins, who excel but take a little more time to conceptually analyse and respond, will rarely participate in lessons for the fear and embarrassment that they could be wrong. For such learners, learning isolates them from the rest.

2.4.7 Developing identities

Developing a positive identity in a mathematics classroom is bound to evaporate learners' feelings of alienation and isolation. Bartholomew (2002) in her study highlights the importance of one's self-perception. A top-set Grade 10 learner was asked: 'What do you think are the bad things about your maths lessons?'. The response was "we go through the topics very quickly without having time on one. A lot of people in the class are naturally very clever and it is embarrassing to get something wrong in front of them."

Interviewed again in the latter part of her Grade 11 year, her approach had changed. When asked what had changed, she replied: "*My attitude. More thinking about myself than what other people know. That instead of what other people know and what I don't know, it's more what I know. Now I am concentrating on that*" (Bartholomew, 2002, p: 7-8). The shift in her focus from others to herself helped her to create her own identity and concentrate on areas she would need to improve. This indicates changes in her understanding (reconceptualisation) of mathematics and how success in the subject may be achieved. Boaler (1997) argues that pertinent issues and insights surrounding the nature of mathematics education can be gained when the focus shifts away from 'ability' to thinking in terms of 'belonging' to a community of practice (Wenger, 1998). Bartholomew (2000) echoes Boaler's (1997, p: 8) thoughts:

“changing the emphasis from ‘ability’ to ‘belonging’ ... demythologizes the special status of mathematics. The idea of belonging immediately raises the question of ‘belonging to what?’ allowing the possibilities of multiple communities of practice, rather than a monolithic edifice.”

Once learners are able to reconceptualise what it is means to be successful (whether they are in the top, middle or bottom set) and identify the various ways in which this success

can be met, they would then be able to function as a joint enterprise whose mutual engagement of learning and applying mathematics will lead to a shared repertoire of success.

2.4.8 The environment

The environment (habitus) that one is exposed to, the field (influences, social status, enlightened general knowledge and access to modern technology as well as the lack thereof), and capital (social and economic as well cultural heritage, including inheriting talents, and developing an eye for vision, an ear for listening and a gifted mind) are also influential factors that affect learner performance (Noyes, 2004). These are the key features of Bordieu’s theory of practice, a framework which will be used to understand and analyse the findings in this study (see Chapter 3). This theory indicates that if a learner’s capital is high, i.e. if s/he has a gift for numbers, or comes from a mathematically rich (talented) family, then they are most likely to succeed in the subject. Vice versa should also hold true, therefore learners who have illiterate parents or siblings with little mathematical experience and came from disadvantaged backgrounds might have experienced some difficulty in the subject.

Thus habitus, which refers to the historical backgrounds, living and learning environments and beliefs and ideologies learners may or may not possess about mathematics education, in some way impacts on the learner’s mathematical learning plight. Social networks (field) also encourage and empower one to explore and expand one’s knowledge base. However, if learners are located within less-developed fields with minimal access to knowledge and the power of

modern technology, they are to an extent disadvantaged in any mainstream school. Roth (2002, p: 50) states that:

“through considerable socio-analysis ... through an awakening of certain forms of self-consciousness and self work that enables practitioners to get a ‘handle on their dispositions’, habituses can be transformed.”

Although individuals may inherit physically, culturally or historically and this may in some way impact on their lives, it does not restrict one from changing and evolving. What should be noted is that despite being advantaged or disadvantaged, the individual also possesses the ability to rise above circumstances and transform their status.

2.4.9 Support systems

According Mizelle and Irvin (2000) it is important for high schools, middle school and primary schools embark on transition programs to help students succeed during their first year of the new schooling phase. The programs should include activities that (a) provided students and parents information about the new school, (b) provided students social support during the transition, and (c) brought middle school and high school personnel together to learn about one another’s curriculum and requirements (Mizelle & Irvin, 2000).

Students and parents are often curious about the operations of high school and would like know about and understand high school programs and procedures. Providing students and parents the answers and direction should be a central component of a high school transition program. Parents need to understand and be actively involved in the decisions their children make at high school. For example, should the child choose Afrikaans or Zulu as their first additional language? Parents should be aware of learners’ options and the long-term effects of the course decisions.

Mizelle & Irvin (2000) acknowledges the imperativeness of parent involvement in their child’s transition from primary school or middle school to high school is. According to Mac Iver (1990) ,when parents are involved in students’ transition to high school, they tend to stay involved in their child’s school experiences ; and when

parents are involved in their child's high school experiences, students achieve more. Students whose parents are involved in the transition process tend to adjust better, and are less likely to drop out of school. One of the main concerns are, that parent involvement in school related activities decreases during the transition to high school, *unless* schools and teachers work to encourage their involvement. Schools are encouraged to maintain parent involvement by engaging them in school related activities. At primary and middle school level, parents need to be informed about all transition activities and encourage them to participate. Parent involvement in the transition process to high school should be encouraged through a variety of activities. Parents may be invited to participate in parent-educator conferences; engage the services of the high school counsellor to discuss course work and schedules; they may be invited to visit the high school with their child for orientation programs; or just be invited to spend the day at the high school to help them understand the processes and procedures.

Support from both family and friends impacts on the transitional period. Harter (1990) investigated how learners' perceptions of competence may be influenced by their perceived support from significant others. She found that learners' self-definition was based on how they see themselves as well as their perceived appraisal and support from parents, teachers, classmates and close friends. Trent, Russell, Cooney and Robertson (1994) established that peer support marginally influenced learners' perceptions of their mathematical ability at the start of high school as a result of the increasing importance attributed to peer group during adolescence. According to Damon (1991) and Rosenberg (1979) the general peer group is the most critical source of information concerning the self-concept during this period.

Trent *et al.* (1994) also found that the mother's expectations were very influential at this stage, and research (Russell & Russell, 1987) showed that mothers rather than fathers appear to be more involved in the school achievement of children in middle childhood. In addition, they found that there was a decline in the significance and influences of teacher expectations and support. This could partially be attributed to learners who realised their performance could be controlled. However, further research needs to be carried out in this area.

While learners may become a little more independent as they move up to higher grades, their academic dependencies in subjects like mathematics and science become greater. These learning areas are more difficult, abstract and demanding, and competition among colleagues increases. Not all parents/siblings are able to provide support and assistance as required, for they may lack knowledge of the subject due to curriculum changes or may not have had any experience in the subject. Neither can some enlist external help for several reasons, such as lack of interest, other more pressing socio-economic problems, cost factors, time, transport constraints and so on.

2.4.10 Gender issues

According to Trent *et al.* (1994) there are no significant influences based on gender regarding the changes in the performance of mathematics during transition. However, Bartholomew (2002) found that girls struggled a little more than boys during the transition phase. Although both boys and girls felt that the mathematics taught was highly procedural and limited their understanding, boys seemed more inclined to ‘play the game’ (Boaler, 1997). Boys appeared to be able to work through exercises without questioning too much; many girls seemed unable or unwilling to compete on these terms. Their withdrawal in such lessons is seen as their lacking in ability. It should also be noted that girls who come from disadvantaged backgrounds and patriarchal societies continuously have to fight for their identity in the male-dominated world where men are considered to be better in mathematics than women. To date there has been no conclusive evidence that boys are better in mathematics than girls.

2.5 Adaptation to secondary school

A close examination of learners’ personal reactions and adaptations to the initial year at high school enables an understanding of the transition process as an important and personal event for these learners. If we were to disregard the emotions the learners felt, we would be disregarding the fact that transition is experienced by each individual learner. The transition to high school is generally seen and discussed from a group perspective; however, this is a unique and individualised experience. Based

on this premise, these feelings form a core facet of the transition for these learners and as such need to be rightfully acknowledged (Johnstone, 2001c).

Transition also relates to complex processes of changes within the individual, often embedded in communication with the physical and social environment. The heightened demands of change and changing environments, places an enormous amount of stress on the individual. In addition, these demands to adjustment and adaptation may largely result in the changes in identity, relations, and roles these individual may take on. Adaptation to new demands has been studied within the stress paradigm. Theories on stress (Lazarus & Folkman, 1987) as well as on critical life events (Filipp, 1995) consider the appraisal of the critical event – challenge or threat or loss - as being important. It is not the literal event itself, but the coping process that makes it a transition. The acceptance and development into this process is not only actualised by the child, but also the factors affecting this process are internalised by the child. Transition is therefore the adaptation to the multiple demands in varying contexts. Learners' expectations may not necessarily be realised as their realities.

In their journals the learners used various terms to describe how they felt about going to high school, with 'scared' and 'nervous' being prominent terms. These terms described their feelings related to the organisational and social cultures of their high school. However, some of the learners also described themselves as being 'excited' and 'looking forward' to being in high school. In their interviews some of them admitted it was a fearful and daunting first day (fear of the unknown), but that thereafter they seemed to have 'fitted in'.

Learners also mentioned their concerns related to the organisational and social cultures of their high school and their personal feelings towards their transition. While some learners may have shared concerns, it is important to note that not all learners expressed the same concerns. Some students seemed to be more concerned about the increase in their workload or more difficult work, others seemed to be more concerned about social relationships and 'fitting in'. The transition process is a highly individualised experience, and learners are expected to make mature and responsible decisions. Arguably this may not always occur.

2.6 Differences and similarities between primary school and secondary school

One of the major differences between primary and secondary school is in the methodologies and strategies through which teaching and learning take place. Barnes (2005), in a South African study found that games are often regarded as primary school activities and are very rarely used in secondary school classrooms. Daniels and Anghileri (1995) examined the benefits of environmental aspects such as appropriate practical work, problem solving, games in the mathematics classroom, group work, co-operative learning, reciprocal teaching and the active participation of learners during lessons. They stated that games create stimulating and non-threatening environments in which learners can practice and consolidate routine procedures and number skills. However, such activities are portrayed as time-consuming and noisy in a high school classroom. Social learning (interaction) and real-life scenarios develop problem-solving strategies and aid in the acquisition and development of concepts which allow learning to be relevant to the lives of the low-attaining learners in order for it to be meaningful. Although many educators are aware of these teaching strategies, very few high school teachers actually choose to implement them.

Doig, Groves, Tytler and Gough (2005) explored the similarities between primary and secondary teachers' perceptions of their practices in a project called 'Improving Middle Years Mathematics and Science: The role of subject cultures in school and teacher change' (IMYMS). This project was aimed at investigating the role of mathematics and science knowledge and subject cultures in mediating change processes in the middle years of schooling. The foci of this research project were an audit of teacher practice and beliefs, and student perceptions and learning preferences. Nine components were examined for effective teaching and learning purposes.

Firstly, the learning environments were investigated to determine if they promoted a culture of value and respect. This component consisted of positive relationships being built between teachers and learners through knowing and valuing each student. It examined whether the environment was characterised by a sense of common purpose and collaborative inquiry as well as being a safe place for learners to take risks with

their learning. In addition, IMYMS wanted to test whether persistence and effort were valued to actualise a sense of accomplishment. Analysis of the project revealed that this was the component that showed the greatest difference between primary and secondary school. Teachers at secondary schools experienced greater difficulty in achieving these outcomes, especially with building positive relationships and developing a sense of common purpose and collaborative enquiry.

The second component dealt with learners being encouraged to be independent and self-motivated. This looked at whether students were encouraged and supported to take responsibility for their own learning as well as to reflect on their learning. Here the study showed little difference between the two types of institutions, but rather a similarity in learner dependency on their teachers.

The third component focused on how learners are challenged to extend their understandings. It looked at the subject matter (conceptually complex and intriguing but accessible), the assessment tasks (do they challenge the learner to explore, question and reflect on key ideas?) and teacher expectations of each learner. In this category both types of educators experienced a difficulty in scoring themselves. According to Luke (2003, p.129), “classrooms where higher order thinking about mathematical topics are encouraged ... and where mathematical topics are linked to real life situations”, require a better understanding of what goes on in the classrooms and a more systematic emphasis on intellectual demand.

The fourth aspect explored how learners are supported to develop meaningful understanding. This entailed whether individual learning needs were monitored, addressed and supported to make connections between key ideas, and if learning sequences involved the interweaving of concrete and abstract concepts. It also looked at how teaching strategies explore and build on learners' current understanding and promote sustained learning that builds over time. In this component there was also little difference between primary and secondary mathematics; however, secondary school teachers found this aspect easier to relate to.

The fifth component involved encouraging learners to see themselves as mathematical and scientific thinkers. The processes of mathematical investigation, problem solving, mathematical/scientific reasoning and argumentation were explored. The study again showed that both secondary and primary school educators found extreme difficulty in rating themselves, as in component three.

The sixth component looked at how mathematics and science content is linked with learners' lives and interest. In most instances school mathematics remained isolated from most learners' lives and interest at both primary and secondary school level.

The seventh component characterised assessment as an integral part of teaching and learning. It focused on the assessment criteria, whether assessment practices reflected all aspects of the learning programme, and if learners received feedback to support further learning.

The eighth aspect related to how learning connects communities and practice beyond the classroom. This included an engagement with a rich, contemporary view of mathematics knowledge and practice and collaboration with local and broader communities. Here secondary school educators were able to rate themselves highly since the curriculum allowed accessibility.

Finally, the ninth category considered the learning technologies used to enhance student learning. Technology has been used in both primary and secondary mathematics classrooms to enhance teaching and facilitate learning; however, it has been found to be used more frequently in secondary schools.

Thus the IMYMS component project resulted in the creation of action plans for implementing change by identifying gaps between teachers' views of effective teaching and learning and their actual practice. This project also resulted in schools and clusters (both primary and secondary) focusing on higher-order thinking, promoting student reflection, and assessment and developing community links.

One of the major changes in the transition for learners of mathematics is problem-solving questions and representations of their work. From anecdotal evidence, high

school mathematics educators have found that very little emphasis is placed on drawing conjectures or employing problem-solving strategies to solve problems at primary school level.

Learners in junior secondary are generally confused when their solutions (which are mathematically incorrect) are marked wrong even if they coincidentally arrive at the correct final answer. They do not seem to see the need nor do they realise the importance of logical solutions and mathematically correct procedures. All they are interested in is the final answer being correct. Teaching methods also play a significant role in promoting or reducing learner performance in mathematics. The commonly used, *explain – practice – memorise* teaching approach can become detrimental to a learner as it lacks making connections and meaningful learning. It becomes necessary at some stage that learners are taught mathematical skills, procedures and proper problem-solving strategies. It is therefore recommended that these values are fostered at an early age (primary level), so that eventually they will be able to apply these tactfully and construct insightful variations to solve problems in different contexts using similar ideas.

McGuinness *et al.* (1996) also agree with the idea that mathematics teachers experience a problem with recognition of the conflict between the rote learning deemed necessary for the basics and getting through the curriculum and examination work, and investigative learning to encourage thinking and problem solving. Schoenfeld (1994), cited by Eaton and Bell (2005, p: 12), argues that learning to think mathematically means developing both competence with the tools of the trade and a mathematical point of view by valuing the process of mathematisation. However, the reality is that in many high schools there seems to be very little room for investigation of the value of mathematics as the curriculum is intensely exam-driven and teachers, race against time to achieve syllabus coverage, which is in total opposition to the nature of primary school.

Athanasίου and Philippou (2007) indicate that motivation and learning are intertwined with the contexts of the classrooms and schools in which students are located. They state that researchers have identified the transition from childhood to

adolescence as a time of significant personal and contextual change. The period surrounding the transition from primary to secondary school has been found to result in the decline in students' motivation and achievement in mathematics. This decline is directly related to certain dimensions of the school and classroom culture. There are developmentally inappropriate changes in a cluster of classroom organisational, instructional and climate variables. Midgely, Feldlaufer and Eccles (1989) and Urdan and Midgley (2003) found that some of these dimensions also included the perceived classroom goal structure, teachers' sense of efficacy and teachers' ability to discipline and control students. This study would like to further explore some of these dimensions in a South African context, in order to gain insight into employment of suitable strategies to increase motivation.

Reuman, Iver, Eccles and Wigfield (1987) also found that when learners make the transition from primary school to secondary school they seem to experience abrupt organisational changes in their schooling environment. They move from 'a' primary teacher and a single set of classmates to a departmentalised curriculum with several teachers and several sets of classmates in high school. Learners often move from relatively small primary schools near home to larger, more centralised and impersonal high schools.

David Messum, cited by Wilcock (2010), Head of Service at Conwy Social Inclusion Service in Wales, gave this presentation to the 2nd National Conference of the All Wales Mental Health Promotion Network in October 2008. Among some interesting research findings he offers this table:

Table 2: The differences between primary and secondary school

THE PRIMARY SCHOOL	THE SECONDARY SCHOOL
Generally small buildings	Large spread out buildings
Generally one teacher teaches a range of subjects	Subject specialists teach their own subject only. Many contact members of staff.
Pupils usually have a good knowledge of everybody in their class and of the teacher and Vice versa.	Pupils can not have a sound knowledge of all others in their groups or the teachers that teach them and vice versa especially in the early stages of transition
Parents and teachers meet readily	Parents and teachers generally meet at parents evenings only.
Pupils in year 6 are the oldest in the school	Pupils in year 7 are the youngest in the school
Levels of responsibility in the school are generally given to year 6 pupils.	Levels of responsibility in the school are generally given to the higher year groups.
Children generally come from the immediate local community.	Pupils come from the wider community and often are bussed to school.
Opportunities for enhancing self esteem are enhanced when there are fewer pupils to target for such things as musical productions and sports teams.	Opportunities to be involved in school representation are often less, when there is a larger number of pupils to choose from. Esteem may not be enhanced as readily.
Learning difficulties can be easily identified when there are fewer	Pupils who have learning difficulties may not be identified as readily when

contact staff.

there are more contact staff.

Table 2 is a summary the differences that learners experience in transition phase. All of these impact on a learner physically, emotionally and psychologically. It lack of support and the inability to cope with the changes in the different settings during transition often results negatively on a learners academic achievements and discourages engagement in various learning areas.

Another major change that learners encounter at high school level is their assignment to separate classes based on their past academic performance: 'high-ability', 'regular' and 'low-ability' classrooms. That grading process affects the stability of learners' achievement-related beliefs, values and behaviour in mathematics.

Finally, greater instability between school years occurs in the areas of learners' experience that are affected by discrete changes in the classroom environment when learners make the transition. There is a pattern of differential instability which becomes evident in a learners' mathematics test anxiety, self-concept of mathematics ability, expectancies for success in mathematics, mathematics intrinsic value, time spent on mathematics homework, and subjective sense of doing well in mathematics. This pattern is also influenced by other variables, such as teacher ratings of learners and learners' liking of their mathematics teacher.

2.7 Studies conducted to help improve mathematical performance during the transition process

Several studies have been conducted in Australia (Perry & Howard, 2002; Anderson, 2007; Esterly, 2003; Doig *et al.*, 2005) regarding transition from primary school to high school mathematics, which focus on developing/implementing teaching strategies to help improve learner performance. The Australian Government has undertaken a great initiative to help and improve performance of learners who leave primary school and enter secondary schools. One of the projects they embarked on was the 'Counting On' programme to support learners (especially low-performing

learners) who left primary school and entered high school. The rationale behind this initiative was as follows:

“too many students enter secondary school with calculation methods that consist solely of scheme of counting by one. While these methods will often result in the correct answer, they take so much effort that there is little chance of learning new methods. The learning of these students in mathematics has reached a plateau.” (NSW Department of Education and Training, 2001, p: 7)

The ‘Counting On’ project aimed to build the professional knowledge of teachers and assist in addressing the needs of low-performing students. Perry and Howard (2002) conducted an evaluation of this project, and discovered that it was successful in its aim to help targeted students improve their mathematical thinking strategies in the area of place value. The study also highlighted the successes of:

- using video-taped interviews for assessment purposes;
- emphasis on student strategies as well as outcomes;
- small group work in mathematics;
- collegial support among teachers, particularly as students move between schools; and
- use of teaching strategies to change student and teacher beliefs about the teaching and learning of mathematics.

The overall assessment of the study indicated success in improving the performance of low- performing learners.

In another Australian study Anderson (2007) explores the nature of transition, its impact on learning mathematics, and discusses the ways forward. She maintains that “the primary curriculum is flexible enough to allow different approaches in mathematics which lead to a range of understanding. Finding ways to assess mathematical knowledge and developing lessons, which support the diverse need of all students is a real challenge for teacher” (Anderson, 2007, p: 1). Acknowledging the existence of problems experienced in the transition from primary school to high school, the Department of Education and the Australian Federal Government put into place several programmes with the approach of informing teachers’ assessment and pedagogical practices. They recognised that early intervention provided the “best

chance of success for children at the risk of failure” (Anderson, 2007, p: 1). Their research found that learners in junior secondary, especially between the ages of 11 and 15 years, endure various changes in their emotional and social well-being which affected their learning. It also discovered that the secondary school context is very different from the primary school one, and that learners experienced a great deal of conflict within their learning environments as well as in the differences in schooling cultures.

Despite intervention programmes implemented to address the above issues, evidence suggests that these programmes still do not solve the problems, but do create a climate for change. To address the problem many numeracy projects were carried out throughout Australia, resulting in greater success. An analysis of the study dictated that schools should aim to address issues such as creating opportunities for success so that learners gain confidence and feel empowered. Teaching strategies and methods should be learner-centred and incorporate scaffolding teaching and learning methods. Teachers were encouraged to develop environments that support speaking, listening and working together. In addition, they were required to develop classroom activities and tasks that create opportunities for learners to link mathematical concepts and make connections with real-life situations. Finally, teaching and learning should focus on emphasising, conjecturing and generalising rather than just doing.

Anderson’s (2007) case study found several aspects that junior secondary educators should take into consideration. She recommends that all secondary educators should be knowledgeable about primary school curriculum so that they become aware of key concepts learnt, errors and misconceptions associated with each topic. Teachers should not make assumptions about student knowledge, skills and understanding but rather administer pre-tests. It also becomes vital to assess learners’ prior knowledge as they may disengage from their learning because they lack foundational knowledge or they already understand (get bored) and may feel like they are wasting time.

Her study also revealed that at secondary schools there was greater emphasis on high stakes testing in the senior secondary phase. For this reason, in many instances less qualified and in-experienced educators were allocated the juniors who were unable to

nurture their potential at this tender time of transition whilst qualified / trained teachers taught the senior grades.

Midgley *et al.* (1989) in their study entitled 'Student/teacher relations and attitudes toward mathematics before and after the transition to junior high school' found that there was a need for a support system for students who entered high school, especially those who were weak in the subject. They reported that high school teachers were perceived as less warm and supportive than primary school teachers. Teacher supportiveness is directly associated with a students' academic adjustment (Berndt & Hawkins, 1988). Moving to a less supportive teacher is associated with a deterioration in the valuing of mathematics by students and may result in an overall decline in their performance.

Another study, conducted in Michigan and based on the Transitions in Early Adolescence project (1983-1985), cited in Reuman *et al.* (1987), examined several factors that affected mathematics learning, motivation and behaviour during transition. These were the standards of excellence learners used to evaluate themselves in mathematics (social comparison versus self-reference standards); fear of failure in mathematics (worries, math test anxiety, somatic signs of evaluation anxiety); components of achievement expectancies (self-concept of math ability, perceptions of math task difficulty, expectancies of future success); components of achievement values and affect (utility value versus intrinsic value of mathematics, liking one's mathematics teacher); and effort and performance in mathematics (amount of time spent on homework and studying for a math test, engagement in mathematical activities other than at school).

Results of the study showed that in every case the change seen was a decline from the sixth grade to the seventh grade. It discovered that learners' patterns of decline emerged for different dependant variables. Substantive evidence showed that learners were generally 'turned off' mathematics at transition. Not only did they find a decline in factors which would tend to keep learners invested in mathematics (e.g. standards of excellence which they strive for, the values they attach to mathematics, and their confidence in their own mathematics skills), but also declines in factors that might

tend make learners withdraw from mathematical activities (e.g. their worries and anxieties about mathematics, and their perception of mathematics as a difficult subject). It seemed as if learners increasingly do not care about mathematics as an activity domain.

2.8 Conclusion

From the literature reviewed it seems that there is some kind of disparity between the learning and teaching of mathematics in primary school and in secondary school. However, very little research has been done in South Africa in the area of transition, factors that affect the process and the impact it has on mathematics learning. The literature presented serves to put this study into perspective.

Chapter 3

Theoretical framework

3.1 Introduction

Since this research was located within the interpretivist paradigm, it explored learners' and teachers' subjective experiences of the world of mathematics in the transition from primary school to secondary school. This research was underpinned by sociological descriptions of forms of participation that emerged through reproduction and evolution of social practices. Constructivist theories underpinned analysis of the emerging data. Two fundamental frameworks were used to understand and theorise the data obtained: situated learning theory and social learning theory.

3.2 Situated learning theory

The first theory is Mark Boylan's (2002) 'ecologies of practice', born out of Jean Lave and Eittien Wenger's 'communities of practice' and adapted from situated learning theories. Situated learning theory is based on sociological descriptions of the various forms of participation that may emerge through varied reproduction and the constant evolution of social practices. The essential features of this framework are based on mutual engagement, joint enterprise and a shared repertoire. The situated perspective assumes that learners function in a social context and that learning cannot be isolated within a class. It redirects the focus from teaching and learning to the practices that learners are engaged in, thus re-characterising the role of the educator (from the holder of knowledge to expert in practices). Situated learning theory helps explain the lack of knowledge transfer from school to non-school contexts, and also recognises a connection between subject practices and pedagogical practices (providing insight into why different pedagogies not only influence the amount that is learned but also what is learned).

Jean Lave is a social anthropologist who shares an interest in social theory and is based at the University of California. Etienne Wenger was a teacher who joined the Institute for Research on Learning in Palo Alto, having gained a Ph.D. in artificial intelligence from the University of California at Irvin. Most of their work foci are

based on the 're-conceiving' of learning, learners and educational institutions in terms of social practice. When looking closely at everyday activity, Lave argued that 'learning is ubiquitous in ongoing activity, though often unrecognized as such' (Lave, 1993, p. 5). Their in-depth analysis and ideologies, first published in *Situated Learning: Legitimate peripheral participation* (Lave & Wenger, 1991), and later augmented in works by Lave (1993) and Wenger (1999, 2002) set the scene for some significant innovations in practice within organisations and more recently within some schools (Rogoff & Lave, 1984).

3.2.1 What are communities of practice?

According to Lave and Wenger (1991) communities of practice exist everywhere, and we are generally involved in various aspects of them, though either being at work, school, home, or in our municipal civics and leisure interests. Communities of practice are shaped by people who engage in a process of collective learning in a shared domain of human endeavour. This may range from ethnic groups or clans learning to survive, artists seeking new forms of expression, a group of engineers working on similar problems, a clique of learners' defining their identity in the school, a network of medical specialists exploring novel techniques, or a gathering of new corporate leaders helping each other cope. Communities of practice can therefore be seen as clusters of people who share a common concern for something they do, who learn how to do it better as they interact regularly (Wenger, 2007). In some of these communities we may be core members, while in others we may be more at the periphery. Therefore primary school and secondary school mathematics classrooms can be recognized as communities of practice in a mutual engagement of mathematics learning.

Our mere existence as human beings dictates constant engagement in the pursuit of enterprises of all kinds, from ensuring our continued physical existence to our quest for the most exquisite pleasures. As we define these enterprises and engage in their pursuit together, we interact with each other and with the world and tune our relations with each other and with the world accordingly. In other words, we learn. Over time this collective learning results in practices that reflect both the pursuit of our

enterprises and the attendant social relations. These practices are thus the property of a kind of community created over time by the sustained pursuit of a shared enterprise. It makes sense, therefore, to call these kinds of communities ‘communities of practice’ (Wenger, 1998, p. 45).

3.2.2 Characteristics of communities of practice

The characteristics of such communities of practice may vary. Some have names, while many do not. Some communities of practice are quite formal in terms of their organization, and others may be very fluid or informal. However, members are brought together by joining in common activities and by what they have learned through their mutual engagement in these activities (Wenger, 1998, p. 49). In this regard a community of practice is different from a community of interest or a geographical community in that it involves a shared practice.

According to Wenger (2007), three elements are crucial in distinguishing a community of practice from other groups and communities: the domain, the community and the practice. A community of practice is definitely something more than just a group of friends/colleagues or a system of associations between people. It is an identity created and defined by a shared domain of interest. Relationships in a community of practice are defined by a commitment to the domain, and therefore a shared aptitude is a distinguishing factor that separates its members from other people. By pursuing their interest in their domain, members engage in joint activities and discussions, help each other, and share volumes of information. They build relationships and develop their strengths, which enables them to learn from each other - and hence a community is born. The members of a community of practice hence become practitioners. They develop and contribute to a shared repertoire of resources: experiences, stories, tools, methods of addressing chronic problems - in summary, a shared practice. This can only occur over a period of time and with sustained interactions. Similarly, the primary school and high school classrooms can be classified as communities of practice. In this domain the learners are jointly engaged in the practice of learning mathematics by participation in joint activities and discussion. However, when learners move from primary school to a secondary school mathematics classroom, the community of practice does not change, just some of the

physical components do. These could range from the environment, the members of the community, or to the structure of the classrooms. The learners in transition have now reached a new/ different level of engagement within that community. Central to this study are the learners' experiences of engagement within these communities whilst adapting to the physical change.

Members begin to develop a sense of joint enterprise and identity since these communities are organised around some specific area of knowledge and tasks or activities. For a community of practice to be functional, it needs to generate a shared repertoire of hopes and ideas, commitments and legacies. It also needs to develop various resources such as tools, documents, routines, a vocabulary and symbols that in some way carry the accumulated knowledge of the community. Basically this involves practice of appropriate methods of conducting and approaching ideas or tasks that are shared to some significant extent among members.

The interactions involved and the ability to undertake larger or more complex activities and projects through co-operation binds people together and helps to facilitate relationships and trust. Communities of practice can be seen as self-organising systems and have many of the benefits and characteristics of associational life, such as social and cultural capital. Schools can therefore be seen as formal learning organisations and hence constitute a community of practice or contain multiple communities of practice.

3.2.3 Legitimate peripheral participation and situated learning

Rather than looking to learning as the acquisition of certain forms of knowledge, Lave and Wenger (1998) have tried to place it in social relationships, in situations of co-participation. The emphasis is not placed so much on learners acquiring structures or models to understand or make sense of the world, but on them being able to (or developing the ability to) participate in frameworks that have structure. The acquisition, development and sustenance of knowledge therefore involve learning as participation in a community of practice. Here participation "refers not just to local events of engagement in certain activities with certain people, but to a more encompassing process of being active participants in the **practices** of social

communities and constructing **identities** in relation to these communities” (Wenger, 1999, p. 4).

Lave and Wenger (1991) illustrate their theory by observations of different apprenticeships. At the beginning, when individuals join communities they tend to be learning at the periphery. This means that the activities they are involved in and tasks they undertake may be less key (minor) to the community in comparison to those of other members who have been in the community longer. With time, experience and development of the necessary skills, these members engage in fuller participation. Like wise, in this study, at primary school level, the learners are participating at the periphery in their mathematics classrooms. They watch, they learn with a lot of guided support and thereafter also practice with close guidance. However at secondary school level fuller participation is required. In addition to becoming a fuller participant, the work load in mathematics increases, the content is more demanding and the assessments are more challenging. Although the learner is still an apprentice to the mathematics teacher, the amount of support and guidance is reduced. During the transitional phase the learner is expected to make that adaptation. This study explores some of the occurrence during the transition process in order to determine the effects that it may or may not have on mathematics learning. It also investigates whether the learners’ progress in mathematics is also affected.

Situated learning theory is directed by the way of approaching learning. It is more than simply ‘learning by doing’ or experiential learning. As Mark Tennant (1997) has pointed out, Lave and Wenger’s concept of situatedness involves people being full participants in the world and in generating meaning. For newcomers, Lave and Wenger (1991, pp. 108-9) comment that “the purpose is not to learn *from* talk as a substitute for legitimate peripheral participation; it is to learn *to* talk as a key to legitimate peripheral participation”. This reflects directly on the need to draw attention to learning in context and to understand the relevant body of knowledge required. The body of knowledge in mathematics often involves complexities and a degree of abstractness. Primary school mathematics is perceived to be much easier than that at high school, yet many learners grapple with it. In mathematics it may often not be possible that learners understand the relevant body of knowledge. It is

this lack of understanding that ties the community together. Knowing that they are not alone in this deficit gives them a sense of comfort. It is together that they learn to forge the ideas of understanding of various concepts. They learn together with their teachers and peers to develop their conceptual and practical understanding.

As members develop and master their skills, their competence and confidence increase. The more competent they become, the more involved they are in the main processes of the particular community. They rise from legitimate peripheral participation into 'full participation' (Lave & Wenger, 1991). As a result, learning is not seen as the acquisition of knowledge by individuals but rather as a process of social participation. The context, dynamics and nature of the situation impact significantly on the process.

Learners unavoidably begin to participate in communities of practitioners. Mastering the required skills and development of relevant knowledge invites newcomers to move toward full participation in the socio-cultural practices of a community. According to Lave and Wenger (1991), 'legitimate peripheral participation' provides a way to speak about the relations between newcomers and old-timers, and about activities, identities, artifacts, and communities of knowledge and practice. A person's intentions to learn are engaged and the meaning of learning is configured through the process of becoming a full participant in a socio-cultural practice. This social process includes - indeed it subsumes - the learning of knowledgeable skills (Lave & Wenger, 1991, p. 29). This may be directly related to the creation of identities, with learning to converse, behave, improvise and manage in ways that make sense in the community. Ironically, this is in contrast with learning as internalisation: "learning as increasing participation in communities of practice concerns the whole person acting in the world" (Lave & Wenger, 1991, p. 49). The focus is on the ways in which learning is "an evolving, continuously renewed set of relations" (Lave & Wenger, 1991, p. 50). This implies that there is a relational view of the individual and learning.

3.2.4 Mathematics as a community of practice and the creation of identity

In contrast to the psychological theories of identity, a sociological approach considers how students interact with their social environment and how the two elements (the individual and the environment) are mutually constitutive of identity. In their extensive work with communities of practice, Lave and Wenger have argued persuasively that learning is a social practice through which we come to know who we are (Lave, 1992; Lave & Wenger, 1991; Wenger, 1998). Rather than seeing learning as a process that takes place ‘within an individual’, Lave and Wenger (1991) also argue that it is only through social processes and shared experiences that people gain a sense of self and of meaning.

However, Lave and Wenger (1991) reposition identity as a function of participation in different communities. They argue that people do not have one identity but several different identities that are more or less salient in different situations. Thus identity is not represented as stable, consistent or life-long but rather as dynamic and situated. Through their works they have systematically explored the intersection of community, practice, meaning and identity. This proves to be a more productive means through which we can come to understand not only how learners come to learn mathematics, but that through participating in the community of practice (in this case mathematics learning) they come to learn mathematics and a sense of who they are as learners within the social practice of mathematics.

By studying how to learn mathematics and about mathematics, they also learn how to make sense of learning mathematics and of themselves. Wenger (1998, p: 40-41) argued that:

“They learn how not to learn and keep their shoulders bent and their fingers busy, to follow the rules and ignore the rules. They learn how to engage and disengage, accept and resist, as well as how to keep a sense of themselves in spite of the status of their occupation. They learn how to weave together their work and private lives. They learn how to find little joys and how to deal with being depressed. What they learn and don’t learn makes sense only as part of an identity, which is as big as the world and as small as their computer

screens, and which subsumes the skills they acquire and gives them meaning. They become claims processors.”

This argument can also be directly associated with learners of mathematics. These learners are compelled to sit in a mathematics classroom for a significant period of their schooling lives, and as a result come to learn how to interact and participate within that context. They easily learn when to respond, when to resist, how to appear busy and when to avoid work. In addition, they learn how to cope with the discomforts of mortification and embarrassment, learn to express their joys and sadness, and most master the art of cajoling. They also learn how actions in the classroom have meaning and how some of the actions of teachers, texts and fellow learners take on substantially different meanings for themselves and others, based on varying circumstances. They indeed learn how to be a ‘mathematics student’. They develop a sense of who they are as learners within this context, which may be very different from others within and beyond the school context. The mathematics learner that they envisage themselves to be may be very different from other learners in the same classroom. Similarly, the learner that they see themselves as in the mathematics classroom may be very different from the learner they see themselves as in other subject classrooms.

Limited studies exist in mathematics education that explore the construction of identity in and through the practices of mathematics (Boaler, in press). Wenger (1998, p: 47) defines practice as a process of doing within a “historical and social context that gives structure and meaning to what we do ... (such that) practice is always a social practice.” Practices include both the explicit and implicit; what is said and what is left unsaid. It includes language, artifacts, tools, symbols and rules, along with less obvious aspects including unspoken conventions and rules, assumptions and worldviews. All of these practices come to make up what it is to be a participant and member of a particular community of practice, in this case a mathematics learner.

It is through the practices within a community of practice (e.g. primary and secondary school mathematics classrooms) that learners develop a coherent sense of what it is to be a member of that community. Learners attempt to make sense of the community,

and in so doing develop a sense of self in relation to that community of practice. For some learners there is a greater synergy and sense of belonging, whereas for others there is a sense of rejection and hence little sense of identity within the community of practice. Like all communities of practice the mathematics classroom has developed over a period of time; what is perhaps most remarkable about this particular community of practice is how little it has changed globally over the last century.

3.3 Theory of practice

The second framework that informs this study is Andrew Noyes' (2002) 'mathematics learning landscape', a metaphoric analogy based on Pierre Bourdieu's 'theory of practice' which comprises of broad categories. These categories are: field (a reference to contexts and power relations); habitus (an embodiment of culture and personal history); and capital (economic, social and cultural wealth). However, Noyes' (2004) theory is characterised by geology, climate (not geographical/technical but metaphorical), human influence and time. The geology in education is a reference to the physical existence of buildings, architecture and site as well as the compulsory age of schooling, while climate refers to the social environment. This theory is related to Bourdieu's work that is linked to objective structures, subjective structures (habitus), power relations (field) and time. Noyes (2004) uses the landscape metaphor to create an image that will support exploration of similarities and distinctions between two mathematics learning locations, i.e. primary school and high school.

The French sociologist Pierre Bourdieu's work provides a way of understanding the processes of the social construction of knowledge. It locates this dissertation in the current of contemporary thought and introduces the tools of Bourdieu's theoretical analysis which underlie some of my arguments. The use of this analytical tool is to, firstly, construct an understanding of the culture of education in a South African context. It is also used to analyse how the understanding and knowledge of mathematics have come to be accepted as the knowledge by our learners, and to probe the factors, contexts and circumstances (field, habitus and capital) that affect mathematics learning during the transition from primary school to secondary school. Mathematics may be seen as a socially constructed body of knowledge based on a set of conventions of approach that are located in the cultural domain. The difficulties

that many learners encounter with mathematics can be directly related to their contexts, circumstances and the assumptions made in transmission of mathematical knowledge over the different phases of schooling.

This chapter provides the theoretical background to the dissertation by positioning my argument in the context of current thought. Drawing on the ideas of critical social theory, the ideas portrayed here represent a way of interpreting social interaction so that we can begin to understand why some people, either as individuals or as groups, appear to accept as inevitable socially constructed situations which place them at a disadvantage, often attributing the outcomes of this disadvantage as the result of a personal deficiency. There are several reasons for poor performance in mathematics (see Chapter 2) and this study investigates whether transition affects mathematics performance and how? These theories are the microscope which magnifies the contexts for a closer examination.

3.3.1 The field

Bourdieu's 'theory of practice' is an attempt to move beyond objectivism and devoid of committing to subjectivism. The focus here is on the individual (one's disposition), the experiences encountered and strategies employed as an individual. Bourdieu was able to generate a theoretical basis for examining societal structures that is based on empirical evidence rather than on the pre-eminence of "theoretical theorising". It is the experiences that individuals encounter that moulds their character and influences their beliefs. His reference to fields is the division and categorisation of the social sphere into areas of influence. These fields are synchronised by their commands of practices developed through generations of ritualistic routines and traditions, much along the lines that, since it's 'always' been done like this, it will continue to be so (Noyes, 1994).

Central to Bourdieuan sociology is the relational dimension of social life. However, these relationships (social aspects) do not necessarily exist in harmony, but often struggle amid the social space which positions individuals relatively. This characteristic of division or segregation is the fundamental idea of what is known as

class analysis in Bourdieu's work. Wilkes (1990, p. 130) illustrates this by drawing on Bourdieu's work:

“... in its artistic components, in eating habits, in the dispositions of the body, in theatre visiting (or not theatre visiting), in a concern for music or no concern, in the political attitudes, the cars they drive, the men and women they marry, the sort of living rooms they construct - in all these ways the lives of classes are drawn.”

For this study the classification of dispositions allowed the participants to be placed in fields of their social spheres according to their families and environments and in relation to their mathematics learning and performance. Therefore, it would seem apt to suggest that the fields that learners are exposed to or are placed in would largely influence their behaviour and attitudes towards mathematics. A learner who dwells in a community or family that does not place value on mathematics or any value on education itself, will reflect the same views and values. For example, ‘we come from a family of beauticians, we’ve never needed math. Any way, we have never been good at it, neither would you be.’ Such a learner would have given up on the subject before s/he even gave it a chance. On the other hand a parent or community that encourages mathematics education, inspires and motivates the learner would most likely have a learner who excels in the subject. The existence of their fields is also based on their habitus. If there is no field there can be no habitus and vice versa.

The concept of field has often been misused or misunderstood. Grenfell and James (1998, p: 16) explain that:

“Field is ... a structured system of social relations at a micro and macro level. In other words, individuals, institutions and groupings, both large and small, all exist in structural relation to each other in some way. These relations determine and reproduce social activity in its multifarious forms. Moreover, because they are structural, positions ... can be mapped or located, and the generating principles behind their relations ascertained.”

Noyes (2004) defines a field as a network or configuration of objective relations between positions objectively defined. This dissertation therefore not only considered the field of mathematics education but also the family, friends and related culture fields. The thoughts, beliefs and ideas that our educators, friends, family share about mathematics and mathematics engagement shapes our vision of mathematics. Learner's behavior, interest, engagement and attitudes more often than not reflect their field and habitus.

3.3.2 Habitus

Several sociologists have attempted to define Bourdieu's notion of habitus:

“A set of dispositions, created and reformulated through the conjuncture of objective structures and personal history” (Harker, Mahar, & Wilkes, 1990, p: 10)

“... history embodied in human beings. Its existence is apparent in and through social practices as manifested in ways of talking, moving getting on with people and making sense of the environment” (May, 1996, p: 126)

“A system of schemes of perception and discrimination embodied as dispositions reflecting the entire history of a group and acquired through the formative experiences of childhood” (Nash, 1999, p: 177)

“An embodiment of the complex amalgam that some would call structural factors, such as social class, gender and ethnicity, together with a person's genetic inheritance, all of which continually influence and are influenced by others through interaction” (Bloomer & Hodkinson, 2000, p.: 589).

However, none of these definitions fully justify Bourdieu's powerful concept of habitus. However, Reay (1995, p: 354) argues habitus as *“a deep, interior, epicentre containing many matrices”*. From her involvement with primary school children she expresses the importance of understanding personal histories and recognising that *“the habitus acquired in the family is at the basis of the structuring of school experiences”* (Reay, 1995, p: 356). According to Swartz (1997), habitus primarily originates from family socialisation, ancestral traditions and experiences. He also explains that habitus can be modified through interaction with, for example, the peer group in a limited but evolutionary way.

Cann (1996) explains Bourdieu's concept of habitus as "that system of dispositions which acts as a mediation between structures and practice", (Bourdieu, 1973, p: 72); it is the "durably installed, generative principle of regulated improvisations" (Bourdieu, 1977, p: 78), the "practice-unifying and practice-generating principle" (Bourdieu, 1984, p: 101). Thus habitus emanates from internalisation. The conversion of internalisation into a disposition produces meaningful practices and provides meaning-giving perceptions. Noyes (2004, p: 89) cites Bourdieu (1984) to point out that "... *it is a general, transposable disposition which carries out a systematic, universal application beyond the limits of what it has actually learnt - of the necessity inherent in the learning conditions*". These inherent practices among individuals give rise to varying social classes. Similarly, in a mathematics classroom, learners are unspokenly categorized by their peers and educators according to their behavioural patterns (social activities) into different classes. They could be classified as hard workers or shirkers; or strong learners of mathematics or weak learners of mathematics; or as well disciplined learners or delinquents. So too, would a teacher from the apartheid era would hold the view that a white child is smarter than a black child. By the same token an educator in a traditional patriarchal society would believe that mathematics is not a subject for girls because on boys are good at it. These are subjective realities/beliefs that we cultivate based on our upbringing and our social interactions with our communities and surroundings. It is these environments that we are exposed to, is referred to as our field or habitus.

It becomes explicit that habitus is an embodiment of culture and personal history. It is also clear that the habitus allows individuals to generate and interpret practice. There is a sense in which the actor is free to choose how to act, but not free to choose the principle by which they choose how to act (Noyes, 2004, p: 90). It is also important to note the relative stability of the habitus, as it is durable but not eternal. In other words, although the early formation of the habitus might have been largely within the family, there is potential for it to evolve over time. However, in Bourdieu's view the potential for this evolution to occur is probably not as immense as many may think, as habitus is fairly resistant to change since primary socialisation is more formative of internal dispositions than subsequent socialisation experiences. Habitus

encounters continuous adaptation, revision and evolution, but this process is generally slow, unconscious, and tends to elaborate rather than fundamentally alter the primary dispositions (Swartz, 1997, p: 107). For Bourdieu the habitus of a biological individual is merely a deviation from those with similar internalised life chances. In this study, where I worked with individual learners, I had to allow the analysis of individual situations to reflect something of their relative classified social position.

Practices are reproduced through repetition of encounters with common structures, and since the habitus incorporates a sense of the expected belonging, enables practice in familiar situations to recur. Such practices would be considered appropriate in familiar situations; however, the same practices reproduced outside of familiar situations can appear inappropriate. For example in America a mathematically inclined learner would be considered a 'nerd' whilst the same learner would be given the status of a 'genius' in Russia. Although the production of 'appropriate' behaviour in unfamiliar situations can be successfully achieved, it is always at the cost of a considerable conscious effort; the cost of overriding the habitus with behaviour that has to be constantly monitored to appear to 'fit in', while others, accustomed and conditioned to that same environment, appear to produce appropriate behaviour naturally and without effort (Bourdieu, 1990, pp. 108-109). It is this Theory of Practice that helps this study to analyse learner practices and perceptions based on their perceived subjective views of mathematics content and learning engagement.

3.3.3 Capital: Economic, cultural and social

Bourdieu's metaphorical reference to capital is another window through which we may perceive class and field. Status and social standing in any society are defined by the collective amount of capital. Economic capital refers to all the inherited and accumulated wealth. However, capital is not merely economic but also cultural and social. It is the unique combination of capital that defines positions in the social sphere.

According to Bourdieu (1985), cultural capital can exist in multiple forms which could be embodied (e.g. body shape, deportment, social airs), objectivised (e.g. books, art, music) or institutionalised. Cultural capital is continuously transmitted

within the family and is passed on from generation to generation. Hence the transmission of cultural capital plays a critical role in maintaining distinctions or differences in society. The inequitable distribution of cultural and economic capital creates and maintains distinctions among the various social classes.

The third aspect concerned with capital is social capital. Social capital is associated with the ability to mobilise relationships and so relates to membership of groups. However, it goes further than this as an individual's level of social capital is related to the amount and types of capital possessed by those people with whom s/he is in a relationship. In a nutshell, social capital refers to the allegiance of power to various hierarchies of status in any social space. According to Cann (1996), social and cultural capital includes academic and professional reputation, qualifications and heritage as well as childhood to adult development and the stigmas attached to belonging to a particular social class, gender or cultural group. He also uses the analogy of an expert tennis player and his movement within the field during a game of tennis: *“the moves are clearly right, but they are apparently undertaken without conscious thought, the results of having embodied the game”* (Cann, 1996, p: 10). The location of this embodiment is the habitus:

“Action is not the mere carrying out of a rule, or obedience to a rule. Social agents, in archaic societies as well as in ours, are not automata regulated like clocks, in accordance with laws which they do not understand. In the most complex games, matrimonial exchange for instance or ritual practices, they put into action the incorporated principles of a generative habitus: this system of dispositions can be imagined by analogy with Chomsky’s generative grammar – with a difference: I am talking about dispositions acquired through experience, thus variable from place to place and time to time. This ‘feel for the game’, as we call it, is what enables an infinite number of ‘moves’ to be made, adapted to the infinite number of possible situations which no rule, however complex, can foresee”

(Bourdieu, 1985, p: 9).

Just as a team player adapts his strategies according to the tempo of a game and the roles assigned, based on the strengths and weakness of their own team and of the opposing team, so too individuals will adopt strategies in any field that have been acquired through experience and to which they pay little heed during the game. In short, individuals more often respond as a result of innate experiences or conditioning.

Cultural capital and habitus, along with field, form part of Bourdieu's 'thinking tools' in his theory of practice, and within the social role of educational systems. Our behavior and habits are not mechanically generated, but rather are based on our own ideologies, inventions and creations that we were exposed to, depending on what we 'chose' to focus on and what we 'chose' to ignore. Of course we may not actually consciously choose at all. Within any field the individual assumes positions of influence according to their capital.

3.4 Conclusion

Bourdieu's theoretical work can be seen as providing a set of tools which can be applied, as required and with differing emphasis, to inform empirical observation and interactions. In addition, so too does situated learning theory inform this research. Both frameworks are relevant to this study as they are context-based and social learning theories. They both focus on the environment (joint learning enterprise or habitus), as well as the development of identities. These frameworks inform this study by analysing the different contexts (i.e. primary school and high school) of learners' experiences and interactions, the identities they create and the patterns that may emerge. In this sense, the concepts presented inform the arguments in later chapters, although their influence will generally be implicit rather than openly stated.

Chapter 4

Research method, methodology and design

This research is encased within the interpretivist paradigm as it explores learners' and teachers' subjective experience of the world of mathematics. This paradigm has allowed me to "*demonstrate human individualism and how their experiences are mediated by their thoughts, beliefs, expectations and judgements*" (Willing, 2001, p: 35). He further articulates that individuals attribute meaning to events which then shapes their experiences of these events. The data which were collected are empirical since the study involved documenting of real events, recording what people said (words, gestures and tones), and studying written documents. It has "*attempted to capture aspects of the social world for which it is difficult to develop precise measures expressed as numbers*" (Neuman, 2000, p: 64). The research methods and methodology were informed by the two social learning theories discussed in the previous chapter.

A qualitative approach had been adopted in this study since I was interested in the events that transpired during the transition from primary school to secondary school and how learning and teaching of mathematics takes place in the different environments.. This study investigated and interrogated some of the various contextual factors that affect this interactive process. This research approach allowed me flexibility and robustness since qualitative research is multi-method in focus, involving an interpretive, descriptive approach to its subject matter. This enabled me to probe deeply and intensively analyse the emerging phenomena in order to establish informed generalisations. This qualitative approach occurred as a minor case study which enabled me to investigate phenomena spanning a considerable period of time (seven months), yet it permitted examination and interpretation of discrete events and activities within this temporal space (Denzin & Lincoln, 1994).

A primary school and a secondary school located in a relatively developed urban suburb of Durban in the province of KwaZulu-Natal were the sites chosen for this study. Both schools were chosen since they were public co-educational schools which

were easily accessible to me. It was easy and convenient to commute between the schools which facilitated the data collection process. The principals (headmasters) of both institutions were very accommodating and permitted access to the schools' facilities and human resources. Their only concerns were based on protection of identities and the infringement of tuition time. They were assured of anonymity and that data collection would be carried out in learners' and educators' personal time.

The primary school is a feeder school to secondary school. This research only documented events of learners who exited this primary school and entered into the secondary school which was the research site. Purposive sampling was used as I specifically needed Grade 7 learners from the primary school who were going into Grade 8 at the secondary school. Initially nine primary school Grade 7 learners (two boys and seven girls) volunteered to be a part of this project. However, a girl chose to opt out in the high school phase as her parents no longer permitted her to be a part of the study. According to the learner, they did not find it necessary to explain their reasons for exiting the project, but she expressed that journal entries were time-consuming and now that she was in high school she needed to concentrate on her academic studies. One of the boys relocated and therefore could not be included in the sample as he did not attend the high school chosen as the research site. In addition, one of the female learners refused to hand over her written journal, claiming that she had lost it and did not want to continue any longer. Although I exhausted the confidentiality code and expressed her total anonymity in order to convince her to continue, she refused. Hence, my sample size was narrowed down to six learners. Included in the sample were all (three) of the junior secondary mathematics educators (two female and one male) and the primary school senior phase mathematics educator (male). All the names of learners and educators mentioned in this study are fictitious. Pseudonyms were used to make reference to the various individuals. The tables below indicate characteristics of the participants in the data sample.

Table 3: Characteristics of the learners' sample

Learner	Age	Gender	Personality
1. Tina	13	F	Very motivated , has high expectations of herself
2. Tammy	13	F	A little shy and seems to lack confidence in herself
3. Mary	13	F	Friendly, confident and motivated
4. Sam	13	F	Sweet, gentle lass who feels a little disillusioned
5. Nancy	13	F	Bubbly, playful and a little naughty
6. Mark	13	M	Care free, go with the flow kind of person

Table 4: Characteristics of the Educators' sample

Educator	Type of school	Age	Gender	Subject Qualification	Teaching Experience (Years)
1. Sidney	Primary school	45	M	Mathematics	24
2. Natasha	High school	27	F	BSc. Honours	5
3. Fathima	High school	46	F	English, Music, ACE in mathematics	14
4. Sihle	High school	38	M	Mathematics	18

The secondary school has an enrolment of 1200 learners from Grade 8 to 12, although it was built to accommodate approximately 1000 learners. The primary school has an enrolment of about 600 learners from Grades 'R' to 7. These schools are open to all race groups and are also well resourced. The socio-economic background of learners ranged from fairly average to very affluent. The primary school is relatively well resourced with textbooks, various mathematical learning apparatus and experienced educators. The secondary school is equipped with some of the latest technology in mathematics and has qualified and experienced educators on its staff. The mathematics department at this school receives a substantial grant from a company which has set up a trust to promote mathematics learning. A huge portion of the money was spent on the installation of an interactive smart board, a complete mathematics laboratory with modern computers, laptops for educators and additional tuition for learners of mathematics in all grades. Additional software has also been purchased, namely computer-based mathematical tutorial programs, and a geometer's sketchpad and autograph. Teachers have subsequently been trained in using some of these teaching aids.

The interpretive approach was used to seek a methodical enquiry into trying to establish whether the transition process affects mathematics learning, and if so, the factors in this process that may have contributed to poor learner performance in mathematics. This was done by engaging in observations of the different environments (primary and secondary classrooms) and interviews in order to make significant discoveries. Data collection and research tools included: classroom observations, questionnaires to be completed by educators and learners, interviews with learners and educators and written journals kept by learners. Below is a time table of the data collection process.

Table 5: Time table of the data collection process.

PARTICIPANTS	INTERVIEWS	CLASS ROOM OBSERVATION	QUESTIONNAIRES	JOURNALS		
<p>Primary School Educator</p> <p>1. Sidney</p>	<p>All interviewed once</p>	<p>Done once when the learner participants were in their latter part of their grade 7 year in primary school</p>	<p>All completed</p>			
<p>High School Educators</p> <p>1. Sihle</p> <p>2. Fathima</p> <p>3. Natasha</p>		<p>Done once when the learner participants arrived in high school. Beginning of grade 8 year</p>				
LEARNERS						
1. Tina		<p>Done towards the latter part of the first term of high school year.</p>		<p>Completed in the latter part of the first term of high school year.</p>	<p>Two journals were kept. One during the latter part of primary school and the other for the 1st term of high school</p>	
2. Tammy						
3. Sam						
4. Mary						
5. Nancy						

Observation was done once-off (at each institution) on a preliminary basis in order to get the feel of the primary school classroom setting compared to the high school, in order to draw some kind of parallel in their differences and similarities. Reflecting on my visit to both the primary school and secondary school, I found this experience to be somewhat awkward as I constantly felt like an intruder. I was always aware that the environment was in some way altered by my presence, despite my assurance to the educators that I was not observing or judging them. The learners also seemed to be very conscious of my presence and responded with a sense of caution.

Questionnaires were used to elicit information to guide the interview questions as well as to gain some statistical data. The questionnaires for educators contained categories such as: (1) qualifications, (2) teaching experience, (3) knowledge of primary school and high school curriculum, and (4) their role in the transition phase. The questionnaires for learners were divided into three categories: (1) their mathematics learning experiences, (2) a comparison of their primary school experiences with those in high school, and (3) factors in the transition process that shaped and moulded their performance. This was an effective way to gather information as the respondents were not involved in actual interaction with the interviewer and this therefore eliminated some of the feelings of nervousness, fear and intimidation. This method also did not restrict respondents to respond within a specified time limit but over a period of time, allowing time for thought without feelings of pressure and resulting in more meaningful responses.

Although this was a very resourceful method, I encountered some difficulty in retrieving the questionnaires for analysis. Educators and learners were given two weeks to complete the questionnaire and return them. Despite constant reminders and rallying around them, the collection process exceeded the allocated time frame. In addition, this method did not provide the opportunity to probe and interrogate responses received. To overcome that problem the participants engaged in semi-structured interviews.

Semi-structured interviews were conducted with learners in the latter part of the first term of their first year (Grade 8) of high school. This seemed to be an ideal period

since the learners would have had some time to sufficiently experience high school in addition to the maintenance of a relatively fresh memory of their primary school experiences. This time frame would have enabled the participants to draw some comparable parallels. Semi-structured interviews were used so that I could facilitate the direction of discussions as well as allow the respondent to express their own ideas and opinions on related issues (without having to stick to the interview questions). This seemed to be an appropriate way to probe and gain insight as well as explore other avenues of information emerging from the interview. The interview questions were divided into four major categories: (1) their learning environment, (2) their feelings about mathematics, (3) teachers' presentation of concepts and learners' visualisation of these concepts (a topic taught in Grade 7 and extended to Grade 8), and (4) issues related to transition from primary school to high school.

The interviewees were given a choice whether to be interviewed indoors or outdoors and all chose to be indoors. The interviews were carried out in the quiet sanctuary of an empty classroom where we sat opposite each other at learner desks with a dictaphone placed between us. I sat at the learner's desk in order to make the learners feel a little more comfortable and to try and eliminate the teacher/pupil image. A copy of the interview questions was made available to them a day before their interviews so that they could become familiar with the questions that would be posed. It was also meant to prepare them as to what would be expected and to help curb the anxiety of being interviewed. It also provided them with the opportunity to gather their thoughts and not blank out when being questioned.

Although they received the questions in advance, some of the participants still did not seem very prepared for the interview. This could have been attributed to fear, nervousness, anxiety or mere lack of preparation. The learners were also encouraged to speak openly and honestly about their experiences and were constantly assured of the confidentiality code. Despite all the assurances, learners still showed initial signs of nervousness and intimidation. I was constantly aware that all their responses may have not necessarily have been completely honest (as I am an educator at the school), but I would have to trust the respondents and consider their responses as their truths. All participants were rewarded with a little token of appreciation for their efforts.

Educator interviews were carried out on a similar basis as the learner interviews. The educators felt more comfortable being interviewed in their own classrooms. All educators preferred to be interviewed during school hours, either in their free time and/or in the breaks as they had other commitments and responsibilities. Interviews that were carried out in lunch breaks sometimes lost momentum due to time constraints and lacked lustre when continued at a later stage. Some of the educators were not too enthusiastic about being interviewed but took part as they felt they were contributing to a good cause. They all expressed apathy towards the poor mathematics results and the lack of learner motivation in all grades. The primary school educator was initially very reluctant to do the interview. I had to speak to him on several occasions, each time highlighting the importance of his participation and contribution. Eventually I managed to coerce the senior primary mathematics educator. Some of the junior secondary educators were also not very keen, but seemed to identify with the dilemmas and challenges this study was exploring. They were very interested to learn from the findings that would emerge from this study and hence agreed to become participants.

According to Guba and Lincoln (1985), there must be a personal and individualised approach to interviewing; they also emphasise the importance of verifying findings with respondents after data are collected to ensure that the results match what they intended to say. I therefore discussed my findings and summaries of their responses with all relevant persons and participants concerned for their input. This also enabled confirmation and clarity on several issues.

Learners were also asked to provide a written biography of their experiences of learning mathematics through the different phases. Goodson and Sykes (2001) confirm that when people tell stories of their lives, they craft a narrative that links together events, unique experiences and perceptions. Therefore learners were requested and encouraged to keep a daily journal from the latter part of their Grade 7 year going into the Grade 8 year. They were also provided with incentives to encourage completion of their journals. They were issued with a little lockable journal in Grade 7 and it was collected at the end of that year. At the beginning of

their Grade 8 year they were issued with a new journal and this was collected before the end of the first term. Learners were expected to reflect on their experiences of mathematics learning during their primary years up to the first term of their high school year in the form of a personal narrative. Each of the learners received guidelines and instructions to direct their journal entries. However, not all of them adhered to these instructions. Here again I struggled to retrieve the journals timeously as learners continuously forgot to bring them in and made various excuses.

Finally, I acknowledged that my presence was likely to introduce some kind of distortion to the natural scene and was fully aware of this restriction. I did undertake every possible measure to minimise the effect. Since the participants were expected to grant access to their lives, their minds and their emotions (Lofland & Lofland, 1984) throughout the data collection process, I provided them with an explicit description of the intentions of my research. I also expressed complete confidentiality at all times and made them aware that they were allowed access to my research findings.

I was also aware that some of their responses may be influenced by this site being the school at which I teach and also knowing the respondents well. I indicated to both educators and learners that they had the option of pulling out of this project at any time that they wanted to. Lastly, I engaged them (principals of the schools, educators, learners and their parents) in written consent and confidentiality contracts to ensure the safety and security of their identities.

Chapter 5

Data analysis

5.1 Introduction

Schools are dynamic and complex social learning enterprises in which various factors interact together to attempt to contribute to the teaching and learning process. The transition from primary school to secondary school is generally complicated and sometimes very daunting for many learners. In this chapter I capture and analyse the data obtained from some learners involved in this process. The illustration of findings presented here is born out of this dynamic and interactive process. Interpretation and analysis of the empirical data collected are based largely on issues that came out of the available literature reviewed in Chapter 2, and is also informed by the dictates of the two theoretical frameworks used in this study.

This chapter first discusses the communities of practice that exist in the schools and then locates the learners and educators within these communities of practice. This is followed by contextualising the schools by considering the domain, the community and the practice from the teachers' and learners' perspectives. Thereafter a description and analysis of learners' diary entries from their written journals is carried out in accordance with the identities they create, their habitus, fields and social, economic and cultural capital. Next the educators (work history and experience) are briefly described and the contributions they make to these communities (drawn from interviews, questionnaires and personal interaction) are discussed. Lastly I look at the learner and educator interviews and draw on similarities and differences in their responses to common contexts (such as the learning environment, teacher/learner relationships and their contributions in the classroom).

5.2 Communities of practice within the schooling environment

All schools can be seen as learning organisations with systems and structures in place to make them appropriately functional. Within any organisation there exist multiple communities of practice, each according to their shared domain of interest. So too, within the schooling environment there are technical, athletic, aesthetic, practical

and many more communities in addition to the academic communities of practice. Membership of these communities is not exclusive, since members could belong to several different communities at the same time. Membership of the different communities is one of the finer factors that shapes and moulds their identities as learners of a particular organisation. However, the mathematics classroom and learning environment as a community of practice is the focus here.

Incorporated within both the primary and the high school (the fields of this study) are very functional practicing mathematics communities. Each of these schools constitutes active learners, suitably qualified educators and a library of mathematical resources. From observation, both classrooms in the two different institutions (primary and secondary) were governed by structural authority, disciplinary rules and regulations and bound by an engagement of mathematical procedures and activities. The similarity of both of these contexts (communities) could be a possible reason why the learners would have experienced a relatively smooth transition from the primary school to high school. In contrast, the rapid pace of lessons, lack of constant revision, supervision and review of previous work as well as the demanding, abstract and complex nature of mathematics at high school can become a set-back for learners in the initial phase of the transition.

5.3 The domain

In these mathematics classrooms there exists a shared domain of interest in the learning of mathematics by the learners. They embark on a mutual engagement of mathematical events, trials and tasks. Together they aspire to excel in this learning area; however, not all are necessarily successful. Some are newcomers to certain topics, others may have had previous exposure in the different aspects of mathematics, and some may become instant experts (based on their talent, aptitude and capital they possess), whilst others may be content to learn at the periphery or not participate at all. One of the reasons for this may emerge from the fact that membership to any community is largely voluntary and an individualised decision (such as an apprentice to the expert); however, the learning of mathematics arguably is not a voluntary option, especially not in the junior schooling years. Mathematics or Mathematics Literacy as learning areas are compulsory parts and prescribed

components of the South African education curriculum. The status and the excellence demanded of the subject places added stress and pressure on learners of mathematics.

The mathematics educators in this community of practice play a vital role in the teaching and learning of mathematics. Educators are seen as the experts in their subject fields, the holders of knowledge who engage in a joint enterprise of dispensing this body of mathematical knowledge to their learners (the apprentice). They are expected to draw from the fountains of their professional and practical training, their past and present teaching practices and their childhood to adult learning experiences. They are entrusted with the responsibility to tap into and to nurture every learner's mathematical potential. However, this may not be very possible due to various factors such as time constraints, class sizes (large number of learners), learner competence, learners' willingness to participate and the intangible dynamics of different classroom situations.

5.4 The community and the practice

The mathematics classroom as a community of practice involves more than just the exchange of the technical knowledge of mathematics and the carrying out of mathematical procedures and tasks. The members of this community are involved in a set of relationships which over a period of time have evolved this mathematics classroom into a community of practice. This community has now been developed around the teaching and learning of mathematics. The fact that they are organising around particular mathematical concepts, ideas and algorithms defines them as a community. This specific area of knowledge and activity creates among its members a sense of joint enterprise and, to a degree, a shared identity. The mathematics classrooms in the primary school as well as the high school are both functional communities of practice as they generate a shared repertoire of feelings, thoughts, ideas, commitments and memorable experiences. These communities function using various developed resources such as textbooks and work/exercise sheets (tools), curriculum and examination guidelines (documents), mathematical routines, mathematical vocabulary and symbols that in some way carry and emulate the mutual and collective knowledge of the community. In a sense it involves practice – i.e.

expressing the ways of doing things and emanating their expressions that are shared to some noteworthy extent among members.

The interactions involved here and the abilities combined together to take on bigger or more difficult and complicated tasks and endeavours through teamwork, connecting these individuals to each other and helping to build relationships of trust, faith, dependence and confidence. These communities of practice can be recognised as self-organising systems. They also bear characteristics of associational life such as the creation of new identities, the generation of social and cultural capital and expansion and evolution of knowledge. We must also be aware that the mathematics community of practice does not change, but at the time of transition there is an interaction and integration of different members of this community as learners come together from various primary schools.

5.5 Locating the educators within the community of practice

This research analyses data from the perspective of social learning theories which places learning “in the centre of our lived experiences of participation in the world” (Wenger, 1998, p. 3). These theories facilitate my attempt to describe how the teacher contributes to the creation of such a learning community in the classroom. This information has been processed from the data captured from the interviews with Sidney (the primary school mathematics educator), Natasha, Fathima and Sihle (the junior secondary mathematics educators, pseudonyms used in all cases). The following are brief descriptions of each of the educators interviewed.

Sidney possesses a professional qualification and has majored in Mathematics. In addition, he has 24 years of teaching experience in primary school. For most of his teaching career he has taught mathematics up to Grades 6 and 7. Sidney comes across as a confident primary school mathematics educator who has some qualms about how learners are taught mathematics at high school and the amount of freedom learners are given. He claims to enjoy and prefers teaching mathematics in the primary school as he finds the learners more manageable and is able to relate to them. He is also very technologically orientated and tries to use technology in his lessons. Quiet often he surfs the Internet to find new information and innovative ways to teach mathematics.

Furthermore, he is involved in liaisons with other primary schools and high schools. They have formed clusters and meet to discuss curriculum development, syllabi and the setting of common exam papers.

Natasha is a young and vibrant educator who joined the education fraternity recently. She possesses an Honours degree in Science. Since she did not enjoy the confines of a laboratory, she pursued a career in teaching Mathematics, Science, Technology and Life Orientation. Of her six years of teaching at high schools she has taught Grade 8 learners for five years. She has never taught in a primary school as she prefers the high school. According to her, the DoE has unfortunately not put any structures in place nor encouraged any meetings between primary school and secondary school educators. However, she sometimes interacts with primary school educators during parent-educator conferences, but has not met with primary school mathematics educators on a professional basis. She believes that parents need to be more proactive with their children and assist with their learning. Parents should motivate their children and also offer rewards. She also thinks that mathematics educators can help learners by revisiting their teaching methods and adapting their teaching styles according to the needs of the learners. Mathematics lessons should be interactive where educators should also motivate learners and continuously emphasize the importance of their academic studies.

Fathima spent 14 years teaching English and Music. As Music began to fade away as a learning area, she began teaching some Mathematics and began to further her studies in Mathematics Education at the University of South Africa. In the midst of her studies she left the profession to join the corporate world. In 2010 she returned as a junior Mathematics educator. She possesses a wealth of teaching experience both at public and private schools. Currently (2011) she is studying towards an accredited certificate in Further Education and Training (FET) in Mathematics. Like Natasha, she also enjoys and prefers to teach Mathematics at a high school. However since her return to the educational field she found teaching to be a challenge, especially at her current high school. She has discovered that learners seem to lack academic and moral discipline which contributes to the poor learning morale. As a result, she has adopted an authoritarian role in the classroom. She firmly believes that parents and

the schools management team should enforce disciplinary measures And that parents also need to take an active interest in their children's academic studies in order to motivate them and provide support and guidance.

Sihle graduated as an educator from the University of Zimbabwe, specialising in Mathematics. He has a great passion for the subject. Due to the circumstances in Zimbabwe he renounced his citizenship there and took up permanent residence in South Africa. In total he has 18 years of teaching experience in Mathematics and other related subjects. In the past 14 years he has been teaching Mathematics at several different South African schools. He has gained a wealth of experience by teaching and interacting with learners from diverse and multicultural backgrounds. Although he has taught in primary and combined schools, he prefers to teach in secondary schools. He also finds that discipline is a serious problem in many South African schools. To maintain a balance, he adopts a firm but friendly attitude.

One of the issues emerging from this study is an understanding of the construction of classroom community and its implications for the production of mathematical ways of knowing during the transitional period from primary school to secondary school. In this research I attempted to understand the overall coherence of teachers' practices and perceived ideas of mathematics teaching, including the conceptions which drive those practices. This type of inquiry, which looks at teaching perspectives drawn from classroom practice, sometimes heightens awareness surrounding the complex processes involved in establishing classroom communities of practice. To date there is insufficient understanding of "*the role of the teacher within this type of learning*" (Sfard & Kieran, 2001 p: 186).

Drawing from the data, some of the pedagogical approaches involve content knowledge and competence, the identification of pedagogical content knowledge and the identification of beliefs. All of these teachers seemed to have engaged in processes to become sufficiently competent in the content knowledge of the subject by attending curriculum workshops or studying towards degrees and certificates. These educators also pointed out that they had built a cordial and trusting relationship with their learners. They also expressed that they had always tried to make

mathematics lessons meaningful to their learners' lives, and as far as possible relate the mathematics taught to real-life situations. In response to the question 'Describe some of the novel ways you employ in your teaching?', Sidney replied as follows:

“as it comes up like for example like multiplication tables, I don't ask children to rote learn, but I use finger techniques like e.g. 7×8 , I will tell them 7×8 by using their fingers so we will take 5 here and because there is 7 here we close 2 and here we close 3 so the ones that we close are the tens column, that's 50 and then 2 left here and 3, then 2×3 is 6, 50 plus 6.”

He tries to simplify the operation by breaking down the numbers into smaller digits to make multiplication simpler; however, the method (although commonly used) can actually be cognitively complicated. However this method may not benefit, for example, a physically challenged learner who may not have any fingers to count on. Although counting using fingers can sometimes be seen as drill work it is also encouraged. Literature (Smith, 1995; Zaslavsky, 1994) justifies the use of counting using your fingers. Smith (1995) points out that in order to be good at mathematics you do not have to be good at calculating. He also mentions that using an abacus is as good as counting on the fingers. Many Chinese learners excel in mathematics and the abacus is used in the primary years of schooling.

Natasha responded by saying:

“I relate every example to something maybe like with financial matters I would actually use, like them buying and selling their own cars. They would have to come up with their own company of what they would like and I think depending on the section we would have to pick an apt example and discuss how it relates to maths.”

Although Natasha tries to relate learning to real-life situations and thinks that she is choosing 'apt' examples, this may not necessarily be true. As human beings we sometimes assume that we all have the same perceptions and experiences, which is not always true because of our own habitus, fields and capital. We know only what we have learned, experienced and have been exposed to. Similarly, every child would not necessarily have had the experience of owning a car or running a business or even

any concept of monetary worth. As educators it is important to be aware that each person's reality differs from another's, based on their habitus, field and social and cultural capital. When real-life examples are chosen, educators should try to ensure that these are relevant and meaningful to their learners' lives.

Fathima chose the route of using both physical and virtual manipulatives. According to her: *"for Grade 8-9: regular quizzes, number challenges and maths games. Computer-based teaching when I was at the private schools. Peer teaching; inductive learning –real-life scenarios"*.

Her teaching strategies are varied and may be attributed to her years of teaching experience, the different subjects that she has taught as well as her experiences outside the education field.

Sihle, like Natasha, also attempted to find ways to relate the mathematics to real life. However, he ensured that the examples he used were known and relevant to his learners:

"I think it depends on the topic at hand. I may not give an umbrella way of doing things but the bottom line is I try to relate whatever situation I find myself in that we are doing to the reality of life in other words I also take mathematics into their homes. Use examples that they are familiar with and take some of the jokes they give me and turn them into some kind of maths so that they can see that it is application. All we are trying to do is develop some kind of interest in them so I won't really say that I do this, but I take advantage in terms of the situation that we are in that particular moment. I try to use the examples that they know, things that are happening round them, even give examples like when they go shopping. Like, for example, when I talk about division or at home when the mother is cooking, you know you just do not throw in pieces of meat in the pot, there is a little bit of division taking place, distributive law, all those things, distribution in products and so on. I take advantage of certain things like in home when the parents maybe are buying a certain thing they cannot only be looking at child X and forget so and so, and so when they have to distribute whatever they giving to their kids

they must make sure that everything is given to everybody, so I take advantage of a situation as it were.”

From their responses it can be ascertained that these educators do try to actively engage their learners in mathematical activity, and allow learners to investigate and explore in order to cultivate some form of critical thinking. When mathematics is integrated with other subject areas inside or outside the school field, this means that everyday knowledge and subject knowledge are less separated. A relation to everyday knowledge and therefore learners' contributions in class can appear more or less appropriate. It should be noted that conceptualisation of knowledge and coming to know takes as its central principle the idea that knowledge evolves with community and its culture. However, we must also bear in mind that the pictures that teachers paint of their work often may not necessarily correspond to observers' characterisations of that same practice.

Although both the primary school and high school educators seem to have reputable academic/educational qualifications, some experience of mathematics teaching and try to teach with innovative methods that relate to real-life situations, they may not necessarily identify with the difficulties a mathematics learner may experience if they have not had that experience themselves. We must be aware that two of the high school educators are not mathematics specialists and may have not experienced mathematics at tertiary level, which sometimes gives insight into what learners may feel with their initial experience of high school mathematics. Neither are all the primary school mathematics educators mathematics specialists, and this can sometimes make them textbook-dependant. Textbooks are not always accurate and sometimes contain errors. If one lacks mathematical knowledge and understanding, then they may not realise the mistakes and errors that may occur. As a result, incorrect concepts may be taught. It is indeed a very difficult task to UNLEARN a concept taught incorrectly. This may be one of the weaknesses of not having a qualified mathematics educator teaching the junior mathematics. Factors such as these at the time of transition will bear detrimental effects on mathematics engagement, even in the years beyond.

During the interview Sidney was asked ‘So when you get your learners from the lower grades do you think those teachers actually develop basic foundational concepts?’, and his response was as follows:

“What I realize is that many, because they tend to lack experience, they become textbook teachers instead of actually grasping the concept on their own and trying to bring it to the fore to the children. But I notice that many of the younger teachers they will stick to one textbook and they will follow that as a Bible, which I won’t recommend.”

I probed further by asking ‘So your teachers in the lower grades are not maths specialists?’ and he replied “*Some of them are not but actually for this year we got the HOD [head of department] doing maths.*”

It can therefore be assumed that schools (primary and secondary) may sometimes employ mathematics educators who may lack suitable qualification or training in lower (junior) grades. Schools may sometimes be placed in difficult predicaments and resort to employing these educators for various reasons, such as the shortage of skilled educators or to quickly fill a vacant post. However, this can be detrimental to a learner’s progress if the educator is unable to nurture and gently harness the learner’s potential at the time of transition.

Every educator brings with them (consciously or unconsciously) innate characteristics of their habitus, a wealth of experience from their fields and their own beliefs and ideologies (their social and cultural capital) about mathematics and the way it is taught and the way it should be taught. The educator is largely responsible for developing the norms of the mathematics community of practice in their classrooms. Norms are collective understandings of the expectations and obligations that are constituted in the classroom, and it is through their establishment that a classroom environment that is conducive to teaching and learning is able to be maintained.

5.6 Communication between primary school and high school educators

Some of the problems that teachers and learners are confronted with at the time of transition from primary school to secondary school are as a result of the lack of

communication between the teachers of the different stages. There is a general agreement that regular meetings between teachers of the two levels are important to increase the knowledge of the teaching methodology of the other level. This is a platform at which teachers of the primary school can learn how to prepare their learners for secondary school. In the same light, high school teachers will learn how to ease their new learners into their new learning environment. It is also important for high school teachers to take note to avoid the start-again effects which implies the necessity to build upon competencies that primary school learners bring with them otherwise it could lead to many learners reduced motivation.

Communication between primary school and high school mathematics educators need to be consistent and ongoing. The DoE seem to have put some structures in place so the primary and secondary school mathematics educators can meet to discuss the curriculum and its challenges. This provides a platform to marry the Grade 7 (primary school) syllabi with the Grade 8 syllabi so that learners are not immediately overwhelmed with the demands of high school mathematics.

The educators were asked ‘Do you ever meet with teachers in the primary school to discuss curriculum or any other aspects related to your learners and mathematics?’, and the high school educators responded as follows:

Fathima: *I do on a personal level – I discuss methodology and ways to improve delivery.*

Researcher: *Are there any joint meetings between primary and high school educators?*

Fathima: *Have not been to one this year.*

Researcher: *Does the DoE ever encourage such meetings?*

Fathima: *I do not know.*

Natasha: *No, unfortunately!*

Researcher: *Does the DoE ever encourage such meetings?*

Natasha: *No, unfortunately not!*

From both these educators’ responses we could gather that there are no structures put in place for any communication between high school educators to meet with primary

school educators to discuss curriculum, teaching strategies and the challenges that mathematics educators may endure. If there were such structures they seem to be ignorant of them.

However, Sihle's interview revealed a totally different tale:

Researcher: *Do you ever meet with teachers in the primary school to discuss curriculum or any other aspects related to your learners and mathematics?*

Sihle: *Ya! When we go to these cluster meetings, that's when we meet them not occasionally. There are primary schools in our cluster. [mentions a few] We discuss curriculum and teaching strategies. The last time I attended they discussed teaching transformation, a topic they feel was a little abstract.*

Researcher: *Are there any joint meetings between primary and high school educators?*

Sihle: *Ya. As I said there are cluster meetings.*

Researcher: *Does the DoE ever encourage such meetings?*

Sihle: *Well, ya officials are there. They do encourage meetings but do not provide support. There is very little that these officials offer. When we ask questions and guidance they say that there is no policy to that effect and that they will get back to you but never do. There are a very few things that they actually are hands-on with.*

From the above responses we can see that there seems to be some sort of contradiction. This may be attributed to some sort of miscommunication among the mathematics teachers at the high school. All three teach junior secondary mathematics, but only one is aware of such meetings between primary and secondary schools. I have also been a mathematics educator at this school for the last three years and I do teach junior grades and to date I have not been invited to a cluster meeting in the General Education and Training (GET – grade 8/9) phase. However I have

attended several such meetings in the Further Education and Training (FET grade 10-12) phase.

When the primary school educator was interviewed on this issue, he responded as follows:

Sidney: *See although the structures are at place but my feeder school never attended the meetings.*

Researcher: *So you had meetings?*

Sidney: *There are meeting always taking place but somehow I don't know why but...*

Researcher: *And who is responsible for this meeting?*

Sidney: *We have our own clusters. We have clusters formed by the Department but in fact the coordinators also feel that somehow the high schools feel that they don't have to attend this interaction with primary schools.*

Researcher: *So there are structures in place. There are things in place but its actually not happening?*

Sidney: *Yes there are but its not being attended by secondary schools.*

Researcher: *So basically secondary schools are not adhering because they are not coming?*

Sidney: *Yes.*

Researcher: *And would you know the reason because you say they feel it's not necessary for them.*

Sidney: *It's not necessary and as I said there's so many changes amongst the teachers, there is no continuity and maybe information is not going forward because it happens in our area but if you look at the other cluster in Bellair you will see that the secondary schools they come from it but in our area we not getting the response from the secondary schools.*

Researcher: *Are there any joint meetings between primary and high school educators? You have not had one for this year?*

Sidney: *No, we had the meetings but it's not attended.*

Researcher: *So when you have this meeting only primary schools attend?*

- Sidney:** *Yes only primary schools attend.*
- Researcher:** *Ok and what do you discuss at this meeting in general in terms of curriculum?*
- Sidney:** *Actually we already started that. We set common assignments, projects, we discuss you know per term the topics that we are going to handle and then we share the work and then we all contribute to the maths paper.*
- Researcher:** *So you try and have a common paper for the cluster?*
- Sidney:** *Ya, that's what we are doing.*
- Researcher:** *Yes that's good in a sense if the child moves from school to school.*
- Sidney:** *Ya, but I also notice that there are big differences amongst schools.*
- Researcher:** *So within the primary schools there are differences too in terms of teaching of the curriculum. Syllabi, structure.*
- Sidney:** *Yes the interpretation of the syllabi because some people just go lightly but some like I go quite deeply into it ... I hope I go quite deeply into it.*
- Researcher:** *In terms of direction into your syllabi do you have a subject advisor that co-ordinates this meeting or attends any of these meetings to help give some guidance or direction?*
- Sidney:** *Fortunately these Department co-ordinators they are quite good and they actually come in to assist.*

A comparison of the primary school and high school educators' responses reveals that there seems to be poor or little communication between the two institutions. There are several possible reasons for this. One of the main reasons may be the lack of communication among educators in their own schools. Secondly, this may occur as a result poor dissemination of important information through the proper channels. Alternatively, primary school educators may feel a sense of inferiority or intimidation while the high school educator may feel superior and not find it necessary to attend. Whatever the underlying reasons may be, teachers need to be educated on the importance of meetings with other teachers of mathematics from different institutions

for the purpose of their personal growth and professional development and for the progress and development of their learners. It is important for mathematics educators to belong to the communities of practice they create and also to encourage a shared vision. It may sometimes create logistical problems for these liaison meetings and workshops to occur, but it needs to happen. There is time set aside for the FET phase educators to meet, therefore there should be a time set aside for the GET phase educators to meet.

5.7 The educators' vision of present-day mathematics learners

Learners of mathematics are generally held in high esteem and may be seen as future academics and pillars of the economy. Ironically, this does not seem to apply to learners of mathematics presently. The educators were asked to describe the calibre of their learners over the recent years, and their responses contradicted the traditional view of a disciplined, enthusiastic, highly motivated learner that was hungry for a challenge. Natasha responded as follows:

“The calibre of the learners is very, very bad. They squeal and fuss for no reason whatsoever. With maths, this is something where your facilitator is only supposed to do 20% of the work and the learner is supposed to do the other 80% of the work. In terms of the work, I mean, but the way the learners are going the facilitators are doing 90% of the work for the child to understand. The calibre of mathematics learners seems to be decreasing exponentially. They are extremely apathetic when it comes to academics. Their morale needs to be boosted.”

Her response signals a disparity in the way learners currently behave in comparison to the way they are expected to behave. The learners seem to lack interest and motivation in the subject and do minimal work.

Fathima's response echoed similar sentiments:

“The calibre of mathematics learners has definitely degenerated. They are badly disciplined and largely lack interest and motivation in the subject. Their work ethos is extremely poor. They complain that mathematics is difficult but make no effort or show any enthusiasm to do some serious learning.”

Sihle also found that his learners over the years were not as 'smart' as they used to be, but the underlying reason may not necessarily lie with their ability. He explains:

"I think over the years personally I feel that the learners are getting weaker and weaker. I don't know but that's how I feel. I feel they are weak learners unlike the previous years and I attribute this somehow to the syllabus change it makes our learners weak. Certain things I challenge the learners to think. They are weak generally. There are number of reasons for this; among other things I think the maths guys on top there who designed the curriculum, they are not being fair to these kids you know."

Apart from the deterioration in learner ability, there is an added challenge of coping with the change in the syllabi of the subject. It would seem that this type of attitude is also prevalent at primary school level. Sidney also seems to be plagued by similar challenges:

"I noticed that it's going down and especially we are, you know at the moment the behavioural problems, all this is having an impact and if you look at it the worst behaved children in our school are the junior primary. In fact the pre-school children are our best children. As for the Grade 7's, as the years are going by you can say that the intellectual capacity is getting lower. Like our babies in Grade 7, they show tendencies of being totally immature to going to high school. They are not like long ago where these kids were much more, you know, like they could handle things but these kids they are still babies. Yes, their level of maturity, it has gone down."

It would appear that learners in present times seem to mature much later and therefore their intellectual development would possibly also occur a little later. There is also an implication that learners lack motivation and are lazy to a certain degree. The luxury of modern technology has certainly made people a little lazy, but it has also added to a better quality of life and provided exposure to knowledge and volumes of information. However, it would seem necessary to reflect critically on what shapes the dynamics of emergence of such behavioural patterns within the mathematical learning domain and how we can research these complex interplays. It would also be beneficial if learners were taught academic discipline at the early stages of transition.

It should be made explicit to learners, what is expected of them as a learner of mathematics and how to conduct themselves in a mathematics classroom. This may facilitate productive mathematics learning and teaching during and after transition.

5.8 Who is responsible for learners' poor performance in mathematics?

Teachers' evaluations of learners' achievement reflect the progress that learners construct. However, if learners are not competent enough, then they are not ready to progress further. From anecdotal experience, educators of mathematics are mainly held accountable for the poor learner performance in mathematics. Research (see the literature review) shows that there are several factors that affect learning and teaching of mathematics (Figure 2).

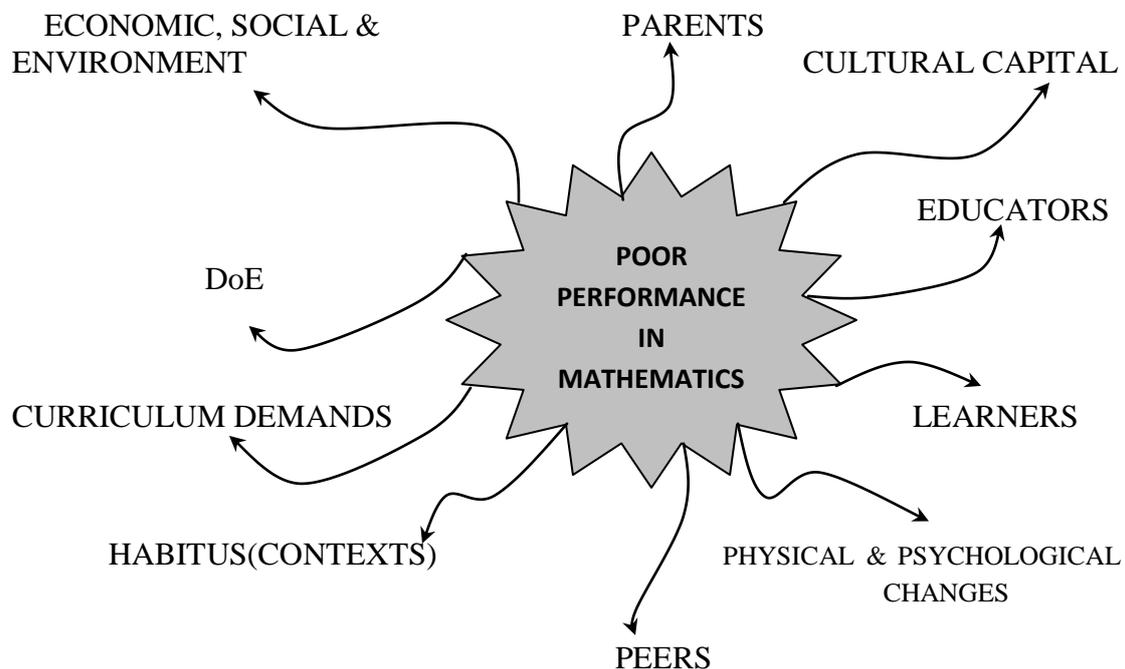


Figure 2: Various elements that may be related to learners' poor performance in mathematics during transition.

This study wanted to further probe these factors or persons that may be responsible for this poor performance in mathematics. We went to the source of teaching and learning and asked the educators involved 'Whom do you think should be blamed for the poor math results in mathematics?'

Natasha said that *“the learners are, because of their negative attitudes. At this school there are highly esteemed educators.”* In present times, learners seem to have to have adopted a lackadaisical attitude towards learning of mathematics. Although aware of the demands of the subject, they do not seem interested in putting in the extra effort. It would appear that they do not value the education that they are entitled to.

Fathima believes as follows:

“The child’s or learners’ education is the joint responsibility of learners, parents, school and Department of Education. The entire programme needs to be overhauled and realistic targets need to be put in place. Plights of the disadvantaged schools need to be addressed i.r.o. upgrading methodology, class sizes, teaching aids, meeting the expectational needs of the learners in the 21st century.”

There definitely are several different factors that can contribute to the poor performance in mathematics. What would be ideal is that the different stake holders involved in education came together and took on the responsibility to improve performance in mathematics collectively. Sihle, like Fathima, felt that there were several factors that affect the teaching and learning of mathematics:

“... there a lot of factors, human factors in terms of the educators, management of the school and so on and the learners themselves. The parties need to come together and ensure serious work is done. Generally there is also a perception that maths is difficult and some learners retire themselves when they go for maths. There should be some kind of motivational talks to improve their perceptions.”

Sidney found that learners experienced physical changes which at that time (from the 12 - 13- year age group) redirected learners’ focus from their studies to themselves. In addition, at high school learners are not classroom-based, and this can create some distraction:

“... see primary school was class teaching, now when they get into high school, they have to move to the teacher and they have avenues to actually fool around so that is one of the problems I have. The other issue I feel that I

know high school will treat them like babies and they tend to send the younger teachers to these kids and then they tend not to give them the full attention. I also feel that the teachers ought to be coming to them so they don't get a chance to just move about and fool around. It's something new to them and that's what they want to do. Somehow we feel that you know it's not a big difference from what we are doing from Grade 7, but there is some type of independence between the Grade 7 teacher and the Grade 8 teacher."

The data reveal that there is not one specific factor that is responsible for poor performance during transition, with various factors interacting with each other. These factors range from the physical development of the learners to the type of environments they are located in. It also includes changes in the curriculum, the qualifications of educators and parental involvement.

5.9 Description and analysis of learner identities

In this study the practices of primary and secondary school mathematics teaching study were examined from the perspectives of the learners, in order to understand how they constructed a sense of themselves in relation to their mathematical progress during the initial period of transition from primary school to secondary school. Six learners: Tina, Mary, Tammy, Nancy, Sam (five girls) and Mark (a boy) were participants in this project (all pseudonyms).

Drawing from their journals, interviews and personal interactions, it can be stated that Mary and Tina were enthusiastic and relatively bright mathematics learners who set high standards for themselves. They enjoyed their primary school mathematics and educators and took this attitude forward to the high school mathematics and educators. They seem to have become established members of the mathematics learning community. Tammy claims to be a struggler in the subject and tries very hard to cope. She also experiences difficulty in communicating with her mathematics teachers. She hated her primary school educator and is much more comfortable with her high school teacher. She seems to be a newcomer in the community who is trying to establish her position within.

Nancy is an expressive, confident as well as playful learner who feels that she performs at an average rate and is happy to continue so. She seems to have fitted into high school quite comfortably and contributes in the mathematics lessons whenever it may suit her to do so.

Sam comes across as a very demotivated learner of mathematics. She experiences some difficulty with the subject. Her acknowledgement of great dislike for the subject's abstractness stems from her opinion that it has no relevance to real life apart, from basic mathematics. She also claims that her lack of performance in mathematics is based (her belief) on her feelings (dislike) towards this learning area - hence the poor performance. It would seem as if she does not really participate fully as a member of the mathematics learning community but belongs not by choice.

Mark is an unassuming learner and does not seem to have a problem with anything. He seems to have happily adapted to high school. Mark finds that he has more freedom at high school than primary school and is enjoying it. He also prefers to do what his friends are doing rather than to act as an individual. As far as his mathematics learning is concerned, he can be very easily distracted even though he claims to enjoy mathematics. Extreme weather (too hot) conditions bother him easily and he is unable to concentrate. It seems as if Mark participates on the periphery in this community.

In mathematics classrooms learners learn more than just the mathematics; they learn what it is like to be a member of that community of practice, and whether or not they want to become active participants. Learning can be described as a social activity which entails the relations between people and knowing. The 'old-timers' (the teachers) through their actions and talk convey a sense of what it is to be a member of this community of practice. This can be in terms of the ways in which one works mathematically, how one communicates the mathematics and how one presents the mathematics to outsiders. Newcomers (learners) survey and evaluate the actions of their teachers and the practices within the discipline and decide whether (consciously or unconsciously) or not they want to join the members of this community.

This study explored how students come to make sense of who they are as learners in relation to the community of practice of mathematics learners. Drawing from the data, almost all of the participants found that they sometimes learnt from each other or asked the teacher to explain concepts they did not understand. However, Tammy experienced difficulty in communicating with the teacher at primary school level as the educator seemed to criticise learners for some of the answers they provided. When asked to describe her least favourite mathematics teacher her response was:

“That would be my Grade 7 maths teacher. He likes to tell jokes to the class but in terms of maths I did not like him. As I said before he does not teach properly. He criticised us when we went to him.”

This negative experience has in a way begun to hamper this learner’s mathematics learning and her feeling toward the subject. Even at high school level as she shies away from asking questions in class or gaining any assistance from the teacher for fear that she may be embarrassed by the teacher, despite the fact that she acknowledges that her high school teacher is more approachable and less critical. Bourdieu’s theory of practice also explains that children carry what they learn from their past experiences to their present social and academic environments.

It is my contention that any account of what happens in mathematics classrooms will be incomplete if it ignores the essentially social nature of schooling. Mathematics learners in secondary schools are continuously negotiating the development of conflicting identities as young men or women undergoing physical, emotional and psychological changes, as members of a variety of friendship/acquaintance groups, and essentially as learners. Most learners strive for success in mathematics, for the status and prestige it exemplifies. In other instances it stems from the need to sustain and not alienate themselves from groups with whom they feel affinity. Sometimes, the playing out of these social roles will lead learners towards specific individuals or groups, while in others it will be influenced by a desire not to be like an individual or a group. Consequently, for learners of mathematics, such communities give rise to experiences of meaningfulness where there is the invitation to engage, share experiences, and incorporate that competence into an identity of participation. Identities are defined through the practices learners engage in and those they do not.

In this regard, learners know who they *are* by what is familiar, and who they *are not* by what is unfamiliar (Wenger, 1998).

The data below reveal that five out of the six of the learners showed a natural dislike for mathematics as a subject. When each of the learners were asked ‘Did you always enjoy learning mathematics?’, they responded as follows:

Mary: *No, when I was smaller I never enjoyed maths. I did not like numbers and stuff like that. Later as I understood why I needed to learn maths and how it helps you and working with numbers and then I started enjoying it.*

Tina: *Yes. It was not hard to learn maths and if you think of it as a challenge and you challenging yourself towards something, then at the end if you get something right, you know that you did well and that it is not hard for you and you like it.*

Tammy: *Not always. Because sometimes it was hard ... usually everything was hard, but now I understand it’.*

Sam: *Not really. No. Sometimes in the lower grades like Grades 1 and 2 but as it got higher it became hard and I did not like it.*

Nancy: *Not really. No. It is difficult.*

Mark: *In the beginning no, because I felt it was too hard. I started learning my timetables and I then started to enjoy it because I knew most of the answers.*

The extracts from interviews above and the many more that could have been selected clearly showed that mathematics classrooms presented to the apprentice an unambiguous vision of what it means to be successful at mathematics, and of what it means to be a mathematician. Regrettably, it becomes evident that many learners of mathematics experience difficulty in identifying with this vision. They would like to

attain success in mathematics in order to advance to the next stage of their educational training or perhaps their future career fields, and not because they want to be mathematicians. For many learners, becoming a mathematician does not seem to feature in their plans.

The emphasis placed on learners' 'ability' is one of the key factors associated with success and failure. However, if the emphasis shifted from 'ability' to 'belonging', it may change attitudes and perceptions and impact positively on learners' mathematical progress. Most often, 'able' students who are eligible to study mathematics further choose not to do so, as this idea is conceived by looking at this as an issue not of 'ability' but of 'belonging'. This is important for those learners who are keen to develop perspectives on mathematics that are consistent with a view of knowing as connected to human existence, in contrast to the prevailing view of mathematics as separate, abstract, remote and alien (Boaler, in press). Learners who develop a sense of identity which resonates with the discourse of mathematics are more likely to continue with their studies than their peers who do not develop such a sense of identity.

Critical to this study is the understanding of the processes through which students develop such a sense of who they are in relation to mathematics during this transition period. In her interview and journal entries Sam expressed her dislike for mathematics several times, as well as her inability to perform in the subject. She seems to be a 'self-professed failure'. Her concern lies with ability rather than belonging. Perhaps the opportunity may have not yet have arisen for her to show a sense of belonging or to let her feel that she belongs. Identity also reveals issues of marginality and learning on the periphery, sometimes constituting a form of non-participation that restricts and prevents legitimate participation.

5.10 The mathematics classroom environment

The students were asked to describe their mathematics classroom environment, and the interview engaged learners in conversation about the different features they described. This may be characterised by the following learner's description:

Tina: *Our maths class is not unique. It is very easy to learn in because there is space and sir says we are allowed to ask each other if we need help and explain to each other and sir explains to us in a very good way. It is very easy to get along with each other.*

Researcher: *In terms of environment?*

Tina: *As in?*

Researcher: *Structure, the classroom, your learners.*

Tina: *We all get along with each other as long as we do not argue or fight. The classroom is neat and it is very easy to learn and it is not packed with lots of charts and it is not distracting.*

In addition, all learners at some stage described teachers reviewing homework, explaining methods at the board and directing questions to learners. Learners also expressed that they were encouraged to work on questions together. This describes a type of community as a context where students learn and negotiate meaning through mutual engagement in joint enterprise. Practice in these communities exists because learners and educators engage and negotiate meanings with one another. However, the distinct characteristic of high school mathematics learning that came through was the rapid pace at which topics were covered and the large volume of work that is dished out. For some this was an overwhelming experience. Learners seem to miss the primary school methods of continuous repetition and consolidation of previous work. They have also discovered that at high school there aren't any serious consequences of homework being incomplete or not done, and that workbooks may not be marked regularly. This kind of knowledge and freedom needs to be managed with maturity and academic discipline. Many high school learners appear to lack this kind of maturity and discipline, which generally impacts negatively on their academic performance.

In the initial stages of the high school years learners have found the high-stakes testing (assessment) programmes and content-driven examinations to be a terrifying experience. In a high school classroom the learner generally works individually on

content delivered in discrete steps and sometimes isolated from other aspects of mathematics. In addition, the mathematics curriculum at high school is more intellectually demanding, discrete and abstract. These practices continue to dominate high school mathematics classrooms as they are seen to transmit content that can be tested efficiently. Thus it is understandable why learners consider mathematics learning irrelevant, boring and difficult, and consequently shape an identity of non-participation of marginality (Wenger, 1998).

Although the South African Government has embarked on a transformation of the country's education system by introducing Outcomes-based Education and revised the National Curriculum Statement (NCS), very little has changed in terms of assessment. Despite the encouragement of educators to use scaffolding techniques, group work and multi-modal assessment techniques, the focus still lies heavily on formal examinations. One of the possible reasons for this lies in the preparation the learner for the ultimate matric examinations.

It may be argued whether one is concerned with the holistic development of the learner, or the preparation for the big test that determines the learner's future. High school classroom practice evidently differs from the primary school conventional practice of doing group work and writing a series of short tests/assignments based on particular topics. The stress and anxiety of writing such formal examinations (on all topics taught) at the end of each term could be a possible factor affecting their performance. Learners who struggle to keep pace with content delivery and the way in which assessments are conducted in mathematics classrooms are more likely to shape an identity of non-participation based on marginality, since their learning needs may not be addressed adequately.

5.11 Learners' perceptions of their mathematics educators

The learners were asked to describe their favourite primary school mathematics educators. Below are some of their responses.

Mary: *In Grades 4 and 5, Mr YY was my teacher. He taught us using different methods. I really liked him.*

It would seem that Mary enjoyed her mathematics learning experience at primary school. Her teacher contributed to this by making the lessons fun as well as by maintaining a cheerful disposition.

Tina also enjoyed learning mathematics as she is relatively good at it and is therefore a little more confident than the other learners. She is not afraid to ask questions and shares a cordial relationship with her educators.

Tina: *Sir, Mr XX, was not hard to talk to in class and it was very easy to ask him a question and he will simply explain to us again and if we did not understand. He will ask us which part of the example we did not understand and he will explain that in more detail to us instead of going through the entire example. He was a bit strict but he was also funny. He made us laugh and it was not hard to talk to him.*

Here she also points out that her teacher is fun despite maintaining a degree of strictness.

As described earlier in this chapter, Mark is a carefree, fun-loving lad who likes things to be easy-going. It would seem that mathematics learning in his primary years was fairly easy going.

Mark: *Mr XX, he made it fun for us to learn and it was easy to study the way he taught us in Grade 5, and 4 it was Mr YY, but Mr XX was my favourite teacher because he made learning fun. The way he taught maths to us, he gave us the easiest ways to learn it.*

From his response we can gather that his enjoyment of mathematics was largely related to the teacher's personality and the way his teacher conducted his lessons.

Sam is not a very confident learner and sometimes (most times) struggled with some mathematical concepts.

Sam: *Mr XX, because he will go over the sums until we get it into our head.*

Researcher: *So did you get it in your head?*

Sam: *Yes.*

Researcher: *But you still dislike math?*

Sam: *Yes, but he would write sums on the board. He would let us use the calculator but sometimes we have to show the working if not he will mark the answer wrong. He would like make up easier rules so that we could get the answer, for examples like 9 times table, he will go from 0 to 9 and then from the bottom write 0 to 9 and then all your 9 timetables you will know it.*

Although Sam lacked the confidence and some of the skills, she still seemed to enjoy the way she was taught. She found that her teacher made a conscious effort to help her to learn by using alternate methods.

Like the others, Nancy also found primary school mathematics learning to be enjoyable.

Nancy: *Mr XX, because he made jokes in between and it was fun. He will teach the lesson then he will explain the lesson and the next lesson he will explain the last lesson and then he will teach the next section. He was a little bit strict but he was a nice teacher.*

Again, the description of the way the teacher taught rose above all else.

Tammy seemed to cope with mathematics, but found it difficult to adapt to her new primary school environment based on her social class. She felt that she did not match their social standing and as a result was in conflict with her learning environment. She also did not like her mathematics educator at this school as she found him to be critical and derogatory. Her response to who was her favourite mathematics educator, was as follows:

Tammy: *My Grade 6 maths teacher in my previous primary school. We had a textbook and we had the method taught to us and I was not afraid to go to him. But I only wanted to confide in him alone not with the class around, and when I went to him he explained it to me and if I still did not understand he would explain it to me again.”*

It becomes evident that she missed her previous mathematics teacher, whom she could relate to.

Analysis of the above responses shows that the learners reflected fond memories of their primary school mathematics educators. My interactions with these learners and the way in which they expressed themselves gave me the impression that they missed the methods by which they were taught by their previous mathematics educators. They seemed to miss the laid-back pace of lessons, the light-hearted and jovial environment and the constant repetition and revision of concepts.

The learners were also requested to give a description of their high school educators. Tina and Tammy are taught by the same educator. They seem to have easily adapted to him and enjoy the way he teaches them.

Tina: *Sir is very nice. He likes to makes us laugh. He is funny and while he is funny and nice he also teaches us and helps us to understand maths in a more detailed way.*

Tammy: *I like my high school maths teacher very much. He teaches properly and he explains to us in detail. I’m still a little afraid of him. I don’t know, I guess it’s a general fear from last year that carried over.*

They also provide warm and caring descriptions of him in their journals and questionnaires. Drawing from Tammy’s journal entries and responses from the questionnaire, she seems

to be overcoming her fear of mathematics and the teacher. She has also gained confidence and created a new identity. She seems to have adapted to high school. This could perhaps be attributed to the fact that she, like the other learners, was a newcomer to this community. Her social and economic status does not seem to matter any more. She seems to have found her place in this community. Transition from primary school to secondary school seems to have impacted positively on her.

Mark, Sam and Nancy are taught by the same educator. However, their responses in their interviews contradicted their responses from the questionnaires and journal entries. In the interview Mark described his teacher as follows: “She also has a good personality and the way she teaches is easy to learn and it is ok.” In his journal he indicated that his teacher explains the lessons in detail but he gets bored, and in the questionnaire he also expressed that he would like the “work to be taught in an easier way.” It would appear that Mark has mixed feelings about his teacher. He seems to be happy with her in terms of her personality, but not so much in the way she teaches him.

Similarly, Sam described the teacher as follows: “She makes it a little bit fun but not that much. She is ok.” I probed further:

- Researcher:** *Does she give you guidance?*
- Sam:** *Yes.*
- Researcher:** *And if you don't understand anything?*
- Sam:** *You ask her and she will help you.*
- Researcher:** *Does she get irritated or is she just willing to help?*
- Sam:** *She is willing to help.*
- Researcher:** *She is willing to help even if you did not pay attention and got bored in her class?*
- Sam:** *Ok, if you got bored and were not listening she would not help you.*

When learners describe the teacher as ‘ok’, the impression given (in the interview) is that they have just settled with this educator because they were assigned to her. In her

journal Sam constantly expresses her dislike towards mathematics and her boredom in the classroom, but does not reveal any negativity towards the educator. Later on in her journal she eventually wrote that she enjoyed some of the lessons as she understood what was happening. Finally, in response to the questionnaire question ‘Is there a difference in the way you were taught mathematics in primary school and the way you were taught in high school?’ she wrote “Yes. In high school the teacher does not really know what she is doing. In primary school the lesson was enjoyable and the teacher would drill the work into our head until we knew the work.” Further on, when she was asked what she would change about the way she was taught mathematics, she said “I would make math more easy and enjoyable and have a teacher that knows what he/she is doing, so the subject could be a little easy and the children could enjoy what they are learning.”

Two issues seem to emerge here. The first is that mathematics is not easy, and secondly the educator does not seem to do enough to help their development - to the extent that the learner finds her to be incompetent.

Nancy has a bubbly personality and can be forthright in her responses. However, she was quite lost for words when it came to describing her high school mathematics teacher. The extract below shows that she had to be prompted several times.

Nancy: *There is nothing different except the gender. I don't know how to describe her.*

Researcher: *Is your teacher at high school equally fun as your teacher in primary school?*

Nancy: *Yes*

Researcher: *So she makes jokes as well?*

Nancy: *Yes, she makes jokes.*

Researcher: *Does she help you?*

Nancy: *Yes. If you ask her to explain it again then she will explain it*

Researcher: *So if you don't ask her she will not?*

Nancy: *She will ask us if she must explain it again and if anybody says yes then she will explain it.*

From this extract I seemed to gather that Nancy did not seem to really enjoy her mathematics educator, but would not articulate that. In her journal she writes very vaguely but reflects positively about her mathematics lessons. However, in one of her responses in the questionnaire she revealed that she would like to change her mathematics educator as she confuses her. The questionnaire asked ‘If you could, what would you like to change about your teacher?’; she wrote “I would like to change my teacher. She confuses me.”

All three learners (Mark, Sam and Nancy) seemed to express some positive attributes of their high school educator but would like her to change the way she taught them. These learners seem to experience difficulty in coping with the fast pace and the challenges of the subject. They feel that it is the educator’s responsibility to sort this out. The literature (Chapter 2) reveals that the impressions and perceptions that learners have of their educators, as well as the relationships they share, impacts on their performance in the subject.

We are aware that mathematics teaching and learning varies from school to school as well from teacher to teacher. When teachers are not sensitive to these differences this might produce difficulties for the learners that migrate to them.

5.12 How learners perceive themselves as mathematics learners

One of the greatest challenges of mathematics education lies in cultivating positive attitudes towards mathematics as a learning area. It becomes difficult to shift the focus from the degree of difficulty to the development of the skills. Yes, the mathematics becomes progressively difficult, but it is not unattainable. Many learners tend to give it up as soon as they are able to do so, despite knowing the implications and limitations it may place on future endeavours.

Critical to this study is the understanding of the processes through which learners develop a sense of who they are in relation to mathematics. For these learners, mathematics seems to be largely a teacher-dominated practice, since they describe their lessons where “the teacher explains the work on the board”. Although there is explanation and application of the work, it is not necessarily the case that all learners

grasp what has been taught. Learners seem to bear the expectation that the work should be drilled; however, this does not happen. The expectation and the reality contradict each other. Like most South African high school classrooms, there is a reliance on formal pen-and-paper testing, the fast pace of lessons and a pursuit to complete syllabi. Hence learners come to learn what it is to be a mathematics student through these practices.

Here are the learners' descriptions of themselves as mathematics students:

- Mary:** *I would say average because I don't always get full marks.*
- Tina:** *I describe myself as a very hard worker and I will do anything to get my answers right and I will work as hard as possible to understand my work and if I still don't, I go to tuition so I still have that I can associate with.*
- Mark:** *Average, I would say, because I am not really very good at it. In tests, if it's out of 30, I get 26 or 27 not full marks.*
- Sam:** *I am not that good at maths. I am ok. Not that good. Because I don't pay attention in class and I ask my parents and my brother for help.*
- Tammy:** *I feel that I have the potential, I am not an over achieving but I achieve as I go along. You know last year I kept on blaming the teacher but maybe it was my fault maybe I was too scared to communicate and maybe I was too scared to work harder and I would say that about myself.*
- Nancy:** *I am active in class like asking questions and replying to the questions and giving answers. I am not that bright but I love maths.*

The above responses show that these learners (apart from Tina) do not have very positive perceptions of themselves as mathematics students. The identities created are directly linked to their performance in the subject. The students' enjoyment of mathematics is largely related to the extent to which they identified as a mathematics learner (Boaler, 1999). It is important that learners in transition develop positive attitudes in order to sustain interest and engagement or else they would be lost to

mathematics. Interest and the joy of learning mathematics need to be cultivated in early high school years. It is important for learners to see the subject in a positive light and be encouraged that learning mathematics is not beyond them. There is a need to develop within the learner a sense of confidence and comfort with regards to mathematics learning. If these seeds are sown early in the transitional period, interest and engagement is most likely to be retained with the learner for the rest of their learning careers.

5.13 Learners' views versus educators' views

Drawing from all the data collected and analyzed and from the above discussions, Table 2 can be seen a brief summary of the learners and educators dispositions.

Table 6: Summary of learner's and educator's views

MATHEMATICS EDUCATOR'S VIEW	MATHEMATICS LEARNER'S VIEW
Have to adopt an authoritarian stance as learners are poorly disciplined.	They would like the mathematics educator to be more friendly an fun. To teach in way they could understand.
Educators have to teach at a certain pace to complete syllabus as they have to sometimes write external exams, even in Grade 8.	Learners find that lessons at taught at a rapid pace and would like more revision and consolidation.
Educators try to relate topics, where possible to daily, real-life situations.	Learners find that the mathematics is difficult and often abstract.
Find learners to be lazy and lack responsibility when it comes to completing homework and class work.	The workload in mathematics has overwhelmingly increased.

The first point in this table deals with teacher learner relationships. Both, learners and educators would like to enjoy positive healthy relationships with each other, however this does not seem to happen. According to the literature (Doig *et al.*, 2005) found that secondary school experienced difficulty in building positive relationships with their learners and developing a sense of common purpose and collaborative enquiry.

This would mean that educators should make a more conscious and concerted effort to develop strong positive relationships with their learners so that their learners become more comfortable with them. In a comfortable relationship, learners feel less intimidated and less threatened to make enquiries regarding their misconceptions and misunderstandings they may have with regard to the content taught. If learners develop a positive and collaborative relationship with their educators in the initial stages of transition, then the possibility of them maintaining interest in mathematics and sustaining engagement might be greater.

The second point in the above table dealt with the rapid pace that teaching takes place as well the volume of work they received in mathematics. The educators justify the teaching pace on the basis of syllabus completion or else learners will go into the next grade with gaps from the previous year. Mathematics is also foundational; learners need the previous knowledge to build on the new. Previous knowledge gives insight to solve problems as well as to construct new meaning. The teacher participants in this research acknowledge need to complete the syllabi, but do not race to complete it. Literature also points out that globally learners in transition share the same feelings of increased work load and rapid teaching pace, however learners eventually adjust to it.

The next aspect dealt with the difficulty and abstractness learners experienced with mathematics learning. The educators here try to minimise this by relating the content to everyday, real life situations. Doig *et al.* (2005) also emphasises that learners need to make connections with the content taught and to real life scenarios in order to make meaning. He maintains that learning sequences should involve an interweaving of concrete and abstract concepts which high school educators find easier to relate to in comparison to primary school educators.

Finally, learners' work ethic is questioned. Drawing from educator interviews, learners do minimal work and make no effort to practice their mathematical skills, yet they aspire to excel in the subject. Literature (Doig *et al.*, 2005) suggests the educators should encourage learners to see themselves as mathematical and scientific thinkers. Teaching strategies such as mathematical investigations, problem solving and games should be employed so that learner interest and engagement is increased.

This should be done in early in the transitional period so that learner interest is captured.

This learning barrier between educators and learners needs to be overcome. It would seem that learners need to be orientated regarding the demands of high school mathematics so that they can cope a little better. In addition, educators need to be a little more sympathetic to the learners' needs and feelings about the subject especially during the fragile time of transition.

5.14 Learners' mathematical performance from primary school to high school

When learners progress from primary school to secondary school there is generally some kind of decline in their academic performance. Although, as literature (Research Division, New Zealand Ministry of Education, 2008) also indicates, that learners do not initially find a major difference between the primary school and high school mathematics content but it is the pace of lessons and the way in which the content is presented that affects them. Drawing from the data, all six learners managed to make a successful adjustment from primary school to secondary school. However, the transition from the primary mathematics classroom to the secondary one was a little more trying. Although they enabled the physical adjustment, the emotional and conceptual adjustment did not quite happen automatically. This was evident in their results. The table below is a comparison of the learners marks attained in mathematics in primary school and in high school.

Table 7: Comparison of learner's mathematics marks

Learners	PRIMARY SCHOOL (grade :7)			HIGH SCHOOL (grade : 8)			
	JUNE	NOVEM	MARCH	JUNE	SEPT.	NOVEM REPORT	NOV EXAM MARK ONLY
Tina	89	82	63	65	84	72	62
Tammy	62	52	53	36	43	47	43
Sam	62	50	21	24	34	38	43
Mary	85	81	71	68	60	67	50
Nancy	76	65	40	22	48	49	8
Mark	71	69	52	48	51	57	59

*** *All the marks have been indicated as percentages*

The marks shown in the above table reflects the learners' progress from June 2010 to November 2011. The primary school June and November marks are inclusive of Continuous Assessment Tasks (CASS). These are not the raw scores achieved in the examination, it also contains a fraction of all other assessment tasks done through out the year. However the high school marks from March to September are raw scores. The March and September examinations are minor tests based on just that terms work. The June examination assesses all work taught in the first half of the year whilst the November examinations assesses all the content taught through out the year. The result reflected in a learners' statement of results (report) in November is not the raw score, it is inclusive of the CASS mark. Therefore the table indicates two columns for the high school November marks. One is the report mark whilst the other is the actual mark attained in the examination.

A comparison of the learners November marks in primary school as to the November report mark indicates a definite decline in learners' performance. The high school November report mark is made up of 75% CASS and 25 % exam mark. This 75 % consists of various types of assessments such as investigations, tutorials, assignments and short tests. Some of these assessments are conducted in class while others are taken away and assigned due dates. The learner has enormous opportunity to boost the marks by ensuring the complete these tasks correctly. There are no stress or time

constraints of an examination when an assignment is given over a two week period. Yet, none of these learners were able to achieve a mark above 72 %. Even the primary school high flyers, Mary and Tina achieved average overall marks.

Mark whose primary school results indicate that he is an above average mathematics learner has achieved consistently mediocre marks through out his first year of high school. It would seem that he could be content with his achievement. Looking back at his interview, he indicated that he likes to go with the flow of things, do what his friends do. Even in his journal entries he expressed his boredom in the mathematics classroom as well as his overwhelmed joy of the freedom in high school. I do however wonder if these results are a true reflection of his actual potential.

Nancy's results are the most alarming. She went from an average / above average mathematics learner to an under achiever. Her raw score in the November examinations was 8%. If the CASS was not added on, she would have failed the subject. A closer examination of her June and November report marks in primary school as compared to the June and November marks at high school indicated a drastic decline. This is exactly what this research is investigating. What is the cause of this drastic change? This indication of a decline in performance resonates with the literature (Anderson, 2007) that states that performance of students in mathematics plateaus between the ages of 11 and 14 years.

Although Sam's primary school mathematics results imply that she is an average achieving learner, she perceives herself to be a weak mathematics student. In her interview and journal entries she constantly expresses her difficulty with the subject and dislike towards it. Just like Nancy, she moved from being an average mathematics learner to an under achiever until the end of that year. The element of surprise was that despite Sam achieving marks in the 20's for the first three terms of high school, she managed to attain a mark (raw score) that was higher than Nancy's and the same as Tammy's in the final examination .

The data indicates that there is a general decline in the performance of mathematics when they enter high school. Literature also exemplifies this. Section 5.8 of this chapter provides some possible reasons for this decline. I think that learners,

educators and parents need to work closely with each other in order to help overcome some of the factors that negatively influence learner performance during transition and beyond.

5.15 Learner support systems

The transition from primary school to secondary school is a critical period in a learner's schooling career. It is important for learners to have some sort of support system to help and guide them through this process. Drawing from the data, learners indicated that they occasionally received help with their mathematics learning from friends and peers. When questioned above how their friends felt about high school mathematics, most indicated that they were coping and that they very seldom discussed mathematics. This may be indicative of perceived feelings of intimidation or embarrassment of their own performance or self-worth in the subject.

Some of the learners also said that they received help with their mathematics homework from their parents or older siblings who were familiar with the new curriculum. Due to the curriculum change and the complex nature of high school mathematics, most learners were not able to receive any help from their parents. In those cases they outsourced assistance from tutors if it was affordable. However, one learner indicated that although she was struggling to cope, her parents thought it was too early for her to be receiving extra tuition in mathematics. She often asked her educators to help her in their free time.

To improve the results in mathematics and assist learners with their mathematics learning, the high school also provided extra tuition on a Saturday morning at no cost to the learner. This was funded by an organisation which aimed to improve mathematics in schools. Most of the learners (the participants of this study) were not able to get into that programme because they were initially unaware that the school provided this facility (although their parents were informed of it in orientation programmes and newsletters). When they discovered this, it was too late since registration for the extra classes was closed and the classes were too full to accommodate them. These learners expressed their disappointment and indicated that

it would be better if the weaker learners were considered first rather than on a first come, first served basis.

It would be excellent if all South African public schools were resourced enough to provide support systems for their learners in transition: a guidance counsellor to whom they can vent their feelings of frustrations and dismay (a confidante), extra lessons or catch-up programmes for weaker learners, and maybe computer-aided self-study programmes available to learners to practice in their free time. Sounds idealistic, doesn't it! However, this does occur in most private and ex-Model C schools. Access to such facilities would certainly ease the transition process for many.

5.16 Conclusion

This chapter has discussed several emerging events at large, but not necessarily exhausted them. The reasons for this stem from a lack of some information as well as ethical issues involved. The two frameworks used as analytical tools helped to facilitate the discussions and provided insight into various issues. These issues should be considered by parents, educators and learners in transition.

Chapter 6

Conclusion

This study explored the transition of mathematics learners from primary school to secondary school as a social phenomenon, providing a framework for understanding how individuals learn mathematics and receive instruction in their own fields. However personal and individual the experiences might appear, the data collected from journals, interviews and questionnaires indicated a unifying element derived from their belonging (or not) to the social group that has claimed ownership of mathematical knowledge and its means of production.

The rationale for use of the two theoretical frameworks was to view the process of transfer from a bigger picture perspective, considering the broader range of socio-cultural factors that impede upon the learner of mathematics and the passing between schools. Bourdieu's tools of field, habitus and capital helped reflect on how dispositions to learning, schooling and people that have been developed affect the individual's ability and enthusiasm to learn mathematics. Lave and Wenger's instruments of joint enterprise, mutual engagement and shared repertoire put into perspective the mathematics learning communities that were created and how it evolved in primary schools and secondary schools.

In this thesis I chose not to focus on the actual teaching and learning of mathematics but to illustrate that there are differences among the individual learner habitus regarding their approach to learning mathematics, as well as the teacher habitus that tend to reinforce the differential impact of transfer. I chose this route in order to highlight some of the other layers that form the learning landscape, primarily the classroom and the role of the teachers and learners in relation to their environments.

This brings me back to the critical question: ‘Does the transition process influence the learners’ mathematical performance?’

I travelled the road of transition between schools with the six participants and documented comprehensive accounts of their individual experiences. It is from this experience that I dare say that transition does influence mathematics learning, based on varying factors discussed in depth in the previous chapter.

The next critical question that this study explored was ‘How do learners experience their mathematics learning in the primary school phase as compared to the high school phase?’.

Indeed, there were notable differences in primary school mathematics learning as compared to secondary school mathematics. This ranged from the pace of teaching and learning to the demanding and complex nature of high school mathematics.

The final question that this study sought to answer was ‘What are the contextual factors in the transition process and how do these factors affect the learner’s progress?’. There are several factors involved, which have also been discussed in detail in the previous chapter. The figure below broadly summarises these aspects.

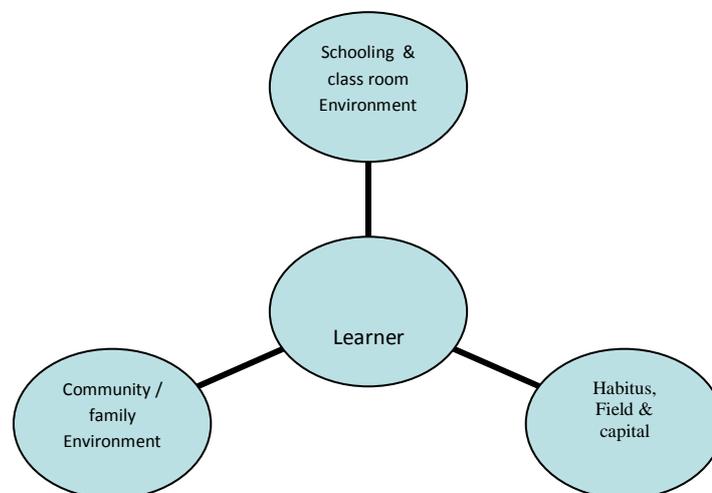


Figure 3: Factors that affect learners in transition

The diagram above illustrates that there are various aspects of the environment that impact on the learner and their mathematics learning. The learner is continuously engaged in negotiating their identity in order to harmonise the interaction between environments and their expectations.

6.1 Summary of key findings

Firstly, the primary to secondary schooling transition is not the catastrophe that it is often made out to be. Most learners seem to have quickly adapted to the more immediate changes inherent in a move from a primary to secondary school, such as finding their way around in the new school, moving classes, and becoming familiar with different rules and routines. Transition requires learners to make ongoing adjustments over a period of time: for example, when encountering the different requirements and expectations of their mathematics teachers, when managing multiple forms of homework and other deadlines, and while getting to know new classmates.

Secondly, by the end of their first term at secondary school, none of learners expressed a desire to 'go back to how things were' at primary school. However, all the learners found that there was an overwhelmingly increased workload in mathematics. Some found the mathematics period to be too short for the amount of work they were expected to do.

Thirdly, the learners expressed that the mathematics lessons lacked drilling and continuous revision as compared to primary school. They also expected the educator to be the interface between them and the mathematics.

Fourthly, learners did not portray a positive self-concept in the area of mathematics. Five out of the six learners saw themselves as an average or below average mathematics learner. Some developed a negative attitude towards their mathematics educators as they felt the educator was not competent enough. The increased tendency to be more negative about mathematics learning, their relationships with teachers, and teaching and learning in general was evident in the latter part of the first term, and not in the first few weeks following the transition.

Finally, the educators of mathematics seemed to face various challenges: they seemed to have to deal with a large number of learners in their classes, and it was not always possible to provide the individual attention that mathematics learners require. In addition, they encountered several serious (moral and academic) disciplinary problems. These teachers also felt that learner morale in mathematics was low and that learners had a negative attitude towards mathematics. Furthermore, they found that there were continuous curriculum changes with little direction given.

All of the data collected and researched, including the interviews documented in this study, suggest a strain of research which could prove to be a lifework: these interviews, questionnaires and journal recordings are the tip of the iceberg in terms of total learner experience; they eloquently underscore the potential of such life-histories to enhance our understanding of learners' approaches to academic mathematics. How this research can be brought into the classroom cannot yet be clearly defined, but I hope that this will provide 'food for thought'.

6.2 Areas for further study

I do not claim that this study has provided many answers. I hope that it has focused on the relevant issues and given insight into the critical questions regarding the relationship between transition and mathematics learning. In these concluding paragraphs I wish to raise some of the possibilities for further research that have arisen from this study.

- I would recommend that a larger-scale study be carried out. This should include learners from diverse cultural backgrounds to see the actual effects of transition in terms of mathematics in relation to the advantaged learner (e.g. wealthy Afrikaner learner leaving the farm to go to an English-medium boarding school) and disadvantaged learners (e.g. an African learner leaving his/her rural home to go to an English-medium high school in the city).
- It would prove to be rather insightful to make inquiry into the actual teaching and learning of mathematics on a day-to-day basis over a specified period of time.

- I would also suggest an investigation into the South African Government's (DoE) role/involvement in improving mathematics in the junior grades in South African high schools.
- Finally, I wonder about the benefits of piloting one of the many successful international intervention programmes in a few South African schools which were used to help improve mathematics in the initial years of high school while coping with transition.

6.3 Limitations to this study

I would like to acknowledge that there have been some limitations to this study. Firstly, all the findings here are specific to this context and field and may not relate to others, and hence generalisations cannot be formed (although they do relate to the literature at large). It would be great to have conducted this research on a much larger scale, but unfortunately I lacked the resources and time as I am a full-time educator. Secondly, my habitus and my subjective views as a mathematics educator were constantly in conflict with my objective thoughts.

Lastly, and the most hampering factor which I was constantly aware of, was that I was an educator at one of these schools. I felt that this may have restricted the learners and educators in expressing themselves with freedom and total honesty.

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Appendix A - Questionnaire for Educators

Please tick all applicable boxes

QUALIFICATIONS

1. What are your qualifications in the field of education ?

- Matric only Diploma B.Ed Degree Honours degree Masters degree
 other (specify) : _____

2. What subjects / learning areas did you specialize in?

TEACHING EXPERIENCE

3.1 Have you taught in :

- a primary school only a high school only in both

3.2 You are currently teaching in a primary school high school combined school

4. How many years of teaching experience do you have? _____

5. What teaching methods do you use in your classroom?

- chalk & talk group work investigations scaffolding drill
 others (specify) : _____

6. Which of your methods do you find most effective ? How / Why ?

7.1 Do the learners at our school struggle with mathematical concepts? Yes No

7.2 If yes, can you list a few possible reasons why.

KNOWLEDGE OF PRIMARY AND HIGH SCHOOL CURRICULUM

8. Are you familiar with the primary school mathematics curriculum (grades 4 to 7)?
 Yes No

9. Are you familiar with the high school mathematics curriculum of the senior phase
(grades 8 and 9)? Yes No

10. What in your opinion are some of the key/core mathematical concepts that a learner
needs from primary school curriculum for the first year of high school?

ROLE IN THE TRANSITION PROCESS

11.1 Do you believe that there is a gap in the teaching and learning of mathematics from primary school to high school ? Yes No

11.2 If yes, can you list, what you think, what some of these gaps are?

11.3 What in your opinion are the factors that contribute to the creation of these gaps?

12. What measures, would you suggest, that can be taken to bridge this gap?

|

13. What role do you as the educator play in the transition process?

Appendix B - Questionnaire for Learners

Please tick all applicable boxes

1. What grade are you currently in ? _____

2. Do enjoy mathematics ? Yes No

Why?

3.1 How are you taught mathematics at school? What methods do your teachers use?

3.2 Is there a difference in the way you were taught mathematics in primary school and the way you were taught in high school ? Yes No

3.3 If yes, please outline at least 4 differences.

4.1 Do you struggle with mathematical concepts? Yes No

4.2 If yes, please list some of areas of your struggle.

5.1 Are you able to relate the mathematics you learn at school to real life situations?
 Yes No Sometimes

5.2 If no, please try to explain why?

6. If you were able to change the way you are taught mathematics, how would you change it? Why?

7. Have you been able to make the adjustment from primary school to high school yet?

Yes, how?

No, why?

8. How has this transition impacted on your mathematics learning?

Appendix C – Classroom Observation Schedule

1. Classroom Environment (structure, seating, décor, size) :

2. How does the educator interact with the learners :

2.1 Educator’s response to learners :

2.2 Learners response to educator :

3. How do the learners respond to each other :

4. How does the primary school mathematics classroom differ from that of a secondary school.

	PRIMARY SCHOOL	HIGH SCHOOL
Setting / Environment		
Learner behaviour (Identity)		
Teacher / Learner Interaction		
How teacher responds to learners		
How learners respond to the educator		
Other interesting events / observation		

Appendix D – Educator Interview Schedule

1. Can you please describe your work history? Have you always taught mathematics? Have you taught in both primary and secondary schools? If both, how would you compare both contexts?
2. Briefly describe your current teaching environment. You are free to speak because whatever you say will be totally confidential.
3. Do you enjoy teaching mathematics?
4. Has teaching become better for you? Why?
5. What are some of the factors that have influenced the way you teach or feel about your teaching?
6. Do you believe that the current way you feel impacts on your teaching?
7. If you had a choice would you want to teach primary school or high school learners?
8. Do you think that your learners enjoy mathematics? Why?
9. Do you think that the math teachers in the previous grades try hard to develop understanding when they teach?
10. How do you ensure that your learners feel more comfortable in their learning environment?
11. Describe some of the novel ways you employ in your teaching?
12. What are (if any) the common aspects that your learners experience difficulty in? Why do you think so?
13. Do you ever find that basic concepts / foundations are lacking? If yes, what do you think has contributed to this?
14. How do you think that we can over come this?
15. How do you manage your weaker learners? What kind of support do you offer these learners?
16. What in your opinion hampers a learners' progress in mathematics?
17. How do you think we can help these learners?
18. What role does the parent play in the child's mathematics learning?

19. How often do you involve parents in the child's learning and progress? Does parental involvement help the learning process? How / Why not?
20. Over the recent years, how would you describe the caliber of mathematics learners?
21. What do you think is the cause for poor mathematics performance at high school level?
22. Do you feel/believe that transition from primary school affects a learners' progress in mathematics? If yes, how so?
23. What you think that we (as the school, the teacher, management, parent) do to help improve learner performance in the child's initial high school years?
24. Whom do you think should be blamed for the poor math results in matric?
25. Do you believe that there is a way to overcome this serious concern of matric failures in mathematics?
26. Do you think that schools are mainly responsible?
27. Do you ever meet with teachers in the high school to discuss curriculum or any other aspects related to your learners and mathematics?
28. Are there any joint meetings between primary and high school educators?
29. Does the DoE ever encourage such meetings?
30. What do other teacher friends of yours believe to be the problems with mathematics teaching in schools?

Appendix E - Learner Interview Schedule

1. Describe your mathematics learning environment in terms of the classroom as well as your new high school?
2. Are you comfortable in your mathematics classroom and in high school in general? Why? Why not? Explain!
3. How does your mathematics classroom here in the high school differ from the ones in primary school?
4. What do you like most about being in this high school?
5. What do you like least about being this high school?
6. How is the high school different from the primary school for you?
7. Do you like maths in primary school? Why? Do think the teachers helped you to like math?
8. Did you always enjoy learning mathematics? Why? Why not?
9. What do you remember most about learning maths in the primary school?
10. How would you compare your primary school mathematics learning as to your high school learning?
11. What was your favourite mathematics topic in primary school? Why?
12. Now that you are in the high school do you feel the same about the similar topic here? Why? Or why not?
13. Which section did you dislike the most? Why? Explain!
14. Do you still dislike it here?
15. Describe your favourite primary school math teacher regarding his/her personality and the way in which s/he taught.
16. Do you miss his / her teaching?
17. Describe your least favourite primary school math teacher regarding his/her personality and the way in which they taught.
18. How would you describe your math teacher in high school?

19. Do you feel that you can interact / communicate with your maths teacher?
20. Do you ask questions if you do not understand the concept that is taught? Why / not? Explain! What kinds of questions do you ask?
21. How does your teacher respond to the questions that you ask?
22. Do you think that your teacher can help you understand the mathematics better? How?
23. If there were anything that you could change about the mathematics or your teacher, what would that be? Why?
24. How would describe yourself as a mathematics student? Why would you say that about yourself?
25. Do receive any assistance with your mathematics learning? Who from? Are they actually able to help you (in what sense / describe the kind of help you get)?
26. Do you do your homework on your own? Do you revise / consolidate what was taught each day? Why? Why not?
27. How can we (the school, the teachers, school management) make mathematics learning any better?
28. Has the change from primary school to secondary school affected your mathematics learning any way (positively/ negatively)? How? What are the reasons behind this?
29. Do you have many friends in this school? How are they making the adjustment to high school and their mathematics learning?
30. How do they feel about the mathematics learning in high school?
31. Do you receive any learning support from your teachers/ parents / siblings / peers? What kind of support do you get?
32. Are your mathematics classes streamed (graded)?
33. How do you feel about learning in streamed classes? Why?

Appendix F - Transcripts of learner interviews

- 1. I: Describe your mathematics learning environment in terms of the classroom as well as your new high school?**

L1: It is fun and it is not difficult to learn.

I: Why is it Fun?

L1 Because we get to interact with the children and the teacher which makes it easier to learn with concepts that we find difficult instead of you just have to sit there and do your work.
- 2. I: Are you comfortable in your mathematics classroom and in high school in general?**

L1 Yes

I: Why? What makes you comfortable?

L1: We don't have to fight for our teacher and if we do he gets the necessary help.
- 3. I: How does your mathematics classroom here in the high school differ from the ones in primary school?**

L1 In primary school it used to be noisy the time after we got our work and in high school we are able to concentrate more. In primary school we were given correction we were given work and we would do more examples and then get to do your work.

I: So are you saying that in high school you did not get as much consolidated work?

L1 We get correction and we do get help but we move on/

I: So you move quicker in high school than you do in primary school.

L1 Yes we do

I: That is very good

4. **I: What do you like most about being in this high school?**
- L1** I am not sure
- I: So you have not found what you like yet?**
- L1** Yes it takes time getting used to it. The environment is not like in primary school. In primary school its like a smaller number of people that you get to interact with.
- I: It is very different.**
5. **I: What do you like least about being this high school? That should be easy because you don't have anything that you like.**
- L1** The assembly because I am not used to having assembly three times a week. I don't like it very much.
- I: Ok but in terms of academic.**
- L1:** Nothing
6. **I: How is the high school different from the primary school for you?**
- L1:** The work load I guess. In primary school, every day you get a certain amount of work but in high school you get a lot of work, sometime you get a little and other times you don't get at all.
- I: So how would you like to change that?**
- L1:** Maybe if everyday we get like so much of homework then maybe we can learn a lot. Maybe then everyday we can take a page and learn because we don't have that much of homework
- I; So what you saying is that it would be better if we had a homework timetable and people stuck to it.**
- L1** Yes that is what we had in primary school.
7. **I: Did you like maths in primary school?**
- L1** Yes but sometimes if I never understood the topic then I never used to like it

I: Do you think the teachers helped you to like math?

L1: Yes

I: How?

L1 He always did examples to make it easier for us and then you understood it and then you adapt.

I: When you say examples is it examples of the types you are doing or real life.

L1: Real life and types we are doing.

I: Is that happening in your high school classroom?

L1 We get examples but I don't think on real life but mostly on what we are doing so we understand it.

I; So that is more better to read than the real life examples.

L1 Yes

8. I: Did you always enjoy learning mathematics? Why? Why not?

L1 No when I was smaller I never enjoyed maths. I did not like numbers and stuff like that.

I: And later

L1 Later as I understood why I needed to learn maths and how it helps you and working with numbers and then I started enjoying it.

9. I: What do you remember most about learning maths in the primary school? Something that stuck out in you mind.

L1: Maybe the methods. If I come to school now I remember when I did maths here the methods that I did here most of it we did in primary school.

I: So basically your primary school foundations are helping you cope with the grade 8 maths.

L1: Yes

I: How would you compare your primary school mathematics learning as to your high school learning?

L1: They are very similar especially like we have the foundations that helped me a lot.

I: So what is different?

L1 As in different topics

I: In terms of topics, teaching, syllabus and how things are happening in the maths classroom in primary school.

L1 With maths now we are much more faster. Some of the methods are different.

I: So you feel that there are different methods but you are doing the same thing.

L1: Yes

10. I: What was your favourite mathematics topic in primary school? Why?

L1: Integers. Addition and subtraction of integers. That I understood and I liked working with negatives and positives and you don't get confused with the topic.

11. I: Now that you are in the high school do you feel the same about the similar topic here? Why? Or why not?

L1 We did not start with integers but I am sure that I will feel the same way about it here

12. I: Which section did you dislike the most? Why? Explain!

L1: Fractions and when you change it into a decimal and bring it back to a fraction, that I found hard and ever time when we wrote a test I have to go through the whole thing again

13. I: Do you still dislike it here?

14. L1 No
I: **Describe your favourite primary school math teacher regarding his/her personality and the way in which s/he taught.**
L1: In grades 4 and five, Mr YY. He taught us different methods and he made learning maths fun and he was a very happy person
15. I: **Do you miss his / her teaching?**
L1: Yes
I: **Why?**
L1: Because of the way he taught
16. I: **Describe your least favourite primary school math teacher regarding his/her personality and the way in which they taught.**
L1: No. I only had two maths teachers and both were very nice so I did not have a least favourite maths teacher
I: **Generally children don't like their maths teachers.**
17. I: **How would you describe your math teacher in high school?**
L1: Well, she is nice, calm, easy to understand.
18. I: **Do you feel that you can interact / communicate with your maths teacher?**
L1 : Yes. She is approachable.
19. I: **Do you ask questions if you do not understand the concept that is taught? Why / not? Explain! What kinds of questions do you ask?**
L1: Yes I do ask, it helps me to understand concepts I'm not sure about.
20. I: **How does your teacher respond to the questions that you ask?**
L1: In some cases she uses examples to explain, in others by giving the meaning of the concept.

21. **I: Do you think that your teacher can help you understand the mathematics better? How?**
- L1:** Yes, by using examples that will stick in our brain.
22. **I: If there were anything that you could change about the mathematics or your teacher, what would that be? Why?**
- L1:** Nothing, I am fine with my teacher.
23. **I: How would describe yourself as a mathematics student? Why would you say that about yourself?**
- L1:** Average, I am no perfect at maths but I can cope.
24. **I: Do receive any assistance with your mathematics learning? Who from? Are they actually able to help you (in what sense / describe the kind of help you get)?**
- L1:** Yes, extra classes and dad. He helps me with answers, sometimes show me easier, shorter methods.
25. **I: Do your parents and siblings help you? How do they feel about maths?**
- L1:** Yes. My dad feels that maths is very important and that I should do well in it.
26. **I: Do you do your homework on your own? Do you revise / consolidate what was taught each day? Why? Why not?**
- L1:** Yes on my own, if I don't know something I try it out and learn from my mistakes when we are doing corrections.
27. **I: How can we (the school, the teachers, school management) make mathematics learning any better?**
- L1:** Give easier work.
- I: We are teaching according to the content of the curriculum? How should we make it easier?**
- L1:** I don't know. The work is sometimes difficult.
28. **I: Has the change from primary school to secondary school affected your mathematics learning any way (positively/negatively)? How? What are the reasons behind this?**
- L1:** No. I think I have a goo maths foundation.

29. I: Do you have many friends in this school? How are they making the adjustment to high school and their mathematics learning?

30. I: How do they feel about the mathematics learning in high school?

L1: It is average, no too easy but not very difficult either.

31. I: Do you receive any learning support from your teachers/ parents / siblings / peers? What kind of support do you get?

L1: Yes. My parents are always encouraging me to do better.

32. I: Are your mathematics classes streamed (graded)?

L1: No, but I think in the higher grades they are.

33. I: How do you feel about learning in streamed classes? Why?

L1: Its 50/50. In one way it can help the children move at the same pace, it can also make the children scared.

I; How, why?

L2: It is scary to be in a class of only bright children. Sometimes you can look stupid if you don't know what's going on. It is also embarrassing to be with only weak children too.

Learner Interview 02 -- Tina

- 1. I: Describe your mathematics learning environment in terms of the classroom as well as your new high school?**

L2: Our maths class is not unique. It is very easy to learn in because there is space and sir says we are allowed to ask each other if we need help and explain to each other and sir explains to us in a very good way. It is very easy to get along with each other.

I: In terms of environment.

L2: As in

I: Structure, the classroom, your learners.

L2: We all get along with each other as long as we do not argue or fight. The classroom is neat and it is very easy to learn and it is not packed with lots of charts and it is not distracting.
- 2. I: Are you comfortable in your mathematics classroom and in high school in general? Why? Why not? Explain!**

L2: Yes. It is not hard to be comfortable in your maths class because I like maths a lot and I don't have to get used to it. In high school I am comfortable because my sister is here and my last years friends are here.
- 3. I: How does your mathematics classroom here in the high school differ from the ones in primary school?**

L2: New children, it has a white board, new teacher

I: In terms of setting – the desks and the seating.

L2: It is the same
- 4. I: What do you like most about being in this high school?**

L2: .The standard of education.
- 5. I: What do you like least about being this high school?**

L2: The children mostly because of the way they act. Some children are a bit mean, they push you but when you ignore them then you are like fine.

6. **I: How is the high school different from the primary school for you?**

L2: It's bigger, there are lots more children and there are different teachers and there is a swimming pool.

7. **I: Do you like maths in primary school? Why? Do think the teachers helped you to like math?**

L2: Yes. It was not hard because I did well and I understood it and certain questions were a challenge and I like challenges. The teachers helped a lot.

8. **I: Did you always enjoy learning mathematics? Why? Why not?**

L2: Yes. It was not hard to learn maths and if you think of it as a challenge and you challenging yourself towards something then at the end if you get something right you know that you did well and that it is not hard for you and you like it.

9. **I: What do you remember most about learning maths in the primary school?**

L2: Our teacher. The ways and the method that he used to teach us was not hard at all and if we did not understand something he would go over the example and explain to us in more detail and it was not hard to learn.

10. **I: How would you compare your primary school mathematics learning as to your high school learning?**

L2: Work is not so different but it is more of a higher standard

I: So it is similar topics but more depth.

L2: Yes

11. **I: What was your favorite mathematics topic in primary school? Why?**

L2: Probability and combinations. I first of all got it wrong but when I ended up learning the method and how it works I ended up liking it because I got it right.

12. **I: Now that you are in the high school do you feel the same about the similar topic here? Why? Or why not?**
- L2: Did not get to the section as yet
13. **I: Which section did you dislike the most? Why? Explain**
- L2: None that I can think of.
14. **I: Describe your favourite primary school math teacher regarding his/her personality and the way in which s/he taught.**
- L2: Sir was not hard to talk to in class and it was very easy to ask him a question and he will simply explain to us again and if we did not understand. He will ask us which part of the example we did not understand and he will explain that more to us instead of the entire example. He was a bit strict but he was also funny .He made us laugh and it was not hard to talk to him.
15. **I: Do you miss his / her teaching?**
- L2: Yes, a bit but now that we know that we have such a nice maths teacher here, it is not really hard to miss what sir used to teach us because our new maths teacher in high school is a bit like our old maths teacher.
16. **I: Describe your least favourite primary school math teacher regarding his/her personality and the way in which they taught.**
- L2: We only had 2 maths teachers besides junior primary and both of the maths teachers were very nice because they taught in a similar way and it was not very hard to talk to them or to ask them questions because they used to explain to us in a very well way.
17. **I: How would you describe your math teacher in high school?**
- L2: Sir is very nice. He likes to makes us laugh. He is funny and while he is funny and nice he also teaches us and helps us to understand maths in a more detailed way.
18. **I: Do you feel that you can interact / communicate with your maths teacher?**
- L2: Yes, a lot because sir will ask us first if we understand something and if we say no or if we pick up our hand and say we don't understand

something he will re-explain the parts that we do not understand so it is not hard to communicate with sir.

19. I: Do you ask questions if you do not understand the concept that is taught? Why / not? Explain!

L2: Yes. Because if I don't understand the work then I won't know how I am going to get the answer right or I won't know if it was coming out in the test then I won't know what is the correct answer or the method that was used

I: What kinds of questions do you ask?

L2: Questions mostly regarding to the subject and to the section that we are doing in the classroom.

20. I: How does your teacher respond to the questions that you ask?

L2: He first asks us which parts of the example that we don't understand and by then he will take the same part and explain it to us and if we don't understand it again he will explain it again and maybe try and use different ways to explain it so that we understand it.

I: So he does not scold the class or get irritated

L2: No

21. I: Do you think that your teacher can help you understand the mathematics better? How?

L2: Yes a lot. Sir explains it in different ways and he gives us different examples in real life situations so we understand it more. For examples we were doing integers and sir was asking us in reality which ways do we use integers.

22. I: If there were anything that you could change about the mathematics or your teacher, what would that be? Why?

L2: I don't think I would change anything about sir because he is a very nice teacher he make us laugh and he is strict at times and he makes sure we do our work and we do well.

23. I: How would you describe yourself as a mathematics student? Would

you say that about yourself?

L2: I describe myself as a very hard worker and I will do anything to get my answers right and I will work as hard as possible to understand my work and if I still don't I still go to tuition so I still have mam that I can associate with.

I: Does maths come naturally to you

L2: Yes

I: Or do you find that you have to be always working at it.

L2: It comes in both ways because my dad was very good with maths at school and at certain new topics if I work towards it and if go through the examples then I will understand it.

24. I: Do receive any assistance with your mathematics learning? Who from? Are they actually able to help you (in what sense / describe the kind of help you get)?

L2: Yes

I: From who?

L2: From my parents and my sister

I: Are they actually able to help you and in what sense

L2: Yes they do help me with examples and I don't go to them all the time just if I did not understand something I go to them one or two times and they will give me examples of the types and they will show me what to do in the example and then they will set out examples for me to answer.

25. I: Do your parents and siblings help you? How do they feel about maths?

L2: Yes. They like maths a lot. In our house, we all can mathematically work out equations and problem solving.

26. I: Do you do your homework on your own? Do you revise / consolidate what was taught each day? Why? Why not?

L2: Yes. I don't revise every single day because I understand my work but if I feel I need to I go over my work and I ask my parents if I don't understand.

27. **I: How can we (the school, the teachers, school management) make mathematics learning any better?**

L2: Maths is not hard to learn in school

I: You always say not hard what do you mean it is not hard

L2: It is not difficult for me because I understand maths more because my parents and my sister understand it a lot and in our family we understand maths very well and I like maths as a challenge

I: But what can the school do for you

L2: They already provide us with maths tuition which I already go to. basically that's about it because we get everything we want for maths at school.

28. **I: Has the change from primary school to secondary school affected your mathematics learning any way (positively/ negatively)? How? What are the reasons behind this?**

L2: Not at all. We have written our maths test and I did very well in my test just like how I used to do in primary school, well mostly with maths and it does not effect me with maths and if you enjoy something then you will be able to understand it more so it does not affect me.

29. **I: Do you have many friends in this school??**

L2: Yes

I: How are they making the adjustment to high school and their mathematics learning

L2: For them it is not very hard either. Their adjustment is just fine and they are coping.

30. **I: How do they feel about the mathematics learning in high school?**

L2: They don't feel maths is too hard or too easy.

31. **I: Do you receive any learning support from your teachers/ parents / siblings / peers? What kind of support do you get?**
- L2: When I am learning my parents and my sister come to check on me and they tell me if I don't understand then they will give me examples and explain it more to me and then I will understand it..
32. **I: Are your mathematics classes streamed (graded)?**
- L2: No
33. **I: How do you feel about learning in streamed classes? Why?**
- L2: I feel for the children that are for example in 8E if it was in streamed classes, I feel bad for them. It is putting their self confidence down, like they are the worst class in maths and other child in grade 8A will say they are better than the other children.
35. **I: Do you think that there is a stigma attached to this?**
- L2: Yes because their self esteem goes down and they do not feel right
36. **I: How do you think we should deal with weaker learners and extend the brighter ones?**
- L2: All learners should be mixed up in classes and the brighter children should help the weaker children so that the teacher the learners. There should not be a lot of children in a class so it makes it easier to work with the children

Learner Interview 03 -- Mark

1. **I: Describe your mathematics learning environment in terms of the classroom as well as your new high school?**
- L3: The classroom is ok. It is fine to learn there and it is not too crowded and I would prefer to learn there than in any other classroom.
2. **I: Are you comfortable in your mathematics classroom and in high school in general? Why? Why not? Explain!**
- L3: Yes
- I: Why?**
- L3: I am comfortable because it's not like primary school where you have to sit in one classroom for everything. You get to move around
3. **I: How does your mathematics classroom here in the high school differ from the ones in primary school?**
- L3: It's just the same
- I: In terms of setting and size**
- L3: It's just the same
4. **I: What do you like most about being in this high school?**
- L3: You can do whatever. You can walk around.
- I: During the period; Oh!**
- L3: Not during the periods or in the middle of the period. You don't have to sit in one class and be crowded all the time.
5. **I: What do you like least about being in this high school?**
- L3: the children most of the bigger children trouble me.
6. **I: How is the high school different from the primary school for you?**

- L3: In primary school you could not walk around when you changing periods, here u can
- I: In terms of size**
- L3: It's bigger here
- I: You comfortable with bigger**
- L3: Yes
7. **I: Do you like maths in primary school? Why? Do think the teachers helped you to like math?**
- L3: A little bit
- I: Why**
- L3: They used to teach us a lot of stuff and it was hard for us to cope. The teachers helped us a bit
- I: And the other bit**
- L3: No response from learner
8. **I: Did you always enjoy learning mathematics? Why? Why not?**
- L3: Not always because sometimes it was hard
- I: So you found maths difficult**
- L3: Yes
- I: What did you find difficult**
- L3: Usually everything but now I understand it
9. **I: What do you remember most about learning maths in the primary school?**
- L3: . Numbers mostly
- I: So maths to you in primary school was just numbers**

- L3: Yes, just the same
- 10. I: How would you compare your primary school mathematics learning as to your high school learning?**
- L3: Primary school was not so much but now it's a lot
- I: So you found it difficult in primary school so do you find it difficult in high school as well**
- L3: Not as difficult. Here we have more time and they teach us better.
- I: How**
- L3: They have longer periods, There they have 30 minutes .Here its sometimes 40 sometimes 45 minutes.
- 11. I: What was your favourite mathematics topic in primary school?**
- Why?**
- L3: Factors
- I: Why**
- L3: Because they are easy to learn
- 12. I: Now that you are in the high school do you feel the same about the similar topic here? Why? Or why not?**
- L3: yes
- I: Why**
- L3: because I know it and it is easy
- 13. I: Which section did you dislike the most? Why? Explain!**
- L3: Nothing. I like all the sections.
- I: So you did not have a real fear of fractions and all of those things.**
- L3: No

- I:** **So you liked everything**
- L3: Yes
- 14. I:** **So in high school do you dislike any section thus far?**
- L3 No thus far
- 15. I:** **Describe your favourite primary school maths teacher regarding his/her personality and the way in which s/he taught.**
- L3 Mr XX. He made it fun for us to learn and it was easy to study the way he taught us.
- I:** **So he took you all throughout primary school.**
- L3 No. In grade 5 or 4 it was Mr AA.
- I:** **But Mr XX was your favourite teacher**
- L3 Yes
- I:** **Why?**
- L3 Because he made learning fun.
- I:** **How?**
- L3 The way he taught it to us. He gave us the easiest way to learn it
- 16. I:** **Do you miss his / her teaching?**
- L3 Yes
- I:** **Why**
- L3 It was just fun then and now it is more serious
- 17. I:** **Describe your least favourite primary school math teacher regarding his/her personality and the way in which they taught.**
- L3 I had only had two and they were not bad

18. I: **How would you describe your maths teacher in high school?
You don't have to mention names**
- L3 She also has a good personality and the way she teaches is easy to learn and it is ok
19. I: **Do you feel that you can interact / communicate with your maths teacher?**
- L3 yes.
20. I: **Do you ask questions if you do not understand the concept that is taught? Why / not? Explain!**
- L3 Yes
- I: **What kinds of questions do you ask?**
- L3 like is there another way to get the answer
21. I: **How does your teacher respond to the questions that you ask?**
- L3 She gives me the answer
- I: **Does she give you the answer or does she explain it ?**
- L3 She explains it
- I: **So she does not scold the class or get irritated**
- L3 Only when you do stupid things in class and ask the same questions over and over again
22. I: **Do you think that your teacher can help you understand the mathematics better? How?**
- L3 No, because I already know it and they make it easy for us to know it
23. I: **If there were anything that you could change about the mathematics or your teacher, what would that be? Why?**
- L3 Nothing
24. I: **How would describe yourself as a mathematics student? Why would you say that about yourself?**

L3 What do you mean?

I: Do you think that you are intelligent or average or weak child?

L3 Average

I: Why would you say that?

L3 because I am not really very good at it. In tests, if its out of 30 get 26 or 27 not full marks.

I: Getting almost everything right you class that as average

L3 yes

I: Why would you say that you are average? Because you don't get full marks

L3 Yes

I: Is there any other reason

L3 No

25. I: Do receive any assistance with your mathematics learning? Who from?

L3 Yes. Tuition every Saturday from 10:00 to 11:00

I: Are they actually able to help you (in what sense / describe the kind of help you get)?

L3 Yes. They just go over the work that we always do and she makes it better. Its just like study except there is somebody there to tell you.

26. I: Do your parents and siblings help you? How do they feel about maths?

L3 Yes and they feel the same way that I do.

I: How is that

L3 You feel that it is easy when you study but if you don't then you feel that

it is hard.

I: How are they at maths

L3 My mother is good, my father is good, my one brother is good but my other brother is not good so he does not help me

I: So the expectation of you is that you should do well as well

L3 Yes

27. I: Do you do your homework on your own? Why? Why not?

L3 yes

I: Do you revise / consolidate what was taught each day?

L3 No, I don't revise every time

I: why not

L3 because sometimes it gets boring to do the same thing over and over again

28. I: How can we (the school, the teachers, school management) make mathematics learning any better?

L3 I don't think you can because its just fine. Its ok now

29. I: Has the change from primary school to secondary school affected your mathematics learning any way (positively/ negatively)? How? What are the reasons behind this?

L3 positively

I: How so?

L3 because last year I got good marks for maths and I think I can do it again

I: so there is no interference in high schools that has dampened your maths in any way.

L3 No

30. I: Do you have many friends in this school??

- L3 yes
- I: How are they making the adjustment to high school and their mathematics learning?**
- L3 same way as I do. It's a positive thing they also find it easy here. It's a positive thing.
- I: Isn't it a general trend to say that I did so well in primary school and suddenly I come to high school and it is not the same?**
- L3 here they think it is easy just like primary school and they don't study hard enough
- 31. I: How do they feel about the mathematics learning in high school?**
- L3 they find it a little bit hard
- 32. I: Do you receive any learning support from your teachers/ parents / siblings / peers? What kind of support do you get?**
- L3 From my peers in school. Usually I do whatever others are doing like if they are talking I will also talk and I wont do my work but if they are doing their work then I will also do my work.
- I: So you feel that you are under some kind of peer pressure at times ?**
- L3 most of the time
- 33. I: Are your mathematics classes streamed (graded)?**
- L3 no
- 34. I: How do you feel about learning in streamed classes? Why?**
- L3 I wouldn't like to be in a streamed class because then you would not get anywhere it will be all the high flyers in one class and if you do bad you will be put in the low class and it wont be nice.
- I: so its about how you feel?**
- L3 yes

I: Don't you think if you are in a high flyer class it is easier for the teacher to teach at a faster pace and teach you more things and extend you further and if you are in a weak class then the teacher can keep the pace for a slower learner ?

L3 Yes, but if you in a high flying class you would be fast and the slow class would be behind.

I: Don't you think that learners should learn at the pace.

L3 Ya, but it is not nice.

THE END

Learner Interview 04 -- Sam

- 1. I: Describe your mathematics learning environment in terms of the classroom as well as your new high school?**

L4: I don't really like maths but I am getting used to it. High school is a little bit tough but it is going well.

I: In terms of environment .Structure, the classroom, your learners.

L4 We have a lot of children in our class but the teacher helps us and she gives us examples. High school is better because the classrooms are bigger. Everyone is open. The surroundings is more better than primary school.

I: How is it better?

L4: The teachers explain it better like in our work stuff. The children are not so good here but it is ok
- 2. I: Are you comfortable in your mathematics classroom and in high school in general? Why? Why not? Explain!**

L4: Little bit because I don't really know much about maths. Sometimes I get bored and sometimes I don't tend to listen

I: If you don't understand what is happening how do you get bored?

L4: I don't really like figures.

I: So you stop paying attention after a while ?

L4: Yes
- 3. I: How does your mathematics classroom here in the high school differ from the ones in primary school?**

L4 Previous primary school, the teacher used to just randomly pick and tell us sums and you must just know it just like that and here sometimes we do that but not always.

I: In terms of your class size

L4: There is a large amount of children and the classroom is bigger. In primary school there were smaller number of children and smaller classrooms.
- 4. I; What do you like most about being in this high school?**

5. L4: No much really. The surroundings are ok but I don't know.
I: **What do you like least about being this high school?**
- L4: The behaviour and the way the children talk the children are abusive and wild and fight a lot.
6. I: **How is the high school different from the primary school for you?**
- L4: The teachers don't really worry about the children if they fight. They don't break up the fights. In high school, the teachers go on duty and they break up the fights and pay more attention to those children. In primary school there are less fights and the teachers don't break up the fights and in high school they do break up the fights and there are more fights.
7. I: **Did you like maths in primary school? Why?**
- L4: No, I never ever liked maths. Its just that I don't like the figures. I think it is boring
- I: **Do think the teachers helped you to like math?**
- L4: Not really
8. I: **Did you always enjoy learning mathematics? Why? Why not?**
- L4: Not really. Its not my favourite.
9. I: **What do you remember most about learning maths in the primary school?**
- L4: We learnt mostly like time tables and we learnt rules. We did like stem and leaf. We did area and perimeters. The thing that stands out is area and perimeter in grade 7.
10. I: **How would you compare your primary school mathematics learning as to your high school learning?**
- L4: Here it is more advanced and we are learning new things that we never learnt in primary school. We are getting used to what we are learning here and I am becoming a little more better in maths.
11. I: **What was your favourite mathematics topic in primary school? Why?**
- L4: The stem and leaf and perimeter because it was easy and it was not that hard and not much working out.
12. I: **Now that you are in the high school do you feel the same about the similar topic here? Why? Or why not?**

L4: No because here we have to show working for every sum and we are not allowed to use the calculator.

I: So in primary school were you allowed to use the calculator

L4 Yes

I: Besides that did it matter how you got the answer right or wrong in primary school or that you just got the answer right was what mattered?

L4 Sometimes if we are writing a test or exercise and if they tell us to show the working then we have to otherwise we just give the answer

I: What happened in primary school if you had the method wrong but the right answer, was it marked right or was it marked wrong?

L4: They will give you like half a mark for it

13. I: Which section did you dislike the most? Why? Explain!

L4 I am not that good in my timetable I just disliked the long multiplication sums and sometimes when perimeter is hard to do then I dislike it but then I get used to it.

14. I: Do you still dislike it here?

L4 Yes a little bit

15. I: Describe your favourite primary school math's teacher regarding his/her personality and the way in which s/he taught.

L4 Mr XX. because he will go over the sums until we get it into our head

I: So did you get it in your head

L4 Yes

I: But you still dislike it

L4 Yes

I: Describe him

L4 He would like write sums on the board. He would let us use the calculator but sometimes we have to show the working if not he will mark the answer wrong.

I: How did he make it fun ?

L4 He would like make up easier rules so that we could get the answer, for examples like nine times table, he will go from 0 to 9 and then from the bottom write 0 to 9 and then all your 9 timetables you will know it.

16. I: Do you miss his teaching?

L4: A little bit

I: Why?

L4: Because in high school its more strict and its not much fun

17. I: Describe your least favourite primary school math's teacher regarding his/her personality and the way in which they taught.

L4 Mr YY. because he would scream most of the time. He would not teach properly. He will just give us worksheets and we have to do it on our own and he will not explain much and he will just read it out and that's it.

18. I: How would you describe your math's teacher in high school?

L4: She makes it a little bit fun but not that much. She is ok

I: Does she give guidance?

L4 Yes

I: And if you don't understand anything?

L4 You ask her and she will help you.

I: Does she get irritated or is she just willing to help ?

L4 She is willing to help.

I: She is willing to help even if you did not pay attention and got bored in her class?

L4: Ok if you got bored and were not listening she would not help you.

19. I: Do you feel that you can interact / communicate with your math's teacher?

L4: Yes I think I do that sometimes

I: Why u not sure?

L4 Because I get bored in class and I don't pay attention

- I: Does she scold u for that or is she aware of that ?
- L4 No
20. I: Do you ask questions if you do not understand the concept that is taught?
- L4 Sometime I ask questions
21. I: What kinds of questions do you ask?
- L4 Like if I did not understand something I would ask her and she would explain it.
22. I: How does your teacher respond to the questions that you ask?
- L4 She would write the whole sum on the board and re-do everything
23. I: Do you think that your teacher can help you understand the mathematics better? How?
- L4 Yes because she is a math's teacher and she knows what she is doing and I just got to listen.
24. I: If there were anything that you could change about the mathematics or your teacher, what would that be? Why?
- L4 She can make the lesson more fun by making jokes sometimes and make the work a little bit easier for us and explain it better.
25. I: How would describe yourself as a mathematics student? Why would you say that about yourself?
- L4: I am not that good at maths
- I: Are you very bad at maths?
- L4 I am ok. Not that good
- I: Why would you say that?
- L4 Because I don't pay attention in class and I ask my parents and my brother for help.
26. I: Do receive any assistance with your mathematics learning? Who from? Are they actually able to help you (in what sense / describe the kind of help you get)?
- L4 Yes sometimes. Like one or two times I will ask the teacher if I don't understand something or when I go home I will ask my brother or mother
27. I: Do your parents and siblings help you? How do they feel about maths?

- L4 Yes. They are good in maths so I mostly ask them to help me if I am struggling with something
- I: The fact they are good in maths what are the expectations from you?**
- L4 To be good in maths and get all A's
- I: Are you going to live up to this expectation?**
- L4 Yes a little bit
- I: How you plan to do that ?**
- L4 I will pay a little bit more attention in class and I will ask the teacher for guidance if I don't know something.
- 28. I: Do you do your homework on your own?**
- L4 Yes I do my homework on my own but the work that I don't know leave the sum out or I will ask my parents.
- I: Do you revise / consolidate what was taught each day? Why? Why not?**
- L4 I don't revise all the time just sometimes
- 29. I: How can we (the school, the teachers, school management) mathematics learning any better?**
- L4 I don't really know
- 30. I: Has the change from primary school to secondary school affected your mathematics learning any way (positively/ negatively)? How? What are the reasons behind this?**
- L4 No it is the same.
- I: So you don't feel any differently about maths?**
- L4 No
- 31. I: Do you have many friends in this school??**
- L4 Yes my friends from last year and I made a couple of new friend.
- I: How are they making the adjustment to high school and their mathematics learning?**

L4 Some of them are good in maths and some of them are not really but they know what they are doing and they understand.

I: Are they coping in high school?

L4 Yes they are coping

32. I: How do they feel about the mathematics learning in high school?

L4 They find it ok. I am struggling a little bit and I am getting used to it but I would not say it is bad.

33. I: Do you receive any learning support from your teachers/ parents / siblings / peers? What kind of support do you get?

L4 Yes from my parents and my brother

I: From your friends

L4 No

34. I: Are your mathematics classes streamed (graded)?

L4 No

35. I: How do you feel about learning in streamed classes? Why?

L4 I don't like to be in a graded mathematics class because if they put us in a graded mathematics class if everyone is bad and if you want to know something they would not be able to help you much but I think the teacher would pay more attention to you. In a graded class

THE END

LEARNER INTERVIEW 05 -- Tammy

- 1. I: Describe your mathematics learning environment in terms of the classroom as well as your new high school?**
- L5 My new high school is ok. I feel like I can confide in the teachers about anything and I like my new maths teacher very much
- I: In terms of classroom size and schools**
- L5 Its kind of like a concrete jungle but my maths class is ok
- 2. I: Are you comfortable in your mathematics classroom and in high school in general? Why? Why not? Explain!**
- L5 At first I was not. In primary school maths was very hard I did not understand a thing But my math's teacher is nice. I am comfortable
- 3. I: How does your mathematics classroom here in the high school differ from the ones in primary school?**
- L5 We had no order in primary school. Sir just taught us one method and expected us to know the rest of the methods. Here sir explains to us and we can go to him again and again that's what he tells us.
- I: In terms of class size, how is it different?**
- L5 It is practically the same.
- I: And the number of learners?**
- L5 Its different in primary school. There was 22 now its 38. Its kind of stuffy.
- 4. I: What do you like most about being in this high school?**
- L5 The teachers and my maths class now. I am more confident about maths now than I used to be
- 5. I: What do you like least about being this high school?**
- L5 I don't think there is anything I hate in this school. Everything is perfect here.

6. I: **How is the high school different from the primary school for you?**

L5 We were treated like seniors in primary school because we were about to leave for high school and now its like big and everyone is treating us like babies.

7. I: **Do you like maths in primary school? Why? Do think the teachers helped you to like math?**

L5 No. I did not like my math's teacher because when we asked him something he would criticize us in front of the whole class and he would laugh like it's a joke to the class and that is why I used to be scared to go to him and confide in him about my problems.
No the teachers did not help me.

8. I: **Did you always enjoy learning mathematics? Why? Why not?**

L5 Sometimes in the lower grades like grades one and two but as it got higher it became hard

I: **Because of difficulty you did not like it?**

L5 Yes

9. I: **What do you remember most about learning maths in the primary school?**

L5 It was a specific topic. In terms of my classroom it was a different environment and I had to adapt to it because I left a different school and came to a new primary school and because I did not know maths properly nobody seemed to like me

10. I: **How would you compare your primary school mathematics learning as to your high school learning?**

L5 High school is different because they treat me better. They like me for who I am and not because of my money and other stuff.

I: **Or your abilities**

L5 Yes

11. I: **What was your favourite mathematics topic in primary school? Why?**

- L5 Addition in the lower grades and in primary school in grade 7 it was fractions.
- I: You liked fractions**
- L5 Very much
- I: Not generally a favourite topic**
- 12. I: Now that you are in the high school do you feel the same about the similar topic here? Why? Or why not?**
- L5 Yes I do
- 13. I: Which section did you dislike the most? Why? Explain!**
- L5 Integers. I hated integers because I did not understand how it worked
- 14. I; Do you still dislike it here?**
- L5 Sir said we can go to him but I don't want to go to him because I feel that I give him too much problems because lots of other children don't understand as well so I go to my mother for help
- I: But it's sirs job to help you and he will help you if you ask**
- L5 Yes
- I: Are you afraid to ask him?**
- L5: Yes
- I: Why?**
- L5: I don't know. He may get angry or think I am stupid.
- 15. I: Describe your favourite primary school math teacher regarding his/her personality and the way in which s/he taught.**
- L5 My grade 6 maths teacher from Falcon park. We had a text book and we had the method taught to us and I was not afraid to go to him but I only wanted to confide in him alone not with the class around and when I went to him he explained it to me and if I still did not understand and he would explain it to me again.

16. **I: Do you miss his / her teaching?**

L5 Now that I am in high school, no I don't because our maths teacher here has the same type of personality as my grade 6 maths teacher.

17. **I Describe your least favourite primary school math teacher regarding his/her personality and the way in which they taught.**

L5 That would be my grade 7 maths teacher. He likes to tell jokes to the class but in terms of maths he is not good.

I: Why?

L5 I did not like him. As I said before he does not teach properly. He criticized us when we went to him.

18. **I: How would you describe your maths teacher in high school?**

L5 I like my high school maths teacher very much. He teaches properly and he explains to us.

I: Then why are you afraid of him?

L5 I don't know. I guess it's a general fear from last year that carried on this year.

19. **I: Do you feel that you can interact / communicate with your maths teacher?**

L5 Sometimes I don't think its right

I: Why?

L5 Sometimes I am scared to go to him because he explains it four or five times and I am scared to go and ask him again

I: Is this based on your previous experience

L5 Yes

20. **I: Do you ask questions if you do not understand the concept that is taught? Why / not? Explain! What kinds of questions do you ask?**

L5 No I have never once asked my high school maths teacher anything yet.

I: Why ?

L5 Because some of my maths concepts were easy from the beginning of the year until now so I never had to ask him anything. Only now recently we started integers.

I: So up until now you had no problems?

L5 No. I had no problems

21. I: How does your teacher respond to the questions that you ask? Basically you have not asked so how does he respond to other learners when they ask questions?

L5 Sometime my friends ask and they are confident. They are not scared to ask and when they do ask sir responds ok and he explains it again and he goes to the learner and gives them a private tuition.

I: Does he get irritated when the learners ask questions?

L5 No not at all

I: Does he scold when learners ask questions?

L5 No

22. I: Do you think that your teacher can help you understand the mathematics better? How?

L5 I do but I am scared to go to him sometimes

I: How do you think he will be able to help you?

L5 I am not sure

I: Do you think if he gives you a one to one explanation most probably?

L5 Yes

23. I: If there were anything that you could change about the mathematics or your teacher, what would that be? Why?

- L5 Nothing, sir is perfect
24. **I: How would you describe yourself as a mathematics student? Why would you say that about yourself?**
- L5 You know last year I kept on blaming the teacher but maybe it was my fault maybe I was too scared to communicate and maybe I was too scared to work harder and I would say that about myself.
- I: Basically I am asking you what type of student do you think you are – an average, a bright, a capable student, an underachieving, an over achieving?**
- L5 I feel that I have the potential, I am not an over achieving but I achieve as I go on
- I: So you achieve averagely?**
- L5 Yes
- I: Do you think you have the capability of doing better than average?**
- L5 Yes
- I: And how do you plan on bringing this potential to the fore?**
- L5: I plan on communicating more with sir, practicing harder every day, not using the calculator and doing things practically in my head.
25. **I: Do receive any assistance with your mathematics learning? Who from? Are they actually able to help you (in what sense / describe the kind of help you get)?**
- L5 My mother. My mother was a very good math's student and sometimes I feel like I betrayed her and I am not living up to her standards and that's why I try to work harder
- I: Is your mother actually able to help you? Does she know the content.**
- L5 Yes she does, most of it any way.
- I: With the new curriculum change do you think it would be always possible for her to help you?**

- L5 No I don't think so because they did different things when they were younger and we are doing different things and if she is not able to help me then I would go to someone else like you or sir.
26. **I: Do your parents and siblings help you?**
- L5 My siblings are all younger than me so they cant help me but my relatives help me.
- I: How do they feel about maths?**
- L5 My whole family was good mathematical students but my father's side were not very good at maths so I fall on my father's side
27. **I: Do you do your homework on your own? Do you revise / consolidate what was taught each day? Why? Why not?**
- L5 No never
- I: Why?**
- L5 I feel that if I do and turn in he wrong answer to sir then it would be a bad impression on me
- I: So you get help before you actually do your homework**
- L5 Yes and it would give sir a bad impression that I am a weak student
- I: Do you revise**
- L5 Yes I always revise. I got my own tuition book although I don't attend Saturday classes and I go to the ashram and they would help me there.
28. **I: How can we (the school, the teachers, school management) make mathematics learning any better?**
- L5 They could provide text books or something but I don't think there is anything to be done because the way the school teaches is excellent
29. **I: Has the change from primary school to secondary school affected your mathematics learning in any way (positively/ negatively)? How? What are the reasons behind this?**
- L5 Absolutely it has a very positive effect on my maths learning and I am very positive about the future lessons than I used to be.

I: And the main reason behind this

L5 I was too lazy last year and this year sir has inspired me to move further and learn harder

I: So you are saying that the teachers play a vital role

L5 Yes

30. I: Do you have many friends in this school? How are they making the adjustment to high school and their mathematics learning?

L5 Yes lots of them. I have a lot of clever friends. They are excellent and one of them is a RCL representative and they have adapted very well more easier than I have. I am still finding my way

31. I: How do they feel about the mathematics learning in high school?

L5 The maths learning for them is ok

I: They coped?

L5 Yes, it seems so.

32. I: Do you receive any learning support from your teachers/ parents / siblings / peers? What kind of support do you get?

L5 No not most of them. Only my mother

What kind of support do you get?

I: They motivate me a lot because they say if I want to become a doctor or lawyer then I need maths. Maths is very important and lots of children in this country are finding it very hard and I must not be one of them. I need to work hard.

I: Is your mother instrumental in overseeing your work.

L5 Yes she always checks and make sure that I have done it

33. I: Are your mathematics classes streamed (graded)?

L5 Yes

I: Do you think all the bright children are in one class and the weaker children are in one class?

L5 No I don't think so

I: So there are mixed abilities

L5 Yes mixed abilities

34. I: How do you feel about learning in streamed classes? Why?

L5 I think it is better because I know that I am not alone. There are other children who are like me who want to do better in maths.

I: So you think that they would be able to extend the higher flyer work at the pace of the people who cant cope.

L5 Yes

I: Is there anything that you would like to tell me exactly about how you feel about maths and high school. Something that's on your mind, something that we can change, something that we can help you along with.

L5 I recently applied for the Saturday classes and I was not accepted and I found that there are lots of clever children that went for it and they did not really need it and I was a bit angry with it.

I: So you think that in terms of getting people we should actually look into a quota system where if you are performing poorly you actually be given the choice.

L5 Yes

THE END

Learner Interview 06 – This learner opted out of the study

***** Could not use this data *****

1. I: Describe your mathematics learning environment in terms of the classroom as well as your new high school?

L6: In primary school it was quite different. There was more space and less children and the teacher paid more attention individually. Here here are about 38 children and he won't be able to help us if we have a problem. He will explain to the whole class so I don't understand sometimes.

I: So basically you find this environment bigger and you are somehow lost.

L6: Yes

2. I: Are you comfortable in your mathematics classroom and in high school in general?

L6: Yes it is comfortable because in primary school, we were all separated. There were like individual desks so now if you don't understand and the sir is busy you can ask your friend next to you to explain.

3. I: How does your mathematics classroom here in the high school differ from the ones in primary school?

L6: These ones are bigger with more children

I: In terms of teaching.

L6: In primary school they explain more in detail and in high school I cant understand most of the work but then I do go for tuition.

I: Do you understand the work at tuition?

L6: Yes because there are less children there.

4. I: What do you like most about being in this high school?

L6: Children are very friendly. The teachers are also very nice. If you have a

problem you can go to them.

I: So what do you like most?

L6: The teachers mostly because you can talk to them.

5. I: What do you like least about being this high school?

L6: Some children don't pay attention in class and try to disrupt the lesson.

I: So you dislike the disruptions

L6: Yes

6. I: How is the high school different from the primary school for you? What's the major change?

L6: In primary school we did not walk around to the teachers but now we have to. The teachers used to come to us. Sometimes we get lost with relief.

I: And in terms of teaching?

L6: There's nothing different. In high school they teach more advanced stuff than in primary school but in grade 8 and grade 7 it is similar stuff so I know my work

7. I: Do you like maths in primary school?

L6: Yes I did

I: Why?

L6: The work was simple and easy to understand

I: Do you think the teachers helped you to like math?

L6: Yes. He explained everything to us and we understood and I got high marks in maths

8. I: Did you always enjoy learning mathematics? Why? Why not?

L6: In the beginning no because I felt it was too hard. I started learning my timetables and I then started to enjoy it because I knew most of the

answers

9. **I: What do you remember most about learning maths in the primary school?**

What's the most outstanding thing that comes to mind?

L6: It was an experience. When we were trying to work out a sum and then I worked it out. It was a nice feeling.

10. **I: How would you compare your primary school mathematics learning as to your high school learning?**

L6: Primary school was much easier. High school is an experience. I am starting to like it. At the beginning I did not. I felt it was confusing

11. **I: What was your favourite mathematics topic in primary school? Why?**

L6: It was perimeter and area. I really enjoyed that because I knew all the rules and formulas so it was easy for me.

12. **I: Now that you are in the high school do you feel the same about the similar topic here? Why? Or why not?**

L6: We never actually come to that yet but I am sure it will be the same for me.

13. **I: Which section did you dislike the most? Why? Explain!**

L6: Integers because I felt it was very hard and it was confusing for me but we did it in high school..

14. **I: Do you still dislike it here?**

L6: Yes. Over here the sir has taught it to us very well so im starting to like the topic.

I: So you understand it better now

L6: Yes

15. **I: Describe your favourite primary school math teacher regarding his/her personality and the way in which s/he taught.**

L6: It was a sir. He used to have fun with us while teaching which was very

nice and in between he used to tell us little jokes.

I: He made the learning fun

L6: Yes

16. I: Do you miss his / her teaching?

L6: Yes but I must say our teachers here are very nice as well

17. I: Describe your least favourite primary school math teacher regarding his/her personality and the way in which they taught.

L6: Our first mathematics teacher. He was actually quite strict and he never used to have fun with us. He never used to explain to us as well as our grade 7 maths teacher used to. He will give us a worksheet and then make us do it without explaining sometimes.

18. I: How would you describe your math teacher in high school?

L6: He is one of the best teachers I ever had for maths. He is fun and at times he has to be strict with us because of the disturbance in the class. Overall he is one of the best teachers I had.

19. I: Do you feel that you can interact / communicate with your maths teacher?

L6: Yes

20. I: Do you ask questions if you do not understand the concept that is taught?

L6: Yes I do but sometime he would not give us individual attention and so sometimes I get lost.

I: So what kinds of questions do you ask?

L6: If I did not understand integers then I would ask him how to do the sum because there are different sums like I had problems with the plus one and he did explain it and I now know it

21. I: How does your teacher respond to the questions that you ask?

L6: He explains it very well so that I can understand it and the whole class as well will understand it and if I did get something wrong the other learners

will help me.

22. I: Do you think that your teacher can help you understand the mathematics better? How?

L6: Yes he teaches in detail so I know what is going on

23. I: If there were anything that you could change about the mathematics or your teacher, what would that be? Why?

L6: There is nothing that I will change because he is one of the best teachers. No he is a nice teacher but sometimes he just screams at us for no reason.

24. I: How would describe yourself as a mathematics student? Why would you say that about yourself?

L6: I am actually an average student because I get like around 80 but I was trying to aim for 100 but I feel that this year I might get that 100 because of our teacher

25. I: Do receive any assistance with your mathematics learning? Who from? (in what sense / describe the kind of help you get)?

L6: Yes sometimes my sister helps me when I don't understand

I: Are they actually able to help you?

L6: Yes like sometimes I really don't understand. Like when I am doing my homework and I don't understand and she would help me and explain what to do and if I still don't understand, I would ask the sir the next day.

26. I: Do your parents and siblings help you?

L6: Yes

I: How do they feel about maths?

L6: My sister finds it easy. My father is quite good at maths but my mother is not that good

27. I: Do you do your homework on your own? Do you revise / consolidate what was taught each day? Why? Why not?

L6: I do my homework and sometimes I do read over it and sometimes I am just lazy and I don't

- I: But you do your homework on your own?**
- L6: Yes but only when I do not understand then I get help.
- 28. I: How can we (the school, the teachers, school management) make mathematics learning any better?**
- L6: Not give us too much notes because when we were doing whole numbers, integers and rational we wrote about 2 or 3 pages. He never taught it to us. He just made us write it down
- I: So you prefer to not have so much of theory?**
- L6: Yes and He should explain it as we write because he does not do that.
- I: But don't you think it is a good idea to have the theory so that you could always refer to something?**
- L6: Yes like say if he gives us a whole number he gives us a summary of that and it will be better if he explains it because he does not sometimes
- 29. I: Has the change from primary school to secondary school affected your mathematics learning any way (positively/ negatively)**
- L6: It did positively and as I said before I was not that good in integers but now I have improved in that topic
- I: And how has it helped you?**
- L6: He explained it in detail and when I did not understand I asked him and he explained it to me
- I: So your teacher was instrumental in that?**
- L6: Yes
- 30. I: Do you have many friends in this school??**
- L6: Yes
- I: How are they making the adjustment to high school and their mathematics learning.**
- L6: They are doing well. A lot of them were bad in maths but now they are

getting into the average speed

31. I: How do they feel about the mathematics learning in high school?

L6: Most of them feel that the teacher here is better than our primary school teacher because this teacher explains it more thoroughly

I: So are you saying that high school is a little better than primary school thus far

L6: Yes from what I know

32. I: Do you receive any learning support from your teachers/ parents / siblings / peers? What kind of support do you get?

L6: Yes. My friends and family would help me if I do not understand. If I am weak in a topic then they would find a way to make me improve in that

33. I: Are your mathematics classes streamed (graded)?

L6: No

34. I: How do you feel about learning in streamed classes? Why?

L6: It would not be that nice because the people that are bad in maths would not feel good. They would have a low self esteem

I: Do you know that at this school at a later stage you would be in a graded class?

L6: Is that true?

**I: In grades 10, 11 and 12
So it is about the low self esteem?**

L6: Yes they would not feel like they could do better. It will just make them feel bad because they are in a lower grade and the ones in the higher grade might pick on them.

THE END

Learner Interview 07 -- Nancy

1. I: Describe your mathematics learning environment in terms of the classroom as well as your new high school?

L7: The learning environment is nice. The teachers are nice. The new school is hectic

I: How is it hectic?

L7: I am used to the primary school. I can't remember the number of the classroom and which classroom to go to.

I: So you mean it is quite big and there is constant movement.

L7: Yes

2. I: Are you comfortable in your mathematics classroom and in high school in general?

L7: Yes it is nice

I: What is nice?

L7: The teachers are friendly and I catch up very quickly with the work

3. I: How does your mathematics classroom here in the high school differ from the ones in primary school?

L7: There are more children and the teacher is different. Last year we had a male but it is fun

I: The fact that you find there are more children here is it intimidating

L7: No

I: What do you like most about being in this high school?

L7: I know that I am going to learn more things and I am going to further my studies.

I: So that's what you like most about being in this high school?

L7: Yes

4. **I: What do you like least about being this high school?**

L7: The fights

I: Why

L7: Because it is childish. They fight about stupid things

5. **I: How is the high school different from the primary school for you?**

L7: We move around a lot and the teachers are different.

I: How are the teachers different?

L7: Last year the teachers were strict with us because we had to pass because they did not want to keep us back from moving on but this year it is not the same.

I: This school you say the teachers are not strict

L7: Some of them are

I: So how is high school different from primary school for you?

L7: It is bigger. The teachers are different. There are more children and it is fun.

I: So primary school was not fun

L7: It was but there was not much things to do because we were stuck in the classroom.

6. **I: Do you like maths in primary school?**

L7: I enjoyed it

I: Why?

L7: The teacher explained it to us and we could catch up very quickly

7. **I: Did you always enjoy learning mathematics? Why? Why not?**

L7: Yes it is part of our every day life so we have to

8. **I: What do you remember most about learning maths in the primary school?**

L7: How to work out fractions and timetables

I: So those are the things that stand out in your mind

L7: Yes

I: Why ?

L7: Because those are the ones that I caught up fast with and they were explained in detail.

I: So you enjoyed fractions

L7: Yes

I: Did you always enjoy learning maths?

L7: Yes

I: Why ?

L7: Because it was fun and in between the lesson the teacher made jokes

9. **I: How would you compare your primary school mathematics learning as to your high school learning?**

L7: Both are the same but last year I think it was more fun.

I: Why, is this year not fun?

L7: It is fun but it is more stuffy in the classroom and the teacher speaks very softly and I sit right at the back and I cannot hear.

I: So did you not ask her to change your place?

L7: I did but she said that she will change my place but I must wait a little while.

10. I: **What was your favourite mathematics topic in primary school? Why?**

L7: Adding and subtracting fractions

11. I: **Now that you are in the high school do you feel the same about the similar topic here?**

L7: Yes

I: **Why**

L7: Because the teacher would explain it and then she will give us examples and then she will explain how to do that example and she revises the previous days work.

12. I: **Which section did you dislike the most?**

L7: Products

I: **Why**

L7: It was a little bit difficult

I: **But you said that you like timetables and timetables are products**

L7: Yes but we learnt it in a different way so it got difficult as the lessons went on.

13. I: **Do you still dislike it here?**

L7: No because during the holidays I learnt how to work it out

14. I: **Describe your favourite primary school math teacher regarding his/her personality and the way in which s/he taught.**

L7: .Mr XX. because he made jokes in between and it was fun.

I: **How?**

L7: He will teach the lesson then he will explain the lesson and the next lesson he will explain the last lesson and then he will teach the next section.

I: **And that was fun**

L7: Yes

I: And your teacher's personality.

L7: He was a little bit strict but he was a nice teacher.

15. I: Do you miss his / her teaching?

L7: Not really

I: How come?

L7: We must learn how to move on and now that we have a new teacher it is different.

I: You need to adapt

L7: Yes

I: Have you adapted?

L7: Yes

16. I: Describe your least favourite primary school math teacher regarding his/her personality and the way in which they taught.

L7: The Isizulu teacher because she scolded us for nothing.

I: I am talking about your least favourite maths teacher

L7: All were fun

I: So you did not have a least favourite maths teacher in primary school.

L7: No

17. I: How would you describe your math teacher in high school?

L7: There is nothing different except the gender. I don't know how to describe her.

I: Is your teacher at high school equally fun as your teacher in primary school?

L7: Yes

I: So she makes jokes as well.

L7: Yes she makes jokes

I: Does she help you.

L7: Yes. If you ask her to explain it again then she will explain it

I: So if you don't ask her she will not.

L7: She will ask us if she must explain it again and if anybody says yes then she will explain it.

18. I: Do you feel that you can interact / communicate with your maths teacher?

L7: Yes

I: How so?

L7: I am not a very shy person so I don't think I will be to myself.

I: You are not shy so does that mean that your teacher is receptive to you?

L7: Yes

19. I: Do you ask questions if you do not understand the concept that is taught?

L7: .Yes

I: So what kinds of questions do you ask?

L7: Like how to work it out and an easier method. Things like that.

20. I: How does your teacher respond to the questions that you ask?

L7: She will give an answer

I: She will give you the answer or will she show you how to get the

answer?

L7: No to my question she will give me the answer.

I: Is your teacher strict?

L7: No

I: Is she nasty if you ask her questions?

L7: No

21. I: Do you think that your teacher can help you understand the mathematics better?

L7: Yes

I: How?

L7: If you don't know something she will explain it so then you can learn more about the lesson.

22. I: If there were anything that you could change about the mathematics teacher, what would that be? Why?

L7: I will not change anything

I: Why will you not change any thing?

L7: A person is a person. You can't change anything about a person

I: What would you have liked to change?

L7: I would not change anything because I am used to her teaching and she is a nice person

I: So you are happy with the way she is teaching?

L7: Yes

23. I: How would describe yourself as a mathematics student? Why would you say that about yourself?

L7: I am active in class like asking questions and replying to the questions and

giving answers.

I: Do you see yourself as a bright student?

L7: Not that bright but I love maths

24. I: Do receive any assistance with your mathematics learning and from whom?

L7: My neighbour

I: Are they actually able to help you

L7: Yes

25. I: Do your parents and siblings help you?

L7: Yes

I: How do they feel about maths?

L7: They feel that maths is one of the subjects that I must improve in and I get quite a lot of scolding if I don't do my homework.

I: Are your parents good at maths?

L7: My father is

I: Do you have any brothers or sisters?

L7: Yes I have a sister

I: Is she good at maths?

L7: So far she is

26. I: Do you do your homework on your own? Do you revise / consolidate what was taught each day? Why? Why not?

L7: I do my homework on my own but the things that I do not know I ask my neighbour

I: How can we (the school, the teachers, school management) make mathematics learning any better?

L7: Get more spaces in the tuition room.

I: Are you talking about the Saturday classes that are held at school

L7: Yes

I: Why, do you attend those classes?

L7: I was not accepted

I: In any other way

L7: No

27. I: Has the change from primary school to secondary school affected your mathematics learning any way (positively/ negatively

L7: No it has not because during the holidays I revise through my work and I did examples of last years sums and I did not throw my book away.

28. I: Do you have many friends in this school??

L7: Yes

I: How are they making the adjustment to high school and their mathematics learning.

L7: They are doing quite well because it is no different from primary school but just that there is more walking and they have to remember the room numbers.

I: So they have the same things as you.

L7: Yes

29. I: How do they feel about the mathematics learning in high school?

L7: I am not sure because I don't ask them questions like that because during the breaks we talk about different things like if there is a test then we will talk about the test.

I: So you don't talk about how you are coping?

L7: No

30. **I:** **Do you receive any learning support from your teachers/ parents / siblings / peers? What kind of support do you get?**

L7: Yes I receive support from my neighbours, my father and my sister

31. **I:** **Are your mathematics classes streamed? That means is it graded according to ability**

L7: I don't think so

32. **I:** **How do you feel about learning in streamed classes? Why?**

L7: I would feel very bad because they should not do that because all the high flyers would be in A and B and all the weak ones will be in the last classes.

THE END

Appendix G - Transcripts of Educator Interviews

Junior Secondary Educator Interview 01 - Natasha

1. I: Can you please describe your work history?

JSE 1: I have taught maths every single year. This is the first year that I don't have junior secondary maths but I taught for about six years of grade 8 maths.

2. I: Have you always taught mathematics?

JSE 1: Not only maths. I have taught Physics, LO, Natural Science, Arts and Culture

I: Very diverse

JSE 1: Very

3. I: Have you taught in both primary and secondary schools? If both, how would you compare both contexts?

JSE 1: No just secondary schools

4. I: Briefly describe your current teaching environment. You are free to speak because whatever you say will be totally confidential.

JSE 1: In terms of environment in terms of resources I think from all my previous schools, this school so far has the best resources and facilities however in terms of the learner, the learner here seems to be a bit more arrogant than previously and they don't pay attention and they continually have a bad attitude. In terms of my peers I have absolutely no problems at all and in terms of management, my HOD has been very supportive so in that regard I am very lucky. In my previous schools the HOD was not supportive and there was no peer complaints at all

5. I: Do you enjoy teaching mathematics?

JSE 1: Yes I enjoy teaching maths

6. I: Has teaching become better for you? Why?

JSE 1: I think as the years progress teaching has become better for me and as you become more affair with the syllabus so it is easier to teach and as we go along we realized how to come up with certain things and you know the problem areas and what to emphasize.

7. I: What are some of the factors that have influenced the way you teach or feel about your teaching?

JSE 1: I think the main factor would be the learner, him or herself. Basically you have to adapt your teaching around the learner. I have worked in a situation where we had graded classes so I know how to adapt myself to a top class or high achieving class as compared to an underachieving class and I can manipulate the language in which to teach so that I can teach the class properly.

8. I: Do you believe that the current way you feel impacts on your teaching?

JSE 1: Yes it does

I: How?

JSE 1: If you in a good mood learners somehow respond as compared to if you are in a bad mood, they are scared and the don't respond or ask you questions

1. I: If you had a choice would you want to teach primary school or high school learners?

JSE 1: High school learners.

I: Why not primary school?

JSE 1: Well so far I have only taught in a high school so I am more comfortable and also with primary school I feel that they need a lot more nurturing and I feel that maybe I am not capable of nurturing them to that extent.

2. I: Do you think that your learners enjoy mathematics? Why?

JSE 1: Yes most of them do but it is those individuals that are logically but you get some that are just lazy and seem to have no logic what so ever so they don't enjoy mathematics.

3. I: Do you think that the math teachers in the previous grades try hard to develop understanding when they teach?

JSE 1: From my experience with the grade eights coming in from primary school sometimes I feel that some of the teachers don't do a very good job of instilling basic fundamental knowledge and I feel that I have to do primary school work all over again.

4. I: How do you ensure that your learners feel more comfortable in their learning environment?

JSE 1: My lessons are very interactive because there are lots of discussion times and during the discussions they get to open up and feel more comfortable in class.

5. I: Describe some of the novel ways you employ in your teaching?

JSE 1: I relate every example to something maybe like with financial matters I would actually use like them buying and selling their own cars. They would have to come up with their own company of what they would like and I think depending on the section we would have to pick an apt example and discuss how it relates to maths

6. I: What are (if any) the common aspects that your learners experience difficulty in? Why do you think so?

JSE 1: In terms of actual sections.

I: Yes basically in general when they come from primary school into high school, what are the loopholes do you think?

JSE 1: The big loopholes are factors, integers and volume.

I: Do you think there is a reason?

JSE 1: Integers I think maybe there weren't even proper rules. Once you enforce these rules every day then it will be absorbed but they haven't even come up with it. You have to come up with it. Factors I think is a bit confusing for them. You know with the different applications it is confusing and volume I think they mess up with percentage or volume of the cylinder and they get confused with pie.

I: I don't know if you have this problem when you mention volume everyone just knows that volume is length x breath x height

JSE 1: Yes but that's how they improve and I always tell them that volume is area times height. They need to learn the general formulae then apply to the specific.

7. I: Do you ever find that basic concepts / foundations are lacking? If yes, what

do you think has contributed to this?

JSE 1: Yes

8. I: How do you think that we can overcome this?

JSE 1: The problem can be overcome provided that there are meeting schedules in between especially the intermediacy, between the grade 7 and grade 8 educators even if they are from two separate schools, meetings should take place between them.

9. I: How do you manage your weaker learners? What kind of support do you offer these learners?

JSE 1: As I said that my lessons are very interactive so from this I can determine which are my weaker learners and from here once a task is assigned to them, while the task is given to them I go to them and I can check what they are doing and I work it out with them

I: So your weaker learners are given individual attention.

JSE 1: Yes and during my frees they come to me.

10. I: What in your opinion hampers a learners' progress in mathematics?

JSE 1: I think first of all would be their self esteem.

I: Ok. Why do you say that?

JSE 1: Because if they already know that they are doing badly in maths then they don't show a liking for the subject and so they just disregard it. They ultimately feel that they are not going to do well in it so they don't bother.

11. I: How do you think we can help these learners?

JSE 1: I think a one on one interaction with them would be very helpful and pay more attention to them and find their problem areas and when they overcome their problem areas it improves their self esteem and they start liking it again.

12. I: What role does the parent play in the child's mathematics learning?

JSE 1: With my brighter learners parents play a very very big part and with my weaker learners parents don't bother.

13. I: How often do you involve parents in the child's learning and progress? Does parental involvement help the learning process? How / Why not?

JSE 1: Every day they are given homework so everyday the parent should be involved in their child's homework and if the parent does not understand or something does not make sense to them then they are most welcome to write a note so that I can explain the concept which is something that I have done in the past. And if the child does not understand then they say that I must be writ a note and tell them how their children have done.

14. I: Over the recent years, how would you describe the calibre of mathematics learners?

JSE 1: The calibre of the learners is very, very bad. They squeal and fuss for no reason whatsoever and with maths there is something where your facilitator is only supposed to do 20% of the work and the learner is supposed to do the other 80% of the work. In terms of working I mean but the way the learners are going the facilitators are doing 90% of the work for the child to understand. The calibre of mathematics learners seems to be decreasing exponentially. They are extremely apathetic when it comes to academics. Their morale needs to be boosted.

23. I: What do you think is the cause for poor mathematics performance at high school level?

JSE 1: First of all peer pressure come in. Not everyone wants to be a nerd . Every teenager has their own priorities in their head, however school work is not one of them. With high school maths the learner needs to put in a lot more effort by completing additional tasks individually. Since this is not done, they cannot cope with the volume of work and they tend to 'give up' and submit to failure.

24. I: Do you feel/believe that transition from primary school affects a learners' progress in mathematics? If yes, how so?

JSE 1: Yes, at high school level there is no extension of the learner. All assessments are based on whatever has only been taught in the classroom. Basically classroom exposure to examples, is all that is required to excel in maths. However at high school level, a learner has to be pro-active and do additional work on their own to excel.

25. I: What you think that we (as the school, the teacher, management, parent) do to help improve learner performance in the child's initial high school years?

JSE 1: the parents need to be more pro-active by assisting learners with their work, should offer encouragement, motivate their children. Even offer rewards. The

educators need to also re-visit teaching methods, simplify it, adapt it so that learners are able to grasp concepts. Lessons have to be interactive. Educators have to encourage learners to do well and explain the importance of academics. The school's management also needs to provide support to educators in the classroom.

26. I: Whom do you think should be blamed for the poor math results in matric?

JSE 1: The learners, because of their negative attitudes. At this school there are highly esteemed educators.

27. I: Do you believe that there is a way to overcome this serious concern of matric failures in mathematics?

JSE 1: Yes. Learners need to be motivated, by having motivational talks which highlights the plights of those who fail mathematics.

28. I: Do you think that schools are mainly responsible?

JSE 1: No. not really.

29. I: Do you ever meet with teachers in the primary school to discuss curriculum or any other aspects related to your learners and mathematics?

JSE 1: Yes, when we meet at Parent- educator conferences

30. I: Are there any joint meetings between primary and high school educators?

JSE 1: No, unfortunately.

31. I: Does the DOE ever encourage such meetings?

JSE 1: No. this is again unfortunate.

32. I: What do other teacher friends of yours believe to be the problems with mathematics teaching in schools?

JSE 1: Poor learner attitudes towards the subject matter. In sufficient grounding at primary school level.

Junior Secondary Educator Interview 02 - Shile

- 1. I: Can you please describe your work history with regards to years of experience in terms of your qualifications, background into your working history**

EI 2: Right I started working as a qualified educator in 1996. I have a diploma in education from the University of Zimbabwe specifically majoring in mathematics. So I have taught mathematics, all streams of maths right from pure maths, algebra, mechanics, geometry, everything so I did maths as a double major. So in a nutshell I can say for over 14 years now I have been teaching maths. Primarily I have been teaching. I have taught other subjects but my main area is mathematics.

- 2. I: Have you always taught mathematics?**

EI 2: Yes. My main subjects is maths though once in a while I have taught other subjects

- 3. I: Have you taught in both primary and secondary schools?**

EI 2: Yes but I taught in primary school as a temporary educator before I was trained as a teacher but after my formal training I have been teaching at the high school

- I: How would you compare your primary school context with high school?**

EI 2: In terms of the demands of national certificate primary school there is a lot of drill than compared to the high school where in some extent they expect learners to think and make their own patterns and generalization based on understanding in other words problem solving in primary school is very lacking

- 4. I: Briefly describe your current teaching environment. You are free to speak because whatever you say will be totally confidential.**

EI 2: Well the thing is it outcomes its own challenges. Well we get some problems in terms of the discipline of the learners and that on its own does have an effect on the delivery of the lesson because in as much as you may have planned one or two things depending on how the learners respond to your planning in terms of the questions and so on that might lead to the next question in a way you get affected but generally if the discipline was to be improved it would be nice because some of the learners for instance like where I am right now they are enthusiastic, they got the ego but they are disturbed by certain factors but otherwise it is fairly balanced in terms of the learners that we have. Some are

challenged, some can try on their own. That's basically it.

5. I: Do you enjoy teaching mathematics?

EI 2: I am passionate about the subject. Anything maths, I am passionate about the subject. I don't think that there is any subject that I can teach besides maths

6. I: Has teaching become better for you? Why?

EI 2: Yes considering that when I came to XX secondary, I had not taught in an Indian school before. Yes I did teach at a school where there were Africans, Blacks, Coloureds and a few whites but I never had to be in a school that is predominantly Indian in terms of population so there were certain things that I learnt but maths being maths it is the same but I think the way that people relate to certain things I really have come to enjoy being part of where I am.

7. I: What are some of the factors that have influenced the way you teach or feel about your teaching?

EI 2: Honestly my maths teacher. The way I teach I model the way he used to teach me

I: So you emulate him

EI 2: Exactly I emulate my former maths teacher. He was a very articulate man ya in almost everything that I do it centres around the way I was taught though of course with the advent of technology and other things I try to change here and there but basically the bottom line I emulate what I got from my maths teacher.

8. I: Do you believe that the current way you feel impacts on your teaching?

EI 2: Yes yes very much. It has a serious impact on that.

15. I: If you had a choice would you want to teach primary school or high school learners?

EI 2: High school learners.

I: Why?

EI 2: You know I believe that maths at high school is more challenging rather than like I did say earlier on like for me it is more like a dream you know merely reproducing things as they are, there is very little thinking. I would want a situation where learners are challenged to think because the essence of mathematics in many cases it inculcates some kind of thinking so I would love

high school for that reason

16. I: Do you think that your learners enjoy mathematics? Why?

EI 2: Ya I think they do. The majority of them do enjoy and this is evident from the way they contribute to the lesson even beyond the normal teaching time some do come for extra work, some of them share ideas on how they thought certain things should be done and that on its own I feel that they have an interest and they do enjoy maths.

17. I: Do you think that the math teachers in the previous grades try hard to develop understanding when they teach?

EI 2: Unfortunately I don't think all of us do that. Based on my experience of what I have seen because you see you get some learners like say in grade 9 or 10 still failing to do basic things that we would have expected them to have mastered in grade 8 and 9 while it may not have been right through the teacher factor but somewhere I think the two teachers I mean the teachers in the previous two grades do contribute.

18. I: How do you ensure that your learners feel more comfortable in their learning environment?

EI 2: I am one person who's very strict when it comes to teaching but I am more accessible to my learners. I allow my learners to express themselves, to share ideas with me, tell me whatever they think about the problem at hand and that on its own I believe I also besides mathematics I also allow my learners to share anything with me within certain times but obviously not losing focus of what he has to do and that on its own by doing that I am trying to reach out to my learners so that we can develop some kind of a cordial relationship

19. I: Describe some of the novel ways you employ in your teaching?

EI 2: I think it depends on the topic at hand. I may not give an umbrella way of doing things but the bottom line is I try to relate whatever situation I find myself in that we are doing to the reality of life in other words I also take mathematics into their homes. Use examples that they are familiar with and take some of the jokes they give me and turn them into some kind of maths so that they can see that it is application. All we are trying to do is develop some kind of interest in them so I won't really say that I do this but I take advantage in terms of the situation that we are in that particular moment but I try to use the examples that they know, things that are happening round them, even give examples like when they go shopping like for example when I talk about division or at home when the mother is cooking, you know you just do not throw in pieces of meat in the pot, there is

a little bit of division taking place, distributive law, all those things, distribution in products and so on. I take advantage of certain things like in home when the parents maybe is buying certain thing they cannot only be looking at child X and forget so and so and so when they have to distribute whatever they giving to their kids they must make sure that everything is given to everybody so I take advantage of a situation as it were.

20. I: What are (if any) the common aspects that your learners experience difficulty in? Why do you think so?

EI 2: Ya you see what I have discovered especially in the first term you realize the basic addition and subtraction as well as the multiplication tables is very ,very poor and you see because of that they cannot do a lot of computations that are expected of them because of that so the basic simple operations addition, subtraction, multiplication and division I think they are in almost all the learners I have met in early secondary school that is grade 8 and 9 its lacking.

I: What do you think are the reasons behind this?

EI 2: I relate that to the drilling method and also maybe the introduction of the calculators at early stages where learners don't think for themselves and they only use these calculators and stuff so much so that they end up forgetting because they so much rely on those calculators.

21. I: Do you ever find that basic concepts / foundations are lacking? If yes, what do you think has contributed to this?

QUESTION ANSWERED ABOVE

22. I: How do you think that we can over come this?

EI 2: I think the best thing is that there has to be some kind of a liaison between high school expectations and tat of primary school so that link there is no abrupt change for the learner by that I mean I think primary schools also there must be expected to teach them some problem solving skills so that when they come to high school as least they know what is expected of them not only that but they are also able to apply them rather than me than recalling and writing it.

23. I: How do you manage your weaker learners? What kind of support do you offer these learners?

EI 2: I try as close as I can possibly get to my weaker learners in terms of trying to understand their problem areas and then I restructure the work and make it so simple so that they can understand and try to work with them and time constraints

it may not allow me to do it within the normal teaching time but I do also advise them to come during breaks and so on and only I believe if they practice more and more they can also come out so the only thing that I really do is to give them more and more practice trying to make problems as simple as I can for them understand.

24. I: What in your opinion hampers a learners' progress in mathematics?

EI 2: In some cases there is to some learners they don't see the reality of mathematics in other words the link to maths and the outside world and maybe that on its own develops disinterest in them and also they lack practice. Most of our learners are not self motivated to do the work on their own. I think basically that makes it difficult and also I think mathematics is a problem if the foundation is not good. If learners have a bad foundation then it does have an impact on their progress.

25. I: How do you think we can help these learners?

EI 2: Try to provide more resources in terms of practice work and then lets say work books and so on and also as educators try to simplify as far as you can and also we need to motivate them where possible so that as least they can feel that they are doing something and their achievements are also recognized. I think by doing that more practice, more developing them and also making them achieve no matter how little it is an achievement is always an achievement. It might go a long way in motivating those learners

26. I: What role does the parent play in the child's mathematics learning?

EI 2: To monitor that the practice work is done because as far as I am concerned consider mathematics as a practical subject. No matter how good a listener you are but if you don't physically do it yourself, work out the solutions, try to understand the language of mathematics you may not be able to understand so I challenge the parents as it were to make sure that when kids are given work, work has to be done so monitoring of the homework and practice work relies entirely on the parent

27. I: How often do you involve parents in the child's learning and progress? Does parental involvement help the learning process? How / Why not?

EI 2: It is not always easy to involve the learner in terms of direct communication but generally when you happen to talk to the parents you tell them what you expect of them and to assist the kids and so on and these days you know when the parents are so preoccupied with other things so much so that I believe they don't give too much time to their kids and in some cases when you try to get in touch with the

parent I think there is very little involvement basically that comes through and as I said it could be other commitment and stuff like that.

28. I: Over the recent years, how would you describe the calibre of mathematics learners?

EI 2: I think over the years personally I feel that the learners are getting weaker and weaker. I don't know but that's how I feel. I feel they are weak learners unlike the previous years and I attribute this somehow to the syllabus change it makes our learners weak. Certain things I challenge the learners to think. They are weak generally. There are number of reasons for this among other things I think the maths guys on top there who designed the curriculum, they are not being fair to these kids you know.

23. I: What do you think is the cause for poor mathematics performance at high school level?

EI 2: I think the learner input itself. There is very little input from the learner in terms of doing his part, like assignments, practical work and like I said before mathematics is practical, you have to involve yourself unless learners get to understand that maths is so demanding in terms of doing work the chances of succeeding is little so I think the cause mainly is lack of work on the part of the child.

24. I: Do you feel/believe that transition from primary school affects a learners' progress in mathematics? If yes, how so?

EI 2: Ya, I do very much because like I said the syllabus requirements to some extent they are different. So what a learner is expected to do in high school is somehow too much demanding than when he was in the primary school and besides not only that there are many subjects now to be done at high school and therefore in a way with the demands of mathematics on the other side the child fails now to manage the situation and that on its own makes mathematics suffer and the nature of its subject, mathematics it demands a lot so I think really there is a problem in the transition.

25. I: What you think that we (as the school, the teacher, management, parent) do to help improve learner performance in the child's initial high school years?

EI 2: Right I think the parent has to come to the party in terms of monitoring, making sure that the child does he or her work. The school must provide the necessary resources in terms of textbooks maybe teaching and learning material I mentioned all of them and then the teachers must also make sure that they do their part build these kids, give them the necessary foundation so that they can

comfortable do maths in the higher grades.

26. I: Whom do you think should be blamed for the poor math results in matric?

EI 2: Well there a lot of factors, human factors in terms of the educators, management of the school and so on and the learners themselves. The parties need to come together and ensure serious work is done. Generally, there is also a perception that maths is difficult and some learners retire themselves when they go for maths. There should be some kind of motivational talks to improve their perceptions.

27. I: Do you believe that there is a way to overcome this serious concern of matric failures in mathematics?

EI 2: Ya, you see, I so much believe so that a lot can be done in terms of assisting the weaker learner right from the start rather pushing them through. Some kind of remediation can be done not only with work but support also needs to be given. Educators need to go beyond classroom time to assist and should be remunerated. Maths unlike other subjects needs a lot of time and attention and learners cannot work on their own.

28. I: Do you think that schools are mainly responsible?

EI 2: No. No.! No! not at all. There are quiet a number of factors. The schools the parents, the learners themselves.

29. I: Do you ever meet with teachers in the primary school to discuss curriculum or any other aspects related to your learners and mathematics?

EI 2: Ya ! when we go to these cluster meetings , that's when we meet them not occasionally. There are primary schools in our cluster. (mentions a few) We discuss curriculum and teaching strategies. The last time I attended they discussed teaching transformation, a topic they feel was a little abstract.

30. I: Are there any joint meetings between primary and high school educators?

EI 2: Ya. As I said there are cluster meetings.

31. I: Does the DOE ever encourage such meetings?

EI 2: Well, ya officials are there. They do encourage meetings but do not provide support. There is very little that these officials offer. When we ask questions and guidance they say they will get back to you, there is no policy to that effect. There are a very few things that they actually are hands on with.

32. I: What do other teacher friends of yours believe to be the problems with mathematics teaching in schools?

EI 2: They think that maths is difficult. They also become surprised when they see so and so teaching maths and was studying something else. They feel the problem lies with a lack of qualified educators.

Junior Secondary Educator (JSE) Interview 03 - Fathima

1. I: Can you please describe your work history?

JSE 3: I started teaching in 1987 and resigned in 2001. I taught English (Grade 8 – 1); music (Grade 8 -12) and maths Grade 8 -10). I joined business (owner/manager). I resumed teaching in 2010 and taught maths from grade 8 – 10. I registered for FET (maths) at Edgewood College in 2010.

2. I: Have you always taught mathematics?

JSE3: NO. I taught English, music & maths

3. I: Have you taught in both primary and secondary schools? If both, how would you compare both contexts?

JSE3: Yes.

4. I: Briefly describe your current teaching environment. You are free to speak because whatever you say will be totally confidential.

JSE 3: Classroom teaching is disrupted with disciplinary problems and related administration. There appears to be little control at school level on discipline and control and this impacts on the classroom.

5. I: Do you enjoy teaching mathematics?

JSE: Yes

6. I: Has teaching become better for you? Why?

JSE 3: Yes : With personal experience and maturity; with greater maths- content knowledge and with access to the internet

7. I: What are some of the factors that have influenced the way you teach or feel about your teaching?

JSE 3: Personally, I set high standards for learner behaviour and performance – I enjoyed research and believe that technology in the classroom is a useful aid to teaching. My own training in the arts cause me to approach maths with less rigidity. I think that edutainment would help increase interest in the subject.

8. **I: Do you believe that the current way you feel impacts on your teaching?**

JSE 3: Yes

9. **I: If you had a choice would you want to teach primary school or high school learners?**

JSE3: I do enjoy teaching the high school curriculum, however in terms of discipline, I would much prefer teaching primary school kids.

10. **I: Do you think that your learners enjoy mathematics? Why?**

JSE 3: Learners who are intrinsically motivated do. Learners enjoy the number challenges and quizzes. Many see no relevance to maths and their life choices.

11. **I: Do you think that the math teachers in the previous grades try hard to develop understanding when they teach?**

JSE 3: From learners' responses it appears that they don't.

12. **I: How do you ensure that your learners feel more comfortable in their learning environment?**

JSE 3: This is a challenge in this particular school where tight discipline and an authoritarian approach is necessary to deliver your lesson in the classroom. Learner discipline than comfort is a priority however I encourage peer teaching, board work and emphasize that getting answers wrong is acceptable. Knowing why you get it wrong is real learning.

13. **I: Describe some of the novel ways you employ in your teaching?**

JSE 3: **With the** Grade 8 – 9 's we have regular quizzes, number challenges and maths games .Computer based teaching at my other school. Sometimes use peer teaching; inductive learning – real life scenarios.

14. **I: What are (if any) the common aspects that your learners experience difficulty in? Why do you think so?**

JSE 3: Yes they are with bonds, integers, basic terminology, fractions

15. **I: Do you ever find that basic concepts / foundations are lacking? If yes, what do you think has contributed to this?**

JSE 3: Understanding the number system, introduction to Algebra, BODMAS. Teachers teach by rules (deductive) – large syllabus, little time to finish; big classes; mixed abilities; little use of technology.
Teachers prefer traditional ways of teaching.

16. I: How do you think that we can overcome this?

JSE 3: Foundations need to be strong and solid. Better equipped (technology and methodology) teachers at primary school, small class sizes, different approach to curriculum planning and syllabus coverage.

17. I: How do you manage your weaker learners? What kind of support do you offer these learners?

JSE 3: Most weak learners are de-motivated. Those who exhibit disciplinary problems are difficult to help in large class sizes. Generally I organize my teaching and class to accommodate mixed ability learners. I try to set out worksheets to accommodate different abilities. In other schools, tuition is offered separately to weaker learners and high fliers.

18. I: What in your opinion hampers a learners' progress in mathematics?

JSE 3: Little potential, interest or guidance. Poor self esteem or self worth – lack of motivation. 1. Maths is far removed from real life experience, 2. they see no relevance to their career choices and 3. traditional maths teaching is rigid and coached in language that is difficult to understand

19. I: How do you think we can help these learners?

JSE 3: Address these concerns above

20. I: What role does the parent play in the child's mathematics learning?

JSE 3: A large role – guide, direct, motivate, discipline, study programme and tuition.

21. I: How often do you involve parents in the child's learning and progress? Does parental involvement help the learning process? How /Why not?

JSE 3: While we would like to, large class sizes and increased work loads as well as finances makes it difficult to contact parents as often as we could. Parents also do not have the necessary parenting skills to make meaningful contribution to their child's education. They do not appear to have the time to follow up and children are largely unsupervised.

22. **I: Over the recent years, how would you describe the calibre of mathematics learners?**

JSE 3: It just gets worse. Learners are badly disciplined, have negative attitudes as well as poor work ethic.

23. **I: What do you think is the cause for poor mathematics performance at high school level?**

JSE 3: Apart from the discipline and lack of motivation, all teachers face competition from television, game station, technology – mix it, face book, cell phone, computers, etc. Learners today have less time to study and more access to entertainment

24. **I: Do you feel/believe that transition from primary school affects a learners' progress in mathematics? If yes, how so?**

JSE 3: Yes. High school responsibilities shifts to learners and learners do not manage this.

25. **I: What you think that we (as the school, the teacher, management, parent) do to help improve learner performance in the child's initial high school years?**

JSE 3: Workshop rights and responsibilities.
Orientation programmes to assist in the transition.

26. **I: Whom do you think should be blamed for the poor math results in matric?**

JSE 3: Child's/learners' education is the joint responsibility of learners, parents, school and Department of Education. The entire programme needs to be overhauled and realistic targets need to be put in place. Plights of the disadvantaged schools need to be addressed i.r.o. upgrading methodology, class sizes, teaching aids, meeting the expectational needs of the learners in the 21st century.

27. **I: Do you believe that there is a way to overcome this serious concern of matric failures in mathematics?**

JSE 3: Not immediately but in the near future, with the support of the D.O.E , parents and learners. As I mentioned before.

28. **I: Do you think that schools are mainly responsible?**

JSE 3: No, but partially. There are generally contextual factors such as large class size, poor learner morale, lack of parent intervention, constant curriculum changes and so on.

- 29. I: Do you ever meet with teachers in the high school to discuss curriculum or any other aspects related to your learners and mathematics?**

JSE 3: I do on a personal level – I discuss methodology and ways to improve delivery.

- 30. I: Are there any joint meetings between primary and high school educators?**

JSE 3: Have not been to one this year.

- 31. I: Does the DOE ever encourage such meetings?**

JSE 3: I do not know.

- 32. I: What do other teacher friends of yours believe to be the problems with mathematics teaching in schools?**

JSE 3: Maths is seen as an elitist subject that is not meant for every child. That the majority will not do well is an acceptable conclusion.

THE END

Primary school Educator Interview 04 - Sidney

1. I: Can you please describe your work history?

EI 4: From the inception of my teaching career that's from 1985 I have been teaching maths.

2. I: Have you always taught mathematics?

EI 4: I have always taught in the primary school and I have always taught maths for the last I think 24 years or so

3. I: Have you taught in both primary and secondary schools? If both, how would you compare both contexts?

EI 4: Only in primary school

4. I: Briefly describe your current teaching environment. You are free to speak because whatever you say will be totally confidential.

EI 4: Ya right especially in my school I have got a lot of flexibility and make them work with maths on my terms and somehow with the experience I have received, self taught I would say, I can actually relate more to the children and its much more better that way and also looking at creating a good rapport amongst the pupils and when they see that you are at their level they are more receptive to you.

I: So you basically have a very cordially relationship

EI 5: Yes that's right and I actually have to go backwards and come to their level so that one thing with our children is that if they tend to like you then they would like your subject.

I: That's true

5. I: Do you enjoy teaching mathematics?

EI 4: I have been

6. I: Has teaching become better for you? Why?

EI 4: It has improved as I said discovering my own ideas and thoughts and with the inception of me actually getting into the internet and using updated information which I share with other schools so to me its good but I am always you know

with whatever topic I am doing I will never actually use previous work. I will always sit on the internet and try to find new ideas and new worksheets and things like that.

I: So basically you use previous worksheets whatever it is but you actually plan a new lesson

EI 4: Yes current information

I: Ok based on that how do you feel about the new curriculum with OBE, FET in comparison to what we used to do before

EI 4: I would say that at the moment it is more practical and our pupils are getting better understanding of concepts and some like some concepts there are more relations to real life situations now to our mathematical teaching for example like shapes you actually bring it into reality like African art design and all that so the children are finding it much more interesting in that way than actually concentrating more on theorems and previous algebra.

7. I: What are some of the factors that have influenced the way you teach or feel about your teaching?

EI 5: Being a pupil, from my pupil days I always excelled in maths. I ended up with an A symbol in maths in matric so that was the situation and I would say that in fact my teachers also played a role in motivating me. In fact like coming from a poor environment and getting some exposure in that way and the teachers really were role models.

I: You said that your teachers were role models. Do you feel that you do teach in the ways that your teachers taught you or you incorporate some of those ideas?

EI 4: What I would say is that that stage it was more respect and looking at people with authority but now the situation has changed where we don't tend to get that same authority especially children they don't actually look upon teachers as how we would be looking at them.

I: Basically what you are talking about the teaching style

EI 4: Yes. Basically now you can expect, I don't know ya basically the same styles we are going through.

8. I: Do you believe that the current way you feel impacts on your teaching?

EI 4: It does

I: How?

EI 4: As I said before that I always bring my lessons to present reality and I always link it for example like integers, why are we studying this and lets go onto basics. We talk about simple life examples like VAT, you know a real life experience so my concentration is more like a life experience and that is drawing the children to like the subject than being abstract.

I: Right you also said that you search the net and all of those things the fact that I guess that you are quite computer literate. So I guess because of your enthusiasm in those terms you also bring that to your classroom

EI 4: Yes

9. I: If you had a choice would you want to teach primary school or high school learners?

EI 4: At the moment I would prefer the primary school but however I also have another view about the secondary school. I feel that time has changed now and although the department has four phases eg. junior phase and intermediate, then senior and with the senior phase incorporating grade 7 to grade 9 my personal view is that we should have a middle school now instead of actually having that from 8 to 12 in the high school

I: That was quite an interesting aspect

10. I: Do you think that your learners enjoy mathematics? Why?

EI 4: I hope they do but from the response I am getting and in fact from parents like my child hated maths and my child did not know anything about maths and from the comments that I am receiving I can see that there is a progression upwards and further to that even XX secondary being my feeder school, I get reports that the maths is quite good compared to the other schools that send the children to ZZZZ Secondary.

11. I: Do you think that the math teachers in the previous grades try hard to develop understanding when they teach? Do you teach all the grades firstly

EI 4: No mostly the senior

I: So when you get your learners from the lower grades do you think those

teachers actually develop basic functionally concepts.

EI 4: What I realize is that many because they tend to lack experience they become textbook teachers instead of actually grasping the concept on their own and trying to bring it to the fore to the children but I notice that many of the younger teachers they will stick to one textbook and they will follow that as a bible which I wont recommend

I: So your teachers in the lower grades are not maths specialist

EI 4: Some of them are not but actually for this year we got the HOD doing maths.

I: Because it becomes a problem if you are not a maths specialist and if you are learning and teaching

EI 4: Yes but in most cases there is a lot of rapport there. They show me respect and actually they come forward to ask me for suggestions and short methods and things like that. They always interact with me even my HOD too, he is always interacting with me.

I: So there is talk amongst them

EI 4: Yes there is talk

12. I: How do you ensure that your learners feel more comfortable in their learning environment like generally a maths classroom is quite daunting like if you ask a child which subject he prefers, he would rather prefer a theory to maths. How would you create a comfortable and conducive environment?

EI 4: First of all my approach is like show respect to the and somehow once they have this feeling like hey this person here, he is really looking at our interest then they start opening up to you so my learning approach is very conducive. I actually allow them to speak, to question me which in most cases does not happen now which is good so the rapport and “friendliness” that prevails help them to come forward.

I: So basically your personal relationships actually develop.

EI 4: Yes

13. I: Describe some of the novel ways you employ in your teaching?

EI 4: As it comes up like for example like multiplication tables, I don't ask children to

not learn, but I use finger techniques like eg. 7×8 I will tell them 7×8 by using their fingers so we will take five here and because there is seven here we close two and here we close three so the ones that we close are the tens column, that's fifty and then two left here and three, then 2×3 is six, fifty plus six.

I: Ok that is very interesting

EI 4: Somethings like that we do

I: Ok so you have innovative ways

EI 4: Yes we got innovative ways

I: So basically there is not always chalk and talk.

EI 4: Yes as I said there are some artic ways of thinking and also some general concepts that came up from the child' early years its actually is mathematically correct even teachers they look at the round circle. So these are the things for me that's an example we are just talking about shapes. The first thing a parent will do or the teacher will do they will teach the children, lets learn about the square but we know that the rectangle must come first because the square is a rectangle and all rectangles are not squares. So these are the concepts we are looking at

I: So you say the basic understanding of certain concepts are not actually fostered.

EI 4: Yes

14. I: What are (if any) the common aspects that your learners experience difficulty in? Why do you think so?

EI 4: Generally what I am saying is that they grasp the information properly but especially with my pupils the fact that they didn't want to go back and look at and actually feel part of it, take ownership of the content. They fail to do that and that and that's the reason why they tend to be doing bad at times. Like the recognition and recalling which many like even you, parents and adults they feel that you don't have to learn for maths which is the wrong concept so that is the problem that is going down with some of the children.

I: So basically you can't pinpoint particular aspects. It's a general pattern.

EI 4: But as I said once again recognition and recall because simple concepts like even our grade 7's and grade 6's things like tables, multiplication tables is the concepts you know its like conversions and all that. They don't want to keep

abreast with it. Keep on recollecting it.

I: So what you are basically saying is that there is a lack of initiative on the learner part.

EI 4: Yes there is

I: So basically they understand what's going on, they grasp the concept so its not beyond them.

EI 4: No its not beyond them but what I am also noticing is that it is not only in mathematics where these children are bad. They are also performing poorly in all subjects like comprehension is becoming another big issue especially with English now.

I: Your learners are all English first language

EI 4: Yes

I: So despite them being English first language they have a serious comprehension problem.

EI 4: Yes

I: How do you think we can actually shower this down or improve our learner capabilities?

EI 4: Basically again we are also being prescribed with things from the department but as I am saying I genuinely feel that more has to be done in the languages, especially reading because these kids are not reading and they are not learning concepts so if you can actually create more time for languages. You know once they take an interest in the reading it will definitely assist them

I: In your subject how do you motivate them because you said they lack initiative. So what kind of measures do you actually put in place to try and ensure that some of them actually take that initiative. I am sure that there is a handful that do. How do you get that from them?

EI 4: Basically once again I always have that open policy so it can be in the corridor or during lunch time or something they actually come forward and they speak to me and I also forward them like worksheets of relevant information. I encourage them to keep a diary and to actually record important stuff. You know as I speak to them. You know like angle and all that.

I: Yes I remember in primary school we used to have a little book called a source book where we had all our work.

EI 4: Yes that is what they are doing and that is actually helping them.

15. I: Do you ever find that basic concepts / foundations are lacking? If yes, what do you think has contributed to this?

EI 4: Sometimes, this generally happens when there is a continuous change in math teachers or when unqualified takes a class. Also if the syllabi in the previous grade was not complete.

16. I: How do you think that we can over come this?

EI4: Its not always easy to sort these types of problems. There is a shortage of qualified math teachers. It is better to have some teacher in the class rather than none. As far as the syllabus is concerned, we do try to ensure all topics are taught.

17. I: How do you manage your weaker learners? What kind of support do you offer these learners?

EI 4: You see there are lot of aspects to the weaker learner but as I would say you know one of my thoughts is not to stifle them with concepts eg. if you are teaching them story problems the idea is for them to comprehend the problem so I actually allow them to use a calculator because I am not teaching them calculations but I am teaching them comprehension of the problem so in a way all these are tools because even we as adults or parents, we are all using calculators so actually for things like that I would allow them to use calculators so I am actually developing the concept of the word problems than actually needling on other issues. That's one way and as I said I come up with all these simple ideas for them to actually take interest in it but as I said again it is always talking about it and asking them ways to handle the situation.

18. I: What in your opinion hampers a learners' progress in mathematics?

EI 4: Once again I would say there is the idea that you don't have to learn for maths which is wrong and I am saying they need to start learning especially getting down to it and learning maths and we still need more parental support

I: When you say learning you mean basically the application of the work that they are doing.

EI 4: Yes just having a working knowledge of how for examples fractions or something. Have the thoughts flowing in your head of what to do with addition of

fractions or what to do for multiplication of fractions, what to do for division, you know just build up thoughts in your mind as to how to do it and I think that is more interesting and when you tell them about learning maths I always encourage them to write maths so even adults too, parents they have the concept of hey how are you going to learn for maths You can't look at the book. You need to have a pen and a page and you should be doing the sums. I actually encourage them too scribble in the workbooks when they are studying because I want their mental process to work so they must have a good idea of exactly what is happening

19. I: How do you think we can help these learners?

EI 4: In the primary school. Once again probably I would say we are having a problem and people they don't actually like my thoughts usually management when I am telling them grade the children. When you grade the children, you got your flying class there, you can excel with them and then you got your weaker children, you spend more time with them at a slower pace

I: So basically we can work at their pace.

EI 4: Yes but then always these guys are saying it is better to mix them and treat them equally but I would prefer that you know where you actually grade them and you can work slowly with them, probably even set different papers for them but you know they will be learning to you because they actually get lost. That's part of the problem where the domineering child especially it happens where someone is talking more you tend to go with the flow and then this quiet people, another reason is these kids are quiet, they will not talk and most of my weak pupils they don't speak.

I: So don't you deliberately ask them questions?

EI 4: I do just to encourage them

I: And how do they respond?

EI 4: They are breaking up like this year I had an experience with some children that they never spoke in the previous years but now they started talking. In fact people are actually surprised that they will actually come to me and we would talk which you don't get from these kids. They don't even talk

I: One more thing you said that you think that you should have them graded. Don't you think that the learners that are graded into lower classes have some kind of stigma attached to them or how do you think if we do grade your learners how do we alleviate that problem of children feeling like

they are outcasts? Because there is stigma and status that attached to the bright class against the weaker

EI 4: Yes as I said there is no need to classify them to say like A or B class or something but have different concepts like for example let the class run under the teacher's surname like 6 AS or 6ZM or something like that but as we said it is known to children that in fact I admit to them that I have weaknesses too and I want to develop and improve my weaknesses so people must know that there are weaknesses but we are not condemning you but we are saying we can improve you.

I: So you are actually going to point out to them that you are giving them a chance to rise above their weaknesses.

EI 5: Yes that's the attitude but not to mock them or something.

I: Ok in the event hypothetically speaking something like that does happen will learners be given the chance to move from a weaker class to a brighter class in the event that they should show signs of improving or anything of that sort.

EI 4: Yes definitely they will always have a chance to move back and forth

I: But sometimes in a school context it becomes difficult unless you are running the maths simultaneously.

EI 4: That's right it does happen

20. I: What role does the parent play in the child's mathematics learning?

EI 4: You see a handful of them the people who are really interested in the children's education they come forward and they are quite honest and they say you know what I really don't understand how this is happening or that is happening. Please explain to me and I go and send them notes and they phone me and I speak to them and tell them how or what should be done.

I: So basically there is a handful. There is not a large number of parents.

EI4: No its not a large group

I: Is it because they are not interested or they are already knowledgeable about what's happening or they can actually help their child?

EI 4: Its just you know what its just individual reaction and then.

I: In general I would want to know because I want to grasp what kind of parental involvement there is.

EI 4: But generally I also notice especially the young parents they are more involved with the economical psychos that they tend to forget about the kids.

I: So basically there is a sidetracking of the learners

EI 4: Ya that's right

21. I: How often do you involve parents in the child's learning and progress? Does parental involvement help the learning process? How /Why not?

EI 4: You know especially when we get report backs. You know when we issue test results and reports going out to children, when we give all this out after a test or something then when we feel that the child is not performing well then we send out notes to them so that they can come to school and discuss it or they can phone me and we talk. I am the only teacher in this school that allow them to phone me on my cell phone so its always open and they can phone me anytime.

I: What's the response like in percentage wise? Do you get a lot of people or what?

EI 4: Very low about 5% or lower than that but then you will also notice you see the department ratings it does not create a good reflection on a child, for example if you are looking at the grade 4 to 6 the pass requirement is from 35% to 49% which you are using the symbols so I am saying that you know the child is weak, he is getting 35% but then in the report it is reflected as a 2. So the parents say hey you know what my child is passing, I don't have to worry about it. Its good enough.

I: So its not of a real concern because of the ratings.

EI 4: Ya even that the ratings is totally misleading function because like grade 6 to 4 again from 70 to 100 is classified as a 4, is a top mark. So you get 70 you getting a 4, you get 99 you getting a 4. The scale is totally not to my liking.

I: You think it's quite imbalanced

EI 4: Ya it is imbalanced and especially with this continuous assessment you can see that especially with assignments and projects the parents are actually doing it in cases.

I: Ok I am asking a very direct question. Do you think that your parents are more interested in your learners passing or in the way the learner excels?

EI 4: I think in most cases especially you one again I am saying that people who are actually interested in their children progressing in school in tertiary education and all that they are keen for their kids to grasp concepts and all that but I think majority of them with the socio-economic set up, they just want their kids to pass because they know that they are going head and passing.

22. I: Over the recent years, how would you describe the caliber of mathematics learners?

EI : I noticed that its going down and especially we are, you know at the moment behaviour problems, all that is having an impact and if you look at it the worst behaved children in our school are the junior primary. In fact the pre-school children and our best children are the grade 7s so as the years are going by you can say that the intellectual capacity is getting lower. Like our babies in grade 7, they show tendencies of being totally immature to going to high school. They are not like long ago where these kids were much more you know like they could handle things but these kids they are still babies.

I: So the level of maturity has degenerated.

EI 4: Yes it has gone down

23. I: What do you think is the cause for poor mathematics performance at high school level?

EI 4: Ya basically I notice well they change and at that time from the 12 year to 13 year group you find that there are also physical changes taking place amongst them. Another cause of that is that especially in high school you see primary school was class teaching, now when they get into high school, they have to move to the teacher and they have avenues to actually fool around so that is one of the problems I have and the other issue I feel that I know high school will treat them like babies and they tend to send the younger teachers to these kids and then they tend not to give them the full attention.

I: So you are saying that when they get to high school basically it's your belief that generally in the junior grades they have younger or less experienced teachers who can't manage these learners.

EI 4: Yes and I also feel that the teachers ought to be coming to them for that grade 8 so they don't get a chance to just move about and fool around. It's something new to

them and that's what they want to do.

I: The environment is also playing a part

EI 4: Yes and somehow we feel that you know its not a big difference from what we are doing from grade 7 but there is some type of independence between the grade 7 teacher and the grade 8 teacher. There is no link. Example like XX Secondary in grade 8 in the first term they would send one assignment which is totally way out about number concepts and every time I end up doing that assignment and the teacher in the class after going through all the problems and instead of asking them to do it he will strike off that thing because he could not find the answer and the same assignment has been given from, my son is in grade 10 now, for the last four years the same assignment has been given. You would watch next year that assignment would be given out again.

I: In first term the assignment of number patterns, what's it number concepts

EI 4: Number concepts

I: And every year they strike off the same questions.

EI 5: Ya

I: Ok I will do that for my research purpose

24. I: Do you feel/believe that transition from primary school affects a learners' progress in mathematics? If yes, how so?

EI 4: Actually my silent research I noticed that you know there is a lot of well I don't do this, I can honestly say that I don't do this but a lot of subjectivity comes into the primary school and then you tend to get popular children coming about but how they become popular is totally different because in my view in fact if you go to anyone here and they will tell you that I treat every child equally. It can be the richest child, it can be the poorest child but I will treat you in fact I am a teacher in this school where all the single, the children that don't have parents, father and all that, they all cling to me the worst, the best so what I am saying is that by them also getting into the high school does not make a big change but as I said there is more possibility for them to, you know because of the sudden change and more the different environment they tend to go wayward.

I: Yes there is, does it or

EI 4: It does

I: So basically it's the transition in terms of the environment, or in terms of the teachers, is it in terms of the work load.

EI 4: Yes as I said , in fact I also noticed that some of the topics is not according to the grade 8 syllabi, they actually handle that so we don't know what's happening and also I don't know maybe its not fair to say this, we want them especially the teachers to get down to teaching because noticed and the kids will speak the truth, they will only put answers on the board and the kids have to do the work on their own but sadly you know I must say this Apollo High is my feeder school too but you know even my weak children that are going to Apollo High and my intelligent children, they actually doing quite well but on this side I see they are falling down.

I: And do you see any reason behind it. Be honest there is total confidentiality

EI 4: Ya as I say a chief problem is teaching, changes in teachers which is a big issue, teacher absenteeism is very high in the high school. These are the problems that we are having but the chief problem is especially when you change teachers and the other concept that I fail to understand , I actually addressed this issues because I got friends there too in management but the management seems to be in a different cycle from the teachers. You know just to highlight somethings to you, if there is four teachers teaching a grade 8 and one teacher, teacher 1 is setting the paper right, its somehow the other three don't know what he set in the paper. There is no scope. The children lack scope. They are not getting that.. So in fact that is one of the chief problems that I know that's happening there where the playing fields are different. The examiners class will be doing well and the other classes won't be doing well but I don't know how its operating but the management keeps on saying that they always have to interact and discuss but when it comes to the nitty gritty of things.....

I: They say there is a lack of interaction between the junior teachers themselves

EI 4: Ya especially for this papers and if now you happen to go and look at it you will see that always the examiners classes are doing better and the kids know that and I could actually quote you examples which I already did where concepts even the examiners they set things in the paper which they did not teach in the class.

I: Ya ok if you are talking about the last paper that they wrote that was departmental

EI 4: Ya no that's fine

25. **I: What do you think that we (as the school, the teacher, management, parent) do to help improve learner performance in the child's initial high school years?**

EI 4: Once again its just the opposite of what I said now. As I said fixed classes. At least get one or two good, experienced teachers.

I: Do you think one of the senior teachers should actually take junior classes?

EI 4: Ya your senior teachers come down there and you going to make less problems for the 10, 11, 12, they will be sailing after that. They will know whats happening down here.

I: And you also think there should be more co-operation and correlation amongst the teachers teaching the same grade but different classes.

EI4: Yes

26. **I: Whom do you think should be blamed for the poor math results in matric?**

EI 4: Ultimately first thing is the child right but to actually alleviate that problem, you know they always say that grade 11 is like more important than grade 12, so once they get the concepts, all that needs to be put into practice.

I: So are you blaming the grade 11 teacher?

EI 4: No not the grade 11 teacher but what I am saying is that but basically it's the child but to put blame on someone.....

I: I am a high school teacher. Generally the high school is blamed for the poor matric results. That's the general thing so I want to know from you what do you think who in this big picture if you look deeper where the ultimate problem stems from? You see when the learners come to high school we blame the primary school teachers. My research is basically focusing on , is there a problem in the primary school or is there a problem in the high school. How do we tie the two if there is a problem from either way?

EI 4: I would say the first thing is the child right because the child ought to be prepared and then there's other reasons like somehow the content. You know like sometimes like the matric paper you find out the teachers cant even answer the paper.

I: So are you blaming the department of education

EI 4: No I would say there is still no rapport. They need to actually stick to the syllabi. Not to go with some unheard things and try to work with those ones because I don't know because there was a comment in the paper by a maths lecturer, he says he couldn't answer the paper.

I: With the new curriculum, yes there's a lot of change.

EI 4: Yes but I mean if you tell the people, you know declare the information early so people will work towards it.

27. I: Do you believe that there is a way to overcome this serious concern of matric failures in mathematics?

EI 4: In the years before that you will also notice with the previous question, I don't know, I am an educator and I feel that I have to go to class and do my fair share but you will also notice that the high school, why have the high school maths teachers they have private tuitions and they are excelling, those children are excelling so how come the children that you have in class, why are they not excelling?

I: So are you basically saying to overcome this problem children should have private tuition as well.

EI 4: They should have but I am also saying that there is conflicting views among the teachers too

I: Ok so you believe that the teacher in the classroom itself, in the school is not playing a role.

EI 4: Yes do more. The delivery must be the same because you producing results out of that thing, out of the system so do the same in class too. We not looking for all the top scores but at least pass the children.

I: Do you actually think that there are high school teachers that focus more on their private tuitions than their class teaching?

EI4: If you look at that, I don't know because I would not say I don't know but if you are looking at institutions like YY Primary from last year from room 1 to room 9 its been loaded with XX secondary high children, studying, doing after tuition, taking tuition so what's happening in the school, why isn't something being done there. Once again it boils down to the child and the parent because here although they come here, its more like a socializing thing. The parents are paying for it but

they don't know what's happening. This bottom half here becomes like a lover's den. So it's a means of escape from the home but somehow the kids they need to grasp that hey I am coming here for something and I want to do it. Not to deviate, not to hide things from parents and all that. You know with all the social problems and all that coming about.

I: So basically you are saying that learners are not making most of the learning opportunities but they are abusing it for other avenues.

EI 5: That's right

I: Ok so how do we try and overcome this problem?

EI 4: You know leaving it to our maths teachers we won't be able to sort this problem but generally if you look at society we need to change. We definitely need to change because we are finding that we are I don't know especially in our community, I am from this community, we are well we are not I won't say that we have a poor community but we have things that we can offer our children and somehow, probably we are offering too much for our children in forms of material gains where the children are coming to feel that you know what this is not important

I: So there is little emphasis on education

28. I: Whom do you think should be blamed for the poor math results in matric?

EI 4: Times are changing. Even the ladies have to go and work and somehow there is a drift. There is no more rapport amongst the children like sometimes in the classroom I will ask them like how many of you spoke to your parents last night and you will get one or two children that will put their hands up so society has to change drastically and also like if you are looking at the media influence it is creating a lot of problems but the parental involvement must be there. Like kids watching TV, kids going into the internet and slut list and all which was started from XX Secondary. So all these issues that start off from there.

I: XX Secondary is not your favourite school .

EI 4: No it is . Do you know it was started from your school.

I: I'm actually there not very long.

EI 4: It started there. One stupid boy, he left from our school, he could not write his name but he started that thing.

I: So do you think that schools are mainly responsible for the high mathematics failure

EI 4: I would say not only the schools

I: So you say not totally

EI 4: No totally. Its all the role players that have to make some contribution

I: The role players you talking about is the environment, the teacher, the school , the parent, the child itself

EI 4: Yes and then as I said you know I always think of this concept you I will be so happy where the schools, it will probably have to start in the high school, where you know like university you do your maths 1, maths 2, maths 3, if you fail your maths 1, you come the following year and repeat it so Im saying if you fail your grade 9 you go to grade 10 but you come back and do your grade 9 maths.

I: That's a good idea

29. I: Do you ever meet with teachers in the high school to discuss curriculum or any other aspects related to your learners and mathematics?

EI 4: See although the structures are at place but my feeder school never attend the meetings

I: So you had meetings

EI 4: There are meeting always taking place but somehow I don't know why but.

I: And who is responsible for this meeting?

EI 4: We have our own clusters. We have clusters formed by the department but in fact the coordinators also feel that somehow the high schools feel that they don't have to attend this interaction with primary schools.

I: So there are structures in place. There are thing but its actually not happening

EI 4: Yes there are but its not being attended by secondary schools.

I: So basically secondary school are not adhering because they are not coming

EI 4: Yes

I: And would you know the reason because you say they feel its not necessary for them

EI 4: Its not necessary and as I said there's so many changes amongst the teachers, there is no continuity and maybe information is not going forward because it happens in our area but if you look at the other cluster in Bellair you will see that the secondary schools they come from it but in our area we not getting the response from the secondary schools

30. I: Are there any joint meetings between primary and high school educators? You have not had one for this year.

EI 4: No we had the meetings but its not attended.

I: So when you have this meeting only primary schools attend.

EI 4: Yes only primary schools attend

I: Ok and what do you discuss at this meeting in general in terms of curriculum.

EI 4: Actually we already started that. We set common assignments, projects, we discuss you know per term the topics that we are going to handle and then we share the work and then we all contribute to the maths paper.

I: So you try and have a common paper for the cluster

EI 4: Ya thats what we are doing.

I: Yes that's good in a sense if the child moves from school to school

EI 4: Ya but I also notice that there are big differences amongst schools.

I: So within the primary schools there are differences too in terms of teaching of the curriculum. Syllabi, structure.

EI 4: Yes the interpretation of the syllabi because some people just go lightly but some like I go quite deeply into it.. I hope I go quite deeply into it.

I: In terms of direction into your syllabi do you have a subject advisor that

co-ordinates this meeting or attends any of these meetings to help give some guidance or direction.

EI 4: Fortunately these department co-ordinators they are quite good and they actually come in to assist.

I: The department co-ordinator is a specialist in the field or just a token person.

EI 4: No I would say the two that we have they are really excellent in maths. In fact the concept of cluster started with maths and all other subjects started coping our concept and they are really progressive.

I: So your'll have actually initiated this.

EI 4: Yes in fact both of them are already authors of textbooks.

I: So although your high schools don't attend they still get an invite to come to these meetings.

EI 4: Yes

I: Is there a departmental schedule as to if and when the dates are set or anything?

EI 4: They actually do that at the beginning of the year

I: And they send it to the schools

EI 4: Yes they do

I: Ok in the event that schools don't receive it for some reason who do they contact to get this information?

EI 4: For us they can contact the Umlazi District Office. The mathematics people are there. They are based there. But as this whole year was a bit disruptive with the strike its just a bad time.

31. I: Does the DOE ever encourage such meetings? What role do they play in all these meetings?

EI 4: You know as I would say and I am saying it again that I really enjoy working with these two people.

I: The subject advisors

EI 4: Yes the subject advisors. They know the stuff and also they are prepared to listen and also they appreciate our input so it is good especially the maths department. We doing quite ok

I: So basically they are a figure of motivation

EI 4: Yes

32. I: What do other teacher friends of yours believe to be the problems with mathematics teaching in schools?

EI 4: You know basically again it just boils down to learning. The kids we want them to learn and then like different areas you know as I said the child don't have food where you want him to go learn maths. The socio-economic status also plays a big role like if you are looking at YY Primary, that's a poor community and like how can you go talk about maths now when the child is saying that his mother is with someone else in the room. You know things like that is really having a negative on the children.

I: So basically the socio-economic status, the lack of learning themselves are the problems

EI 4: Yes

THE END

Appendix H - Letters of Consent

Letter of Consent from Mathematics Student



Dear Student

I am currently studying towards a Master's Degree in Mathematics Education at the University of KwaZulu-Natal. There is tremendous interest throughout the world in the way mathematics is being taught at schools and universities. My interest is in the area of transition from primary school to secondary school and the effects that it has on mathematics learning. This research that I am conducting will assist us in making the teaching and understanding of mathematics much better. As part of my research, I would like to interview you regarding your mathematics learning experiences at primary school and then again at high school. I would also request you to keep journal in which you need to record your learning experiences for the latter part of this year and continue into the first term of your high school year.

In order to conduct the research I need to have access to your journal. Furthermore, if you agree, you may be interviewed by me at your school. The interview will take approximately 60 minutes and will be tape recorded. The data from the interview will only be used for my research purposes and will not be used for any other purpose without your consent. The recorded tapes and journals will be lodged with the myself / university authorities. Participation is voluntary and you are not obliged to answer all the questions that I ask you and you are free to withdraw from the interview or the research project at any time. Please note that no real names will be used in any material that I write up and every attempt will be made to keep the material confidential.

Thank you for your assistance. If you require any further information, please contact me on the number 031 4010850.

Yours sincerely

Mrs. S. Sukhdeo

DECLARATION

I, _____ (full name of learner) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project. I understand that my real name will not be used in any write-up and that my responses will be treated confidentially. I also understand that I will not be under any threat to participate and am at liberty to withdraw from the study at any time.

Signature: _____ Date: _____

I, _____ (full name of parent / guardian) hereby grant consent to my child/ward _____ (full name of learner) in grade : _____ to be a participant of the above mentioned research project.

Signature: _____ Date: _____

Letter of Consent from Mathematics Educator



Dear Educator

I am currently studying towards a Master's Degree in Mathematics Education at the University of KwaZulu-Natal. There is tremendous interest throughout the world in the way mathematics is being taught at schools and universities. My interest is in the area of transition from primary school to secondary school and the effects that it has on mathematics learning. This research that I am conducting will assist us in making the teaching and understanding of mathematics much better. As part of my research, I would like to interview you regarding your mathematics teaching experiences.

Furthermore, if you agree, you may be interviewed by me at your school. The interview will take approximately 60 minutes and will be tape recorded. The data from the interview will only be used for my research purposes and will not be used for any other purpose without your consent. The recorded tapes and journals will be lodged with myself / the university authorities. Participation is voluntary and you are not obliged to answer all the questions that I ask you and you are free to withdraw from the interview or the research project at any time. Please note that no real names will be used in any material that I write up and every attempt will be made to keep the material confidential.

Thank you for your assistance. If you require any further information, please contact me on the number 031 4010850.

Yours sincerely

Mrs. S. Sukhdeo

DECLARATION

I, _____ (full name of educator) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project. I understand that my real name will not be used in any write-up and that my responses will be treated confidentially. I also understand that I will not be under any threat to participate and am at liberty to withdraw from the study at any time.

Signature: _____ Date: _____

Letter of Consent from the Principal



Dear Principal

I am currently studying towards a Master's Degree in Mathematics Education at the University of KwaZulu-Natal. There is tremendous interest throughout the world in the way mathematics is being taught at schools and universities. My interest is in the area of transition from primary school to secondary school and the effects that it has on mathematics learning. This research that I am conducting will assist us in making the teaching and understanding of mathematics much better. As part of my research, I would like to interview some of your mathematics educators and learners regarding their mathematics teaching and learning experiences.

Furthermore, if you agree, they may be interviewed by me at your school in lunch breaks and after school hours. The interview will take approximately 60 minutes and will be tape recorded. The data from the interview will only be used for my research purposes only and will not be used for any other purpose without your consent. The recorded tapes and journals will be lodged with myself / the university authorities. Participation is voluntary and your learners and staff are not obliged to answer all the questions that I ask and are free to withdraw from the interview or the research project at any time. Please note that no real names will be used in any material that I write up and every attempt will be made to keep the material confidential.

Thank you for your assistance. If you require any further information, please contact me on the number 031 4010850.

Yours sincerely

Mrs. S. Sukhdeo

DECLARATION

I, _____ (full name of principal), principal of _____ (full name of school) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project. I understand that my real name and the school's name will not be used in any write-up and that my responses will be treated confidentially. I also understand that I will not be under any threat to participate and am at liberty to withdraw from the study at any time.

Signature: _____ Date: _____

Appendix I - Ethical Clearance



29 November 2010

Mrs S Sukhdeo
School of Education
EDGEWOOD CAMPUS

Dear Mrs Sukhdeo

PROTOCOL: An Exploration of Mathematics Learner Transition from Primary School to Secondary School
ETHICAL APPROVAL NUMBER: HSS/1365/2010 M: Faculty of Education

In response to your application dated 25 November 2010, Student Number: 951053723 the Humanities & Social Sciences Ethics Committee has considered the abovementioned application and the protocol has been given **FULL APPROVAL**.

PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully


.....
Professor Steve Collings (Chair)
HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

SC/sn

cc: Dr. V Mudaly (Supervisor)
cc: Mr N Memela

Appendix J - Editor's Declaration

L. Gething, M. Phil. (Science & Technology Journalism) (*cum laude*)

WHIZZ@WORDS

Private Bag X1008, Hillcrest 3650 South Africa; tel/fax 031 769 1435; cell 072 212 5417

25 October 2011

**DECLARATION OF EDITING M.Ed. THESIS:
AN EXPLORATION OF MATHEMATICS LEARNER TRANSITION
FROM PRIMARY SCHOOL TO SECONDARY SCHOOL**

By Swasthi Sukhdeo

I hereby declare that I carried out language editing of the above paper by Ms Sukhdeo.

I am a professional writer and editor with many years of experience (e.g. 5 years on *SA Medical Journal*, 10 years heading the corporate communication division at the SA Medical Research Council), who specialises in Science and Technology editing - but am adept at editing in many different subject areas. I am a full member of the South African Freelancers' Association as well as of the Professional Editors' Association.

Yours sincerely

LEVERNE GETHING
leverne@eject.co.za

Appendix K - Turn It In Report

An Exploration of Mathematics Learner Transition from Primary School to Secondary School

ORIGINALITY REPORT

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INTERNET SOURCES

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