Student Engagement in Mathematics lessons and tasks during Transition from Primary to Secondary School

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Abstract

This Hermeneutic phenomenological study focuses on students' experience on transition and its perceived effects on engagement in Mathematics lessons and tasks during their first year of secondary schooling in Mauritius. As students transit from primary to secondary school, they are required to extend and transform their mathematical knowledge and skills to meet the requirements of secondary Mathematics learning. Following an earlier study conducted in Stage 1 of the Professional Doctorate in Education (EdD), it was found that some students who excelled in Mathematics in their end of primary school examination achieved lower test results than expected by teachers during their first year at secondary school. Teachers reported that these students displayed a loss in motivation and low levels of engagement in Mathematics. These findings prompted this current study which aims to understand the factors influencing students' engagement in Mathematics as they transit to secondary school.

A socio-constructionist approach was adopted, which enabled an in-depth exploration of students' perspectives on their experiences relating to their engagement in Mathematics lessons and tasks. Data were collected from seven semi-structured group interviews involving 23 students. Participants were purposefully selected to include students obtaining 75% or above in their end of primary education Mathematics examination, but who experienced a substantial decline in their in-class test performances in the subject during their first year at secondary school. Data were analysed using a thematic approach.

The findings revealed that the participants reported experiencing discontinuities in the curriculum and instructional practices, and reduced levels of support concerning Mathematics teaching and learning, all of which impacted negatively on their engagement in Mathematics. Findings also indicate that students disengaged from Mathematics learning when teachers covered topics, students had already mastered during their primary school education, and when students perceived new mathematical topics as challenging.

One key contribution of this study is that the type of students selected have high self-concept and high expectations about their secondary schooling. The findings suggest that these students were unanimously disappointed and frustrated about their school allocation which indicates that they started secondary school with low school belonging. The latter is found to be a key factor in mediating their (dis)engagement in mathematics.

Another key contribution to knowledge is that the linearity of the Kahu and Nelson's conceptual model was found to be limiting to map the findings from this study. Despite that it was not the scope of this study to extend this model, however, the model was restraining when students experienced setbacks and used coping strategies, adaptive and maladaptive, to help or hinder the building of academic buoyancy or everyday resilience. It has been challenging to fit the two constructs of coping and academic buoyancy within a linearconceptual model of student engagement. A cyclic model that would fit the type of data that emerged from this current study would help better understand students' disengagement and re-engagement.

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List of Abbreviations and/or Acronyms

CPE	Certificate of Primary Education
ECCEA	Early Childhood Care and Education Authority
EdD	Professional Doctorate in Education
KM	Kreol Morisien, the mother tongue of most Mauritians
MIE	Mauritius Institute of Education
MOEHRSRTE	Ministry of Education and Human Resources, Scientific Research and Tertiary Education, Mauritius
NCF	National Curriculum Framework
PSAC	Primary School Achievement Certificate
SE	Student Engagement
NCE	National Certificate in Education
NYCBE	Nine Year Continuous Basic Education
ERR	Ending the Rat Race
PSLC	Primary School Leaving Certificate
IMF	International Monetary Fund
SC	School Certificate
HSC	Higher School Certificate
EFA	Education For All

NCTM	National Council Of teachers of Mathematics
RQ1	Research Question 1
RQ2	Research question 2

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Author's Declaration

Declaration

I declare that the research contained in this thesis, unless formally indicated within the text, is the original work of the author. The thesis has not been previously submitted to this or any other university for a degree and does not incorporate any material already submitted for a degree.

Signed: S. Purdasseea

Dated: 18 January 2022

Chapter 1: Introduction

1.0 INTRODUCTION

This study is conducted on the island of Mauritius and focuses on the shift in students' engagement in mathematics in the first year of secondary schooling. As students transit from primary to secondary school, they are required to either extend or transform their mathematical knowledge and skills to meet the requirements of secondary mathematics learning. Such knowledge and skills range from extending their whole number concepts, algebraic thinking, geometrical reasoning, and measurement sense to enabling learners to 'mathematise' situations and solve problems. There is a strong evidence base, in the literature, that relates to the decline in achievement in mathematics after transiting from primary to secondary school. This decline in mathematics achievement during the early years of the secondary school is of concern to teachers, students, parents, and academics. In Mauritius, for instance, the transition to secondary school occurs at the age of 11-12 years. Students achieving high grades at the end of primary school national examination, Certificate of Primary Education (CPE) (replaced by the Primary School Achievement Certificate (PSAC) since 2017), frequently experience a dip in performance after transiting to secondary school.It is common for Heads of secondary schools in Mauritius to express concerns about the fact that many first-year students disengage in Mathematics even after obtaining very high grades at CPE level. This study is particularly concerned about these students disengaging in Mathematics in the first year of secondary school.

My professional interest in students' disengagement in Mathematics stems from my work as a Mathematics educator in a state secondary school in Mauritius. While correcting the copybook of one of Form 4 (now Grade 10) student (aged 15), I found that she was solving a mathematics problem relating to the topic 'Geometric construction and Locus' without reading the question. This fact alarmed me, and after asking all students in the class about their approach to answering questions, I found that 12 students out 29 skim-read the question looking only for the critical information. Despite my enthusiastic efforts to engage students inmy class, I noted that several students were either completely disengaged with mathematicsor had episodes of engagement during the lesson, including those who had performed well at the end of primary school examination. This problem was observed frequently, and following

conversations with other Mathematics educators in Mauritius, it became clear that this problem was quite recurrent. I now work as a Mathematics teacher educator at the Mauritius Institute of Education (MIE), and anecdotal evidence from teachers and other Mathematics educators confirm that there is a tendency towards a dip in student engagement in Mathematics as they enter secondary school. This study aims to understand students' experience of transition and their perception of the reasons for this dip in engagement during the first year of secondary as they move from primary school.

According to Mc Gee et al. (2003), difficult transitions can lead to disengagement, negative self-belief systems and low levels of motivation, especially in the learning of mathematics. Shulman (2002) highlighted that learning begins with student engagement. Whereas Reeve and Tseng (2011) asserted that student engagement is a predictor of highly valued outcomes such as students' academic progress and achievement. Student engagement is also closely associated with higher attendance, fewer disciplinary incidents, lower dropout and higher retention and graduation rates (Appleton et al., 2008; Finn, 1993; Fredericks et al., 2004; Jimerson et al., 2009). Thus, students need to be engaged in mathematics for learning tooccur in the subject. In the context of this study, engagement will be understood as reflectinga person's active involvement in a task or activity (Reeve et al., 2004). Drawing on the centralpremise of this understanding, the following definition of student engagement, as stated by Barkley (2009) will be used throughout the study:

> Student engagement is a process and a product that is experienced on a continuum and result from the synergistic interaction between motivation and active learning.
>
> (Barkley, 2009, p.8)

1.1 BACKGROUND OF THE STUDY

The Republic of Mauritius is an island state in the Indian Ocean consisting of the mainland Mauritius and its dependencies Rodrigues, Agalega, Tromlin, and Cargados Carajos. Only three islands are inhabited, namely, the mainland Mauritius, Rodrigues and Agalega. The mainland is situated at 800 km to the east coast of Madagascar. The mainland Mauritius (henceforth referred to as Mauritius) is of volcanic origin and has an area of 1874 square kilometres with a population of 1.3 million. The country is considered as part of the African continent.

Historically, Mauritius was first colonised by the Dutch in 1598 followed by the French in 1710. The British took possession of the island in 1810. Mauritius obtained its independence in 1968. The successive colonisers brought people from Africa and India to work in the sugar cane fields. Chinese came to Mauritius as traders. As such, Mauritius is now a multiracial, multicultural, and multilingual country whose inhabitants originated from Africa, India, China, and Europe.

1.1.1 HISTORICAL DEVELOPMENT OF THE EDUCATION SYSTEM IN MAURITIUS

Education for both the French administrators and settlers started in 1767 with the first school opened by l'Abbé Challan. In 1815, the first free primary education was opened in the capital of Port Louis by Reverend Jean Lebrun. Following which, the first government school was established in the capital in 1823. However, the slaves working in the sugar cane fields were not admitted in those schools. It was Jean Telfair who opened the first school for slaves in 1833. After the abolition of slavery in 1835, Indian immigrants were brought in Mauritius to work in the sugar cane fields. An ordinance was passed in 1857 making provision for the setting up of primary schools throughout the island. Catholic secondary schools were opened in 1877. Only boys were admitted in these schools. Girls were admitted in schools in 1880 following the opening of Loreto Convent schools by Loreto nuns. One landmark was attainedin 1941 following the Ward report where an Education Act was passed giving the Governorof the island the power to establish regulations. Consequently, in 1957, Education Regulation (also known as the Education Act 1957) was passed, which governs education in Mauritius atall levels. To increase access to secondary schools, in 1977, the then government made secondary education free for young people aged 11-12 to 18-19.

Furthermore, in 1982, the Education Act was amended, making primary education compulsory to all. Before 1980, primary school students had to sit for two examinations at the end ofprimary schooling, namely: Primary School Leaving Certificate (PSLC) and the Junior Scholarship. The results of the following examination allowed students access to the elite secondary schools (commonly known as 'star' schools) in the country. Following Richard's report in 1979, these examinations were replaced by a single examination called the Certificate of Primary Education (CPE) as from 1980. The CPE was both a certification and

selection examination where students were ranked according to their CPE grade aggregate. The high performing students were admitted in the highly rated elite secondary schools of Mauritius. Students failing CPE twice were admitted to pre-vocational schools following the different educational path. The Education Act was once again amended in 2004, making education compulsory to all till the age of 16.

This means that students were withdrawn from the system after failing CPE twice. With the new legislation, all students will progress to the secondary school. Therefore, the whole population of primary school students will experience transition from primary to secondary school.

1.1.2 EDUCATIONAL REFORMS IN MAURITIUS BY DIFFERENT GOVERNMENTS IN POWER

In 1982, following severe economic problems in the country, the World Bank, and the International Monetary Fund (IMF) proposed structural changes. They recommended drastic cuts in the educational expenditure and the government was asked to review its policy for free secondary education. However, the government maintained its decision. In the same year, a commission of inquiry was set up to look into the education system.

Consequently, a White Paper on Education was published in 1984, which emphasised equality, equity, relevance, and cost-effectiveness. Following the implementations of recommendations of the White Paper, improvements were noted in the year 1990. However, in a paper titled 'Master Plan for education for the Year 2000: the Mauritian experience' by a former Education Minister (from 1983 to 1995), Armoogum Parsuramen stated:

> The historical overview of the development of education in Mauritius indicates that educational reform and policy have often been the results of political and economic circumstances and crises that prevailed at different times in Mauritius' history. They had rarely been the outcome of careful planning. Many reports and recommendations had been produced, but most of them were on an ad hoc basis and did not take a comprehensive viewof reforms in education. There had been no attempt to plan the long-term development of education consistently and coherently. Previous studies and recommendations did not integrate the education system within the broader economic and social context.
>
> (Parsuramen, 1991, p. 5)

Nevertheless, despite the observation made by Parsuramen, two significant attempts of reforms were made by the Ministry of Education in the nineties (WGESA, 2006). Firstly, the Ministry of Education developed a Master Plan of Education in 1991, providing short-, medium- and long-term strategies for the development of education. Secondly, the Ministry developed an Action Plan in 1998 (WGESA, 2006).

In 2001, another educational reform was proposed in the document 'Ending the Rat Race in Primary Education and Breaking the Admission Bottleneck at Secondary level – The way Forward (EER)'. As mentioned earlier, CPE was a certification of achievement of primary schooling but also a selection tool of students for the few 'star' schools. Students were ranked depending on their CPE grade aggregates. Only those topping the list were admitted in the 'star' schools. The 'star' schools were sometimes very far from the residence of the students who spent hours travelling to these schools (EER, 2001). Moreover, the fierce competition for a seat in the 'star' schools, education at the end of primary school focused on ensuringthat most of the students are ranked in the top of the list causing psychological pressure in both the students and their parents (ERR, 2001). 'Ending the Rat Race' policy document proposed four approaches to eliminate ranking at CPE level.

- The grading system to measure the achievement of students;
- Construction of new secondary schools;
- Transformation of 'star' state secondary schools into Form VI colleges; and
- Regionalisation of admission to Form I (now Grade 7).

These measures were implemented as from 2002. A new government was in power in 2005. Moreover, it came to a new educational reform. A policy document 'Quality Education for All' (QEA) was produced, proposing measures to increase quality in education. It was proposed that secondary schools will have both academic and pre-vocational classes.

The Education and Human Resource Strategic Plan 2008-2020 (EHRSP, 2009) echoed the efficiencies of the system, focusing on student retention, failure, attrition together with the quality of teaching and learning. The report highlighted the high rate of failures and repetition of CPE, and a large number of young children turning out to be barely numerate and literate (EHRSP, 2009). Following the recommendations of EHRSP, the newly appointed Education Minister, Dr Bunwaree, presented a policy document entitled Education Reforms in Action

2008-2014. Several measures were proposed for the secondary level of which some are listed below:

- Elaboration of National Curriculum Framework in 2009;
- National Assessment at Form III (now Grade 9, aged 14);
- Introduction of activity periods in the timetable as from January 2009;
- E-register (SMS) system in State Secondary Schools and some private secondary schools for immediately informing parents about the absence of their children. This was done in view to contain truancy, absences, and lateness at school; and
- Introduction of new subjects in Form I (Grade 7).

However, at no point in time the transition between primary to secondary school was considered as problematic. As such, no considerations were given to this issue.

1.1.3 THE STRUCTURE OF THE MAURITIAN EDUCATION SYSTEM

The Mauritian government is responsible for the provision of education in the Republic of Mauritius. Primary education in the island has been free for children aged 5-6 to 11-12years since 1815, and following the 1977 Education Act, secondary education also became free for young people aged 11-12 to 18-19years. Education from primary onwards is structured as 6 + 3 + 2 + 2. Children in the Republic of Mauritius follow six years of compulsory primary education (Grades 1 to 6) which culminates with the end of primary education examination called Primary School Achievement Certificate, PSAC (formerly called the Certificate of Primary Education, CPE until 2016). Students start secondary education at the age of 11-12 leading to National Assessment at Form 3 followed by Cambridge School Certificate (SC) after two more years and a minimum of 2 more years to obtain the Cambridge Higher School Certificate (HSC). As from 2019, tertiary education is also free, and 600 million Mauritian Rupees (Rs) is announced to finance the scheme. Transport for all students is also free up to tertiary level. A sum of Rs 17 billion is earmarked in the budget for the education sector, which represents around 12% of the total annual expenditure.

In the Republic of Mauritius, education is considered as a vehicle of social progression. As such, it is one of the priorities of each political party and is included in their electoral programmes. Various educational reforms have been put in place in 1982, 2002, 2006 and 2016 by the different governments. Each government had to come up with a new formula and

claims to have the solution to our educational problems. The pledge of the former government was: “A World-Class Education accessible to all - No child will be left behind”. Education for All (EFA) campaign emerged as a global imperative as a result of the International Conference on Education held in Jomtien in 1990. In line with its recommendations for each country to develop an Action Plan, Mauritius produced a Master plan on education in 1991 to guide its reforms in education.

Moreover, a ministerial Round Table on Quality Education in 2003 concluded that “Quality has become a dynamic concept that has constantly to adapt to a world whose societies are undergoing profound social and economic transformation” (Griffith, 2007, p.101). In line with this, the former Education Minister reiterated his commitment to giving Quality Education to All. A new government was brought into power in 2014. To ensure that no child is left behind, the Nine Year Continuous Basic Education (NYCBE, Inspiring Every Child, MOEHRTESR, 2016)) was introduced. The new educational structure is given in the diagrambelow.

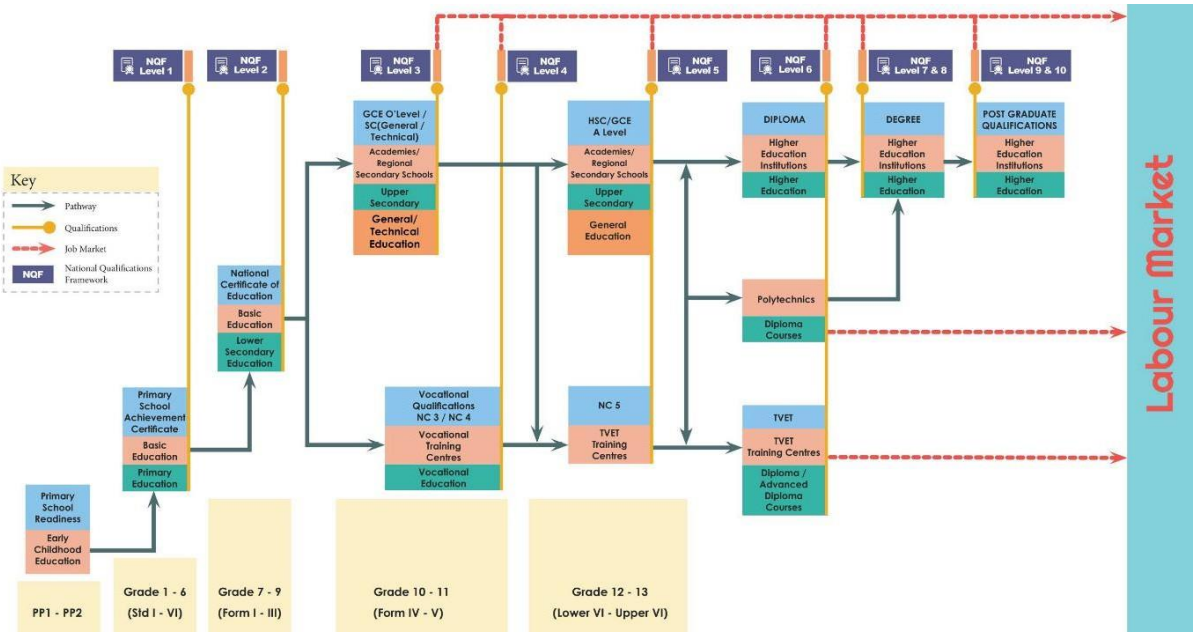


Figure 1: Nine Year Continuous Basic Education (NYCBE): The new educational pathway

In Mauritius, children start their schooling at the age of 3 years in pre-primary schools until the age of 5. Primary education starts in Grade 1 at the age of 5, which lasts for six years. At the age of 11-12 years, children are admitted in secondary schools for at least five years of

education until the age of 16. Education in Mauritius is compulsory until the age of 16. They may continue a further two years to complete their secondary education.

1.2 TYPES OF SCHOOLS IN MAURITIUS

Mauritius is clustered, geographically, in four education zones, and Rodrigues is considered as the fifth zone as illustrated in the map below even though the Rodrigues Education Commission administers the schools in the island.

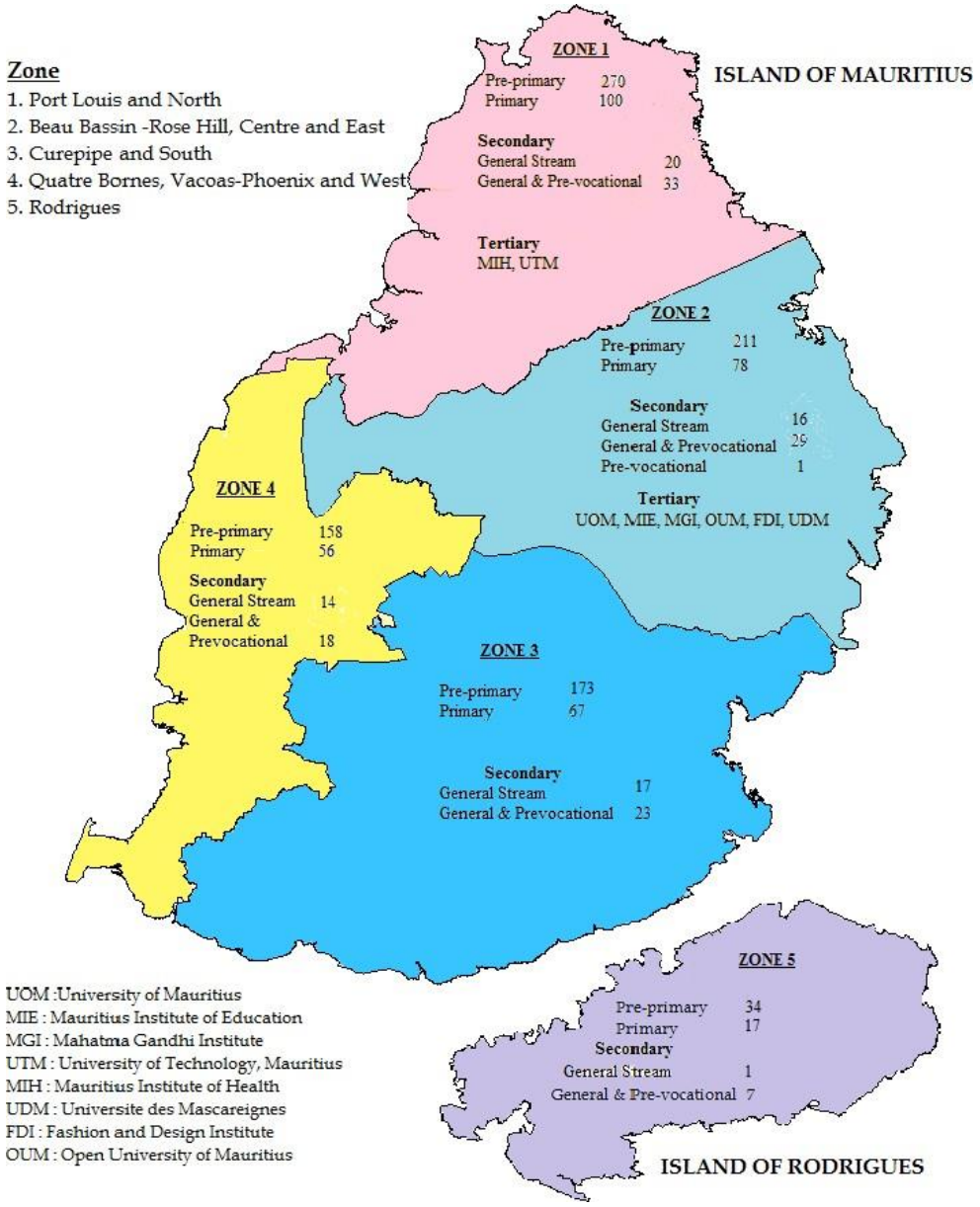


Figure 2: Educational Institutions by zone

Source: (Statistics Mauritius, 2019, p. 6)

There are 291 primary schools in the island of Mauritius, 17 in Rodrigues and 2 in Agalega islands. Out of the 183 schools dispensing secondary general education in the Republic of Mauritius, 177 are in Mauritius and 6 in Rodrigues Island. The state administrates 68 of these schools, while the remaining are either privately owned or confessional schools. Formerly, after the introduction of the 15 'National State Colleges' (top-rated elite schools), there was intense competition to obtain admission in Grade 7 into those colleges. Six are Gandhian secondary schools administrated by the Mahatma Gandhi Institute, and the remaining are grant-aided private secondary schools. This is relevant to this study as the different types of schools are distributed in all the 4 zones in Mauritius. A secondary school can have feeder primary school in different parts of the country.

1.3 NINE YEAR CONTINUOUS BASIC EDUCATION (NYCBE)

The reform, Nine Year Continuous Basic Education (NYCBE) also known as Nine Year Schooling (NYS) is an educational reform from pre-primary to secondary was announced in the Government Programme 2015-2019 – Achieving Meaningful Change. The NYCBE is premised on the necessity to ensure a seamless progression across the levels.

The overall goals of the reform are firstly to complete nine years of quality basic education and achieve relevant learning outcomes; and secondly complete the secondary education cycle, whether General or Technical. The agenda of the reform rests on six fundamental pillars, namely, Curricular Change, Innovative Pedagogies, Assessment, Continuous Professional Development, Learning Environment and System Governance and Accountability.

At the end of primary education, the Certificate in Primary Education (CPE) is replaced by the Primary School Achievement Certificate (PSAC). The rationale given in the NYCBE document is that:

> Mauritius is still wrestling with issues that were raised many years ago – the salient one being the excessive competition generated at the Certificate of Primary Education (CPE) examinations that distort the sub-sector, distracts attention from the school-supported overall development of the children, brands for life some learners as failures and hence marginalises a significant proportion of our future human resources.
>
> (Inspiring Every Child, 2016, p. 3)

Significant transformations are brought to secondary education. In order to avoid students to travel for hours to their secondary schools, they are admitted in regional secondary school. As opposed to the former system where students were admitted in both regional and National (top-rated/elite or star) secondary schools. In the context of this study, one such top-rated school is chosen since these students work very well in the end of primary school examinations. The criteria for admission to the regional secondary schools are based on parental choice, students' grade aggregate and the proximity of residence to the secondary school. These regional schools have two streams, namely, the mainstream where students are admitted after passing the PSAC examinations and the Extended four-year stream admitting students who fail the PSAC examinations. It is the general impression that the government's objective to replace the CPE by the PSAC examinations to reduce pressure and competition for the allocation of the former national schools by regionalisation admission has failed. Competition still exists to obtain a seat in the high demand state secondary schools. Consequently, taking tuition in Grade 6 is perceived by most parents as vital to secure thebest results. The 'National schools' are phased out, and instead, as from 2021, 12 existing state secondary schools will be converted into academies which will admit students in Grade 10.

The central concept of the reform is in line with Sustainable Development Goal 4 (NYCBE, Inspiring Every Child, MOEHRTESR, 2016), which is about inclusive and equitable quality education for all and lifelong learning. Formerly, those who failed the CPE twice were admitted in the pre-vocational stream. Another significant change under the NYCBE reform is that these students are now admitted in an extended four-year stream where they follow the same curriculum as those in the mainstream, which is a three-year Lower Secondary cycle. After four years of secondary schooling (Grades 7, 8, 9 and 9+), the extended stream students will take the same National Certificate of Education (NCE) paper as the mainstream students in the year 2020 and onwards. Many teachers have raised questions whether these students, who failed the end of primary school examinations twice, will be able to cope with the same curriculum and take the same NCE examination as to their mainstream counterparts.

Furthermore, mathematics is a core subject in which the students must pass. After Grade nine, students will continue their secondary schooling in their current school. Those highest achieving students may opt to be admitted in one of the 12 academies to complete their upper secondary schooling. The extended stream students will either continue their progression in

vocational education or will be transferred to the mainstream to continue their academic education.

1.4 SECONDARY EDUCATION PHASE

As mentioned above, the overall result of the PSAC examination determines the entry of students to either a state-owned secondary school, a private or a confessional secondary school. Students work very hard, sometimes taking private tuitions at two or in some instances at three places. The only goal for most parents was to obtain a minimum of four A+to maximise entry in one of those 15 National colleges. Under the new educational reform (NYCBE), these schools are converted into 'Academies' (star schools) and will admit students as from Grade 10 (age 14-15) in 2021.

The secondary schools are organised into lower and upper secondary levels. The lower secondary level includes Grades 7 to 9 (ages 11-12 to 14-15). It culminates at the end of Grade 9 with the Grade 9 National Assessment examination which will be replaced by the National Certificate of Education in 2021. The upper secondary level includes Grades 10 to13 (ages 14-15 to 18-19), and students (aged 16+) sit the Cambridge School Certificate (SC) at the end of Grade 11 and the Cambridge Higher School Certificate (HSC) at the end of Grade 13 (age 18+).

Secondary schools have two streams called the mainstream (also called the regular stream) and the extended four-year stream. Students passing the PSAC examination are admitted in the mainstream Grade 7 classes. However, those who fail the PSAC examination the first time are allowed the opportunity to re-sit the examination in November of the same year.Prior to 2013, 77.5 % of the primary school students secured a pass in the CPE examinations and had access to mainstream stream in the secondary schools. After the introduction of the re-sit examinations in 2013, the percentage of students moving to the mainstream increase to 81%.

Students not securing a pass in their re-sit examination also move to secondary schools but in the 'extended' four-year stream. As per the new educational reform (NYCBE), these students will complete the lower secondary level in 4 years as opposed to the mainstream students who will complete the programme in three years (Grades 7,8 and 9) leading to the National

Certificate in Education (NCE) examination at the end of Grade 9. The extended four-year stream students will complete the same programme in four years (Grades 7, 8, 9 and 9+) and will take the NCE as from 2021 at the end of Grade 9+. This NCE examination will be both a certification and selection examination. Since the Mauritian Education System is like the British system, and the post-16 curriculum is designed and assessed by the Cambridge International Examinations (CIE) in collaborationwith the Mauritius Examination Syndicate (MES).

1.5 PROBLEM STATEMENT

Performance in mathematics

Muijs and Reynolds (2001) state that mathematics, though one of the most important subjects in the curriculum of most countries, is also commonly seen as one of the most difficult subjects by students and adults. In many countries, the performance of students in mathematics is a cause of concern. The Mauritian context resonates with the international situation. In 2010, the only time when 15-year-old Mauritian students participated in Programme for International Student Assessment (PISA), results show that 50% of the students were proficient either at level 1 or below[1], like those observed in Chile and Mexico, the two lowest-performing OECD countries (Walker, 2011).

Here, in 2012, 18015 candidates sat for the CPE examination. 82.9 % of those who passed in Mathematics, 31.3% obtaining either Grades A (75 marks or more) or A+ (90 marks or more). In 2015, the same students took the National Assessment at Form 3 (now Grade 9) at the age of 14. Despite the mathematics paper consisting of 27 marks of CPE-type questions, 2500 students scored less than 10 marks out of 100 and 3500 of them obtained between 10 and 20 marks (National Form 3 Assessment - 2015 Report, 2016). It was expected that the students who passed CPE would score at least 27 marks in mathematics. However, this was not the case. Only 42% passed in mathematics and 17% obtained 70 marks or more. The profile of the students not securing a pass in the National Assessment at Form 3 is, however, not known. It is observed that the percentage of students obtaining high marks (75 or more)in Mathematics in Form 3 decreased significantly as compared to CPE.

[1] There are six proficiency levels in mathematical literacy ranging from level 6 (involving advancedmathematical skills and reasoning) through to level 1 (involving routine mathematical tasks and procedures).

Relationship between academic achievement and student engagement

There is a significant bidirectional relationship between academic achievement and student engagement (Gunuc, 2014; Skinner & Pitzer, 2012). The latter is seen as an important predictor of general academic achievement and positive academic outcomes (Fredricks et al., 2004). Research also shows that students with a high level of engagement have higher levels of academic achievement, and those with low levels of student engagement have lower levels of academic achievement (Skinner & Pitzer, 2012). This means that students who passed CPE with A or A+ had high levels of engagement in the primary. Also, Akey (2006) found that prior successful levels of student engagement in mathematics positively influences academic performance in mathematics in later years. Therefore, it is expected that those students who excelled in the end of primary school examination, have the necessary skills and competencies to extend and transform their mathematical knowledge to meet the requirements of secondary school Mathematics and subsequently perform well. However, for some, this was not the case. In 2014, during my EdD assignment 3, I observed that nearly 30% of those with A or A+ in CPE struggled in mathematics as they moved to Grade 7. They either failed or passed with borderline marks. In 2017, during a group discussion at MIE, secondary school teachers expressed concerns about students' progressive disengagement in mathematics. Likewise, during my 28 years of teaching experience (19 years as a mathematics teacher in the secondary and 9 years as a teacher educator), I have noticed that students are increasingly disaffected with mathematics. In the Australian context, a definite decline in school mathematics engagement of many young adolescents is observed when compared to their engagement in primary school (NSW Department and training, 2005).

Transition and student engagement

Way et al. (2011) observe that the greatest decline in engagement in mathematics occurs inthe primary-secondary school transition; and disengagement becomes most pronounced for students at the end of the first year of secondary school. This finding is supported by Balfanz et al. (2007) and Marsh, Martin, and Cheng (2008). While it is agreed in literature thatstudent engagement is dynamic in nature and can change over time (Skinner & Pitzer, 2012), it is however, not sufficient to explain why those students, who excelled in mathematics at the end of the primary examination in particular, experience a decline in performance in Grade 7 and presumably, experience a shift in their engagement in the subject as they move to secondary school. According to Mc Gee et al. (2003), there is an agreement in the literature that an effect of the transition to secondary school is often a decline in achievement. Similarly, in Mauritius, there is a decline in the performance of some high-flyers in Grade 7 even though there is no national examination. For

many students, the primary-secondary school transition proves to be a challenging time for their academic and emotional adjustment to school (Engels et al., 2009). The movement from primary to secondary school brings changes in the school settings that students must cope with and adjust to**.** While for some, the transition occurs smoothly, whereas, for others, it proves to be difficult, challenging, and stressful (Mackenzie et al., 2012). A difficult transition can lead to disengagement, negative attitudes towards school, reduced self-confidence, and reduced levels of motivation, particularly in mathematics (Athanasiou & Philippou, 2009**).** The question arises as to why those students who excelled in mathematics in CPE/PSAC examination are suddenly at risk of disengagement as compared to others even if all experience the same situation within the class. What hinders their re-engagement with the subject? According to Martin and Marsh (2009), students who have academic buoyancy or everyday resilience, the resources they can access to help them bounce back from setbacks and failures and constructively re-engage with challenging academic tasks (Skinner & Pitzer, 2012). Mauritius is a multicultural island with diverse types of schools and student profiles. However, in the local context, research in students' mathematics engagement is scant. It would be vital to understand, from the students' perspective, the contextual factors that impede in building academic buoyancy inthe context of transition.

For Cantley et al. (2020), "*the transition from primary to secondary education tends to have deleterious effects on student achievement and motivation in mathematics, and these effects have been significantly linked to lack of curricular and pedagogical continuity at transition*" (p. 140). In Mauritius, despite that NCF secondary (2016) caters for curriculum continuity across grades by organizing the topics in a spiral manner, some new topics like algebra, sets and integers (negative numbers) are introduced in Grade 7. A drastic leap between primary and secondary school mathematics is noted expecting students of abstract thinking leading toa 'critical discontinuity' (Tilleczek & Ferguson, 2007) in the curriculum. In addition, Lee (2014) found that understanding integers and the ability to use them fluently in calculations iskey for learning algebra. The lack of understanding of the new topics could affect student engagement in the subject and hence resulting in the low performance of the students. Also, there could be other factors that mediate academic outcomes and student engagement.

1.6 THE DECLINE IN STUDENT ENGAGEMENT IN MATHEMATICS INSECONDARY SCHOOLS

In a recent focus group discussion carried out by the Mauritius Institute of Education (MIE) with Mathematics educators, the latter mentioned that students in secondary school do not engage in mathematics. Consequently, there is a decline in performance at Grade 9 national examinations. Furthermore, there has been a drastic reduction in the number of students enrolling for 'Additional Mathematics' in Grade 10. McPhan et al. (2008), found that students attribute their lack of ability (low self-efficacy) and lack of relevance as reasons for not continuing higher level of mathematics. In the local context, students do not choose 'Additional Mathematics' may be because the pass rate is low at Grade 9 and the discourse atschool relative to the difficulty of the subject. As a former mathematics teacher, I have seen colleagues discouraging students to enroll for 'Additional Mathematics'.

For Balfanz et al. (2007), many students begin a period of disengagement from school in the lower secondary. Gunuc (2014) investigated the relationship between student engagement and academic achievement. Data were collected using the Student Engagement Scale and Demographic Variables Form from 304 students. He found that there is a significant relationship between academic achievement and student engagement. The results also indicated that students with a high level of engagement had higher levels of academic achievement, and those with a low level of student engagement had lower levels of academic achievement (ibid).

Furthermore, according to Klem and Connell (2004), students with high levels of engagement were 74% more likely to do well on attendance and achievement. On the other hand, it is expected that students who enter secondary schools with A+ or A in Mathematics have the necessary mathematical skills, and this will lead to further success. Still, during my third EdD assignment, I found that some students who obtained A+ or A in Mathematics at CPE level failed in the subject during their first year of secondary schooling.

According to Schechty (2002), students who have entirely disengaged with the school have disruptive or rebellious behaviour in schools. In 2006, Ramharai et al. (2006) mentioned that learner indiscipline has never been a severe issue in Mauritian secondary schools as it is barely mentioned in any educational or policy papers. However, recently Belle (2018)

indicated that lack of learner's discipline is a significant school problem in secondary schools in Mauritius. This matter has attained such a great extent that in the 2019 budget speech, the Prime Minister (also the Finance Minister) announced the recruitment of 'discipline masters' for the secondary schools to contain the problem. Discipline problems and a decline in student performance may be the consequences of the shift in student engagement in secondary schools. It is an appropriate time to research on the antecedents of student engagement, especially in mathematics.

This study focuses on the change in students' engagement in Mathematics after the transition from primary to the secondary, especially those students who scored A or A+ at the end of primary school examinations. Since the focus of this study is on students who did well in the end of primary school examination, a deficit approach towards students' experience is adopted for the study.

1.7 PURPOSE OF THE STUDY

The purpose of this phenomenological study is to explore how students, who performed highly in mathematics in the end of primary school examination, construct the meaning of their experience during transition from primary to secondary schools and its influence on their engagement in mathematics.

1.8 THE RATIONALE FOR THE STUDY

After graduation, I joined a private secondary school in 1993 where I taught mathematics at Higher School Certificate (HSC) level for eight years (students aged 17 to 19). It was a mixed school with students admitted after passing School Certificate (SC) from schools in the region. Secondary schools in Mauritius give much importance to the percentage passes at both SC and HSC levels whereby the quantity of passes is more important than the quality of results. Schools can receive positive or negative publicity (Heubert, 2002) based on the percentage of students passing the examination. Therefore, the performance of students is more than ever an important matter. Many teachers, including myself, have expressed their concern towards the low performance of many students in mathematics after the transition. My concern, as a novice teacher, was the performance of my students hence focusing my teaching on rote learning rather than conceptual understanding.

When I joined state school, in 2001, I was asked to teach mathematics in Grade 7 (the first year of secondary schooling). It was quite a hard task for me, helping the students understand mathematical concepts. I was unaware of the Certificate of Primary Education (CPE) syllabus and was following the prescribed book to teach mathematics to the students. Many students performed very poorly in the final examination. This phenomenon was also encountered by many of my colleagues in the mathematics department. The reason put forward by most of my colleagues was that after the CPE when students spent a full year with high demands placed upon them. They then entered Form I in a secondary school, which was a relative period of rest. There is a lack of expectation and pressure from both parents and teachers, andthere is not much parental involvement in the early years of secondary schooling – hence a generalised drop in performance. This is merely a hypothesis.

I am now a teacher educator. While interacting with secondary educators during school visits, I was both surprised and alarmed to know that the decline in mathematics in Form I continues to exist. Also, students admitted in Grade 7 with A+ are now struggling in mathematics in secondary school. According to the teachers, these students do not have the knowledge and skills to follow secondary mathematics.

There is strong evidence in the literature about the deep insight of transition and the decline in the performance after transiting from primary to secondary in UK. As stated above, two out of five students fail to make expected progress after moving to the secondary (Galton et al., 2000). However, these studies do not provide enough evidence in favour of the current state in Mauritius, where students who obtained high grades in CPE struggle in Mathematics in the first year of secondary school.

This study is relevant as it helps understand the reasons why students who performed highly at the end of primary examination in mathematics experience a dip in performance during the first year of secondary school. The recommendations of this research, as depicted in chapter 5, might be helpful to inform policy about the factors facilitating or inhibiting student's engagement in mathematics and the mechanisms through which this occurs. Furthermore, it will help students adjust to the new school environment and facilitate their smooth transition from primary to secondary school.

1.9 AIM OF THE STUDY

The study aims to investigate students' perspectives of their experience on and engagement in Mathematics during the transition from primary to secondary school, and the factors that influence their engagement. The study will focus on three different types of engagement- cognitive, emotional, and behavioural – as identified by Frederick et al. (2004).

The purpose of the study is to have a deeper understanding of the shift in students' engagement in Mathematics and to establish more effective and efficient teaching methods for Mathematics in order to engage students and to produce a higher quality of secondary schooling for those students. This research will also have the purpose of informing stakeholders about the factors impacting on students' engagement during the primary- secondary transiting and to understand learners better to improve the teaching and learning ofMathematics at the secondary level.

I set out with the intention to explore the following areas of concern.

1. Lower secondary school students' perception and their experiences of primary-secondary school transition.
2. The effect this transition has on students' mathematics engagement.

The research questions will be summarised at the end of the literature review, whereby the literature has been discussed, which will inform my thinking and understanding of transition and student engagement in mathematics.

SUMMARY

In this introductory chapter, I provide the context in which this study is framed. I described the development of the educational system from the colonial period to date. A description of the different educational reforms is given. The rationale of the research is provided. This research focuses on the change in engagement in the mathematics of high performing students as they transition to secondary school. The aim is to identify, from the students' perspective, the antecedents of students' engagement in mathematics and the mechanism mediating it.

OVERVIEW OF THE DISSERTATION

Chapter 2 reviews literature on transition, provides a definition of transition and discusses the different models of transition. The continuity/discontinuity paradox is discussed together with the five bridges the facilitates the transition to secondary. Furthermore, literature is reviewed on the construct of students' engagement providing its definition, describing the different models and the factors mediating its different components.

Chapter 3 provides the epistemological and methodological stances. A description of the phenomenological study design is provided. Focus group discussions are conducted using a purposive seeking Grade 7 students' perception of the factors that influenced the change in their engagement in mathematics.

In chapter 4, the findings of the study are presented.

In chapter 5, the findings are discussed in relation to the literature.

Finally, Chapter 6 provides my contribution to knowledge, the conclusion, recommendation for further study and the limitations of this study.

Chapter 2: Literature review

2.0 INTRODUCTION

This chapter aims to review literature relevant to student engagement and primary-secondary school transition. Firstly, the research questions are formulated using insight from the literature. Secondly, frameworks of both engagement and transition adopted in the study are discussed. The main aim of the study is to investigate students' engagement in Mathematics during their transition to secondary school and the factors that influence their engagement. Student engagement is one of the most critical concerns in education (Jang et al., 2010). Individuals who are highly engaged are more likely to excel academically (Wang & Eccles, 2013). Engaging with the literature has had a crucial contribution to my understanding of the concepts related to student engagement in mathematics. It has also enabled me to acquire deeper insight into the continuities and discontinuities in the curriculum, pedagogy, andsocial interactions during the transition period. Research on the influences of school and psychosocial factors on student engagement and achievement in mathematics through different mediating mechanisms is also included. Although substantial research has been carried out on engagement in the tertiary sector (e.g., Kahu & Nelson, 2018; Kuh et al., 2005), this study focuses on understanding students' engagement in mathematics within secondary school in the context of transition.

2.1 FORMULATION OF RESEARCH QUESTIONS

It is suggested in the literature that certain students are at risk during the primary-secondary transition period and eventually experience a decline in performance in Mathematics. What is not explained is the reason why some students who worked well in the end of primary examination experience a decline in mathematics performance after moving to the next stage. Findings from the literature suggest that performance of students is directly linked to students' engagement in mathematics. The latter is multifaceted which in turn is mediated by emotion, self-efficacy, belonging and wellbeing (Kahu & Nelson, 2018). Central to understanding the topic of interest are the students' behavioural engagement in class and the social interactions of those students with their peers and teachers particularly the mathematics teachers.

All the studies on student engagement are either carried out in the western (European and American) contexts or Australian contexts. The findings of these researchers are claimed to be universally applicable. However, questions can be raised to whether those findings are consistent in a small island state like Mauritius. Furthermore, it would be interesting to know whether the findings are contextually sensitive.

As students transition from primary to secondary school, they experience changes in their physical environment but also changes related to academic and social factors (Akos & Gallassi, 2004). These changes influence students' adjustment to school. The disconnect or limited overlap between students' pre-secondary school expectations and their lived experience after the transfer is stressful to the first-year students which in turn, affects their psychosocial factors (emotion, self-efficacy, belonging and wellbeing) (Kahu & Nelson,2018). In the literature, this disconnect is termed as 'cultural shock' (academic, social, and emotional) (Risquez et al., 2008). In the local context, however, to understand the factors that influence this disconnect, it is essential to have a deep understanding of the students' experiences of the transition from primary to secondary. Hence, Research Question 1 (RQ1) isformulated to capture the meaning students' construct about their pre-secondary school expectations and their experience of transition from primary to secondary school.

RQ1: How do first-year secondary school students perceive and experience transition from primary to secondary school?

The participants selected for the present study were those who worked well in the end of primary school examination but experienced a significant decline in their mathematics achievement during the first year of secondary. This means that the primary-secondary transition may have an effect on their achievement. Prior research shows that there is a reciprocal effect between mathematics achievement and student engagement (Reschley & Christenson, 2012). This literature suggests that student mathematics engagement is an antecedent but at the same time a consequence of mathematics achievement. The literature also suggests that there is an effect of transition on student engagement with mathematics. Therefore, in the context of this study, it would be essential to have deep understanding of the mechanism through which the experience of transition influences student engagement, particularly on Mathematics, hence the Research Question 2 (RQ2).

RQ2: How does students' perceived experience of the primary-secondary transition influence student mathematics engagement?

To answer the two research questions, it is essential to investigate the construct of students' engagement in general and student mathematics engagement in particular together with the construct of transition. In the following sections, a review of literature is provided on the two constructs.

2.2 WHAT IS STUDENT ENGAGEMENT?

I start this review of literature by understanding the meaning of student engagement (SE). Reschly and Christenson (2012) report that the origin of interest in engagement is, at least in part, motivated by the desire to improve student learning. Many researchers have studied engagement within the school context either focusing on school engagement (Skinner et al., 1993) or academic engagement (Appleton et al., 2008; Suarez-Orozco et al., 2009) or to classroom or class activities termed as classroom engagement.

Although historically it is known that student academic success is a combination of school factors and students' personal characteristics, there is a gap in our understanding about the process through which these factors interact to bring about that success (Kahu & Nelson, 2018). Astin (1984) offered a solution by suggesting that student involvement was themechanism that facilitated the interaction between school and student characteristics. The term student engagement was later used in place of 'student involvement'.

But the question arises as to what student engagement is. Yazzie-Mintz and McCormick (2012, p. 745) state that "*the question 'what is student engagement?' is deceptively complex*". There has been varying conceptualizations of students' engagement by different researchers. For Reschly and Christenson (2012), for example, "*student engagement is the glue or mediator, that links important contexts – home, school, peers, and community to students and in turn, to outcome of interest"* (p. 3). Kuh (2001) conceptualised student engagement as the time, and energy students spend in educational activities and the institutional efforts for effective use of educational practices. Whereas Zyngier (2008) suggested that student engagement encompasses a wide range of constructs that helps understand students' behaviours, thinking and dispositions highlighting an internal psychological process unlike the behavioural perspective of Astin. Barkley (2009) concurred with the idea of Zingier but also considered

student engagement as a function of both student motivation and active learning. Within the context of college classroom, she proposed a definition of student engagement as follows:

> Student engagement is a process and a product that is experienced on a continuum and results from a synergistic interaction between motivation and active learning.
>
> (Barkley, 2009, p. 8)

These ideas result from the assumption that student engagement can be improved via pedagogical and other interventions. In line with Barkley's idea, Skinner and Pitzer (2012, p. 22) view engagement as the *'outward manifestation of motivation'*.

In a critical analysis of literature, Kahu (2013) found that there are three approaches to student engagement in the literature. These approaches are (a) behavioural following Astin's work (b) internal psychosocial process (with a multidimensional view of engagement) and (c) sociocultural (stressing on the sociocultural perspective of student engagement). Using transition theory and a cultural lens, Kahu & Nelson (2018) refined the framework, proposed earlier in 2013 by Kahu, by integrating the three identified approaches to student engagement. Kahu and Nelson (ibid) underscore the multidimensional view of student engagement.

Despite that various conceptualisation of student engagement exist in the literature, the multidimensional perspective of the construct is widely accepted. Trowler and Trowler (2011) and Appleton (2008) argue that while there is consensus about the multidimensional nature of the construct, there is less agreement on the number and types of student engagement components. Nonetheless, Newmann, Wehlage and Lamborn (1992); Marks (2000); Fredericks et al. (2004); Skinner et al. (2009) and Reeves and Tseng (2011), all agree that student engagement is a multidimensional construct consisting of three components namely behavioural, emotional (or affective), and cognitive engagement. Illustrating the indicators of the three components, Skinner and Pitzer (2012) state that:

> The behavioural dimension of engagement includes effort, intensity, persistence, determination, and perseverance in the face of difficulties, emotional or affective engagement includes enthusiasm, enjoyment, fun, and satisfaction, and cognitive engagement encompasses attention, concentration, focus, absorption, "heads-on" participation, and a willingness to go beyond what is required.
>
> (Skinner & Pitzer, 2012, p. 24)

More recently, others have proposed additional dimensions of engagement. For example, Linnenbrink-Garcia, Rogat and Koskey (2011) expanded on this tripartite conceptualization of

engagement to include a social-behavioral dimension of engagement, relating to students' affect and behavior during collaborative group work. Whereas Reeves and Tseng (2011)proposed agentic engagement as an additional dimension to address how students proactively contribute to the instruction teachers provide. Hence, indicating that student engagement is bidirectional that is, teacher engagement and student engagement influence each other. On the other hand, Appleton et al. (2008) and Christenson, Reschly and Wylie (2012) suggest academic engagement as a fourth component. In any case, advocates of tripartite and four subtypes conceptualisation of students' engagement construe that the subtypes are interrelated and not disjointed. Nonetheless, as described by Pedler et al. (2020), the advantage ofconsidering the multidimensional definition of SE is that:

> This multidimensional construct of student engagement is considered more malleable and responsive to contextual change and thus combines the three dimensions for the purpose of improving student learning and achievement outcomes more holistically
>
> (Pedler et al., 2020, p. 50)

My study is contextualized in a rich multicultural context with a diversity of school and student profile. Therefore, due to its malleability and applicability to different cultural contexts, the multidimensional perspective of the construct of student engagement is thought to be relevant, appropriate, and adapted to study student mathematics engagement in the context of primary-secondary transition in a small island state. Hence, to understand the reasons behind a change in student engagement in mathematics during the primary-secondaryschool transition, this study adopts Fredricks et al.'s (2004) tripartite definition of the construct consisting of behavioural, emotional, and cognitive dimensions. Furthermore, I find Kahu and Nelson's (2018) framework to be relevant in helping to design my study in line with its statedfocus of exploring and documenting how student mathematics engagement may evolve during transition.

2.3 KAHU AND NELSON'S (2018) CONCEPTUAL FRAMEWORK OF STUDENT ENGAGEMENT

Kahu and Nelson's (2018) conceptual framework of student engagement is adopted for purpose of this study. However, Kahu and Nelson (2018, p. 1) reject student transition theory considering it as "*limited because it depicts differences between students and institutions as both transient and temporal*". They added a sociocultural, and holistic perspective to Fredricks et al. (2004) three dimensions of student engagement (behavioural, emotional, and cognitive). This framework is therefore sufficiently broad to be applied in a rich multiculturalcontext like Mauritius. However, to understand students' adjustment during the primary- secondary school transition period another framework namely U-curve theory of adjustment (Risquez et al., 2008) is also adopted.

In addition, Kahu and Nelson (ibid) state that "*student engagement occurs dynamically within an educational interface at the intersection of the student and their characteristics and background, and the institution and its practices"* (p. 59). While it is acknowledged that each student will experience their education differently, the educational interface provides a psychosocial space within which students experience their education. It is also a sensible way of representing the complex interactions between students' structural and psychosocial factors and institutions' structural and psychosocial factors and how these interactions influence student engagement. Therefore, this conceptual framework highlights that student engagement is not influenced by just the student's interests and motivation or just the learning environment or classroom climate but a combination of all. Moreover, the framework highlights that individual students' engagement is dynamic in nature implying that it is situational and can change over time. This is particularly relevant to the currentstudy as the participants experienced a sudden decline in their mathematics performance during the primary-secondary transition period.

While there is a general tendency to blame students for their low performance, this framework indicates that they may not be solely responsible. That is, student engagement is the responsibility of all stakeholders (the students, teachers, school, and policy makers). Atthe core, this framework indicates that there is a range of factors influencing student mathematics engagement and that there is a complex interplay between those factors.

Moreover, the framework recognizes the importance of student agency. Students make decisions in their learning process which affect their engagement with mathematics. In this study, this conceptual framework is believed to be an important tool to understand theinterplay between various factors to influence students' perceived experience and engagement in mathematics during the primary-secondary school transition.

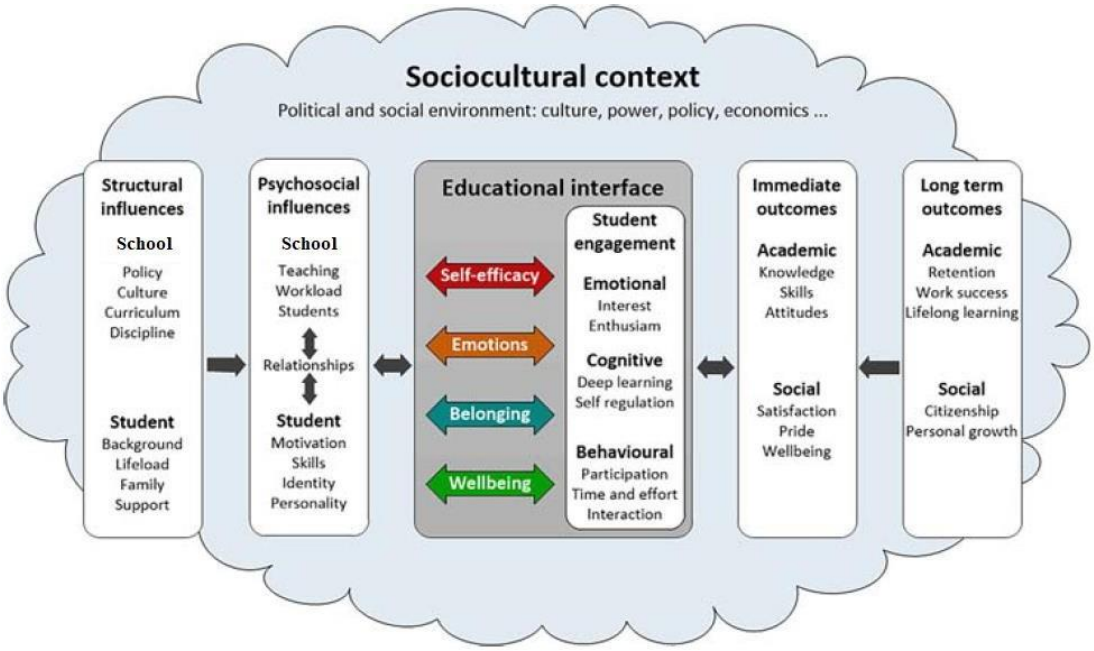


Figure 3: Kahu and Nelson's (2018) Conceptual Framework for Student Engagement

Furthermore, this conceptual framework privileges both psychological and sociological factors that influence student engagement hence calling these as psychosocial influences. For example, in Mauritian secondary schools teacher-student and peer-student relationships couldbe key factors in influencing student engagement within the mathematics classroom. Inaddition, Kahu and Nelson (2018) propose four psychosocial constructs that are critical mediating mechanisms influencing and influenced by student engagement at a personal level. It also underscores that there are numerous ways of improving student engagement. Looking at student engagement from a sociocultural point of view, the educational interface is introduced as a metaphor to understand the individual student's psychosocial space with the institutional and student factors. For Kahu and Nelson (ibid), it is important to understand the interaction between the various factors that influence student engagement to improve student outcomes. They propose four 'psychosocial constructs' or 'mediating mechanisms', namely, academic self-efficacy, emotions, sense of belonging, and wellbeing that influence students' behavioural, emotional, and cognitive engagement (Fredericks et al., 2004). Student

engagement, in turn, influences students' immediate and long term outcomes. It would be interesting to understand which of the four psychosocial constructs are particularly important for students aged 11-12 in the local context.

In a literature review carried out by Gibbs & Poskitt (2010), they construe that prior research on student engagement is divided into psychological and sociological, which is consistent with Kahu & Nelson (2018). The psychological literature favours motivation, attitudes and thinking as promoting student engagement, whereas sociological literature focuses on wellbeing and belonging as antecedents of learning. The students move between different levels of engagement, and the changes are caused by internal factors like their perception of self-efficacy, motivation, and interest in the subject area as well as external factors such asthe nature of teaching and learning and students' experience at school (Tsai et al., 2008). Gibbs & Poskitt (2010), also found that students who are poorly engaged do not necessarily lack the features which influence student engagement instead they are in a qualitatively different state than those who are highly engaged. While there is acknowledgement in the literature about the influence of both student and institutional factors on student engagement, how these factors interact is not known. Kahu & Nelson's framework, therefore, provides insights on the mediating role of student engagement linking relationships at school and institutional characteristics to academic achievement.

It is known that different factors affect student engagement especially that of mathematics. In the context of this study, Kahu & Nelson's conceptual framework is a useful tool to understand the factors that influence how students engage with mathematics as they move to Grade 7. It is also a beneficial tool for identifying interventions intended to improve student engagement in mathematics during the transition period. However, one critical point about the framework is that each student would be in a different 'psychosocial state' and would experience their education differently. As such, the four mediating mechanisms listed inKahu & Nelson's framework may just be a representative of the types of influences rather than an exhaustive list. Other variables might be equally crucial for those young adolescents in Mauritius.

2.4 WHAT IS TRANSITION?

A brief introduction of the sub-sections discussed below would be useful.

2.4.1 THE CONCEPT OF TRANSITION

A review of literature on the concept of transition is considered necessary to obtain the theoretical insight to discuss the findings and to answer the research questions in this study. According to Bridges (2004), movement or change from one context to another and transition, are often used interchangeably. Similar conceptualisation exists, in the Mauritian context, of the primary-secondary school transition. On the other hand, Galton et al. (2000) highlight that, in England, the term transfer has been used to describe the movement from oneschool to another. However, in Mauritius, the term transfer means moving from one secondary school to another or from one primary school to another.

Bridges (1995) differentiated between the terms change and transition. For him, change is situational and relates to an event that is happening whereas transition is the state that change puts people into. This study relates to Bridges' understanding of change as the transfer or movement of students from primary to secondary school. This movement happens at one point in time, at the beginning of the year when students leave primary school and are admitted to Grade 7, the first year of secondary school. Contrary to Kahu & Nelson (2018), who conceptualised transition as temporal occurring at one point in time, Bridges (1995) conceptualised transitionas the internal psychological process that individuals go through during their adjustment tothe new environment. Similarly, Jindal-Snape (2016) has defined transitions as the ongoing psychological, social, and educational adaptations due to moving between, and within, schools. This conceptualisation has value for the current study. Therefore, for the purpose of this study, the term 'transition' is aligned to Jindal-Snape (2016) definition of transition thatis the psychological, social, and educational adaptation of students as they cope and adjust to their new environment.

Various transitions are experienced by individuals throughout their academic life, with the first transition occurring when they enter pre-school. For this study, however, the focus is on the transition students experience after moving to secondary school. According to Meleis et al. (2000), two transitions are coinciding during this period - one is organisational that is from primary to secondary and the second is developmental where students are transitioning from childhood to adolescence. While for some, the transition occurs smoothly, whereas for others, it proves to be difficult, challenging, and stressful (Mackenzie et al., 2012).

On the other hand, as far as mathematics is concerned, Gueudet et al. (2016), focused on two specific kinds of transitions after moving to secondary school. Firstly, the transition as change(s) in mathematical concepts and their learning and secondly, "transition experienced by students as they move between social groups or contexts with different mathematical practices". In order to understand student engagement during the transition period, it can be argued that both types of transitions need considerations.

Focusing on transition from secondary school to university, Burnett (2007), in his Student Experience model, described the existence of a pre-transition phase (a pre-secondary phase) where students start thinking about the next stage. While the context is different as compared to the current study, this insight might be relevant to the primary-secondary transition as well. Therefore, in the next section, literature on the pre-transition phase is reviewed.

2.4.2 THE PRE-TRANSITION PHASE

In order to understand students' experience during the transition from primary to secondary, it is essential to comprehend the psychological state students are in prior to moving to secondary school. Menzies & Baron (2014) and Burnett (2007) describe this phase as a pre-transition phase where primary students start thinking about secondary school and may form expectations before, they move to the next stage. Authors like Galton (1999), Akos & Gallassi (2004) and Kirkpatrick (2004) assert that some students, in the quest for a fresh start, making new friends or having new academic experiences, look forward to joining the secondary school and state a penchant towards secondary school as compared to primary school. Waterset al. (2019, p. 153) found that "*students who expected a positive transition were more than three times more likely to report an actual positive transition experience*".

However, for Tilleczek et al. (2010), there exists an "*emotional paradox*" for students. According to them, "*students are both excited and anxious, both doubtful and hopeful*" (p. 17). On the other hand, Akos & Galassi (2004) claim that there is an effort from parents and primary school teachers to prepare students, for the transition to the new environment. But both parents and primary school teachers are mostly unaware of the secondary school environment and curriculum, and despite their highest motives, they might trigger the development of fictitious images about secondary schooling in students (Akos & Galassi, ibid). Often, students' perceptions of what is involved at secondary school are presented

inaccurately by parents, relatives and often by primary school teachers (Ashton, 2008). Akos & Galassi (2004) stated that:

> Despite their best intentions, parents and primary school teachers are generally unfamiliar with the secondary school environment and curriculum and attempt to prepare primary students for secondary schooling may result in preparing them for an environment that does not exist.
>
> (Akos & Galassi, 2004, p. 220)

This might also be the case for Mauritius. Mauritian students might have a wrong image of secondary schooling before moving to this level. Questions will be asked during the interview pertaining to students' perception of the secondary school before moving. Denovan and Macaskill (2013) suggest that these students experience disappointment and greater stress when the school does not meet their expectations. Driver (1983) found that students' preconceived ideas about secondary school influence their interpretation of their new learningexperiences, and it is precisely these preconceived ideas that serve as epistemological barriersfor their future progress. Understanding the factors that promote or inhibit smooth transitions is important because poor adjustment to school during the transition is linked to poor mental health and poor wellbeing (Lester, Waters & Cross, 2013). The latter is one of the four pathways in Kahu and Nelson (2018) framework through which institutional and studentfactors interact to influence student engagement.

2.4.3 WHAT DOES A SUCCESSFUL TRANSITION LOOK LIKE?

Evangelou et al. (2008) identified five aspects of successful transitions. For them, the definition of a successful transition for children is that they have:

- developed new friendships which improve their self-esteem and confidence;
- settled so well in school life that they caused no concerns to their parents;
- shown an increasing interest in school and schoolwork as compared to primary school;
- got used to their new routines and school organisation with great ease; and
- experienced curriculum continuity.

Rice et al. (2011) followed a group of 2000 students in the UK who transition from primary to secondary school. Students, parents, and teachers were the participants in this study. The researchers collected data about wellbeing, academic achievement and perception of the school, and students' relationship with their friends and teachers. They found that for a

successful transition to secondary school, a student must function well in two areas: firstly, being academically and behaviourally involved in school and secondly, having a sense of belonging to the school. For Mathews (2012):

> Successful transitions can lead to the enhancement of self-esteem, positive self-identity and the development of emotionally healthy and resilient children and young people.
>
> (Mathews, 2012, p. 11)

In conclusion, for a successful transition, students must function well both academically and behaviorally. So far, we have seen that during the primary-secondary school transition students experience two different kinds of transitions: changes in mathematical concepts and their learning as well as changes in context and their mathematical practices. However, one factor that can impact students' transition to secondary might be the mismatch between their perception of the school before and after moving.

2.5 U-CURVE THEORY OF ADJUSTMENT

Initially derived for a cross-cultural transition of students by Lysgaard, it was adapted by Risquez and colleagues in 2007-2008 for the transition to higher education. Berardo (2007, p.7), however, criticised the framework for 'being too simplistic, not explaining the how and why of the emotional adjustment challenges and suggesting a single pattern of adjustment for all'. However, the strength of the framework, as described by Berardo are:

> Easy to understand and identify with, provides a clear visual that's easy to remember and gives participants a model and vocabulary to help them make sense of their and family members' experiences.
>
> (Berardo, 2007, p. 11)

The curve, in the figure below, shows the changes in the degree of students' adjustment to their new environment during the different phases as described by Risquez et al. (2008). It would be interesting to learn whether the findings of the current research resonate with this framework.

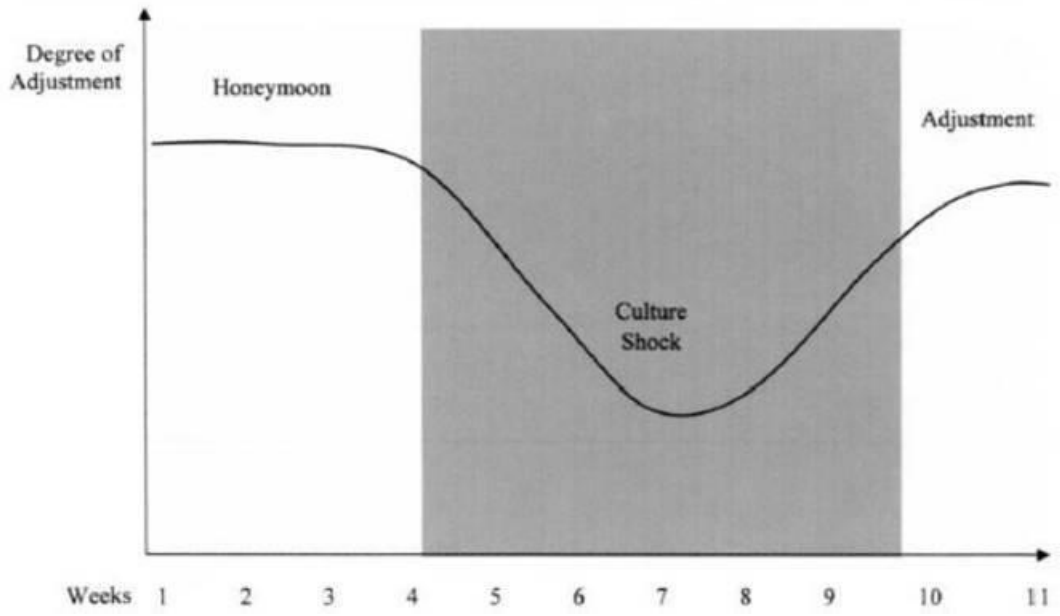


Figure 4: U-Curve model of adjustment Source: Risquez, Moore and Morley (2008)

An explanation of each transition phase will give new insights into the adjustment of participants to the new environment. As such each phase is discussed in the subsequent sections.

2.5.1 HONEYMOON PHASE: THE EXPERIENCE OF A CULTURAL INFATUATION

In their theory, Risquez, Moore and Morley (2008), included a 'honeymoon' phase where students are excited and fascinated with their new environment. They experience a period of "cultural infatuation" (Black & Mendenhall, 1990, p. 226). This is relevant to the current study as students' excitement to join the new cultural setting of the secondary school might cause an initial cultural infatuation. According to Risquez and colleagues (ibid), the experience of felt adjustment may be satisfactory but superficial.

Moreover, this period is short-lived lasting for about 3 to 4 weeks. However, no research has been carried out in the local context to confirm or contradict this fact. The findings of this current study can fill this gap. For the current study, the 'Honeymoon' phase is in line with what Bridges (2009) described, students experience a period of disillusionment and frustration or a

‘Culture Shock’ where students start feeling stressed, boredom and high level of anxiety after realising the unfamiliar nature of the environment. A similar situation might exist in the Mauritian context where students realise the change in their environment with few, or no friends and the high academic demands of the secondary school go through a culture shock.

2.5.2 CULTURE SHOCK

Risquez et al. (2008), further differentiated between three different types of shocks that students experience during the ‘Culture Shock’, namely, academic, social, and emotional shock. For this study, the three types of Cultural Shock may help understand the challenges encountered by high achieving students while making the transition to secondary school.

(i) Academic Shock: Mismatch Between Students’ Prior Expectations and AcademicDemands After Moving to Secondary School

‘Academic Shock’ is the negative consequence of academic changes or ‘critical discontinuities’ (Tilleczek & Ferguson, 2007) in curriculum, pedagogy and the ways of learning that students experience after moving to the next stage. A mismatch is caused by the experience of the critical discontinuity between students’ expectations before and their experience after joining secondary school. This experience of a mismatch or a lack of overlap (Kahu & Nelson, 2018) between students’ expectations developed before moving to secondary school and their lived experiences after transfer to the next level. Due to the unforeseen academic demands of secondary school, students feel stressful (Mackenzie, 2012; Tilleczek & Ferguson, ibid; Vinson, 2006) and anxious. Students find it challenging to shift to the patterns of behaviour necessary to cope with the new situation that is both unfamiliar and challenging. Participants in the study of Risquez et al. (2008) reported havinga sense of unpreparedness for educational demands and having a fear of failure where they feel that everyone else is doing better than them. In Mauritius, students are prepared to pass the end of the primary examination, but there are doubts whether these students are prepared to face the academic demands of secondary school. The findings of this study will help shed light on the situation.

(ii) Social Shock: A Feeling of Isolation and Alienation

While many seem to succeed in making friends and developing a sense of community, Risquez et al. (2008) found that some students felt isolated and alienated. They were unable

to mingle with social groups. The results suggest that those students who are unable to integrate social groups are bound to experience 'Social Shock" (Risquez et al., ibid).

(iii) Emotional Shock: A Sense of Disillusion and Disenchantment

As seen earlier, students have developed expectations about the secondary school they are about to join. Students are both excited and anxious after transfer. This polarity in the feelings of students is termed "emotional paradox" by Tilleczek and Ferguson (2007). The limited overlap between their expectations and their experience of transition also causes an emotional shock and students experience a sense of disillusion and disenchantment with school (Risquez et al., 2008). This phenomenon is termed as 'fresher myth' by Baker and Siryk(1985). In the context of the present study, it can be argued that, during the primary-secondary school transition, loss of friends, changes in curriculum, changes in teachingpractices, relationship with teachers might be some of the factors influencing students emotionally.

2.5.3 ADJUSTMENT PHASE

According to Risquez et al. (2008), in the adjustment phase students start to adapt to their new environment and ultimately, most of them effectively adjust to the new environment. However, the question arises as to what triggers the ascent in the adjustment curve following the "Culture Shock" as described by Risquez and colleagues. Margetts (1999) suggests that students must make sense and adapt to these discontinuities in the environment, educational practices, and social structures. However, this does not explain how or through what mechanism(s) is it possible to make that sense. Hanewald (2013), on the other hand, clarifies that students' sense of belonging and their socio-emotional functioning are essential aspects in their adjustment to their new school. Bean & Eaton (2002), in their psychological model of student retention, report that as academic and social self-efficacy increases, coping strategies are developed in order to adapt to the new environment and an internal locus of control is adopted. This results in an increased level of confidence and motivation and students take the situation to be less stressful. In other words, if teachers boost the self-efficacy of students, students become more confident and are motivated enough to adopt coping strategies in order to adapt to the new environment. The above literature underscores two critical aspects of the adaptation process. Firstly, self-efficacy of students is an important mediating factor in the adjustment to the new environment and secondly, the role of the teacher in students' adaptation.

2.6 CONTEXTUAL FACTORS INFLUENCING STUDENT ENGAGEMENT

According to Dunleavy, Milton and Willms (2009), learning is affected by three contextual factors, namely, community, school, and classroom factors. For Murray et al. (2003), students, teachers and the community engage in schools when schools are engaging place to be. Even if authors have emphasised the importance of the three contextual factors, which remain true for the Mauritian context, school and classroom factors are found to be more relevant to answer the research questions in my study. Kaplan (2007), on the other hand, further divide the school context into three climates, namely, school climate, social climate,and instructional climate. In the subsequent sections, these are discussed in more details.

2.6.1 SCHOOL CLIMATE

The more recent concept of student engagement has placed much interest in the influence of school context, more specifically in the relationships between school climate and students' experience of engagement (Dunleavy, Milton & Willms, 2009). Some researchers mentioned that school climate or atmospheres such as having an ethic of caring and supporting relationships, sense of respect, fairness, trust, and a robust disciplinary environment, are some of the factors that support active student engagement (Dunleavy & Milton, ibid). Konold et al. (2018) used an Authoritative School Model to define school climate. According to them, school climate refers to the patterns of daily social interaction in the school that distinguishes it from other schools. And a positive school climate require high expectations and a supportive environment. Lee (2012) highlight that a positive school climate leads to higher levels of student engagement. Therefore, students' experience of high expectations from school staff and support (respects from adults and the willingness of students to seek help) might be a critical for them to engage with mathematics.

However, studies on student engagement conducted locally, for example, Roopchurn et al. (2019); Santally et al. (2020) and Rajabalee et al. (2020), are primarily related to online learning. In Mauritius, the lack of research on student engagement, especially in the secondary school context, makes it difficult to confirm the results from the literature. Nevertheless, discussion about the different factors influencing student engagement will enrich our understanding of the relationship and interaction between them. Hence, facilitating

analysis of data in relation to students' experience of mathematics and its effect on student mathematical engagement.

Insights obtained from literature and Kahu and Nelson's (2018) framework of student engagement will help in the designing of the interview questions in relation to the structural influences on students engagement and the psychosocial constructs like students' sense of belonging to school and their wellbeing in the context of transition.

2.6.2 SOCIAL CLIMATE

During adolescence, students go through a multitude of changes (physically, emotionally, socially, and behaviourally). During this period, meeting the students' psychological needs (competency, autonomy, and relatedness) are becoming increasingly important (Ryan &Deci, 2000). Consistent with Kahu and Nelson's (2018) framework of engagement, Deci et al. (1991) argue that engagement may be enhanced when young adolescents' basic and developmental needs are met. However, a developmental mismatch may occur if the social environment does not change to meet the students' growing needs (Chu & Powers, 1995) especially in the context of primary-secondary school transition. In the same vein, Murray et al. (2003) argue that a mismatch between primary and secondary schooling and students' developmental needs is caused by a poorly managed primary-secondary school transition resulting in a decline in students' achievement. It remains to be seen whether secondary schools in Mauritius provide the environment conducive for the developmental needs of adolescents mainly as they transition from the primary.

As far as mathematics is concerned, Durksen et al. (2017) highlight the importance of relatedness in mathematics teaching. They assert that student's need for relatedness may be satisfied through teacher-student interactions in the classroom, especially when teachers respond to student's agentic actions like help-seeking by reinforcing, scaffolding, and adapting instructions during the critical transition period. Nyadanu et al. (2015) and Kahu & Nelson (2018) underscore the significance of teacher-student relationship to student engagement. Therefore, in the context of this study, the nature and quality of interaction between teachers and students are fundamental to understanding student mathematics engagement and to answer RQ 1. Hence, teacher-student relationship is discussed in the next section.

2.7 TEACHER-STUDENT RELATIONSHIP

Xerri et al. (2018) highlight that a good teacher-student relationship impact positively on student engagement. Reeves and Tseng (2011) further elaborate that there is a reciprocal influence between student engagement and teacher's interpersonal style within the class. Therefore, the above literature indicates that there is a bi-directional effect between teacher-student relationship and student engagement. Simply put, Reeve and Tseng (ibid) state that levels of engagement rise and fall in response to lessons that are challenging against too easy and varying levels of teacher expression (rapport with the students) and his instructional support. But also, students' engagement influence that of the teacher. Reeve and Tseng (ibid) define this "students" constructive influence into the flow of the instruction they receive as agentic engagement. So, for this study, investigating how mathematics teachers and students mutually influence each other's engagement will be critical to answer RQ 2.

Kahu and Nelson's (2018) conceptual framework highlights the psychosocial influences onstudent engagement. In this study, data will be analysed in relation to the four psychosocial constructs (self-efficacy, emotion, belonging and wellbeing) to understand through what mechanism this influence might happen.

Erogan and Kurt (2015) conducted a content analysis of 54 studies and found that teacher's beliefs and teacher's expectations of the students influence their ability to create an interactive classroom environment. Teachers' beliefs and expectations of students may, in turn, be influenced by contextual factors. For example, Sridar and Javan (2011) highlight that teachers are evaluated based on their classroom management. It may influence their choice ofclassroom management style. In addition, Ekici (2004) found that first year classroom teachers prefer mostly the authoritative (interventionist) classroom management style. These findings are key for my study. In the local context, teachers in general and mathematics teachers in particular, might adopt a similar classroom management style which impact on their relationship and hence on student engagement. However, this study is designed from thestudents' perspectives, giving voice to the students experiencing the mathematics class in the context of transition. The above argument foregrounds one limitation of this study, namely, that teacher's beliefs and expectations, and the influence this has on their choice of classroom management approach can only be inferred from the responses of the participants.

A key component of the teacher-student relationship is teacher support. In the next section, the literature on student support is reviewed to have a deeper insight into its influence on student engagement.

2.8 TEACHER SUPPORT

In line with the literature on students' psychological needs, discussed earlier, Klem and Connell (2004, p.262) claim that "s*tudents need to feel teachers are involved with them and that adults in school know and care about them*". In a longitudinal study, Klem and Connell (ibid) examined links between teacher support, engagement, and academic success. They gathered data from 1846 primary students, 2430 secondary students, and teachers from both stages. The results indicate that secondary students with high levels of teacher support were almost thrice as likely to have high levels of engagement and 74% less likely to feel disengaged. Therefore, high levels of teacher support strongly influence secondary students' engagement in school.

Teacher support can take forms like academic or emotional support. Ruzek et al. (2016) studied the association between teachers' emotional support at the beginning of the year and students' behavioural engagement and mastery motivation giving voice to 960 students aged 11 to 17 in the US. The students reported an increase in both behavioural engagement and mastery motivation. Nonetheless, it is known that the participants in the current study struggle in mathematics. It remains to be seen whether teacher emotional support has any effect on their behavioural engagement and motivation. Ruzek et al. (2008), Cooper (2013) and Eccles and Wang (2014), all state that there is an indirect effect of teacher emotional support on students' motivation and engagement. In addition, Wigfield et al. (2006), pointed out that various motivational theories have strong evidence to suggest that teacher's attributeslike care, respect, trust, and empathy are pivotal to students' motivation and engagement. In the same vein and in line with the discussion about school climate, Klem and Cornell (2004) claim that a caring and supportive interpersonal relationship in school, where expectations arehigh, clear, and fair caused students to have a more positive attitude and values towards the school and be more satisfied with the school.

> Students who perceive teachers as a caring, well-structured learning environment in which expectations are high, clear, and fair are more likely to report engagement in school.

(Klem & Cornell, 2004, p. 207)

Furthermore, Klem and Cornell (ibid), obtaining data from both the students and teachers' perspectives, found that students who reported lower levels of teacher support are 68% more likely to be disengaged from school. Consequently, this disengagement from school, in turn, has an adverse effect on students' academic performance and commitment. In sum, the above literature indicate that belonging and wellbeing might be critical variables through which teacher support influence student mathematics engagement. So, this could be explored during data analysis in the current study.

In a study carried out by Allybokus (2015), the Mauritian context, it is stated that:

> Classes are highly teacher-centred, which are influenced by the elitist culture. She highlighted that "this was probably due to the heavy syllabus and the 45 minutes class, which is too short to cater for both, content coverage and individualised attention".

(Allybokus, ibid, p. 147)

Therefore, it is questionable in the context of my study, whether mathematics teachers provide adequate emotional support to enhance their students' behavioural engagement and motivation.

Using stage-environment theory, Patrick, Anderman, and Ryan (2002) highlight the importance of the perception students have of the support of teacher on enhancing their socio-emotional comfort. This fosters the feeling of confidence and self-worth and encourage persistence in times of difficulties. Similarly, Midgley et al. (1989), mentioned that if students perceived their teacher to be very supportive, they have higher levels of interest and value, and enjoy their schoolwork and have greater expectations of success (Goodenow, 1993). In addition, Lee and Smith (1993) indicated that the simultaneous presence of teacher support and instructional approaches focusing on learning with high expectations have far greater combined effects on student outcome than their effects acting separately. Furthermore, Skinner & Belmont (1993) highlighted the reciprocity between teacher support and student engagement where the more students are engaged, the more they receive support from the teacher and *vice versa.* Thus, suggesting that the relationship between students' experience of support and engagement is bi-directional (Council & Wellborn, 1991). Therefore, in the context this study, it is expected that students' perception of teacher support

can impact significantly on their engagement with mathematics and this, in turn, influence teacher's involvement within the classroom. In the current study, this concept of teacher support will be analysed from the data.

2.9 PEER RELATIONSHIPS

(i) Ability to make friends and the number of friends

Xerri et al. (2017) believe that as student's progress to the first year of secondary, emotional support from friends has a significant impact on their engagement and outcomes. Juvonen et al. (2012) claim that positive peer relationships contribute to both sense of belonging and student engagement. They also suggest that the most socially skillful students can have many friends which in turn provides the advantage to navigate easily in the new environment and therefore remain highly engaged. Also, peer relationships at school have been found to contribute most to students' wellbeing (Weare & Gray, 2003).

Furthermore, Juvonen et al. (ibid) observe that even having one friend may suffice to help students adjust to the new school environment and hence promote engagement. In contrast, a lack of close friendships is associated to lower student engagement (Juvonen et al., 2012). Juvonen et al. (ibid) further state that students with no friends in the first year of lower secondary school were initially more distressed and received lower grades as compared to those with at least one friend. These students were also found to be less engaged as they feel they do not belong in school (ibid).

The above literature suggest that peer relationships influence student engagement through two pathways, namely, sense of belonging and wellbeing mentioned in Kahu and Nelson's framework. This is key for the design of this study. The ability to make friends as students move to the secondary school may help develop a sense of belonging to the school and contribute to their wellbeing. It might indicate that in the local context, having high social skills during the first year of secondary school can be a protective factor against student disengagement. As a result, students' ability to make friends during their experience of transition will be included in the study to have deeper insight into its impact on students' school adjustment and hence their engagement in mathematics.

(ii) Peer Support

The perception of peer support is positively related to student engagement (Juvonen et al., 2012; Veiga, 2014) and results in better academic outcomes (Bingham & Okagaki, 2012). Lester and Cross (2015) studied the relationship between school climate and students' mental and emotional wellbeing and found that feeling safe at school, feeling connected to the school, and peer support were the "*protective factors for students' mental and emotional wellbeing*" (p. 10). They also found that *"peer support was the most significant protective factor over the transition period from primary to secondary school" (*ibid). This argument is particularly relevant for the present study and can negatively impact on students' meatal and emotional wellbeing hence inhibiting students' mathematical engagement.

Similarly, Whiteman et al. (2013) suggest that peer emotional support is protective and generally related to positive mental health and academic adjustment. However, low levels of peer emotional support may not imply that students are at high risks of disengagement (Samuelsen, 2012) because parent support and teacher support are found to be more important than peer support for student engagement (Wentzel et al., 1998). On the other hand,there may be a threshold for peer support below which the other forms of emotional engagement cannot compensate in which case very low peer support is an important indicator (Samuelsen, 2012). Conversely, students with high levels of peer and family support might beable to compensate the negative teacher-student relationship (ibid). From the above literature,one might conclude that there is an indirect link between teacher-student relationship, and peer and family support. It would be interesting to know, in the Mauritian context, the influence peer and family support have on student mathematics engagement especially in the context of primary-secondary school transition.

Negative peer experiences: Rejection and bullying

According to Juvonen et al. (2012), negative social experiences, which include peer rejection and bullying, cause students to disengage and are associated with lower levels of academic engagement. Rejection include social avoidance, dislike of or reluctance to affiliate with a student. Juvonen et al. (ibid) also report that peer rejection threatens school belonging which in turn is associated to increased absenteeism and truancy in secondary schools thus resulting in negative academic outcomes.

On the other hand, bullying is linked to psychological maladjustment. Juvonen et al. (2012) demonstrated that bullied students engaged less and obtained lower academic grades across 3

years of middle school. They also claim that it contributes to negative school attitudes and a desire to withdraw from school. These scholars conclude that:

> Both peer rejection and bullying experiences are associated with lower levels of academic engagement and academic performance. It is likely that negative social experiences cause students to disengage.
>
> (Juvonen et al., 2012, p. 396)

In Mauritius, students transiting to the secondary school might also encounter negative peer experiences. The experience of bullying as well as the lack of social skills to make friends during the first year of secondary schooling might both be problematic and could cause a culture shock (in line with the U-Curve Theory). This present study can provide insights into students' experiences with their peers during the first year of secondary school and its effect on their engagement with mathematics. Therefore, some of these insights will be explored in the data analysis.

2.10 INSTRUCTIONAL CLIMATE

One of the most significant influences impacting on student engagement in mathematics is the teacher and teaching practices or pedagogy (Hayes et al. 2003). Scherer and Nilsen (2016, p. 51) claim that there is '*a partial mediation of instructional quality between school climate and achievement motivation*' of students. In addition, they suggest that to achieve high levels of engagement, the teacher needs firstly, to effectively design learning experiences and secondly, students must have the opportunity to participate in decisions concerning academic tasks. This literature is in line with Kahu and Nelson's framework where the structural influences are highlighted. However, it is not clear through which pathway student mathematics engagement is influenced. One tends to think that the effect of students' experience of the instructional climate on student mathematics engagement might be mediated by self-efficacy and emotion. This could be explored during the data analysis.

Butty (2001) observes that, according to several studies, mathematics instruction, especially at the secondary level, are highly teacher-centered placing more emphasis on teacher talk and textbooks than helping students think critically across subject areas and applying their knowledge to real-world situations. A similar situation is described, in the Mauritian context, by Allybokus (2015). Urdan and Schoenfelder (2006) argue that student engagement and academic achievement are often viewed as individual student attributes or traits but not as

outcomes of how teachers structure their teaching. However, this is contrary to Kahu and Nelson's framework which emphasizes that there are various interacting factors that influence student engagement.

Similarly, Reeve and Tseng (2011) believe there is a reciprocal influence between student engagement and the teacher's interpersonal style within the classroom. Thus, students also influence the flow of instruction within a class. Reeve and Tseng (ibid) define as agentic engagement the "students' constructive influence into the flow of the instruction (Bandura, 2006) they receive". Agentic engagement is a more transactional classroom activity (Sameroff, 2009). What students do or display affects and transforms what teachers do and *vice versa* (Reeve, 2013). Reeve, Jang, and others (2004) found that the attempt to personalise the lesson correlates positively with students' perception of the learning climate and increases the frequency of the efforts in autonomous supportive class and correlates positively with students' achievement. Students, who are engaged, pay attention and participate in classroom discussions, exert effort in classroom activities, and exhibit aninterest and motivation to learn (Fredricks et al., 2004). Moreover, they share ideas, ask questions, and follow each other's leads. Additionally, in classrooms where students are engaged, teachers can identify what their students understand, and which concepts and topics need more explanation and deeper discussion. Engaged students, who work in groups, continue to discuss, ask questions to each other and their teachers, listen critically to each other and argue with examples from their own lives and previous knowledge. Classrooms in which most students are actively engaged to have more energy, and students give more energy to their peers and their teachers (Furrer, Skinner, & Pitzer, 2014).

According to Shernoff et al. (2016), the school context instigates a certain kind of motivation in the students. Introducing challenging learning activities will allow students to test and expand their academic capabilities. Students will engage and value the activities if theemphasis is laid on understanding and mastery of the concepts in mathematics by providing appropriate tools and feedback. The latter must give suitable instruction about how to master the task at hand (Niemiec & Ryan, 2009). However, in Mauritius, mathematics teaching at the secondary school level is mostly teacher centered with emphasis on obtaining right answers rather than developing understanding of concepts. The present study explores the participants' experience of mathematics teaching during Grade 7 and the influence this experience has on their engagement in the subject.

From the discussions so far, teacher factor has been found to be critical in influencing student mathematics engagement. In conclusion, teacher's interpersonal relationship with the students and the support they provide are key in understanding the how students' experience of transition to secondary school influence their mathematics engagement. Therefore, data will be collected in relation to the rapport mathematics teachers have with the student and the adequacy of support provided. Moreover, through what mechanisms do these factors impact of student engagement will be analysed.

2.11 NON-SCHOOL FACTORS

In a study, Wijsman et al. (2016), investigated the declining trends in the performance of Dutch secondary school students. They analysed report cards of 1544 secondary students across grades 7 to 9 using moderators like gender, school type and initial level. They found that the dip of performance was irrespective of the moderators, which means that the initial level of students entering secondary school may not have a significant impact on achievement. The cultural disparity between Netherlands and Mauritius raises questionswhether similar results could be obtained in the local context. That is, does it mean that even if students obtain A or A+ at CPE/PSAC level in mathematics in the local context, there is no guarantee that they will do well in secondary grades. The findings of Wijsman et al. (2016),is contradicted by that of Hemmings et al. (2011) who found that prior mathematical achievement leads to future success. In a study carried out in Uganda, Kiwanuka et al. (2015) obtained similar results as Hemmings et al. (2011). Wijsman et al. (2016), however, suggest that motivational and cognitive factors may have an essential role in the decline in students' performance. These two factors are discussed below.

2.12 MOTIVATIONAL FACTORS

Motivation is key to student engagement, however, students who are motivated are not necessarily engaged with the task (Appleton, 2008). Questions can be raised as to what motivates them to go to school. According to Duleany and Milton (2009), students go to school for achieving long term goals and getting good results. Engagement is more likely than

motivation to be affected by learning experiences and relationships with people involved with those experiences.

A classroom filled with enthusiastic, motivated students is great, but it is educationally meaningless if the enthusiasm does not result in learning. Conversely, students who are actively learning but doing so reluctantly and resentfully are not engaged. For Zepke (2019), student success is central to student engagement. In line with the framework of Fredericks et al. (2004), Lawson and Lawson (2013), expound that in order to succeed students need to invest behaviourally, emotionally, and cognitively.

Wijsman et al. (2016) highlighted two motivational factors, namely 'utility value' and 'social value'. Firstly, they suggested that students do not perceive the usefulness of schoolwork to their daily lives. Not seeing the connection between the mathematics learned at school and the daily lives decline students' "utility value' and their perception of the relevance of the school. Secondly, Wijsman et al. (2016) pointed out that adolescents give life domain like 'social value' more importance than the value of the school. It is no secret that students nowadays are increasingly attached to their friends, social media, and the internet. For the context of this study the student characteristic discussed above can affect student engagement and consequently their performance in mathematics.

2.13 COGNITIVE FACTORS

In general, and in Mauritius in particular, it is expected that the cognitive demands ofsecondary mathematics are higher than that of the primary. Wijsman et al. (2016) suggest thatstudents need to develop their metacognitive skills to master more challenging tasks. But, according to the authors, the metacognitive skills develop during adolescence. Furthermore, research findings show that students of the same age are at a different cognitive developmental stage. Therefore, many Grade 7 students (aged 11-12), who are at risk may still be at the concrete operational stage. Since learning at this level, is an active process whereby the learner constructs knowledge through the interaction with the environment, the traditional talk and chalk method may not be the right strategy for the teaching mathematics. Kahu & Nelson (2018) suggest that new learning experience has the potential to challenge students' ways of being and thinking. Therefore, students in the first year of secondary may be lacking the metacognitive skills necessary to complete the more complex tasks resulting in a decline in their self-concept which in turn triggers a decrease in achievement (Eccles & Wigfield,

1993). Reschley and Christenson (2006) stated that transition might influence student engagement and consequently on learning. Therefore, it would be necessary to understand whether the factors discussed above firstly influence student engagement. In a meta-analysis, however, Lei, Cui and Zhou (2018), conceded that there are contrasting findings in the literature about the relationship between students' engagement and academic achievement. At this point, however, before attempting to acquire a deep understanding of the relationship between student engagement and performance in mathematics, it would be necessary to understand the motivational factors. Tilleczek and Ferguson (2007), in a literature review of 100 international reports, academic and policy papers, found that the risk factors that prevent or promotes transition are those that help school engagement and student success.

2.14 WHAT IS STUDENT MATHEMATICS ENGAGEMENT?

Skilling, Bobis, and Martin (2020, p. 2) state that while "*student engagement in learning is acknowledged as a predictor of general academic achievement, there is evidence that not all students who are highly engaged in mathematics experience similar levels of achievement in the subject*". It means that there is a fundamental difference between student engagement in learning and students' engagement with mathematics. Since the current study focuses on student mathematics engagement in the context of transition, it is important to have a thorough understanding of the construct of student mathematics engagement.

Mathematics suffers from the stereotypical belief that it is difficult and only some can do. Same might be the case in the local context. It is a general belief held by individuals with a 'fixed mindset' (Dweck, 2007). However, there are elements of our day-to-day work that we can actively engage with to disrupt those stereotypes, make teaching more enjoyable, and promote deeper student engagement. According to Stephens (2011), there is an apparent engagement in our mathematics classroom. He claims that some mathematics classes achieve an apparent engagement by having all students occupied in 'busy work' through textbooks following direct teaching. Doing mathematics quietly with the absence of collaboration is the norm in many mathematics classrooms. Students are rarely given the opportunity to explain their thinking to the whole class. Stephens (2011) further claims that disengagement occurs inmathematics more often as compared to other subjects. This occurs when students fail to see the relevance of mathematics to them or their lives. Therefore, in this study, it is important to

investigate whether the students, in this study, see the relevance of the mathematics learned during Grade 7 in their real life or experience an academic shock as indicated in Risquez et al. (2008) U-Curve Theory.

Additionally, from a mathematics perspective, questions can be asked as to what it means to engage and also what are the psychosocial constructs that mediate student mathematics engagement. For the Australian context, Attard (2012) explains that engaged students enjoy learning and value their mathematics learning and see its relevance to their present and future lives. Finally, students understand the functional aspect of mathematics that is they see the connection between the mathematics they learn at school and their real life. She further claims that in a mathematics classroom, engaged students are actively participating, genuinely valuing, and reflectively involved in deep understanding of mathematical concepts and applications, and expertise. Supporting this idea, Stephens (2011) argues that collective engagement is crucial to facilitate that student realise the mathematical relationships and connections and making explicit mathematical thinking. This argument highlights the importance of peer-student relationship within the mathematics classroom. Therefore, one aspect of discussion could be the collaboration and support of peers within the mathematics classroom.

The focus of the current study are the factors influencing students' mathematical engagement during primary-secondary transition. It is, therefore, important to understand what it means when students are mathematically engaged (or disengaged).

2.14.1 EPISODES OF ENGAGEMENT IN MATHEMATICS TASKS

In an engaged classroom, there exist episodes of 'deep' engagement to tasks (Kahn, 1990) that is a student may not engage in a task during the entire lesson. Kahn (ibid) defines the episodes of engagement as a brief period when an individual becomes energized or enlivened, and simultaneously employing their cognitive, physical (behavioural), and emotions to fully inhabit a role in which they perform their part. He highlights that these episodes of 'deep' engagement are short-termed, discontinuous, and temporal. Students move into and out of these episodes of engagement on a moment-to-moment basis. These moments or episodes are believed to encourage positive psychological states (Csikszentmihalyi, 1990), and enhance

performance outcomes (Rich et al., 2010). Therefore, educators need to understand these episodes of deep engagement on a task within a classroom. This will allow them to achieve high levels of engagement of their students. Question arises as to what triggers this 'deep' engagement.

2.15 WHAT DOES IT MEAN TO LEARN MATHEMATICS?

According to Kinard and Kozalin (2008), the prevailing culture of mathematics teaching presents learners with ready-made mathematical concepts using abstract language of mathematical symbols and deductively presenting examples and problems that require direct application of algorithms. For them, the prevalent culture of mathematics instruction has students start by the "products" of mathematical instruction and lead them through a "mechanical" path that does not require the rigor of mathematical reasoning (ibid, p. 107). In the same vein, South African Institute for Distance Education (SAIDE) (2008) assert that in classrooms worldwide, there exists a continuum of practice. It ranges from a more traditional, teacher-centered approach in which teachers spoon-feed students with the use of algorithms and focusing on obtaining the right answers to a more open-ended approach in which the process of learning is equally emphasized and in which students collaboratively explore and discuss mathematical problems and come with innovative solutions. Such teachers hold the mindset that "*learners are empty vessels where knowledge is poured into the learner*" (Van de Walle, 2008, p. 20).

According to von Glasserfeld (1995), the contrasting idea that learning is the passive transmission of knowledge is the theory of constructivism. Hoosain (2001) argue that it is unanimously agreed that the prime objective of mathematics teaching is to promote understanding. However, question arises as to what it is meant to understand mathematics and how it influences the three components of student engagement. In line with Piaget's concept of mental schemas, Hiebert and Carpenter (1992) stated that mathematics is understood if a mathematical idea is part of a network of mental representations. They define understanding as a measure of the quality and quantity of connections that a concept has with existing knowledge. For them:

> The degree of understanding is determined by the number and strength of connections. A mathematical idea, procedure, or fact is understood thoroughly if it is linked to existing networks with stronger or numerous connections.

(Hiebert & Carpenter, 1992, p. 67)

However, Hoosain (2001) warns that there is no unanimous agreement on the question. Perceptions of mathematical understanding vary greatly (ibid). For example, students who recall the formula of area of a rectangle and apply it correctly might be perceived, by some, to have understood the concept. However, for others, it might be an example of procedural teaching. In his seminal work about the theory of understanding, Skemp (1978) claims that there are two types of understanding: relational and instrumental. Relational understanding is knowing what to do and why, whereas instrumental understanding is knowing the 'rules without reason'. According to Skemp (ibid), understanding occurs in a continuum. It is not an '*all or nothing'* phenomenon (Kieran, 1994, p. 598) but an ongoing process (NCTM, 2000). It is well established in research on mathematical learning that conceptual or relational understanding is an essential component of procedural proficiency (NCTM, ibid).

In sum, the above discussion highlights the view that understanding is an ongoing process, and the quality and quantity of mental connections continues to improve with time. It also highlights the importance of prior knowledge in further learning of mathematics. These arguments are particularly relevant to the current study as prior knowledge might have an impact on how students will experience mathematics as they move to secondary school thus influencing their engagement with the subject. In the next section, literature on the impact of prior knowledge on student engagement in mathematics is reviewed.

2.16 RELATIONSHIP BETWEEN PRIOR KNOWLEDGE AND MATHEMATICS ENGAGEMENT

Little attention have been laid on the influence of prior knowledge on student engagement. Recently, Pecore et al. (2017) and Dong et al. (2020) found that prior knowledge has a significant impact on student engagement. Dong et al. (2020) state that cognitive load plays a vital role in the relationship between prior knowledge and students engagement via help seeking strategy. Ryan et al. (2005) identified three types of help seeking behaviours, namely, instrumental (finding hints and explanation to understand a problem), executive (depend on others to find answers or complete solutions) and avoidance (avoiding help). Even if students believe that trying is important for success, if they try and fail, their ability self-concept is

threatened (Covington, 1992). In order to avoid appearing to lack ability, the students adopt ‘failure avoiding strategies’ like procrastination, making excuses, avoiding challenging tasks and not trying (Covington, (ibid). He also found that even high-achieving students can be failure avoidant. This fact is particularly relevant to the current study. The purpose of this research is to find the reasons behind the disengagement of high-achieving students after they transition from primary to secondary school. Rather than responding to challenging tasks with greater effort, these students may try to simply avoid the tasks in order to maintain both the belief that they are competent academically and others view about their competence.

Mac Iver and Epstein (1991) found that changes in lower secondary students’ competence beliefs over a term predicted change in children’s interest more than vice versa. It is recommended by Covington (1992) that a reduction in the frequency of evaluations, competitive and social comparison practices would allow students to maintain their sense of self-worth. As a result, they would adopt less failure-avoidance strategies. On the other hand, Dong et al. (2020) statethat contrary to executive and avoidance help seeking, instrumental help seeking has apositive effect on student engagement.

Furthermore, Ryan et al. (2005) state that the relationship between prior knowledge and student engagement can be improved by means of self-regulated learning. For Zimmerman (1989), a self-regulated student is metacognitive, motivationally, and behaviourally active in his or her own learning process and in achieving his or her goals. He further states that self- regulated learners possess three main characteristics, namely, they use a variety of self- regulated strategies, believe they can perform efficaciously, and set numerous and varied goals for themselves. However, some school contexts do not allow many possibilities in choice of tasks thus making self-regulation more difficult. Following insights gained from theabove, data will be analysed in the context of this study to better understand how theinteraction between school context and the psychosocial factors influence students to adopt help-seeking strategy or help-avoidance strategy during mathematics learning.

Hailikari, Nevgi and Komulainen (2008a), highlighted those individual differences in domain-specific prior knowledge are a strong predictor of students’ academic achievement as it facilitates further learning. Students possessing a large amount of declarative knowledge are not guaranteed success in mathematics (Hailikari, Nevgi & Lindblom-Ylänne, 2008b). It suggests that students who only perform mathematical tasks without understanding the concepts may encounter difficulties in starting their secondary mathematics learning.

Students with low prior knowledge may encounter difficulties solving mathematical problems and may need adequate support from teacher or peers. However, Dong et al. (2020) found that these students who need more help actually seek less help or engage in executive help seeking behaviours. It will be important to discern whether the findings of the current study concur with the above literature and whether students' prior knowledge is indeed a barrier to extend and transform their mathematical knowledge and skills in the secondary. According to Miller and Mercer (1997) and the Cockcroft Report (1982), students who move through the curriculum without understanding the foundation skills will continue to experience failure. Similarly, Hailakari, Nevgi and Komulainen (2008a) state that if students possess inaccurate prior knowledge and misconceptions within a specific domain, it will be difficult to understand or learn new information resulting in a decline in mathematics achievement.When students learn mathematics with understanding, they can apply that knowledge to learnnew topics and solve new and unfamiliar problems (Carpenter & Lehrer, 1999).

From the previous section, it is known that connecting new knowledge to prior knowledge is essential in developing understanding. Also, prior knowledge influences student engagement in mathematics through self-regulated learning and help seeking strategies. This study focuses on students who excelled in mathematics in the end of primary mathematics examination but still struggle in secondary school mathematics. Analysis of my research data will enlighten us, from the students' perspectives, whether in the context of transition students' prior knowledge contributes to the to the gradual disengagement with mathematics.

2.17 WHY IS ENGAGEMENT IN MATHEMATICS A CHALLENGE?

As stated earlier, disengagement occurs more often in mathematics than in any other subject (Stephens, 2011), Mathematics is seen by many students as boring and difficult (Ingram, 2013). Engagement and motivation become weak when students fail to see the value of mathematics in their current and future lives (Stephens, 2011; Sullivan et al., 2006), asopposed to the engaged ones who see mathematics as useful and important (Attard, 2014). Difficult mathematics experience shapes the attitude and behaviour of students towards the subject (Martin, 2007).

Students can either be engaged with the subject mathematics or with individual tasks. Those engaged in mathematics tasks are in a unique *'context of the moment'* for example, the mathematics teacher, the specific mathematics activity, the current social norms in the

classroom and the aspects of the classroom environment like heating, lighting, and the seating arrangement (Ingram, 2013). Ingram (ibid) further states that students have three *'habits of engagement'* in tasks: avoidance, superficial and full engagement. Students who are superficially engaged in mathematics tasks, attempt to solve the mathematics problem, but give up when experiencing difficulty. According to Martin and Marsh (2009), everyday resilience and academic buoyancy can help students bounce back from setbacks and failures. It happens when students use coping strategies like problem-solving and help-seeking (Martin & Marsh, ibid). These are adaptive strategies that help students re-engage with mathematics. Help-seeking, for example, allows students to interact with more competent and supportive individuals like the teacher or peers (Skinner & Pitzer, 2012). The teacher factor isa key to promote engagement and helping students re-engage in mathematical tasks. However, lack of adequate support prevents students from developing coping strategies to re- engage in challenging mathematics tasks (Skinner & Pitzer, ibid). They also found that together with interpersonal resources such as teacher warmth and peer engagement, personal resources such as a sense of competence, relatedness and autonomy can support everyday resilience and re-engagement. In the context of this study, it will be essential to have a deep insight into the coping strategies adopted by the students in the face of challenging mathematical tasks in the secondary. It is also essential to understand how those coping strategies work together cumulatively as a series of adaptive (or maladaptive) responses to meet the challenges in mathematics. Consequently, this will help understand why the participants in this current study experience a shift in their engagement in mathematics and fail to re-engage.

As far as teaching and learning of mathematics are concerned, Stephens (2011, p. 1) mentions that "*in regard to the subject matter and learning, engagement in mathematics has the goal of promoting high-quality mathematics learning, based on deep thinking and challenging tasks*". He further asserts that:

> Regarding teaching, one cannot focus only on individuals who are engaged. Good teaching fosters individual engagement but seeks to build collective mathematical knowledge and shared responsibility for learning.
>
> (Stephens, 2011, p.1)

It is a challenge to ensure that all students are actively engaged in the mathematics classroom. Direct teaching followed by practices from a textbook for all students is the pattern of work

that has become the norm in our mathematics classrooms (Attard, 2014). Additionally, the focus is on individual work and students are hardly asked to explain their thinking to the whole class (Stephens, 2011). Helping all students notice the mathematical relationships and connections and making explicit mathematical thinking is essential for collective engagement (Stephens, ibid) and the shared responsibility of learning. In the local context, it is known, through experience, that teachers are held responsible for the timely completion of thesyllabus. Consequently, the focus is more on procedural teaching rather than on conceptual understanding. The above arguments highlight the link between students' experience of mathematics and student mathematics engagement. The above discussion is critical to answer RQ2. In the context of transition, it is essential to understand the coping strategies students adopt as they experience challenging mathematics tasks and how these strategies influence their engagement with the subject.

Muijs and Reynolds (2001) state that mathematics, though one of the most important subjects in the curriculum of most countries, is also commonly perceived as one of the most difficult by students and adults. It is also the case locally, where many students and parents perceive mathematics as challenging. This feeling towards the subject might turn into nonverbal cues in the classroom resulting in reinforcing the belief in students that mathematics is complicated. Sullivan et al. (2006) found that the students chose not to engage because of the classroom culture, rather than the students' inability to engage. It seems to us that classroom culture may be a more important determinant of participation than the curriculum, methods ofteaching, modes of assessment, teacher experience, level of resources, or anything else" (Sullivan et al., 2006, p. 97). These findings highlight the limitations of studies that view students' learning as a product of individual cognitive processes.

2.18 THE DIFFERENCES IN THE TEACHING OF MATHEMATICSBETWEEN PRIMARY AND SECONDARY SCHOOL

Coad and Jone (1999) conducted a case study in which they compared the approaches used in the teaching and learning of mathematics in a secondary school to those used in its feeder primary schools. They concluded that the similarities and differences in approach may be driven by different external influences. In Mauritius, for example, expectations differ between these two stages. And certainly, the teaching will also differ from primary to that of secondary school due to the lack of national examinations at the end of Grade 7.

Galton et al. (1999) have made a very useful distinction between primary and secondary schools. According to them, the main function of the primary school is to impart basic skills of literacy and numeracy while that of the secondary is to provide a broad and balanced curriculum that emphasises the acquisition of knowledge and conceptual understanding across a range of subjects. However, learning the basics cannot imply the lack of conceptual understanding in mathematics. At the first conference on Secondary Education in Africa (SEIA) held in Kampala in June 2003, it was identified that secondary education should address the three "P's" (Obanya, 2004):

- Personality development;
- Preparation for life; and
- Preparation for formal tertiary education.

However, these goals are not mutually exclusive. Thus, sheer knowledge of the subject matter or good teaching skills does not result in complete learning of the students. Therefore, despite secondary school mathematics teachers are 'subject specialists', it does not imply that students will understand all that is taught at this level. This is against the commitment of the Mauritian government to sustain efforts to transform the education system by emphasising on the enhanced quality of content and improve the delivery of learning (government programme, 2012). As mentioned earlier, the students' prior knowledge may also contribute to the difficulty in understanding or learning new things. In research carried out by Payneeandy (2003) concerning primary school teaching, she found that teaching in ourprimary schools is a mere transmission of knowledge. Students' main form of learning is rote memorization. One may ask whether the teaching of mathematics at Grade 7 is the sole responsible for the low performance of students. Other factors may also be contributing to thedip in performance of students in mathematics. This study adheres to the two types of factors (structural and psychosocial factors) mentioned in Kahu and Nelson's (2018) framework.

This study has come at an important time where finding the factors will help policymakers in their endeavour for the educational reform.

2.19 CURRICULUM CONTINUITY/DISCONTINUITY AS STUDENTSTRANSITION FROM PRIMARY TO SECONDARY SCHOOL

According to Galton et al. (1999), the transition from one level to the next raises issues about curriculum, teaching, and learning. Similarly, Mc Gee et al. (2003) and Bicknell (2009) found

that there is a lack of curriculum continuity and coherence across primary and secondary schools. As a result, the experience of discontinuities that exist between primary to secondary school may cause stress to the students (Galton, 1999). Therefore, he highlighted that those students must have a sense of continuity. However, Margett (1999) advised that students must have a sense of discontinuities. The continuity-discontinuity paradox will always exist, and teachers need to find the right balance to help students cope with the new context.

As far as Mathematics is concerned, Gueudet et al. (2016) indicated that each transition implicates changes in the teaching and learning culture and the type of mathematics that is taught (for example, algebra and integers). While it is normal and expected that certain mathematical concepts taught in the secondary would be different, in the local context, the National Curriculum Framework Secondary (2016, p. 65) indicates that "*since the mathematics curriculum is spiral in nature, concepts are revisited in each Grade for further learning of connected and of the more abstract concepts identified by Educators*". Therefore, the Mauritian curriculum is designed in such a way that there is both curriculum continuity and discontinuity. This continuity-discontinuity discussion is found to have value for this study. Understanding the effects, the experience of continuity or discontinuity in the mathematics curriculum has on students' engagement in general and their engagement with mathematics in particular during the first year of secondary will answer RQ 2.

While many can adjust quickly to the transition, expressing an inclination for secondary school as compared to primary school (Akos & Galassi, 2004; Howard & Johnson, 2004), there are still some who find it difficult to adjust to the new teaching and learning culture and the type of mathematics that is taught. As seen earlier, that teacher is a major factor influencing student engagement. However, questions can be raised to whether the experience of the type of mathematics taught in the secondary (especially the new topics) influence students' academic adjustment and engagement with mathematics. In this study, data will be analysed to better understand the relationship between students' experience of the continuities and discontinuities in mathematics between primary and secondary school and their engagement with the subject.

2.19.1 BRIDGING THE GAP

Previous literature indicates that students making the primary-secondary schools transition can experience discontinuities in the learning of mathematics. Questions can be asked to whether the gaps are only related to curriculum and the prior knowledge as students move to the next stage. Using the metaphor of bridge, Bore and Fuller (2007) developed the notion of five bridges as students move to secondary school. These are:

- Administrative bridge;
- Social and personal bridge;
- Curriculum bridge;
- Pedagogy bridge; and
- Autonomy and managing learning bridge.

According to Bore and Fuller (ibid), putting the five bridges in place will give students the self-esteem and confidence to adopt appropriate coping strategies to adjust to the new environment and have a smooth transition. In the context of the present study, it will be interesting to know, from the students' perspective, how these five bridges are relevant to the local context. The five bridges are explored in the following sections below.

ADMINISTRATIVE BRIDGE

For Bore & Fuller (ibid), an administrative bridge is created when feeder primary schools pass essential information to the secondary school. This is done to ease the transition and reduce anxiety in the students. In Mauritius, however, no such information is transferred to secondary schools.

THE SOCIAL AND PERSONAL BRIDGE

Evangelou et al. (2008), found that the extent students make more, and new friendships act as an indicator for a successful transition. However, those students who lack social skills will have difficulty coping with the transition to secondary school. The findings from this study will help understand whether making new friends, during Grade 7, is a critical factor in students' social adjustment to the new environment. And hence affecting their engagement to school. The idea of the social and personal bridge is to develop social links between students'families, friends, and the secondary school before and after moving to secondary school (Bore & Fuller, 2007). This support system will help students develop high self-esteem and confidence and have 'positive adaptive responses' during the transition (Richards, 2011).

This is echoed in the findings of Rens et al. (2018) in a review of 30 empirical studies which suggest that the relationship between stakeholders, that is students, parents, and school, can improve the challenges of transition.

THE CURRICULUM BRIDGE

For Bore & Fuller (2007), the curriculum bridge is meant for improving continuity in the curriculum between primary and secondary. This will be discussed in more detail in the following sections.

THE PEDAGOGICAL BRIDGE

The pedagogical bridge is created by sharing lesson plans between the primary and the secondary teachers in view to have continuity in teaching and classroom practices.

THE AUTONOMY AND MANAGING LEARNING BRIDGE

After moving to secondary schools, students are transformed from being the oldest in thefinal year of primary to the youngest in the first year of secondary. According to Richards (2011), these students may have a strong sense of autonomy in the primary and may have shouldered responsibilities. But in the secondary, when they become the "small fish in a largepond" (Richards, 2011, p. 38), their self-esteem and confidence may suffer.

As stated earlier, this study focuses on students' experience of transition and how this experience influence their engagement with mathematics. It would be interesting to know whether any of the five bridges are put into place by the ministry or the management of the school in order to smoothen the transition from primary to secondary schools. Analysis of data with respect to the bridges (or lack of them) will deepen our understanding of how student engagement with mathematics is influenced in the context of transition and through what mechanisms.

2.20 FRAMEWORK TO STUDY STUDENTS' EXPERIENCE OF THE PRIMARY-SECONDARY TRANSITION

The Risquez et al.'s (2008) U-curve theory of adjustment is adopted in this study. Departing from Kahu and Nelson's conceptualisation of transition as temporal, Risquez et al. (2008) classified the transition to higher education into three phases, which include 'Honeymoon' phase, 'Culture Shock' and 'Adjustment' phase. Originally developed by Lysgaard in 1955, this cross-cultural adjustment theory describes the socio-emotional changes one experiences

when transitioning to any new environment. It is in line with Jindal-Snape's (2016) definition of transition which describes transition as the psychological, social, and educational adaptation as students cope and adjust to the new environment. Furthermore, this framework has the advantage of providing a visual depicting of the different stages of adjustments as students move to the next stage. It is thought that primary and secondary schools represent two different cultural contexts in Mauritius. Findings from the literature suggest that transition is challenging for students. Therefore, it is necessary to have a deep understanding of the process that students go through during this transition. Therefore, students' experiencesof the primary-secondary transition will be analysed in relation to the different stages of the U-curve theory framework.

Kahu and Nelson's (2018) sociocultural framework is used in conjunction with Risquez et al.'s (2008) framework of U-curve theory of adjustment. Although Risquez and colleagues (2008) used the theory for adult learners, it is thought that students transitioning from primary to secondary might experience similar difficulties as their adult counterparts. Therefore, even if the current study concerns students aged 11-12 years, the phases in the U-curve theory are thought to be relevant for the current study. The framework is explained in more details in the next section.

SUMMARY OF CHAPTER

In this chapter, literature on student engagement, own student mathematical engagement and transition has been critically reviewed. A three tier definition of engagement has been presented. Frameworks of student engagement and transition, adopted in this study have been discussed and connected. Both its structural and psychosocial factors influencing student engagement in general and student mathematical engagement in particular all analyzed. Literature on the challenges student mathematical engagement present in the context of transition has also been reviewed. Finally, in light of the vast literature reviewed come up two research questions have been formulated for this study. In the next chapter, I discuss my ontological and epistemological stances positioning for this study together with my methodological choices to address the research questions.

CHAPTER 3: Methodology

3.1 INTRODUCTION

The purpose of this phenomenological study is to explore how Grade 7 students who made the transition from primary to secondary schools construct meaning of their expectations and experience of their engagement in mathematics. To achieve this, a researcher needs to possess clarity about how s/he construes research. There is also a need to understand a range of research approaches, data collection methods and procedures to produce quality research.

In this chapter, I describe my ontological and epistemological positioning underpinning this study. An interpretivist paradigm was considered using a qualitative approach. I describe the rationale behind using the qualitative research approach and the phenomenological research design, focusing on the essence of the experience of participating students of the phenomenon. The phenomenon under study is the shift in high achieving students' engagement in mathematics during the first year of secondary school. As students transition from primary to secondary school, they experience changes in their physical environment but also changes related to academic and social factors (Akos & Gallassi, 2004). In particular, the primary-secondary transition affects students' lower secondary mathematics achievement (Simmon et al., 2017).

According to Reschley and Christenson (2012), there is a reciprocal effect between mathematics achievement and student engagement. Which means that student mathematics engagement is an antecedent and at the same time a consequence of mathematics achievement. In the context of this study, it would be essential to have a deep understanding of students' perceived experience of the primary-secondary school transition and the effect this experience has on students' mathematics engagement. The main motive for selecting this focus is to deepen our understandings, from the students' perspectives, of the phenomenon under study. I describe the research design, the data collection methods, and the framework used to analyse data in order to answer my research questions. Considerations are also given, in this chapter, to the process used in selecting participants. Moreover, the ethical protocols adopted in the study are detailed. Particular attention is given to the ethical dilemmas that emerged throughout the study and the ways these were addressed. Additionally, my role and position as a researcher have been clarified in the context of this study.

In the next section, I explain the research paradigm adopted for this study.

3.2 PHILOSOPHICAL UNDERPINNINGS FOR THIS STUDY

Denzin and Lincoln (2008, p. 157), define a paradigm as "*the basic set of beliefs that guide action".* Jebreen (2012, p. 163) emphasises that '*in choosing a particular research philosophy, certain assumptions and perspectives are accepted, and certain strategies and interpretations should be involved*'. Explanations about my philosophical assumptions, thatis, the views I hold about the nature of knowledge (ontology) and how that knowledge can be known (epistemology) are given.

3.2.1 ONTOLOGICAL POSITIONING

Crotty (1998) defines ontology as '*the study of being'*. On the other hand, according to Cohen, Manion, and Morrison (2007, p.7), ontological assumptions concern 'the very nature or essence of the social phenomena being investigated'. Cohen et al. (ibid) state that questions arising from the philosophical nominalist-realist debate, and which need to be answered are:

> Is social reality external to individuals – imposing itself on their consciousness from without – or is it the product of individual consciousness? Is the reality of an objective nature, or the result of individual cognition? Is it a given 'out there' in the world, or does one's own mind create it?
>
> (Cohen, Manion & Morrison, 2007, p.7)

Therefore, in the context of this study, I consider students' experience of the primary- secondary transition and the influence it has on their engagement in to be subjective. For me, this experience (of mathematical engagement) is perceived, interpreted, and understood differently by each student. In other words, the factors that influence their engagement in mathematics is the reality that is constructed by each student individually which is in line with the framework adopted in this study. Therefore, ontologically, I position myself as a subjective idealist (Crotty, 1998). It is believed that the world is not separate from the thought, and the external world consists of representations that are creations of the individual minds (Blaikie, 2000). According to Ritchie et al. (2013), no external reality exists independent of our beliefs and understanding. In other words, reality exists; however, what we know of the world is only an interpretation based on our experiences (von Glaserfeld, 1995). One can argue that a concrete world does exist outside the individual 'realities' but our understanding of it is limited and socially

constructed (Bhaskar, 1998).

Eagleman (2011, p. 33 cited in Glattfelder, 2019, p. 406) explains "*you're not perceiving what's out there. You'reperceiving whatever your brain tells you.*" In line with the above, my belief is that we construct reality through our perceptions and understandings, nothing is truly real other than consciousness and its contents. It is assumed that an individual's perspective is his/her reality.We all experience the world differently, and knowledge is subjective and based on experienceand insight. I understand that the social world is without meaning before one's experience of it. There can be no neutral interpretation. I believe that knowledge of the world is based on "understanding" which, according to Ritchie et al. (2013), emanates from experiences. This study aims to develop an understanding of the meaning students give to their expectationsand experience of transition and their perception of their engagement in mathematics after transiting to secondary school.

3.2.2 MY EPISTEMOLOGICAL CONSIDERATIONS

Crotty (1998, p. 8) explains that '*epistemology is concerned with providing a philosophical grounding for deciding what kinds of knowledge are possible and how we can ensure that they are both adequate and legitimate*'. Therefore, I needed to position myself epistemologically right at the onset of this study, as this would influence any decisions taken throughout the research process to gather appropriate and adequate data. In line with a subjective idealist ontological positioning, I adopt a constructionist epistemological stance. According to Crotty (1998, p. 42), constructionism is the view that:

> All knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of the interaction between human beings and their world and developed and transmitted within an inherently social context.
>
> (Crotty, 1998, p. 42)

In the same vein, Paper (1991), asserts that constructionism concerns with the dynamics of change that is, knowledge is formed and transformed within specific contexts. Following both Crotty (1998) and Papert (991), the importance of the interactions between students, peers, teachers, and the school environment is highlighted in the process. This is in line with Kahu & Nelson (2018) where student engagement is influenced by the interaction of institutional and student factors. As this study aligns itself to transition as a state of mind rather than the movement from one stage to another, and student engagement as a meta construct consisting

of behavioural, affective, and cognitive components. Reschly and Christenson (2012) view cognitive and affective engagement an inherently individual internal process and thus, students are the most accurate source of information about these forms of engagement. It means that, the meaning is not inherent in the phenomenon, which, in the context of thisstudy is the shift in high achieving students' engagement in mathematics during the during theprimary-secondary transition period. This meaning can only be accessed through the memories and experiences of students which can be made possible through the interaction between the students and myself. As Daher et al. (2017, p. 25) infer:

> Meaning construction is approached not solely in terms of an individual mental process linked to sensory experience, but as emerging within specific interactions between (at least) two persons who take place in a specific cultural context and are mediated through (and thus confined by) language.
>
> (Daher, 2017, p. 7)

For this reason, socio-constructionism seems to be a highly appropriate approach here as I believe that all knowledge and hence all meaningful reality are jointly constructed through the interaction of human beings with their world (Crotty, 1998, p. 42). And I view knowledge and truth as being subjective and constructed through discourse and conversation. For this reason, I consider all meaningful realities to be socially constructed (Richie et al., 2013) and in the context of this study, I view the school as a small society where meaning-making is notthe activity of the individual mind but rather a collective process (Crotty, 1998). Therefore, the phenomenon can only be understood from the standpoint of the actors, that is, thestudents who experienced it. Each participant experienced the phenomenon individually. But Husserl argue that other's thoughts and feelings have an influence on the individual. Therefore, there would be commonalities in the experiences together with differences. As such, both collective and individual experiences are considered and discussed.

3.3 QUALITATIVE METHODOLOGY

For Creswell (1994), a researcher's epistemology is the theory of knowledge, that helps him/her decide how the social phenomena will be studied. In the same line, Trochin and Donelly (2008, p.18) explain that "*epistemology and methodology are intimately related*". Therefore, the epistemological stance informs the methodological choices of the researcher. According to Myers and Avison (2002), a research methodology is a strategy of inquiry which includes research design and data collection. My understanding of what it means to know

(epistemology) and the nature of being and the connection between these concepts guide the decisions I make about my choice of methodologies and the methods and ways I make sense of the data and present it.

My epistemological assumption of a socio-constructionist resonates with a qualitative methodology rather than a quantitative one. This study aims to explore and understand the meanings constructed by the participants about their expectations and experience of engagement in mathematics during the primary-secondary transition. The studydid not intend to provide the ultimate truth about the research topic. Instead, it is meant to investigate a way of looking at and deriving the meaning of the phenomenon. Thus, the use ofa qualitative approach is justified for this study. Denzin and Lincoln (2011, p. 6) suggest that '*qualitative research is difficult to define clearly. It has no theory or paradigm that isdistinctively its own. Nor does qualitative research have a distinct set of methods or practicesthat are entirely its own*'. However, Ritchie et al. (2014), describe qualitative research as an interpretative, naturalistic approach, concerned with exploring the phenomenon from the interior.

Therefore, in adopting a qualitative approach, this study aligns to Ritchie et al.(2014) description and the students' perspective is sought for this study. Moreover, this study addresses which according to Attard (2010, p. 55) is a "*gap in the literature where there is a lack of 'student voice' exploring students' perspectives on mathematics teaching and learning during the time of transition*". The descriptive nature of qualitative research enables the provision of a description of the experiences and interactions of the participating students within the school. However, relying only on participants' perspectives, which is limited to their interpretation and judgment of the phenomenon, may affect the validity of the study. For example, in this study, it is found that students blame the mathematics teacher for the dip in their performance. There may be other student characteristics which are not articulated by them. To address this problem, follow-up questions were used to probe deeper into their experiences and two methods of data collection were used. These methods are discussed later in this chapter.

According to Denzin and Lincoln (2005), a research methodology is dependent on the nature of the research questions and the subject under study. The following research questions guide this study:

1. RQ1: How do first-year students perceive and construct meaning of their experience of transition from primary to secondary school?
2. RQ2: How does students' perceived experience of the primary-secondary transition influence their engagement in mathematics?

Now that the use of a qualitative methodology is justified, the following section outlines the research design for this study.

3.3.1 HERMENEUTIC PHENOMENOLOGY

According to Yin (2011, p. 75), "*research designs are logical blueprints*". But, For Cohen, Manion & Morrison (2007, p. 417), there is no single blueprint for planning research. For them, "*research design is governed by the notion of 'fitness for purpose'. The purposes of the research determine the methodology and design of the research".* For Shepard et al. (1993), methodological choices depend on the research questions and the philosophical perspective from which the questions are to be explored. The purpose of this study is to explore how students, who performed highly in national tests in mathematics at the end of primary schooling, construct their perception and meaning of their experience of the primary-secondary school transition and the effect this experience has on their engagement with the subject. Therefore, this research lends itself into being a phenomenological study.

Phenomenology is commonly described as the study of phenomena as they manifest in our experience, of the way we perceive and understand phenomena, and of the meaning, phenomena have in our subjective experience (Smith, 2013). Hermeneutic focuses on interaction and language: it attempts to understand phenomena from the respondents' perspectives and is premised on the view that reality is socially constructed (Cohen, Manion & Morrison, 2007). Therefore, in line with my epistemological positioning of a socio-constructionist, hermeneutic phenomenology is found suitable for this study.

Phenomenology does not try to explain the cause and effect of things but instead tries to provide an in-depth description of how the phenomenon is experienced in the natural setting by those involved. Understandably, different individuals will experience the same phenomenon differently as Kahu and Nelson theorized in their educational interface. According to van Manen (1990), the basic purpose of phenomenology is to reduce individual experiences of a phenomenon to a description of the universal essence.

In phenomenological research,

> The researcher aims to understand the subjective cognitive perspective of the person who has the experience and the effect that perspective has on their lived experience.
>
> (Omery, 1983 cited in Cohen et al., 2007)

I wanted to construct a deep understanding of first-year students' perception and experience of the primary-secondary transition and the effect this has on their engagement in mathematics during that period. A hermeneutic phenomenological approach is adopted over transcendental phenomenological study primarily because of two reasons. Firstly, hermeneutic phenomenology recognizes the importance of context. As mentioned earlier, this study is contextualized in a rich multicultural context with a diversity of school and student profile. It is known that institutional and student factors will influence students' engagement separately (Kahu & Nelson, 2018). Student engagement and hence learning occurs in the educational interface at the intersection of institutional and students factors (Kahu & Nelson, ibid) therefore, highlighting the importance of the context (rich multicultural context with a diversity of school and student profile). Hermeneutics adds the interpretive element to explicate meanings and assumptions in the participants' texts that participants themselves may have difficulty in articulating (Crotty, 1998). My experience of the field creates biasness due to my past experiences as a mathematics teacher and presently as a mathematics teacher educator. Even if all my decisions should have been taken objectively, free from any biasness, I acknowledge the challenge to fully 'bracket' my personal experiences during the process of analysis.

On the other hand, ethnographic research was not deemed fit for this research as it focuses on the entire cultural group (Creswell, 2007), that is all students who experienced the primary-secondary school transition. Arnould (1998) suggests that ethnographic research attempts to explicate structured patterns of action that are cultural and/or social rather than merely cognitive, behavioural, or affective. Under ethnographic research, the researcher becomes part of the group under study. He/she is an insider researcher. The benefit of the insider researcher maybe acceptance, trust, and openness (Dwyer et al., 2009). Participants may be more willing to share their experience. However, my present status of teacher educator wouldimpede on my study. Some of the participants may conceal information relevant to the study, or they may wrongly report their experiences. Moreover, according to Creswell (2011), a narrative study reports the life of a single individual.

In contrast, a phenomenological study describes the meaning for several individuals of their lived experiences of a phenomenon. In the context of this study, for me, it was essential to understand several individuals' experiences. In particular, the participants are the ones who

have witnessed a dip in their performance in mathematics in the first year of the secondary school after their primary schooling. How did they live this condition and how they ascribe its effect on their engagement in mathematics? I needed a deeper understanding of thefeatures of this phenomenon. Therefore, phenomenological research is adopted.

As seen in Chapter 1, many stakeholders in Mauritius attribute the decline in performance in mathematics, in general, to the disengagement of students resulting from their negativeattitude and low ability in mathematics. In many workshops organised by MIE, teachers adopt a 'deficit model' of education, thereby always blaming the students for the weak performance in mathematics. Also, in the literature, most of the studies on student engagement are conducted from the adults' point of view. No voice is given to the students todefend this claim and disclose their reality. In the context of this study, the investigation of students' experience of their engagement in mathematics cannot be learnt and understood from the teacher's perspective. Therefore, this study investigates the meaning students give to the factors affecting their engagement in mathematics as they move to secondary school.

For Mills (2014), methods are procedures and techniques employed in a study, whereas methodology is the lens through which a researcher views and makes decisions. Since very little is known about students' engagement in mathematics in the local context, this research is conducted out in the natural setting. The lived character of the experience of the situations that result in the decline in the performance in mathematics allows to have a deep insight into the students' perspective. Since, perspective is characteristic of phenomenological research (Smith, ibid), this design is found fit for the current study.
In the next section, I explain the choice of the three-research site.

3.4 LOCATING THE RESEARCH PARTICIPANTS

I initially considered taking each school as a case and wanted to use a case study design. But a case study design would not give the essence of students' perception of their experience of the transitions and its effects on their mathematics engagement. Furthermore, it would entail multiple perspectives and multiple methods of data collection. This study focused on persons, that is, on the participants who achieved highly in mathematics in Grade 6 but perceived a significant dip in performance during Grade 7. It is known from literature that student engagement is an antecedent for short and long term student outcomes. Therefore, I wanted to

identify the critical events or factors (Martin & Marsh, 2009) that influenced the highachieving students' engagement in mathematics. Hence, locating the right participants was key for this study.

As explained in Chapter 1, Mauritius is a small multicultural island state with a diversity of schools and student profile. In addition, the country is divided into four education zones and the types (state school, private, confessional, and Gandhian schools) are approximately equally distributed. These schools are managed by different governing bodies or authorities. And access to any one of these schools require the written permission form them. But initiallyI considered ethical to contact the heads of some of the schools in one region to seek their consent before writing to the authorities concerned. Therefore, for this study, I selected participants from three schools from the same area due to convenience of access. An overview of the three participating schools are given below.

3.4.1 OVERVIEW OF THE THREE SCHOOLS

Data are collected from three schools in the region due to ease of access. The justification for choosing these three settings is discussed below. Studying the engagement of these students, and not the average and low performing students will provide valuable insights into the factors influencing the engagement of all the students. This research is novel in the sense that factors or events that render these students at risk can be singled out. Also, the findings of this study might reveal important implications for practice. As Robson (2002, p. 183) observes that "*context can be powerful determinants of both causes and effects*". Students' experience of engagement in mathematics may be dependent on the secondary school they are allocated to, as each school has its own culture. However, the aim is to deeply understand the mediating mechanism(s) through which the interaction between the school and student factors influence any shift in student engagement in mathematics rather than seeking correlation as in quantitative research (Creswell, 2007). Therefore, the schools were selected for convenience of access. However, they are representative of schools in the Mauritian context because Mauritius being a small island.

Moreover, issues about the performance in mathematics in Mauritius are considered at a national level and not in specific regions or zones. Therefore, the criteria for the selection of schools was not based on performance of the school in national examinations rather it was purposive and convenient. Whereas, for the selection of participants, I gave importance to

those having experienced the condition of a dip in their performance in mathematics and who can articulate their experiences. An overview of each school is given below.

School A

School A is a private owned co-education secondary school with a population of around 800. This school is highly regarded in the region because it has, in recent years, produced outstanding results in Grade 9 national examinations together with the Cambridge School Certificate and Higher School Certificate examinations. This school is very famous locally and highly respected among parents. For this reason, some parents choose this private school even if their children are eligible to get a state school (generally considered to be better than private schools). Two differences that this school has from other private schools is firstly some students enter with A or A+ in most subjects. Secondly, this school is a co-educational school, unlike most private schools. Therefore, this school was key for locating the type of participants needed for this study. The profile of the participants from this school is given in the section below.

School B

The second school, in this study, is a boys' elite state secondary school where students who achieve highly at the end of primary school examination are admitted. The school population is about 900 with 4 classes of Grade 7 at the time of data collection. This school was chosen firstly because in 2014, during my EdD assignment 3, I found that nearly 30% of those in Form I (now Grade 7) failed the first-year examination in Mathematics (Purdasseea, 2014).

School C

The third school is a girls' state secondary school with a school population of 800. Average performing students in the CPE/PSAC are admitted with some obtaining A or A+ in different subjects are also accepted in the school.

3.4.2 ACCESS TO SCHOOL

According to Kay (2019), a researcher is required to seek permission from gatekeepers for the involvement of children and young people in any proposed research study since those individuals are classified as vulnerable due to their chronological age. In Mauritius, the 'age of majority' is 18 where individuals have the legal authority to vote and take their own decisions. However, in this study, the participants were 11-12 years old. For Campbell(2008), children and young people are surrounded by gatekeepers across the different spheresof the world they inhabit and have, among others, a protective role. In the context of this study, parents, heads of schools, heads of mathematics departments, teachers, and administrators at the Ministry of Education are concerned. In line with what Kay (2009) mentioned that gatekeepers exist in various strata, I asked permissions from gatekeepers form the different strata. Firstly, I contacted the heads of schools and negotiated access to 'their' schools. Heads of departments and teachers were also approached to seek consent to have participants from their respective classes. Following clearance from the gatekeepers at school level, I wrote letter to the Ministry (see Appendix 2) through the director of my institution to have access to the state schools B and C. On the other hand, access for school A was negotiated from the manager of the school.

The table below shows details of the various steps the dates when field work was conducted.
Table 1: Timeline for the study

	Timeline for the study	
Date		Task
24 July 2016	Letter to Ministry through Director of MIE for Access in State Secondary Schools	
28 July 2016	Letter sent to Ministry	
	Access granted	
29 August 2016	Consent from parent and participant for Piloting of face to face Interview	
9 September 2016	Home[2]	Piloting of interview question
September 2016	Re-working the interview questions following the piloting	
12 October 2016	School B	Individual interview (LC1)
14 October 2016	School B	Individual interview (LD1)

[2] The participant from the pilot study was from School A.

14 October 2016	School C	Individual interview (BB1)
21 October 2016	School C	Individual interview (BC1)
24 October 2016	School A	Individual interview (MA1)
17 March 2017	School A	Group Interview (MB)
17 March 2017	School A	Group Interview (MC)
20 March 2017	School B	Group Interview (LA)
22 March 2017	School B	Group Interview (LB)
23 March 2017	School A	Individual interview (MG)
24 March 2017	School C	Group Interview (BA)

3.4.3 SYSTEM OF PSEUDONYMS

Three schools anonymized by letters A, B and C participated in this study. Pseudonyms are used to anonymise the participants. For this study, each pseudonym consists of two letters and a number. The first letter is a code representing the participating school M (for school A), L (for school B) or B (for school C). The second letter represents the order in which the individual or group interviews were conducted in each school. For example, MC means the third interview conducted at school A. In addition, a number is assigned to the participants.

3.5 DATA COLLECTION METHODS

This study adopted hermeneutic phenomenology as a methodology where there is a belief in the importance and primacy of subjective consciousness (Sloan & Bowe, 2014). Following Gadamer's philosophy, van Manen (1997) believes that language reveals being (or existence) within some historical or cultural context. Gialdino (2006) asserts that qualitative research is relational, as it is fundamentally grounded in communication. In the same vein, Flick (1998, p. 6) asserts that "*it is an interactive process involving both the researcher and the participants*. It stems from my constructionist belief that the answers to my research questions can be conceptualised through interactions with the participants. In sum, "*languageof the interview, provides the means for data"* (Sloan & Bowe, 2014, p. 13). Therefore, the principal tools used to collect data, in this study, were individual interviews and group interviews.

As elaborated in Chapter 1, many stakeholders in Mauritius attribute the decline in performance in mathematics, in general, to the disengagement of students resulting from theirlow attitude and low ability in the subject. In many workshops organised by MIE, teachers adopt a 'deficit

model' of education, thus always blaming the students for the weak performance in mathematics. Also, in the literature, most of the studies on student engagement are conducted from the adults' point of view. Students are rarely given voice to defend this claim and explain 'their reality'. According to van Manen (1997), a researcher does not look for truth but for the participants' perception of their truth that is their own experiences as they perceive them. It means that the investigation on the meaning the students give to their experiences of transition and their engagement in mathematics cannot be learnt and understood from the teacher's perspective. Therefore, this study investigates from the students' perspective. As such, the interview method was deemed appropriate to gather data about the participating students' experience of the phenomenon.

A total of six individual face to face interviews (School A: 2, School B: 2 and School C: 2) and five group interviews (School A: 2, School B: 2 and School C: 1) were carried out in all. The interview was piloted at the place of a student in the presence of her parents. On the day of the pilot interview, I talked to the parents as such I was unable to interact with the participants before the interview. As such no trust and rapport was established with the student. The child was not given the opportunity to feel confident. I found her reticent to answer the questions. Moreover, some questions like "*describe the teaching method of the mathematics teacher*" was found not appropriate to the developmental age of the 11 year old participant.

Following the pilot (9 September 2016), the interview setting was changed so that children feel comfortable and would encourage students to open up about their experiences of transition. Each school provided a place where I could interview the participants without the presence of their teachers. The first interview was conducted at school B. However, it was quite frustrating as initially, not much data was obtained from the individual participant. Evenif the participant satisfied the selection criteria and accepted to be part of the study, the participant was initially shy and reticent to respond to the questions. The experiences that the individual participants harboured were not adequately spoken. Phenomenological reflection isnot introspective but retrospective (Sloan & Bowe, ibid). It was challenging for the participants to articulate their memories and experiences. One explanation might be that in the local context, parents prohibit children to talk to strangers to protect them from

malefactors. However, in this study, it proved to be problematic for the research. It was thought that talking to a stranger about their experiences, at a young age, was quite intimidating to the participants. To counteract the shyness of participants, for other interview sessions, I carried out preliminary visits to the schools and met the participants before the interview sessions. This helped build a relationship of trust and rapport between the participants and me. This was also done to avoid that the participants see me as an authority figure (Cohen, Manion & Morrison (2007).

Group interview

In addition to individual face-to-face interviews, group interviews were used to collect data. Bradbury-Jones and Irvine (2009) argue that group interviews, in phenomenology, are actually beneficial because they stimulate discussion and open up new perspectives. According to Cohen and Manion (2007), group interviews are less intimidating and encourage interaction between groups rather than simply responding to adult's questions. They further state that group interviews enhance children's understanding of the situation by challenging and extending each other's ideas. In the context of this study, some participants were recalcitrant to open up about their experiences of mathematics during the primary-secondary transition period during the individual interviews. Cohen, Manion and Morrison (2007) suggest to use alternative methods like playing games, using pictures, photographs among others with young children. However, they also suggest that with older children, using more formal interviews helps them understand the importance of the situation and they respond positively to it. During the group interviews, students were found to give more detailed account of their experiences of both primary and secondary school mathematics.

It could be argued that multiple individual interviews with same students could produce more data but not necessarily new and emergent ones. Moreover, the group settings were homogeneous, consisting of participants from the same class, learning mathematics with the same teacher and perceiving a significant decline in their performance. While for Arksey and Knight (1999 cited in Cohen, Manion & Morrison, 2007), it might be a disadvantage by making participants reluctant to respond to question in presence of colleagues, it actually proved to be an advantage for those in the current study. They interacted with each other and responded with confidence. Furthermore, unlike focus group interviews which yields collective views, individual responses were considered in the group interviews.

Any research concerning the lived experience of participants means that they report the experience of the phenomenon depending on their memory. Whitaker and Atkinson (2019) argue that:

> We are not arguing that, say, memory can only be equated with what is observably, audibly said. Equally, however, we have no access to 'memories' except through actors' memorialisation, and they include spoken accounts of recollected events. Furthermore, they are always mediated by culturally available modes of expression.
>
> (Whitaker & Atkinson, 2019, p. 631)

However, participants are subject to recall bias (Vrijheid et al. 2009). Their current situation biases them. In this study, the difficulty in mathematics encountered can affect the meaning-making of their past events. Retrospection can make it very difficult for students to speak out, thus making the accuracy of the answers an issue. One solution to counteract this problem was to opt for group interviews. Therefore, I also chose the group interview. This was in line with my epistemological stance of socio-constructionism. The participants for the groupinterviews were different from the face-to-face interview to get different perspectives of the same phenomenon.

In the current study, the students' current difficulty in mathematics or decline in their performance might affect the meaning-making of their past events. It is very difficult for young students to speak out in retrospection. One of the solutions to this problem was to interview each student several times. However, there was no guarantee that this methodwould result in better data about their engagement in mathematics to answer the research questions. Therefore, it was decided to conduct group interviews instead. This method is in line with my epistemological stance of socio-constructionism. The advantage of a group interview is that it is practical.

> Furthermore, Denscombe (2010), state that it does not imply, however, that there are as many social realities as there are individuals-each interpreting his or her world in their unique way. As has been stressed, phenomenology does not treat interpretations of the social world as totally individual things. Necessarily, they are shared between groups, cultures, and societies, and it is only at these levels that phenomenology recognizes the possibility of there being multiple realities.
>
> Denscombe (2010, p. 97)

That is why it was thought that group interview was appropriate in the context of this study, and relevant information was obtained to answer the research questions. However, one drawback that was observed during the interview sessions is that some participants tended to dominate the conversation. I had to encourage all the participating students to talk.

Protocols established by Creswell (2007) were followed before and during the interview sessions. Before starting the interview sessions and despite that prior consent was obtained from both the parents and students, I asked the participants whether they still wanted to be part of the study. Furthermore, I communicated the purpose of the study, together with the amount of time needed to complete the interview to all participants.

Interviews provide in-depth information about the participants' experiences and viewpoints of a topic (Turner, 2010). Gall & Borg (2003) summarised three types of interview questions, namely, informal conversational interview, general interview guide approach and semi-structured interview. In this study, a combination of informal conversational interview and semi-structured interviews were used. All the participants were asked the same questions in the same order, in view to achieve data saturation. Moreover, the same focused general information was collected from the different participants, which facilitated the organisation and analysis of data. Group interviews are different in other ways to the experiences and the co-constructed meaning of the participants' engagement in mathematics some rationale atlast. However, this method limits the naturalness and relevance of questions and answers. I probed further in certain situations where new information was emerging and matched the approach to the interview with each participant and the amount of openness; they showed to me. Some questions were asked again to countercheck the trustworthiness of their responses. During the interviews, the researcher interacts with the participants through face- to-face conversation. Thus, interviews by default are relational (Fontana & Frey, 2005).

Zazkis and Hazzan (1999) indicate that the choice of qualitative interview questions can either be clinical, semi-structured or focusing on the subject matter. In this study, semi-structured interviews were used to gather data on students' perceptions and experiences of their engagement in mathematics during the first year of secondary school. The interview questions were rendered as open-ended as possible since a qualitative interview aims at understanding participants "on their terms and how they make meaning of their own lives, experiences and cognitive processes" (Brenner, 2006, p. 357 cited in Yin, 2011, p. 135).

Open-ended questions, however, bring added difficulty in coding the data, but this reduces researchers' biases within the study, particularly when the interview processes involve many participants. Furthermore, interviews are prone to subjectivity and bias on the part of the researcher (Cohen, Manion & Morrison, 2007). As such, listening to participants and probing further following students' responses were favoured to enable students to think aloud. Therefore, simultaneously asking questions and taking notes was avoided. The discourse of the interviewees was audio recorded in two different devices to ensure that data is not lostdue to any malfunction of any one device. However, recording the interview using two devices can intimidate these young participants.

3.5.1 DEVELOPMENT OF INTERVIEW QUESTIONS

The interviews aimed to seek a deep sense of participants' perception and their experiences of engagement in mathematics during the period of transition from primary to secondary schools Moreover, to answer the research questions which are related to students' engagement in mathematics, participants' perceptions of mathematics instructional practices together with perceptions of mathematics engagement and learning were sought.

Furthermore, as beliefs and attitudes are antecedents to behaviour (Bean & Eaton, 2000), students' perceptions of the school and classroom environments are critical in assessing their receptivity to learning. The perceptual dimension, thus, includes students' judgments about their relationships with peers, the mathematics teacher, and school staff; their beliefs that mathematics teacher has high expectations of students; and their understanding of institutional norms, rules and regulations, and support for student success. These factors areof relevance to my study. Since prior research indicate that students engagement in influenced by the integration of environmental factors (school, classroom, and home) and students factors, two frameworks namely Fredricks et al. (2004) and Walberg's Model of school productivity (1980) were used in conjunction to design the interview questions to capture the essence of students' experience. Fredricks et al. (ibid) defined students' engagement as a multidimensional construct consisting of behavioural, emotional, and cognitive components. Walberg (1980) included nine factors that he found to influence learner's cognitive as well as emotional outcomes. These nine factors include (a) ability or prior achievement, (b) age, (c) motivation or self-concept, (d) quantity of instruction, (e) quality of the instructional experience, (f) the home environment, (g) the classroom or school environment, (h) the peer group environment, and (i) the mass media (Walberg, 1980). This

model was chosen because, it extends beyond earlier models of academic learning by examining out-of-school influences and psychosocial factors (Wang, Haertel, & Walberg, 1993) which is relevant to the Kahu and Nelson (2018) model of student engagement (See Appendix 3).

As stated in chapter 1, an informal conversation with the heads of the participating schools and teachers allowed me to have their perspective on the current situation of mathematics teaching in secondary schools. This context-dependent knowledge helped me in designing thestudent interview schedule to understand the phenomenon deeply under study.

3.5.2 THE PILOT STUDY

Since the study concerned young adolescents, and it was planned to gather data through group interviews, it was felt necessary to pilot the interview schedule. As Teijlingen and Hundley (2002) suggest, to carry out a pilot study to test the data collection instrument to identify the potential problem areas and to refine the interview schedule. As such, the aim of the piloting was multi-fold. Firstly, the pilot study tests whether the semi-structured interviewquestions were clear, comprehensible, and appropriate for the developmental level of young adolescents. Secondly, to find the length of time needed to interact with the participants to complete the interview session. Care was taken to eliminate ambiguity and leading questions as far as possible. Consequently, the interview questions were re-worked to fit the purpose of the research.

One Grade 7 students (a boy) from School A, was selected. The selection was made based on the same criteria as the participants in the study. The individual interview was conducted with at the place of the student, in the presence of his parents. It was noted that specific questions were answered by either yes or no, whereas other on other occasions no responses were received.

Three factors were thought to be responsible for this situation. Firstly, the questions might be leading questions and did not provide opportunities for the student to elaborate on his experiences during the transition and his mathematics engagement. Secondly, I was a stranger to the student, and the interview was conducted in the presence of the parents. I also observed that the parents were embarrassed when their child adopted avoidance tactics and did not respond to specific interview questions. Consequently, the parents tried to respond to the

questions in place of the student. Thirdly, the questions were either ambiguous or not set to the level of the participant (Cohen & Manion, 2007). Some questions were re-worked,making them easier to understand, hence eliminating ambiguities. According to Cohen,Manion & Morrison (ibid), an interview is not a naturally occurring conversation; instead, it is a constructed social encounter.

3.5.3 INTERVIEW SESSIONS

For the current study, interviews were carried out within the school premises in the absence of the parents and teachers. It was done to ensure that the students are interviewed in an environment in which they felt at ease. During the actual interviews, apart from the initial stages of the first individual interview where the student was quite shy, the participants were more open and enthusiastic to share their experiences. The pilot study helped gain experience in the field and make appropriate amendments to the structure of the questions, their sequence, and their content before the actual data collection took place.

The data collection sites were chosen first to find participants who satisfied this criterion. Since students are allocated, schools based on their overall CPE/PSAC results, not all schoolshave students with A or A+ (more than 75 marks) in mathematics. Furthermore, gaining access to some private school is a challenge. Participants satisfying the criterion were invited to participate in this study. The criteria set for this study was the students who performed exceptionally well in mathematics at the end of primary examinations but have experienced a significant dip in their test results during the first year at secondary school. Students obtaining 75 or more marks in the CPE examinations in mathematics were accepted to be high achievers in the subject. Since class tests are carried out every month, in secondary schools, the selection of participants was made based on their test results.

Purposive sampling was used to select Grade 7 students from each school who satisfied the criteria. One individual interview was carried out in Schools B and C, whereas in School A two interviews were carried out. Following which 26 lower secondary students were invitedto participate in group interviews to corroborate the individual interviews. Cohen, Manion, and Morrison (2007, p. 115) posit that a purposive sample is chosen based on a researcher's '*judgment of the typicality or the possession of a characteristic being sought'*. In this way, a sample is built that satisfies the specific needs of the study. Therefore, for this study, participants were invited to participate in the three secondary schools, based on the criteria

stated previously. Since I did not have access to the test results, I negotiated with the Heads of Mathematics Department and the class teacher to choose the participants based on the criteria provided. A list of students was made presented by the teachers. Following which, students were invited to participate (see Appendix 4), and parent consent forms were sent through them (see Appendix 1).

In school A, six students were selected of whom two were girls. The disparity in the number of boys and girl participants was due to the challenge in finding participants who satisfied the selection criteria. School B was a boys' state school, and apart from the individual interviews, two group interviews consisting of 4 and 5 students were conducted. Finally, from School C (a girls' state school), two individual interviews and one group interview consisting of 5 students satisfying the criteria asked to participate in the study.

	Individual interviews	Group Interviews
School A	2	2
School B	2	2
School C	2	1

Table 2: Number of interviews per school

3.5.4 PROFILE OF PARTICIPANTS

Participants from School A:

The table below shows the characteristics of each student that fit the purpose of the study.

Participants from School A

Table 3: Participants in School A

Participants from School A	Gender	CPE Grade			
MA1	Boy	A+	Grade 8	Individual interview	Border line passes In mathematics
MG1	Girl	A	Grade 8	Individual interview	
MG2	Girl	A	Grade 8		
MB1	Boy	A	Grade 7	Group interview	
MB2	Boy	A	Grade 7		
MB3	Boy	A	Grade 7		

MB4	Boy	A+	Grade 7		
MC1	Boy	A	Grade 8	Group interview	
MC2	Boy	A	Grade 8		
MC3	Boy	A	Grade 8		

Two girls satisfying the criteria were chosen from the same school. They participated in an individual interview. In this study, they are identified by AB1 and AB2. In other cases, group interviews were conducted. Seven students were selected for data collection by the Head of Department from School A. The students were not from the same class. It was thought that they would not form a coherent group during the interview, and they might not be at ease to respond to the interview questions as one group. As such, it was decided to interview the students of each class separately as two groups.

Participants from School B

Table 4: participants in school B

Participants from School B	Gender	CPE Results			Term 1 results	Term 2 results	Term 3 results
LA1	Boy	A+	Grade 7	Individual interview			
LB1	Boy	A+	Grade 7	Individual Interview			
LC1	Boy	A	Grade 8	Group interview	Fail	No data	Border line pass
LC2	Boy	A+	Grade 8		75	60	Border line pass
LC3	Boy	A	Grade 8		Fail	No data	Border line pass
LC4	Boy	A+	Grade 8		Border line pass	58	63

One individual interview followed by two group interviews were carried out in the boy's secondary school, which is also a high performing school. The school is highly rated by parents. In this school, all the students admitted have outstanding CPE results with either A+ or A in mathematics. The first group consisted of four Grade 8 students who have already spent one year at the school and have struggled in mathematics. The profile of students in the two group interviews is shown in the table below.

The second group interview consisted of 5 students who still worked well in mathematics. However, they have a low perception of their results in Grade 7. They would like to do better.

Table 5: Participants in School B

Participants from School B	Gender	CPE Results			Term 3 results
LA1	Boy	A	Grade 8	Group interview	B
LA2	Boy	A+	Grade 8		B
LA3	Boy	A	Grade 8		B
LA4	Boy	A+	Grade 8		C
LA5	Boy	A+	Grade 8		B

Participants from School C:

One individual interview was conducted in School C. The group discussion from school C consisted of 5 participants from Form 1 (Grade 7).

Table 6: Participants School C

Participants from School C	Gender	CPE Results			Term 2 results
BB1	Girl	A+	Grade 7	Individual interview	
BC1	Girl	A	Grade 7	Individual interview	
BA1	Girl	A	Grade 7	Group interview	
BA2	Girl	A	Grade 7		
BA3	Girl	A	Grade 7		
BA4	Girl	A+	Grade 7		
BA5	Girl	A	Grade 7		

3.6 FIELDWORK

Negotiating access to different settings (secondary schools) proved to be quite challenging. Even though for the state schools, I obtained permission from the Ministry of Education, also negotiated access with both heads of school and mathematics teachers. Since School A was a private secondary school, access was granted quite easily from the head of school and the head of the mathematics department. The heads of mathematics departments of all theschools agreed to shortlist the students who obtained A or A+ (more than 75 marks in CPE) but who have scored very low marks in mathematics tests[3]. Ten students, in total, were identified for the individual interviews, and consent forms were sent to all the parents. Six of them answered favourably.

Before engaging in a conversation with the participants, it was necessary to prepare the interview sessions judiciously. I negotiated with the management of each participating school to get a room where I could interact with the participants without any distractions by school staff. Furthermore, the purpose of the interview, the form, and the duration were once again explained to the participants. I explained to them that they needed to understand the questions before responding to them. In case of doubts, they were asked to seek clarification before answering.

Interviews generate a large amount of information, and it is difficult to record the data using pen and paper or relying on memory. Therefore, the individual and group interviews necessitated that the engagement in conversation with the participants was audiotaped. As mentioned earlier, as a precaution, two devices were used to record the conversations. Taking notes during the interview sessions as it would affect my concentration to probe deeper into the perceptions of the participants on their engagement with mathematics in both primary and secondary schools. These interviews were later transcribed and coded, as explained below. Six individual interviews (2 from each school) and five group interviews (School A: 2, School B: 2 and School C: 1) were conducted with Grade 7 and Grade 8 students (aged 11-13years). Different participants took part in the face to face and group interviews.

[3] There are no standardized examinations in grades 7 and 8. The mathematics test are prepared by the schoolteachers and are by no means comparable in level between the schools. However, all secondary schools follow the same teaching and learning syllabus (TLS).

During the first interview session, the participant of the individual interview was sometimes found to be silent and not adequately responding to the interview questions. Some of them were shy and could not articulate well their experience of the transition and their engagement in mathematics. Contrary to what I expected, the responses of some participants were very short, at times a few words. As a researcher, I had to prompt further for them to open up the lived experiences. I incited the participant to respond to the questions. The solution to this problem was found by interacting with the students before the interview sessions and developing a relationship of trust. As Gaskell (2000) explains:

> While experiences may appear to be unique to the individual, the representations of such experiences do not arise in individual minds.
>
> (Gaskell, 2000, p. 43)

In line with my epistemological assumption of a socio-constructionist, group interviews were used to triangulate data (Patton, 1999) from the individual interviews. According to Gaskell (2000), group interview stimulates the participants to talk and respond to each other, to compare experiences, and to reach what others say. A synergy emerged during the group /social interaction, and the participants were more at ease in answering the questions. According to Flick (2009, p. 196), "*the main advantages of group interviews are that they are low cost and rich in data, that they stimulate the respondents and support them in remembering events, and that they can lead beyond the answers of the single interviewee"*. The group consisted of participants from the same school. In that sense, these respondents have shared social milieu. Since most of the secondary schools in Mauritius are separated based on gender, it was assumed that boys and girls at school have different social milieu and that this may affect their responses.

A total of 28 students were involved in the whole study. The general interview guideapproach was adopted where the same general area of information is asked from eachparticipant. It means that an interview is not a naturally occurring conversation; instead, it is aconstructed situation (Cohen, Manion & Morrison, 2007). However, if new, interesting, and unexpected information were emerging, I prompted further. This flexibility of asking unplanned questions to participants helped generate additional insights into the perceptions and experiences of the participants about the phenomenon under study.

Individual and group interviews were carried out in Mauritian Creole, which is the mother tongue of the participants. Mauritian Creole is spoken by 98% of the Mauritian population; therefore, using this language allowed the participants to express their opinions without encountering any language barrier. Immediately after the interviews were conducted, field notes were taken to supplement the data collection.

As mentioned earlier, no notes were taken during the interview sessions as it would interfere with the proper running of the data collection process and would hinder from prompting further following students' responses.

3.6.1 TRANSCRIPTION

In the context of this study, the accounts were transcribed in Mauritian Creole verbatim without translating into the English language. Even if the transcription process was time- consuming, it was found to be a necessary step. Only parts of the data, relevant to theresearch questions, were translated into English and presented in the discussion chapter. A good translation strategy had to be decided as, according to Filep (2009):

> Many words and phrases that exist in one language do not have an exact equivalent in another. Therefore, we must find a solution for translating these expressions and concepts ina way that their meanings do not get lost by translation.
>
> (Filep, 2009, p. 61)

Therefore, certain chunks of the data were translated in consultation with a colleague from the French department who is a former member of the "Kreol Morisien" unit at MIE and presented. The research questions of the study guided the extracts of the data to be translated. Davidson (2009, p. 38) argues that "*the process is a selective one whereby certain phenomenon or features of talk and interaction are transcribed"*. She further claims that all transcriptions are selective in one way or the other as it would be impossible to record all features of talk. Superfluous information makes a transcript challenging to read and might obscure the research purpose.

3.7 DATA ANALYSIS PROCESS

Braun and Clarke (2006) provide a six-step framework to thematic data analysis, namely:

1. familiarising with the data;

2. generating the initial codes;
3. searching for themes;
4. reviewing the themes;
5. defining and naming the themes; and
6. producing the report.

They define thematic analysis as a method for identifying patterns or themes within the data, analysing, and reporting those patterns (ibid). Thematic analysis is more than just a summary of the data. The Phenomenological study design for this study favoured an inductive thematic analysis. Braun and Clarke (2006) argued that thematic analysis is a useful method for examining the perspectives of different research participants, highlighting similarities and differences, and generating unanticipated insights. The Phenomenological study design for this study favoured an inductive thematic analysis, however, both inductive and deductive approaches were used.

Another, benefit of using thematic analysis is that it is a method rather than methodology (Braun & Clarke, 2006). It means that this type of analysis is not tied to any theoretical or epistemological perspective. Braun and Clarke (ibid) further underline that this makes the method flexible and categorises data analysis into two practices. First, stemming from a theoretical and epistemological position whereas the other, independent of theory and epistemology. However, Braun and Clarke (2006) highlight those researchers are not independent of their theoretical and epistemological positioning and cannot code data in an epistemological vacuum. In this study, data is analysed using a combination of both methods. A list of deductive or a priori codes informed by literature, the research questions and the conceptual frameworks was made before starting the field work. The table below provides these codes.

Table 7: List of a priori codes

A priori codes			
School connectedness	Making Friends	Summer Dip	Tuition
Workload	Completion of syllabus	Parental involvement	Feedback
Teacher Support	Perception of mathematics	Curriculum Discontinuity	Perception about school before

			joining
Quality of teaching	School culture	Students' readiness to join secondary school	Homework strategy
Teacher- student relationship	Teaching of mathematics	Curriculum continuity	

In this study, participants from three schools provided varying insights about thephenomenon. The interactions with the participants produced data in the form of beliefs and constructs. The flexibility of thematic analysis allowed me to capture these nuances in the responses of participants. While thematic analysis is flexible, this flexibility can lead to inconsistency and a lack of coherence when developing themes derived from the research data (Holloway & Todres, 2003). However, Braun and Clarke (2006) emphasise that data analysis is not a linear process moving from one step to another. Instead, it is recursive wherethe researcher moves, as is necessary, forward, and backwards throughout the six steps. They also advise that this guide must be adapted to fit the research at hand.

According to Braun and Clarke (2006), one pitfall is to take the interview questions as themes. In the context of this study, this was avoided. Sections of the data were closely analysed to identify key themes.

3.7.1 DATA REDUCTION PROCESS

Step 1: Familiarising with the data

According to Braun and Clarke (2006), the first step in qualitative analysis is to become familiar with the data. Hermeneutic phenomenology is rooted in hermeneutics, a method of interpretation of philosophical text. Analysis of hermeneutics involves a circular process. Van Manen (1997) explains that research move in the 'hermeneutic circle' between part of the text and the whole text to establish truth by discovering phenomena and interpreting them (Langbridge, 2007). Adopting the hermeneutic circle, I engaged with the data, reading and re-reading the whole transcripts several times, simultaneously listening to the audio-taped conversations with the participants. The purpose of this step was to ensure that no parts of the

audio recordings were missed during the transcription process. But also, it helped in getting an overview of the whole interview. Several interviews (both individual and group) were read simultaneously to capture some perspectives of the whole as established by Gadamer (1997) hermeneutic circle. The same process was repeated for each interview. The aim was to capture, as fully as possible, the essence of the respondents' experiences. Within the transcripts, each response was numbered so that the responses could be identified quickly while searching for meaningful patterns and ideas. Words, phrases, or sentences were written in photocopies of the transcripts besides the responses that were relevant to the research questions. At the same time, the relevant responses were highlighted with coloured highlighter.

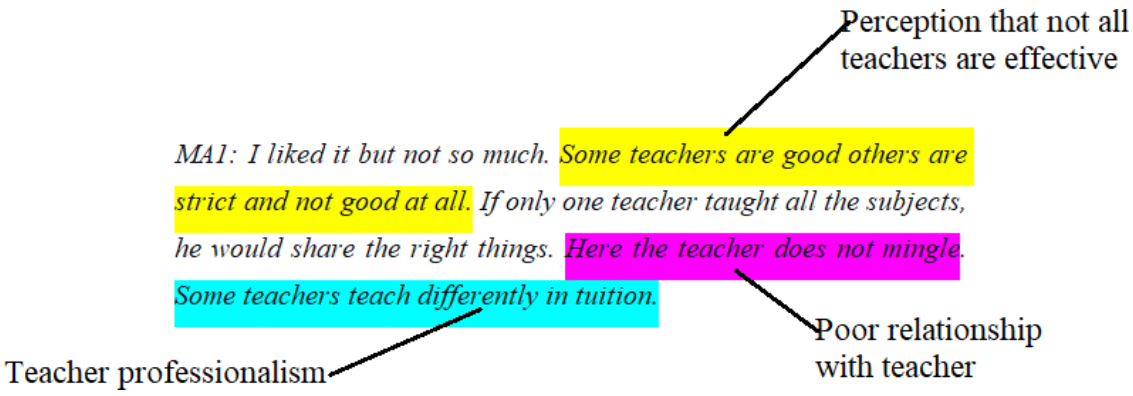
Step 2: Generating initial codes

Letting the data to speak, I developed on what was said in the interview texts to ascertain the essence of the phenomenon being studied. Pseudonyms were assigned to each participant. The words, phrases or sentences were compared, and initial manual codes were identified. Manual coding was done while engaging with the terms or small phrases and jotted down in photocopies of the transcripts. Coding was done systematically for each transcript. All data sets were given equal attention to identifying interesting aspect. The codes gave an early impression of the students' perceived experiences of the phenomenon. Two examples of data extracts with single and simultaneous codes (two or more different codes to a single qualitative datum) respectively are given below.

Example 1:

LB2: In Grade 6 my parents were helping me. But now it is a bit difficult. They do not know themselves.	**Dimished parental support**

Example 2:



The list of initial codes are given in the table below:

Table 8: Themes and sub themes

Deductive codes	Teacher-student relationship		**Inductive codes**
Mathematics is difficult	Parental involvement		Allocation of school
Many new topics	Making friends		Mathematics teachers negative attitude
Self-efficacy	Bullying		Silent class
Summer dip	Peer support		Noisy class
Completion of homework	curriculum		Getting bored
Feedback on tasks	Mathematics teaching		Lack of understanding
Tuition	Repetition of topics		Perseverance and coping strategy
Perception about school before joining			Strict rule and regulations
			Self efficacy
			Teacher professionalism

Step 3: Searching for themes

The codes were further compared and grouped into overarching subthemes and themes. The themes were refined using an iterative process.

I sorted the codes into broader themes that seemed to combine to make the overarching theme. One example is given below. Most of the themes identified in this study are collective. However, specific individual responses which were unique and interesting, and that would enrich the finding of the study, have also been included. For example, some participants cheated by copying homework from their friends. One participant mentioned that he downloaded software which would allow him to scan the question and obtain the worked solution to the mathematics problem instantly. Even if only one participant mentioned this, I included it in the theme as it was new, interesting, and relevant to the study.

Steps 4 & 5: Reviewing, Defining, and naming themes

This step is the final phase of thematic analysis, where themes are refined. The aim is to identify what is interesting about each theme and why.

In this step, themes are reviewed and refined. This stage involved continuously moving backward and forwards between the literature, the research texts, and the earlier analysis, moving from parts to whole following the process by the hermeneutic circle.

After various attempts of refining the subtheme of 'teacher attitude', the theme to 'The attitude of secondary school mathematics teacher towards students as compared to the primary school teachers' and later it was finalised to 'Perceived admonishing behaviour of mathematics teachers towards Grade 7 students'. Similar procedure was used to review all thesubthemes and themes.

The table below shows the codes that have been group to form the subthemes and eventually the final themes which are related to RQ1.

Table 9: Generating themes

codes	Subthemes	Themes
School allocation Satisfaction	Students construct their perceptions and develop feelings and expectations about their new secondary schools	Pre-transition Phase
Perception about school before joining		
School allocation disappointed		
Academic factors	Students' apprehensions about the secondary school before making the move	
Procedural factors		
Social factors		
Perception of Mathematics	Students' construction of perception of secondary school mathematics	
Summer dip	Summer dip: students forget the mathematics concepts learnt in primary school	
Number of subjects and teachers	Academic Shock due to perceived increase in the number of subjects and teachers in secondary school	Perceived experience of culture shock
Expectations		
Experiences		
Strict rules and regulations	Social and Emotional shock due to limited overlap between perceived expectation and experiences of secondary schooling	
Bullying		
Making friends		

Step 6: Producing the report

All responses corresponding to a theme or subtheme[42] were written on paper as shown below.

Table 10: Themes and the responses of participants

Teacher-Student relationship	LA1: Primary teacher very close relationship with all students. LA4: He never tells jokes. We are afraid of him. BC2: The teacher knows my name because I am always among the last in class. MB2: We were closer to the primary (school) teacher. LB1 and LB2: We had better relations with the primary teacher. MB1 and MB2: Here, the relationship is different. MB2: The primary teacher was friendlier (than the secondary LA1: Primary teacher very close relationship with all students. LB2: In primary, the teacher organised get togethers at the end of each term. LB2: In primary, the teacher treated as his children. He was very friendly and very close to us.

[2] In this case the subtheme is: students' feelings and perception about the increase in the number of subjects.

Parental support .	LA2: More parental support in the primary, to obtain good school LA3: G7 is a period of rest for both students and parents. LB1: (399) Education level of parents. (417) Even the well-educated parents do not help the students. LB2: In g6 my parents were helping me. But now it is a bit difficult. They do not know themselves. LB3: My father asks my mother to help me. But she says no. use your brain. BA2: I must give more time to mathematics. BB1: No, they do not help, sometimes they encounter problems themselves. Then I look for solutions in the books. BC2: My parents do not help. CPE yes because should get a good school. But F1 no. MA1: Nobody helps me at home. My mother studied up to grade 6, my father Form 3. I must manage by myself. MC1: Suppose I am sitting and watching television, he asks me whether I complete my homework. If I say no, he asks me to go and complete my homework…each time he says go and do your homework go and do your homework. No one helps me do my homework

After the themes were finalised, these were discussed in relation to the literature. Moreover, to maintain the trustworthiness of the research findings, I acknowledge my predispositions and beliefs underpinning the decisions made and the methods adopted in the study.

The global themes identified for RQ1 are:

Theme 1: Pre-transition Phase: Students' constructed perceptions and expectations of secondary schools before joining

Theme 2: Perceived experience of a culture shock during the primary-secondary school transition

The themes related to RQ2 are:

Theme 1: Mathematics teaching at secondary school

Theme 2: Students' perceived experience of mathematics teacher-student relationship in secondary school

Theme 3: Students' perceived experience of inadequate academic support in mathematics

3.8 MY POSITION AS AN INSIDER RESEARCHER

In this section, I discuss my position as a researcher. Furthermore, how ethical issues were dealt with in this study is also discussed. According to Uncluer (2012, p. 1), "*social researchers must clarify their researchers' roles, especially for those utilising qualitative methodology to make their research credible"*. It is essential to have an awareness of the researcher's contribution to the construction of meaning throughout the research process. This doctoral study is carried out by a teacher educator who is a former mathematics educator in both private and state secondary schools. Being part of the system in which this study is conducted makes me an insider researcher as per the definition of Breen (2007). According to Breen (ibid), an insider-researcher is one who chooses to study the group to which s/he belongs to.

Being part of the education system, my experience as a mathematics teacher in the secondary school has undoubtedly influenced my perception and assumptions about schools and the teaching of mathematics at both primary and secondary levels. Therefore, I hold some preconceived ideas about students, teachers, and the teaching of mathematics in schools. The researcher effect (Silverman, 2000) or reactivity (Maxwell, 2013) is the influence of the researcher on the setting or individuals studied. My position as a lecturer is highly regarded in the Mauritian society. In this study, my status of a lecturer together with my age gap with the

participants could have influenced the participation of the respondents in the first place and secondly the responses offered during the interview sessions. It was thought to be less threatening for the participants to carry out the interviews at the school. This was done in order to reduce researcher effect on the young participants.

Furthermore, my preliminary visits to the schools and the meetings with the participants before the interview sessions were done to create a relationship of trust and confidence between the participants and me. The full cooperation of the participants was sought to provide insight into their experiences. I am fully aware that I can neither assume a value-free position of neutrality nor speculate the lack of the politics of power relations between the respondents and myself. As a researcher, I am conscious that these biases and prejudices can act as a barrier to develop a deep understanding of students' perception of their experience of transition and the process of engagement or disengagement in mathematics that follows. As a former mathematics teacher and now a teacher educator, I know many staff members in the schools where the interviews were conducted.

For this reason, the schools' managers easily granted access to the school. Even if I did not know the participants personally, the teachers/heads of departments talked to the participants about me. It is thought that this might have changed their perception towards the researcher. Therefore, my interaction with the participants could have influenced the participants' responses. This, in turn, can influence the final form of the study as Fraenkel and Wallen (2009) highlight that the researcher cannot be entirely objective. However, this in line with the hermeneutic philosophy which acknowledges that bracketing is not always possible.

Also, to be a teacher educator, I am also the president of PTA of a secondary school and former member of PTA in a primary school. This position and status in the education sector place me in a position of power and could affect the responses of the participants. On theother hand, the knowledge obtained from the EdD programme together with my experienceof the context enhances my awareness and knowledge of the challenges in the field. To be aware of the disadvantages helped me maintain what (van Manen, 1997) referred to as 'hermeneutic alertness'. A reflective stance was hence adopted right from the beginning. I had to constantly question how the whole process of research and analysis will influence the research outcomes.

> The qualitative researcher's perspective is perhaps a paradoxical one: it is to be acutely tuned-in to the experiences and meaning systems of others. Moreover, at the same time to be aware of how biases and preconceptions may be influencing what one is trying to understand.
>
> (Maykut & Morehouse, 1994, p. 123)

As a researcher, I bear the responsibility not only to analyse and present the findings but also to stick to the ethical statements/protocols agreed with the Ministry of Education, students, parents, and heads of schools of secondary schools.

There is no way in which we can escape the social world to study it (Hammersley & Atkinson, 1995, p.15 cited in the extract by Delamont, 2002). This very sentence reflects that reflexivity requires an awareness of the researchers' contribution to the construction of meaning throughout the research process. It can also be said to be an acknowledgement of the impossibility of remaining "outside of one's subject matter".

3.9 ETHICAL CONSIDERATIONS

3.9.1 INVOLVING YOUNG ADOLESCENTS AS PARTICIPANTS IN RESEARCH

Scaly (2014, p. 203), referring to the British context mentioned that there is an '*assumption that children under the age of 16 years lack sufficient capacity to take sole responsibility fora decision to volunteer as a research participant and parental consent (or that of an alternative legally authorised person) is mandatory*'. In Mauritius, the government, through the Ministry of Women's Rights, Child Development, Family Welfare, and Consumer Protection, has ratified various important international human rights treaties. Consequently, National laws have been harmonised in line with the Convention on the Rights of the Child. Therefore, it can be said that as far as children's rights are concerned, the same international laws govern Mauritius.

Considering young adolescents as participants in this study means that they are treated as individuals who have their perspectives on an issue or phenomenon that is valued by the researcher. It also means that the participants are unique and act and react to the world with intention and are agents in their own life. Therefore, in the context of this study, young adolescents were invited to participate in the study to understand how they understand, interpret, negotiate, and feel (Greene & Hill, 2005) about mathematics during the primary-

secondary school transition. Greene and Hill (ibid), commenting on researching children's experiences, state that:

> As one looks from a historical perspective at the vast field of social scientific, empirical research already conducted on and with children, it is evident that the predominant emphasis has been on children as the objects of research rather than children as subjects, on child- related outcomes rather than on child-related processes and child variables rather than children as persons.
>
> (Greene & Hill, 2005, p. 1)

In a literature search on methodological and ethical issues in conducting qualitative research with children and young people, Kirk (2007) argues that the reasons for not researching children in the past rested firstly on the belief that data gathered from children are unreliable. Secondly, it was believed that they were prone to exploitation by researchers. However, Kirk also highlights that:

> Increasing interest to involve children in research that has been influenced by the recognition of children's rights and through the re-conceptualisation of children within the social sciences as active agents rather than as the objects of research.
>
> (Kirk, 2007, p. 1250)

This re-conceptualisation of the child and the awareness of the importance of listening to children was due to Articles 12 and 13 of the United Nations Convention on the Rights of the Child (UNCRC, 1989) which stipulates those children have the right that their views on any matter affecting them be heard and taken seriously. Parties shall assure to the child who can form his or her views the right to express those views freely (UNCRC, 1989).

In the British context, Ofsted (2010) highlighted the importance of talking and listening to children and young people regarding their move to secondary school as a way of informing staff members who are managing their transition and subsequently developing appropriate plans. Similarly, in the context of this study, the findings from the students' perspective are sought to help in the development of intervention plans/strategies for the smooth transition to secondary and further increasing the knowledge and research base surrounding transition. As a result, children have moved from being 'object of study' to becoming meaningful and significant participants (James & Prout, 1990) in research. Therefore, it is not a matter of just

‘giving voice’ to the participants which Braun and Clarke (2006, p. 8) call the ‘naïve realist view of qualitative research’.

The question that one can ask is whether the participants will be able to report the conscious encounters of their new environment. Furthermore, how conscious they are as they live or react to the environment. Greene and Hill (2005) argue that the nature of an individual’s experience is partly inaccessible to the researcher. However, they further state that experienceis socially mediated and is shared by Greene and Hill (ibid). Therefore, to access and understand this socially constructed meaning, group interviews were deemed moreappropriate.

3.9.2 INFORMED CONSENT

Cohen and Manion (2007, p. 52) highlight those four elements are key to understand informed consent namely: competence, voluntarism, full information, and comprehension.

Competence: The onus for not selecting individuals who cannot take the right decisions is on the researcher.

Voluntarism: This entails that participant are free to choose to participate in the study or not.
Full information: consent is fully informed.
Comprehension: Participants (and their parent) must understand the nature of the research project.

The type of respondents selected were those who scored high marks in CPE/PSACexamination but experienced a significant decrease in their mathematics test scores in Grade7. Mathematics class teacher was asked to seek consent from the students first before handingthe consent forms to the students. Participant and parent were provided with the consent forms containing full information about the study. The guidelines ensured that both the parents and students are aware of the nature of the research, the methods employed and the intended outcome (Husband, 2020). Only those students whose parents and themselves have given consent to be part of the study, were interviewed.

Verbal explanations and information were provided to all students before the interview sessions. Their consent was confirmed even if parents granted their consent for participation earlier. Students were given the opportunity to ask questions about the research. They were

informed that they could withdraw from the study at any time without any negative consequences. Maintaining participants' confidence and trust was my major concern.

3.9.3 ANONYMITY AND CONFIDENTIALITY

Cohen, Manion & Morrison (2007, p. 64) state that 'a subject agreeing to a face-to-face interview, can in no way expect anonymity'. However, in this study, however, stakeholders were assured that every effort would be taken to maintain the anonymity of participants and their schools. Therefore, the names of participants and schools are not disclosed, and pseudonyms are used for the different participants together with their schools to avoid identification. Furthermore, the confidentiality of participants' responses is maintained.

3.9.4 ETHICAL DILEMMA

This research has been designed to understand the experiences of respondents and not to shape them (Husband, 2020). In the context of this study, respondents were required to recall information, formulate responses, and articulate their answers based on their experiences as lived in both primary and secondary school mathematics learning. However, the act of reflecting, answering questions and listening to others (particularly during the group interviews) in turn could lead to changes (Husband, ibid) in their attitude towards their mathematics teacher. With the hindsight, I acknowledge that the participants' engagement in the interview sessions might result in the co-construction of knowledge between the researcher and the researched. Since the focus is on protecting the respondents without limiting the generation of new knowledge, I could have talked to the respondents after the interview sessions to dissipate some of the negative feelings towards their teachers this study might have triggered in them.

3.10 ENSURING QUALITY IN THE STUDY

"*The trustworthiness of qualitative research is often questioned by positivists because perhaps the concepts of validity and reliability cannot be addressed in the way in naturalisticwork"* (Shenton, 2004, p. 63). This study used a qualitative approach. Therefore, four constructs of trustworthiness, namely, credibility, transferability, dependability, and confirmability (Lincoln & Guba,1985), were used. These terms correspond, respectively, to the criteria employed for quantitative research of internal validity, external validity, reliability, and objectivity. Face to face individual and group interviews were used to generate data which is thought to increase the depth and richness of the data and reducing the systematic bias in it (Denzin & Lincoln,

2008).

3.10.1 ESTABLISHING AND MAINTAINING CREDIBILITY

For Merriam, credibility deals with the question "*how congruent are the findings with reality*?" Credibility refers to the investigator's ability to accurately represent the participants' thought, feelings and actions and the processes that influence these (Lodico et al., 2006). In this study, authenticity was achieved using participants' voice (verbatim) during the reporting of the findings.

For this study, I contacted the heads of schools, the heads of department and mathematics teachers at each participating schools to explain the purpose of the study. These early contacts helped me establish a relationship of trust. They are the gatekeepers responsible for granting access to the school and the participants. These preliminary visits also helped me acquire an adequate understanding of the three schools. However, Guba & Lincoln warn that prolonged immersion influences the researcher's professional judgement. This limitation was counteracted by regularly discussing the research processes in the EdD critical support group. Furthermore, in this study, group interviews allowed triangulation by the data source of the individual interviews. However, according to Shenton (2004), groups and individual interviews suffer from some methodological shortcomings since both are interviews of a kind. However, at the same time, the distinct characteristics of each method also result intheir strengths (Shenton, ibid). I was able to verify individual perspectives against the viewpoints of the participants by the group interviews. The ethical considerations adopted in this study enabled to enhance the honesty of the participants. They could refuse to participate in the study. Also, they had the right to withdraw from the study at any point in time without giving any explanation. Therefore, data were collected from those who were genuinely willing to participate and talk about their experiences without fear. Another method used to maintain the credibility of the findings was the use of iterative questioning. Some questions were purposefully revisited during the interview sessions to check whether there were any discrepancies in the responses.

Lodico et al. define transferability as:

> Transferability refers to the degree of similarity between the research site and other sites as judged by the reader. Transferability is assessed by looking at the richness of the descriptions included in the study as well as the amount of detail provided regarding the context within which the study occurred.
>
> (Lodico et al., 2006, p. 275).

It is acknowledged that contextual factors may result in a disparity in the findings.

Dependability is the criterion that parallels reliability in quantitative research (Shenton,2004). According to Lodico et al. (2006, p. 275), "d*ependability refers to whether one can track the procedures and processes used to collect and interpret the data"*. Lincoln & Guba stress the close ties between credibility and dependability, arguing that the demonstration of one ensures the latter. For Shenton (2004), "*this may be achieved through the use of 'overlapping methods', such as group and individual interviews*" (p. 71). In the line, in this study, the research design is described thoroughly, and individual and group interviews are used to collect data. Moreover, the procedures for implementation are detailed.

The concept of confirmability is the qualitative criterion which is equivalent to objectivity in quantitative research. Confirmability addresses the critical issue that "*findings should represent, as far as is (humanly) possible, the situation being researched rather than the beliefs, pet theories, or biases of the researcher*" (Gasson, 2004, p. 93). In this study, I acknowledge that my experience as a mathematics teacher can shape my dispositions and beliefs, which in turn can influence my decisions during the research.

SUMMARY

In this chapter, the processes adopted in this phenomenological research are discussed. I explained my ontological, epistemological, and methodological choices together with my role and the conduct of individual and group interviews are examined and justified. The ethical considerations to maintain anonymity and confidentiality of participants and the schools are also explained. It is done to ensure the credibility of this study. In the next chapter, the data is analysed, and the findings presented under the themes identified during the analysis.

Chapter 4: Findings and Discussion related to RQ1

4.1 INTRODUCTION

This chapter interprets and discusses the main findings of this phenomenological study with reference to the literature related to the concepts of transition and student engagement. This study was prompted following an earlier study conducted in Stage 1 of the Professional Doctorate in Education (EdD) in which it has been found that some students who excelled in Mathematics (obtaining A or A+) at the end of primary school examination had significantly lower test results than expected by teachers during their first year at secondary school. This current study aimed to explore, from the students' perspective, how those who performed highly in national tests in mathematics at primary school level, construct the meaning of their experience of transition from primary to secondary schools and their perceived engagement with mathematics during this period.

It should be noted that the term transition is conceptualised as a process of adjustment to the new environment and not as a temporal change in setting as students move. Since this study sampled only the kind of students described above, it is good to be reminded that the results of this study can be different from what one could expect if the whole population of students transiting to secondary school weretaken. Moreover, the focus is more on what went wrong rather than what was right during thetransition. Students' experience is complex (Kahu, Picton & Nelson, 2019) yet not beyond understanding (Sayer, 2000). The conceptual frameworks, Kahu and Nelson (2018) and Risquez et al. (2008), identified during the literature review serve as a guide for the analysis, organisation, presentation, and discussion of the findings. The two frameworks providevarying but related insights into students' perceived experience of primary-secondary transition and their engagement with mathematics.

The findings are discussed in chapters 4 and 5 in relation to the two research questions (RQ1 and RQ2) respectively, which are given below.

RQ1: How do first-year students perceive and experience transition from primary to secondary school?

RQ2: How does students' perceived experience of the primary-secondary transition influence their engagement in mathematics?

RQ1 focuses on students' perceived experience of transition from primary to secondary school whereas RQ2 deals with student engagement in mathematics during the transition period. Chapter 4 deals with the findings related to RQ1, whereas Chapter 5 considers RQ2.

Despite the students (aged 11-12) response to the questions using short sentences, the above themes were identified from the collective and perceived experiences of participants using Braun & Clarke (2006) thematic analysis framework as described earlier in chapter 3. It was interesting to note that, in most cases, there was congruence in the responses of participants between various interviews both within the same school and between different schools. Furthermore, as Kahu & Nelson (2018) state that each student experience their education differently in an educational interface, therefore, the uniqueness and nuances of individual perceived experiences before and during the transition period were also taken into consideration in the discussion. This indicates that small and trivial things do matter to the child's lived experience, and this is well summarized by Ashton (2008, p. 180).

> Much of what students expressed may seem like small, even trivial details to the adults around them. But to the child, it is of great importance to be able to find out about the necessary, everyday details of life at secondary school.
>
> Ashton (2008, p. 180)

Room was also made for emergent themes that were relevant and interesting for the current study. It mean that there were additional themes that emerged from the data that were not related to the conceptual frameworks adopted I this study. One such example is that some students stated, as a coping strategy to the lack of adequate academic support, they used a software called 'Photomath' to scan and copy solutions of homework on occasions when they struggled with challenging tasks. One would expect students to either seek help from others or copy homework from friends to avoid punishment. However, it was unexpected, anecdotal but at the same time interesting to note that students used technology to scan mathematics questions and instantly obtaining solutions to the mathematics problems. Instead of using the software as a tool to further their understanding and to re-engage cognitively with the subject, hence building resilience in the face of challenge and self-regulate their learning, findings suggest that the software was used as a strategy to cope with the prevailing situation in the classroom.

Kahu and Nelson (2018) presented a framework of student engagement which explains how the interaction between a range of factors interact to influence student engagement through four mediating mechanisms. On the other hand, Risquez et al. (2008) provides a curve representing the adjustment of individuals during the transition period. Risquez and colleagues divide the transition period into various phases, namely, honeymoon, culture shock and adjustment phases. The two frameworks reciprocate each other and have been found tobe key to enhance our understanding, in the local context, the effects of the complex interactions between the structural and psychosocial influences on the participants' mathematics engagement.

Discussion of findings relevant to each research questions 1 and 2 have been interpreted and discussed with reference to the literature in chapters 4 and 5 respectively. It is believed that this exercise can allow more in-depth insight into the dynamic and complex interaction between student and institutional structural and psychosocial factors influencing studentmathematics engagement in the context of transition. The first research question focuses on participants' perception of their experience of transition from primary to secondary schools. Data were collected through semi-structured face-to-face interviews and group interviews in three different schools. Participants, selected using a purposive sampling technique, were asked to share their experiences of transition to the new environment.

In the following sections, the themes, and the subthemes have been discussed to have a deep understanding of students' subjective perception of the allocated secondary schools before and during the transition period.

4.2 PRE-TRANSITION PHASE: STUDENTS' CONSTRUCTED PERCEPTIONS AND EXPECTATIONS OF SECONDARY SCHOOLS BEFORE JOINING

According to Kahu and Nelson (2018), in addition to student characteristics and institutional factors, students' experience is also influenced by the wider sociocultural context. As stated earlier, students are allocated their secondary school based on the results of a national standardised assessment which is both a certification and a selection examination. Therefore, participants were asked about the perception they created of their current secondary schools before joining and whether it aligned to their perceived experience of the school during the first year. In line with Burnett (2007) and Menzies and Baron (2014), findings from the current study suggest that there exists a pre-transition period where participants construct images and

develop feelings and expectations about secondary schooling. Findings also reveal that, during this period, participants have mixed feelings about the secondary school they are aboutto move to. Some were excited and looked forward to a fresh start believing that work in the secondary will be more challenging and interesting, and they will get opportunities to make new friends and have positive academic experiences (Mc Gee et al., 2003; Tilleczek & Ferguson, 2007). Whereas others were frustrated about the school allocation as they expected other secondary schools. However, regardless of their initial feelings about their new secondary school, once they joined the school, the experience of the new environment was unanimously perceived as 'different' from what they expected. By 'different' they meant a mismatch between their constructed perceptions and expectations, and their perceived experience. After a deep analysis of the findings, Theme 1 was further subdivided into four sub-themes. The following sub-themes reflect variations in the above Theme 1:

(i) Students construct their perceptions and develop feelings and expectations about their new secondary schools.

(ii) Students' apprehensions about the secondary school before making the move.

(iii) Students' construction of perception of secondary school mathematics; and

(iv) Summer dip: students forget the mathematics concepts learnt in primary school.

Each sub-theme provides a different insight into students' perceptions of secondary schooling during the pre-transition and the transition phases. The findings relative to each subtheme are discussed in relation to relevant literature in the following sections.

4..2.1 STUDENTS CONSTRUCT THEIR PERCEPTIONS AND DEVELOP FEELINGS AND EXPECTATIONS ABOUT THEIR NEW SECONDARY SCHOOLS

The data suggest that there exists a pre-transition phase where are students start thinking about the secondary school before moving to the next stage. This phase is not described in the U-curve theory. It is found that the students have mixed feelings about the allocation of their secondary schools. Some were happy whereas others were disappointed and held the belief that they deserved better schools. It was unlikely that the students create their perception that certain schools are better than others by themselves. The results of this study suggest thatthey are influenced by other individuals and the prestige and status of the school in society. The students construct an image about their new secondary schools. Some developed a positive image and a liking of the school they are about to move and looked forward to joining whereas,

others were anxious and expressed concerns and fear. The latter can have a negative impact on students' adjustment to their new environment during the transitionperiod. I discuss these findings in more detail in the following sections.

4.2.1.1 Feeling of a sense of achievement following the school allocation

To the question about their feelings before joining their current school, some participants, especially from school B, felt a sense of achievement and pride in getting into a top-rated and highly regarded school and looked forward to moving to. Participants, used words like 'very proud' (LB1 and LB4) and 'happy' (LB2 and BA1) when allocated their current school as attested by the following comments:

> *LB1: When I got this college* (School B)*, I felt very proud.*
> *LB4: I was also proud.*
> *LB2: I was happy when I got this school*
> *BA1: I was very happy to get this school* (School C).

School B is a top-rated school, and the eligibility criteria were a minimum of 4 A+ in the CPE examinations together with the parental choices (selection process is detailed in chapter one). Primary school students work very hard to secure a place in a state secondary school which are perceived to be better in the community as compared to private schools. Being one of those students, the participants had a sense of achievement. From my personal experience, the son of a relative obtaining a seat in school B had a feeling of superiority as compared to those students not obtaining that particular elite school. Over the years, it is ingrained in the Mauritian community that certain secondary schools are better than others and additionally, itis reflected in the policy decisions where these highly regarded schools are categorized as national schools or academies under the new educational reform.

Furthermore, participants who had been allocated School B had high expectations about school life. LB1, for example, expected all students to be cultured and to speak either Englishor French language, and not Creole (local language) in the school premises. In addition, he expected all students to perform very well academically and to be very friendly as attested by his comments:

> *LB1: I expected good students, who would speak either English or French. All to be very intelligent. And they would all be very friendly*

This was backed by LB3:

> *LB3: I thought that this was a good school. There are only good students here.*

The Mauritian education system is highly elitist and competitive. For Allybokus (2015, p. 20), the "fierce competition to secure a seat in one of the few elite schools and to become a laureate starts right from CPE". This might be the reason why students expressed their high expectations about the elite school B. The excitement and pride to join a perceived new and high cultural setting of the top-rated secondary school seems to develop an initial "cultural infatuation" (Black & Mendenhall, 1990, p. 226) in the students.

In addition, some participants' sense of achievement after being allocated to their preferred choice of secondary school is in line with the 'Honeymoon Phase' described by Risquez et al. (2008). In the model of transition proposed by Risquez et al. (2008), the 'Honeymoon Phase' begins when students are transferred to the next stage of school with feelings of excitement and happiness. In this study, however, for some participants, the 'Honeymoon Phase' seemed to start well before the actual transfer. This indicates the existence of a pre-transition phase which overlaps with the 'Honeymoon Phase'. This also indicates that some students start developing a sense of belonging to the school prior to the transfer. One possible explanation for this overlap might be related to students' hard struggled during the last year of primary school to perform well in the standardised examination and obtain a seat in an elite secondaryschool. Only the highest achieving students are admitted to either one of such schools or in a regular state secondary school (SSS). Both types of schools have high academic status in the community. This is confirmed in the government document entitled 'Ending the rat race in primary education and breaking the admission bottleneck at secondary level: the way forward', by the Ministry of education (2001). It states that:

> In actual fact, for the 18,000 children who pass the CPE examination every year, and more especially for the 4,500 who obtain 4 A's, there is intense competition to secure a place in the small number of perceived 'star' secondary schools, where some 1,000 places are, in actual fact, available.
>
> (Ministry of Education, 2001, p. 3)

It suggests that there is high competition to obtain a seat in one of those schools. Korpershoek et al. (2019) highlight the important role school-belonging plays in students' school life in general. In the same vein, Connell and Wellborn (1991) and Strahan (2008) conclude that it enables the students to believe that they are in control of their achievement and hence feel more competent as per the Self-Determination Theory of Deci. In line with this literature, some participants felt a sense of achievement using words like "proud" and "happy" on the allocation

of their current school.

(i) Students developing positive perceptions and a liking for the secondary school they are about to move to.

The findings reveal that students create a positive image, and a liking for the secondary school based on parental, peers, and primary school teachers' influence. To the question about how they viewed their current school before moving, from the responses of the participants, especially those from Schools A and B, it was evident that parents considered a school to be 'good' in cases where the schools performed highly in national examinations, where the school maintained high levels of discipline and where the school had a high status in the community. In addition, where parents rated the schools favourably, participants also shared this view. MB1 for example, subscribed to the views of his father that school A was 'good' as illustrated in the following comment.

> *MB1: My father told me it's a good school, many laureates here. The rules are all very strict here.*

Participant MB2 agreed with her aunt, that school A was a 'good' school.

> *MB2: My aunt told me that the school is good. Here, we get lots of laureates.*

Similarly, LA3 subscribed to the views of his primary school teacher as evidenced by his comment.

> *LA3: My primary school teacher told me, don't worry, it is a 'good' school.*

The findings are concurrent with Grolnick and Slowiaczek (1994), who state that families and close ones indirectly transmit their beliefs to children. Especially, parents play an essential role in shaping their children's expectations of success and task values. On the other hand, Connell and Wellborn (1991) find an explanation to this phenomenon in self-determination theory. According to them, compliance with parental beliefs fulfils young adolescents' feeling of relatedness to their parents. It is found that despite this some students wereallocated a seat in a high demand state school, some parents preferred to send their childrento the private School A due to its reputation of high performance in national examinationsand the perceived strict rules.

The findings are consistent with the studies in the West and in the Australian context. Cahill (2009), for example, found that parents rated reputation and discipline highly during their choice of secondary school for their children. Being a private school, unlike schools B and C, parents can admit their children directly to School A without going through the administrative

procedures of the ministry where seats are offered for state owned schools based on students' performance in the end of primary school examination.

Moreover, the responses of other students indicate that they had a positive image of secondary school.

> *LD1: Everyone was saying if you get this school, it would be good. My three uncles came to this school.*

> *LB1: When I got this college, I felt very proud.*
>
> *LB3: I thought it was a good school.*

Allocation of these schools is carried out on a regional basis and are in limited number in the ministry's list as explained in Chapter 1. Therefore, it would be unrealistic to think that, inthe Mauritian context, discipline is one of the factors influencing parental choice in all cases.

4.2.1.2 A FEELING OF DISAPPOINTMENT WITH THE SCHOOL ALLOCATION

Despite some felt 'happy' and 'proud' of their new school, others were disappointed with their school allocation. Responses of participants like LA3, LA4, LA5, MA1, MG1, BA2, BB1 and BC1 reveal their disappointment and frustration with their school allocation. This frustration resulted from the expectation of better schools. Some participants perceived that their allocated school was incongruous with their CPE results and deserved 'better' schools. LA4, for example, despite being proud for getting School B, considered that he had performed very well in Grade 6 and had firm personal belief about his academic abilities and expected to go to the R. College (an elite school in Mauritius).

> *LA4: I was expecting R. College because I performed very well in Grade 6.*

The data suggest that their belief in their high academic capabilities made them expect an even better school allocation. The following responses of some participants attests the above.

> *LA3: I was expecting Gandhian school.*

> *LA5: I am satisfied but not entirely. I wanted Gandhian school.*

> *MG1: When I got the (CPE) results, I was not satisfied with the school allocated. My parents said it does not matter; they will transfer me to (L College). Afterwards, I said no, I will not transfer.*

> *BA2: I did not like much. I was expecting Gandhian school.*

> *BB1: I was disappointed when I got School C., I wanted Gandhian school.*

It can be inferred from the findings that students perceive some elite schools are ranked better than others. Every year, hundreds of parents register complaints to the Ministry of Education about the school allocation and apply for transfer of their children to other schools. However, for students obtaining the top-rated schools such as School B, as per the policy of the Ministry, no appeal is possible. It means that students must move to the designated school even if they are not initially satisfied.

> *BC2: I would like to go to any school I receive. However, I liked when I got School A. But my mother did not like it. She sent me to School C., I do not like to come here because I do not like this school at all.*

In the local context, parents also wish their children to be admitted to one of the top-rated elite schools. LA3, for example, was burdened by his family traditions to attend to a prestigious local secondary school. He commented that even his sister attended a 'high' demand girl's school.

> *LA3: Everyone in my family went to R. College and Gandhian school. Even my sister went to D. R College.*

The response of LA3 indicates that all elite schools, which were supposed to be at the same level and status, may not be perceived as equal in terms of status. Even though the elite schools (converted to 'academies' under the new educational reform) are perceived as thebest secondary schools in the country, a further categorization of these schools is noted. Therefore, many students aspire to join one of these elite schools.

Wanting to move to a perceived elite school other than their current one was not restricted to participants of one participating school. Surprisingly, responses from most of the students interviewed reveal that they wanted a school perceived to be better than their current one despite mentioning that they already adjusted to their current secondary school.

It was noted that this frustration continued even after they moved to their present secondary school. The frustration participants experienced also resonates with Erichsen and Bolliger (2010) and Kim et al. (2017) who suggest that in cases where students are dissatisfied with their school allocation, it reduces their attachment to school and further decreases their sense of school belongingness. Students' sense of belonging is an essential aspect in their adjustment to their new school (Hanewald, 2013) and is a mediating pathway to student engagement (Kahu & Nelson, 2018) which is crucial to retention and success (Thomas, 2013). For Connell & Wellborn (1991), this dissatisfaction with school allocation prevents students from feeling a

sense of competence. It means that these participants might be at risk from school disengagement from school as well as mathematics right from the beginning of secondary schooling.

4.2.2 STUDENTS' APPREHENSIONS ABOUT THE SECONDARY SCHOOL BEFORE MAKING THE MOVE

The data suggest that students, about to move to their new secondary school, are quite diverse in their feelings about the allocation of school. While some participants had positive feelings, felt proud and had a sense of achievement due to their current school, others felt frustrated and were unsatisfied with the school allocation and expressed their desire to move to another school.

From the data analysis, I inferred that the participants expressed concerns about the school allocation, the number of subjects they would do in the secondary, the number of teachers they would have, the class they would get, and the friends that would accompany them to the secondary school, the number of things they would have to do, and the amount of homework they would get including mathematics and the friends that would accompany them to their new secondary school.

The data extracts testify the above.

> *MB2: Sad, we are going to do lots of things.*
>
> *MC1: I was afraid. When I carry all the books, my bag will be heavy.*
>
> *MC2: They will do many things.*
>
> *MC3: Sad, our bags would be heavy.*

Some participants had apprehensions about the class they would be allocated and the friends that would accompany them to their new environment.

> *MG1: I was thinking about which class I would be allocated which friend will be in the same school.*

While on one side, there is excitement to learn new subjects on the other, the new subjects are considered as a burden and an added challenge to their cognitive load. Findings revealed that

before joining secondary school, some students had apprehensions about the amount of homework they would get. The anxiety was apparent in their comments:

LA2: There are more to learn.

LA5: I thought, will give lots of homework.

LA4: I also thought I would get lots of homework.

LA3 complained that he would sleep late as it happened during his primary school days.

LA3: And in the primary, I already had to sleep late.

The finding concurs with West, Sweeting & Young (2010) and Strand (2019) where students express concerns about the volume of homework as one of the concerns before transiting secondary school. For mathematics, LA4 protested that the teacher gave homework after each lesson. This finding suggests that there is an overall reduction in the amount of homework, but not for mathematics.

LA4: Mathematics? There is not a day that we do not get homework.

LA1: (The teacher is) very strict. Give lots of homework.

LB3: After all, completion of mathematics homework is time consuming. We do not get homework from only one teacher; we get a lot of homework. If we concentrate on only maths homework, we will not be able to cope with the other subjects.

The finding from this study about homework does not concur with Strand (2019, p. 7) who found that "*it's very stressful because you get homework in several subjects at the same time*". Getting homework in all subjects at the same time could be true in the Mauritian secondary schools. Strand (ibid) states that students take longer to adapt to manage homework and it remains a concern for students after the transition. However, it must be noted that such a situation may not occur frequently. The data suggest that the amount of homework in other subjects was much less than expected.

LA1: I was going to sleep at 7 pm.

LA2: We did not get homework in some subjects. For others (we) did get homework.

In the Mauritian context, some subjects are allocated only 2 periods per week for example Science, Accounting, Economics, and others. Teachers do not give much homework as compared to the 'core subjects' like mathematics, English and French languages.

Students' concerns were due to the allocation of school but also due for other reasons. For example, the perceived strict rules at school and heavy bags because of the many subjects that participants expected to do and the large amount of homework that it entails in the secondary were the reasons put forward. The negative perceptions of the participants are not in line with the study of Walters et al. (2014) except for the large amount of homework.

From a students' perspective of what the secondary school is going to be like, Smith et al. (2006) ranked the top three concerns for students. These include the amount of homework, an increase in academic difficulty and getting lost. This finding somewhat corroborates with Smith and colleagues (2006) where the first two concerns are also identified. Akos & Galassi (2004) conclude that 'students identify three primary categories of school transition concerns – academic, procedural or organisational and social' (p. 218). In line with Akos & Galassi (ibid), the anticipated concerns of the students in this study can be classified in the three categories as follows:

Academic factors

- the number of subjects they would do in the secondary
- the number of teachers they would have
- the class they would get
- The number of things they would have to do
- The amount of homework they would get

Procedural or organisational factors

- the school allocation,

Social factors

- the friends that would accompany them to the secondary school.

The similarities between both studies were that students expressed concerns and fear about their experience of transition to secondary school. This is in line with the study of Rice et al. (2011), where students' concern about school before and after the transition period were

associated with higher levels of anxiety symptoms. Waters et al. (ibid, p. 160) found that students who reported that they "*were expecting an easy or somewhat easy transition*" into the next grade were "*three times more likely to experience a positive transition than thosewho had a negative expectation*". Furthermore, those who expected a smooth transition reported they had more aspects of the transition to look forward.

Furthermore, Waters et al. (2014) found that the girls were more concerned than the boys about their move to secondary school. However, the girls reported looking forward to social dynamics like making friends and attending more school events and greater variety of school activities as compared to boys. A similar situation was encountered by Akos and Galassi (2004) in the American context. In this phenomenological study, however, no evidence was found that the girls were more likely to feel concerned that the boys.

Furthermore, as stated in Boresok et al. (2018), parents with different levels ofsocioeconomic resources may prioritise different factors in school preferences. According to them, discipline is favoured by higher income households. Gathering this type of data,however, was not the focus of this study. What is clear from these findings is that parents, friends, and primary school teachers contribute to shape the image students have of the secondary school they are about to move. But questions could be raised whether parents, peers, and teachers are acquainted with the prevailing situation in our secondary schools.

Often students' perceptions of what is involved at secondary school are presented inaccurately by parents, relatives and often by primary school teachers (Ashton, 2008). According to Akos and Galassi (2004), there is an effort from these individuals to prepare students for the transition to the new environment. However, they are mostly unaware of the secondary school environment and curriculum, and despite their greatest motives, they might trigger the development of fictitious images about secondary schooling in students. This is confirmed by Attard (2017) who states that often students' perceptions of what is involved at secondary school are presented inaccurately by parents, peers, and primary school teachers. Attard (ibid) stated that:

> Despite their best intentions, parents and primary school teachers are generally unfamiliar with the secondary school environment and curriculum and attempts to prepare primary students for secondary schooling may result in preparing them for an environment that does not exist.
>
> (Attard, 2017)

4.2.3 STUDENTS' CONSTRUCTION OF PERCEPTION OF SECONDARY SCHOOL MATHEMATICS

Question: What were your feeling about mathematics before joining secondary school?

The findings also revealed that many participants' perception of mathematics taught in the secondary was also influenced by other individuals. The responses of some of the participants to the question about their perception of secondary school mathematics before joining, are as follows:

> *LB1: I had friends from another school who said don't worry. Mathematics is easy. You will be able to adjust.*
>
> *LA2: My relatives told me not to be afraid. It will be easy. Mathematics will be easy.*
>
> *LA3: My primary school teacher told me it will be easier than primary. It's easy if you know how to use your logic a bit more…*
>
> *BA5: My neighbour told me that mathematics will be a bit difficult.*

This finding is contrary to what Howard and Johnson (2004) mentioned concerning the study of mathematics. According to them, students are often prepared for work they perceive to be much harder than the primary school mathematics. Likewise, Mizelle and Irvin (2000) noted that some students' expectations of harder mathematics in the secondary threatened their self-image as competent learners. Findings from the current study is not consistent with this study. On the other hand, the findings concur with a study conducted by Waters, Lester and Cross (2014) in the Australian context. In their study, they found that 50% of all participants aged 12-13 years anticipated a positive transition to secondary school. However, it is not known whether the emotional and informational support provided by parents, peers and primary school teachers suffice to enhance students' positive expectations of secondary schooling in general and with mathematics in particular. Nonetheless, the views of these individuals, about a secondary school and mathematics, are found to influence that of the participants.

4.2.4 EXPERIENCE OF SUMMER DIP DURING THE PRE-TRANSITION PERIOD

However, experience shows that students remain idle for two and a half months after completing the end of primary examinations. During this period, students wait for the examination results and the allocation of secondary schools. This might be the period where students forget many concepts and students experience a 'summer dip'. To the question about

whether they were engaged academically during the two and a half months, some respondents had this to say:

> *LA2: During the holidays we have not studied anything. We already forgot it.*
>
> *LA3: Parents already buy the books* (for Grade 7). *They* (the students) *put the books aside. They keep on playing. Afterwards, they get problems.*
>
> *BA2:* (Before moving to the secondary) *we have nothing to do.*
>
> *MG2: No, I was not studying. I was waiting for the results. I thought it* (Grade 7) *will not be the same. We will learn other chapters* (topics).

The data suggest that the two and half months preceding the resumption of studies in Grade 7 was a period of rest for the students. Highlighting various studies conducted during the past decades, Hailakari, Nevgi and Lindblom-Ylänne (2007), state that prior knowledge has a significant impact on students' achievement. Various other studies, especially that of Dochy et al. (2002), indicate that prior knowledge has a significant impact on students' achievement. Inaccurate or incomplete prior knowledge may inhibit or interfere with further learning (Alexander & Judy, 1988; Dochy et al. 1999). Prendergast et al. (2019) highlighted that the root cause of problems students face in mathematics in the secondary may lie at the primary level.

From the students' perspective, there is no evidence to suggest that primary school teachers teach to the test where drill and rote learning are the preferred methods of instruction The current PSAC examination (as the former CPE examination) at the end of primary school in Mauritius is a high-stake examination where both parents and teachers give high importance. In the context of this study, given the importance of the former CPE and current PSAC examinations to determine the type of secondary school allocated to students, teachers seem to narrow the curriculum to teach what is required for the test (ARG, 2002). Teachers emphasise on students' memorising knowledge for the test. Consequently, as Gordon and Reese (1997) concluded, students can pass tests even though they may have never learned the concepts on which they are being tested. Furthermore, Harlen & Deakin (2002) assert that teachers can teach students to answer correctly tests items intended to measure students' ability to apply, or synthesise, even though the students have not developed application, analysis, or synthesis skills.

A further concern related to the above is how secondary school teachers can extend and/or transform students' mathematical knowledge and skills to meet the requirements of secondary mathematics learning if students' understanding of mathematical concepts is not accurately

measured at the end of their primary education. Inaccurate or incomplete prior knowledge may inhibit or interfere with learning (Alexander & Judy, 1988; Dochy et al., 1999).

Students will engage and value the activities if the emphasis is laid on understanding and mastery of the concepts in mathematics by providing appropriate tools and feedback. The latter must give suitable instruction about how to master the task at hand (Niemiec & Ryan, 2009). A diagnostic test at the start of the lesson can help the class teacher find the level the students are in and adapt his/her lessons accordingly.

4.3 PERCEIVED EXPERIENCE OF A CULTURE SHOCK DURING THE PRIMARY-SECONDARY SCHOOL TRANSITION

Data revealed that once at the secondary school, participants experienced a different situation, and their experience of the new environment did not match their expectations and perception. Put another way; there was limited overlap between the students' experiences in the primary and that of secondary school. While it is obvious that perceptions change once an individual experiences something, it is found this mismatch between expectations and perceived experience of transition results in a culture shock which impacts negatively on their adjustment to the new environment. These findings resonate with those of Olson, Roese and Zanna (1996) that the perceptions individuals hold is influenced by expectations beforestarting the secondary school.

According to Könings et al. (2008), the mismatch between students' expectations and their later experience are known to interfere with their development and wellbeing in school. According to Galton (2003), the experience of the discontinuities that exist between primary to secondary school may cause stress to the students. For Smith and Wertlieb (2005), unmet expectations were associated with academic difficulties. This can explain the dip in performance in mathematics of these participants who even after working well in CPE examinations experienced a decline in performance. However, it would be important to understand how this limited overlap or disconnect between perceived expectations and experiences during transition to secondary school influence their engagement in mathematics lessons and tasks.

According to Smith, Feldwisch and Abell (2006), the complexities of the distinctive features ofacademic, social, and organisational (Akos & Galassi, 2004) features combined with a mixture of peers, parents, teachers, and others are related to the disconnect in one or more of

the three mentioned areas. However, Zeedyk et al. (2003) demonstrated perceptual disconnect in the academic and social arenas contrary to this study where the disconnect are found to be related to all three areas.

Two subthemes were deductively identified related to the above theme, namely:

1. Academic Shock due to perceived increase in the number of subjects and teachersin secondary school.
2. Social and Emotional shock due to limited overlap between perception and expectation and perceived experience of secondary schooling.

The findings concerning the subthemes are discussed in detail in the sections below.

4.3.1 ACADEMIC SHOCK DUE TO PERCEIVED INCREASE IN THE NUMBER OF SUBJECTS AND TEACHERS IN SECONDARY SCHOOL

To the question about their experience of the primary secondary transition, students compared the curriculum between the two stages. The participants found the curriculum to bedifferent from that in the primary. The increase in the number of subjects surprised students like LA2, LA5, LB1, LB2, LB3 and LB4.

> *LA2 and LA5: in Grade 6 there were six subjects whereas in Grade 7 they're 11 subjects in all.*

A similar comment was made by MG1.

> *MG1: It was very different. In the primary, we did not have so many subjects* (as compared to secondary school*).*

Some participants attempted to list the subjects offered at their respective schools. MG2, for example said:

> *MG2: 17 subjects. English, French, Maths, Accounts, Agriculture, Economics, Business, Biology, Chemistry, Physics, Hindi, Social studies, Visual Arts, Computer studies, Physical Education, Home Economics.*

> *BA3: There are 14 subjects, sir, that's difficult.*

> *LB3: I was anxious about the number of subjects and amount of homework.*

Despite the findings showing a disparity in the stated number of subjects offered in the different schools, three things are evident from the responses of the participating students. Firstly, this finding is in line with Mc Gee et al. (2003) and Bicknell (2009) that there is alack of curriculum continuity and coherence across primary and secondary schools.

Secondly, some students were not mentally prepared for the discontinuity in the curriculum between the primary and secondary schools. It was evident that participants were far from expecting such a drastic increase in the number of subjects as they started secondary education as commented by BA3.

> *BA3: I did not think that one day I will learn 14 subjects.*

However, it is normal and expected that all participants would experience a marked increase in the number of subjects, as compared to primary together with an equal number of teachers as they transition to secondary school. In line with the NYCBE reform, it is explicitly laid outin the National Curriculum Framework (NCF, 2016) for Grades 7 to 9 that all students are equipped with the knowledge, foundational skills and attitudes that will guarantee success to all in their future learning. Therefore, the NCF makes provision for 16 subjects categorized as core, optional core, and non-core subjects. But it seems that not all students are explained during their movement to the secondary school. As seen earlier, parents and primary school teachers influence students' construction of image about secondary school and is limited to whether the school is 'good' (that is high performance in national examinations and level of discipline) or not.

However, LA2 seem to understand the reason behind the teaching of so many subjects during Grade 7 through to Grade 9. It will facilitate the choice of subjects in Grade 10.

> *LA2: No because we know up to Grade 9, we must study so many subjects. In Grades 7 and 8 we see in which subject we are good. Then when we move to Grade 10, we choose subjects, and they will decrease.*

Finally, the findings reveal that some of the students interviewed struggled in subjects other than mathematics. The comments of MG2, MG1 and MA1, for example, attest the above.

> *MA1: I did not like so many subjects and teachers (in the secondary).*

> *MG2: I did not like biology, chemistry, and economics.*

MG1: A bit difficult. I was not used to so many teachers (as compared to the primary). I did not understand new subjects. Business, Eco. (Economics), Accounts, Home Economics and did not understand.

MA1: The new subjects like Home-eco, Economics, Accounts, and all. It is difficult to study all these subjects. Home Economics, I am not too fond of cooking. Physics, there are new things to do. There are things to calculate.

In line with Risquez et al. (2008) model of transition, it seems that the students experienced an 'academic shock', as they moved to the secondary school. Even if students have physically moved to the secondary school, their subjective appraisal of the new situation seems to indicate that they are still attached to their old practices.

Van Gennep (1908), in his theory of "rites of passage," describes the preliminary or the separation phase during which the students are distanced from their former identities (that is being a primary school student. Margett (1999) advised that students must have a sense of discontinuities. Galton (1999), however, highlighted that student must have a sense of continuity. The continuity-discontinuity paradox will always exist, and teachers need to find the right balance to help students cope with the new context.

The subjective appraisal of their current situation of these students indicates that they have difficulties ending and letting go old relationships and starting a new beginning. Some of the students expected a continuity in the curriculum where the same teacher from the primary would teach them in the secondary school. Their perceived difficulty to adapt to the new system is evident in responses of LB1, MA1 and MG2.

LB1: It was a bit difficult to adapt because just changed school. We were already used to one teacher, when we changed it was difficult to adapt.

MG2: If we had only one teacher, because some are very strict, some do not teach well. I do not understand.

MA1: I liked it but not so much. Some teachers are good others are strict and not good at all. If only one teacher taught all the subjects, he would share the right methods.

Students wanted the same primary school teacher to teach them in the secondary school. The findings suggest the belief held by participants that such practices would ease their difficulty in adapting to the new environment due to their perceived pedagogical differences between the two stages. This finding concurs with Galton (2003) which found that individual students often have pre-conceived ideas and high expectations about the academic challenges presented by secondary schools. As a result, the experience of discontinuities that exist between primary to secondary school may cause stress to the students (Galton, ibid). Stress (opposite to well-being) and anxiety inhibit student engagement (Kahu & Nelson, 2018). Only when student and institutional structural and psychosocial factors align within an educational interface that individual student engagement occurs (Kahu & Nelson, ibid).

Furthermore, it is known that "*students engage emotionally when the curriculum is linked to their interests, life experiences and future selves"* (Kahu & Nelson, 2018, p. 64). The findings reveal diverse emotions among participants when they became aware of the number of subjects they would study as compared to primary school.

MB2: Sad, we are going to do lots of things.

MC1: I was afraid.

MC3: Sad, our bags would be heavy.

MA1: I did not like so many subjects and teachers (in the secondary).

Mapping the findings to the conceptual framework shows that within the educational interface where the students experience their learning, emotion and well-being may be two key factors mediating their individual engagement with their subjects including mathematics.

Still other participants were enthusiastic and motivated by the new subjects as it was an opportunity for them to learn new subjects, as evidenced by the following comments.

MB4: I like to have many subjects so that I learn many things.

BA1: I like because…we learn new things.

BA2: I like learning new chapters (topics).

This is in line with the van Gennep (1908) "rites of passage" where most students, about to transfer, look forward to going to secondary school and expect to learn different things. Students look forward to a 'fresh start', believing that work in the secondary will be more

challenging and exciting and they will get opportunities to make new friends and have positive academic experiences (McGee et al., 2004; Tilleczek & Ferguson, 2007). In their study, Howard & Johnson (2004, p. 7) suggested to students "*that reduced numbers of teachers and subjects might make life easier, but this was universally rejected*". According to them, the higher status of secondary school as compared to primary school was made clear by the responses of the students. The enthusiasm, however, was not apparent in other respondents of the current study.

4.3.2 SOCIAL AND EMOTIONAL SHOCK DUE TO LIMITED OVERLAP BETWEEN PERCEIVED EXPECTATION AND EXPERIENCES OF SECONDARY SCHOOLING

Tilleczek and Ferguson (2007) suggest that there exists an "emotional paradox" where students are both excited and anxious after transfer. Strand (2019) calls the emotional experience following the academic and social changes during the transition to secondary as the "emotional roller coaster". The discrepancy between their expectations and the actual situation also causes social and emotional shock (Risquez et al, 2008), also termed as 'freshermyth' by Baker, McNeil and Siryk (1985). Students experience a sense of disillusion and disenchantment with school (Risquez et al, ibid). Relating to the present study, it can be argued that, during the primary-secondary school transition, strict rules and regulations at school, experience of bullying, loss of friends, changes in curriculum, changes in teaching practices, relationship with teachers might be some of the factors influencing students emotionally.

> The first year is a particularly emotional time for students. For non-traditional students, the gap between their existing identities and experiences and the expectations and requirementsof the institution may result in more negative emotions.
>
> (Kahu & Nelson, 2018)

Listing some factors, Kahu and Nelson (ibid) highlight that these can increase student anxiety and frustration and thus influence a student's engagement and success. It seems to be true in the context of this study where the factors listed above could impact on students' engagement in mathematics. The first three factors listed above, also termed as the structural influences on student engagement by Kahu and Nelson, are discussed below. Whereas the other factors (psychosocial factors) related to their experience of mathematics during the transition period, are discussed in chapter 5. However, these are not taken into consideration by the stakeholders.

4.3.2.1 STRICT RULES AND REGULATIONS

Where strict rules and regulations at school and high level of discipline were two of the characteristics for judging the secondary school as 'good', it became a source of frustration for some participants after experiencing these. For example, strict rules and regulations at school A (a private school) were perceived to be decisive factors during the pre-transition period, however, a few participants did not enjoy these after moving to the secondary school. Therefore, students were found valuing an elite school with rules and discipline beforejoining but not enjoying experiencing these once there. This view is illustrated in a comment by MG1:

> *MG1: We are not allowed to do a lot of things in the school. We are not allowed to wear modern jackets. We are not allowed to wear small skirts. The boys cannot have a particular style of haircut.*

These are the characteristics of a highly regarded school which the students value before they experience them but not enjoying experiencing these once there. While for some respondents, these restrictions were interpreted as violations of their autonomy impeding to their adjustment to the new environment for others, they were a positive thing. MC3, for example, who attended the same school as MG1 and MG2, thought differently and believed that students who do not abide by the rules should be withdrawn from the school. This isevidenced by his comments given below:

> *MC3: I like this school because it is very strict and then if the students are mischievous, put them out.*

These findings resonate with those of Olson, Roese and Zanna (1996) that the perceptions individuals hold is influenced by expectations before starting the secondary school. This finding, however, is inconsistent with findings from a study conducted by Waters, Lester and Cross (2014) in which students who expected a positive transition were found to be three times more likely to confirm congruence between their expectations and experience of positive transition. According to Könings et al. (2008), the mismatch between students' expectations and their later experience are known to interfere with their development and wellbeing in school.

In this study, some students experienced dissatisfaction with the school allocation. Connell and Wellborn (1991) stated that dissatisfaction with school allocation prevent students from feeling a sense of competence. The frustration they experience also resonated with Kim et

al.'s findings (2017) which suggests that where students are dissatisfied with their allocated secondary school this reduces their attachment to school.

Lester and Cross (2015) studied the relationship between school climate and students' mental and emotional wellbeing and found that feeling safe at school, feeling connected to the school and peer support were the "protective factors for students' mental and emotional wellbeing" (Lester & Cross, 2015, p. 10). For a successful transition, students can seamlessly move from primary to secondary while continuing to learn and develop their social, emotional, and mental wellbeing (Lester & Cross, ibid). Unfortunately, the current findings indicate that these students experience a negative transition.

4.3.2.2 EXPERIENCE OF BULLYING

When asked about their relationship with senior students at their current school, it was found that more than half of the male participants interviewed from the three schools mentioned being bullied during the first year at secondary school as opposed to the female participants who unanimously denied being bullied. For example, MA1, a participant from school A was also a victim of teasing and body-shaming from senior students. He described the school as 'very good' before starting secondary schooling. MA1 had looked forward to attendingschool A, and, due to the anticipated high levels of discipline. He never expected to experience bullying.

However, once there, his experiences at the school led to him to feel disillusioned leading to a change in his perception towards the school. He did not feel a sense of belonging to the school and wanted to change school. The experience of bullying by MA1 was not unique. Similarly, participants from both focus group interviews carried out inSchool A, mentioned that they were bullied. It was noted that, for the case of School A, the perceived strict rules and regulations at the school had no effect on the students. The data shows that students transgress these rules. MC3, for example, stated that his friends and he were victims of bullying from their seniors who pushed them, teased, and used foul language.

MC3: Sometimes they push us, provoke us, and swear at us.

Furthermore, MB1 and MB2 mentioned being harassed by senior students. *The extract from the data testifies the above.*

MB1: They tease us.

MB2: They snatch our water bottle and throw away.

Unfortunately, the data did not reveal the prevalence of these perceived experience of bullying, that is whether the occurrence of these situations were frequent, or they happened quite rarely.

According to a study by Belle (2018), a lack of learners' discipline is a major school problem in secondary schools in Mauritius (p. 35). It was not surprising when half of all male participants, from School B, perceived being bullied. LB1 and LB2 stated that the senior students use offensive language at them. LA4, for instance, mentioned that his friends and he were victims of harassment from seniors.

> *LA4: Suppose we are talking with friends; they interfere and harass us.*

Despite, LB3 said he was not a victim of bullying at school, he declared that his seniors were very aggressive towards his friends and him.

> *LB2: We were not victims of bullying. I find the school good. All the teachers, lady teachers are good. But the students are a bit 'out minded'. We do not mix with these students. At least we are learning that is all.*

The data implies that the boys have a higher tendency to be bullied during the first year of secondary schooling as opposed to the girls. Girls participating in the study from both private (mix) school and public school stated that they were never bullied. Participants from both the face to face and the group interviews testify this fact, as evidenced by their comments.

> *BB1: There is no bullying in the school.*
>
> *BA2: No never (bullied). They (senior students) are nice*
>
> *BA3: They help us.*

Other students were also disappointed once they started secondary schooling. Respondents from School B stated that they were proud and happy before joining their current school. LB1 and his friends, for example, expected pupils to be 'cultured' before joining the school but once at the school, found that some students smoked, consumed alcohol, and took drugs. LB1and his friends purposefully kept their distance from these students. Their approach is evidenced by the following comments:

> *LB1:* (We expected*) good students, who would speak either English or French. All to be very intelligent and friendly. Not like when we meet them,*

they push us, bully us, and swear at us… We stay with our group of friends. We must choose our way and friends.

This finding is consistent with Lester and Cross's (2015), where *'peer support was the most significant protective factor over the transition period from primary to secondary school' (*p.10). Peer relationships at school have been found to contribute most to students' wellbeing (Weare & Gray, 2003). There was a change in perception from being proud of the school allocated to that realising it is a 'normal' school just like any other secondary school.

LB1: The school is normal just like any other school.

The change in respondents' perception about their current school was not restricted to participants of one school. This means that the students felt less connected to their current school after the experience of the school climate. Lester and Cross (2015) mentioned that feeling connected at school was also a significant predictor of mental and emotional wellbeing. Interestingly, these students wanted to change school even according to the regulations of the ministry, it was not possible. According to Kahu and Nelson's (2018)framework on student engagement indicates that sense of belonging, and wellbeing are two ofthe four psychosocial factors that mediate the influence of school and student factors on student engagement.

Findings from this study suggest that prior to starting secondary school, some participants especially those allocated School B, a national school, expected the students to be 'good and cultured'. The participants expected that the students at the school to be very intelligent, friendly and who would speak only English and French. However, after joining the school, all male participants reported being victims of bullying both physical (pushing) and verbal aggression (swearing and body shaming/weight-based victimisation).

The findings also revealed that girl participants neither from the girl's school nor from the mixed school were victims of bullying. Although Nansel et al. (2003) found that bullying and victimization are common problems among youth, the finding from the current study is consistent with Pellegrini and Long (2010) who found that the boys targeted the boys and not the girls. According to Pellegrini and Long (ibid), bullying is used to display dominance and bullies and their followers are rewarded by social status in the secondary (Pouwels et al., 2018). Moreover, Pouwels et al. (ibid), declared that bullies and their followers are popular among other gender group (Pouwels et al., ibid). This might explain why, in the context of this study, girls reported not being victims of bullying and victimization by boys in the mixed school.

However, lack of findings about girls' involvement in bullying or being victims of bullying in this study may not imply that there are no such cases in girls' schools. The female participants may have another definition of bullying. Maunder et al. (2010), highlighted that indirect bullying, which include social exclusion and rumour spreading, are less likely to be defined as bullying and are not viewed as serious. Direct bullying like verbal and physical aggression are taken more seriously. Moreover, Mehta et al. (2013), found that bullying has a ripple effect on students other than the victims or those who observe bullying. However, thereis no evidence from this study of any such experience by the respondents.

This study further reveals that there is no support system in place to help those victims. This is line with the findings of Pellegrini (2010) who argues that a combination of school and peer level factors are responsible for bullying, victimisation, and sexual harassment to exist in schools. Not taking any actions at the school level may help in the perpetration of such behaviours at school level. He further asserts that adults in school are directly or indirectly involved in the perpetuation of these acts. Eliot et al. (2010), suggest that the provision of a supportive climate from school staff is a valuable strategy for engaging students against the occurrence of bullying and violent behaviours. In the Mauritian context, heads of schools should be more alert and put in place support systems to deter the occurrence of such issues.

The findings also revealed that the feeling of pride about the school faded following experiences of bullying and the unexpected school environment (e.g., discipline). Mehta et al. (2013), conducted a study on bullying climate and school engagement. The sample consisted of 7058 ninth graders with equal numbers of boys and girls. They found that students' perception of the prevalence of bullying in their school has a negative impact on their engagement in school. Consequently, they are less motivated to learn. In line with the above research, the findings from this study revealed that some participants changed their perception about the school. They found their current school to be a normal one just likeother schools. Some study participants wanted to change school implying a lack of a sense of belonging to their new school. This change in perception from being proud of the school allocated to that realising it is a 'normal' school just like any other secondary school seems tohave been caused by an 'emotional shock' (Risquez et al. 2008) following the experience of disillusion about the school environment. Conversely, Nickerson et al. (2014) found that students perceived a positive school climate even if bullying was widespread in their school. In the same line, Mehta et al. (2013), caution that there may be other factors that interact withschool factors for the disengagement like family and personal factors.

Furthermore, findings indicate that the male students in this study tend to stay with their own friendship groups and do not mingle with others thus avoiding the bullies/followers. This finding is congruent with that of Puhl and Luedicke (2012) where victims used coping strategy of avoidance in response to the situation. For Lester and Cross (2015), feeling safe at school was the strongest protective factors for students' wellbeing in the first year of secondary school. The provision of an environment, where students feel safe and supported by their peers, can enhance their wellbeing and sense of belonging to the school. This in turn can help in a seamless transition and engagement in mathematics.

4.3.2.3 MAKING FRIENDS DURING THE TRANSITION PERIOD

After moving to Grade 7, students seek friends who would confirm their 'sense of identity' (Richards, 2011). The main findings, in the current study, related to making friends are:

- Those who have friends accompanying from the primary or who can make friends quickly, have a greater tendency to adjust to the new environment; and
- Having friends at school can act as a pulling factor to come to school.

The data shows that not all students who transitioned to secondary school had friends accompanying them from their primary school. The findings suggest that having friends in the new environment can help in the adjustment process. Those entering the new environment without friends experienced changes in their social relationship which was an added difficulty in the adaptation process to the new school. MA1, MC3 and BA4, for example, moved to their respective secondary school without any friends from the primary. Each of them mentioned having difficulty making new friends. The amount of time this process took differed from one participant to the other. These students' personal characteristics, however, determined their ability to make friends. Some could make friends easily and gel in the new group while others found it difficult. BA4 stated taking two weeks to make friends, MC3took one term whereas, MA1 stated that two months were necessary to be able to make friends in the new school. During this time, he felt very lonely.

> *MA1: Good friend yes. It took two months to make friends. (I) was feeling lonely. It was like going to a tuition where I had only one friend.*

The greater time in relationship building with peers at the start of secondary education caused him to experience loneliness and a sense of isolation during this time. Evangelou et al. (2008), found that the extent students make more and new friendships act as an indicator for social adjustment and hence a successful transition. However, those students who lack social

skills will have difficulty coping with the transition to secondary school (Evangelou et al., ibid). Lack of confidence to talk to students in the class was found to be a reason for the difficulty in making friends in the new environment. This is evidenced by the comment of BA4.

> *BA4: For me, it was a bit* (difficult). *Because I live at Triolet. All my friends got schools in the North. Only I got transferred to this school* (East). *It was a bit difficult to make friends… I was able to make friends. It took me two weeks. I was afraid to talk to them. I thought they would shout at me.*

On the other hand, for some participants, it was not difficult to make friends, irrespective of whether they had friends who accompanied them from the primary. LC1, BB1, LB3, MC1-3 and MB2 did not have friends from the primary but stated that they were able to make friends easily.

> *MC3: Did not have any problem making friends.*

> *LB3: I did not have friends. But I was able to adapt during the first week.*

This means that the difficulty in making social relationships can impede in the adaptive process of some students. At the school level, no meeting or activities are organized for the induction of newcomers before or after the resumption of studies to help them settle in the new environment. One way to achieve this could be to involve older students (or school prefects). This could be part the social and personal bridge of Bore and Fuller (2007). The idea of the social and personal bridge is to develop social links between students' families, friends,and the secondary school before and after moving to secondary school (Bore & Fuller, 2007).This support system will help students develop high self-esteem and confidence and have 'positive adaptive responses' during the transition (Richards, 2011) which is in line with Evangelou et al. (2008). This is echoed in the findings of Rens et al. (2017) in a review of 30 empirical studies which suggest that the relationship between stakeholders, that is students, parent, and school, can improve the challenges of transition.

For some participants, having friends at school has proved to be a factor that led them wanting to attend school. MG1, MG2, LB2, BA1, MC4 and LC1, for example, declared that they come to school because of friends. For them, staying at home is boring. They prefer to come to school to meet friends, chat and play with them. These findings suggest that having friends can act as a pulling factor for some participants to come to school.

This is evidenced by the comments made by LB4 who admitted that he comes to school because of friends.

> *LB4: No, in fact, we have nothing to do at home. Better come to school. We have friends and all, chat. Study a bit.*
>
> *MB1: Me, I like (coming to school), I'm bored when I stay at home.*
>
> *LB1: I like coming to school. Study. Friends and all in school.*

This suggests that having friends accompanying from primary or being able to make friends quickly can help the individuals feel good and motivate them to come to school. This finding is in line with Kahu, Picton and Nelson (2019, p. 7), that mentioned friends foster wellbeing. They also mentioned friendship is '*central to most students' sense of belonging'* particularly in class hence promoting behavioural and cognitive engagement. This is contrary to what Brenner and Graham (2009) found in a study in USA where absences increased following transition to secondary school. Therefore, in the Mauritian context, absence is not an issue in our schools for Grade 7 students, which in turn, is a consequence of the decline in engagement and motivation. While many seem to succeed in making friends and developing a sense of community, Risquez et al. (2008) found that some students felt isolated and alienated. They were unable to mingle with social groups. The results suggest that those students who are unable to integrate social groups are bound to experience 'Social Shock" (Risquez et al. ibid).

The findings from this study revealed that students had mixed feelings about the secondary school allocated to them. While some respondents were dissatisfied with their allocated secondary school and felt anxious about starting the next stage, others expressed excitement, satisfaction, and in some cases, the feeling of happiness and pride before the transition. This finding is in line with Ashton (2008) where primary students expressed mixed feelings:

A wide range of feelings and ideas were expressed. Many children held mixed feelings, for example: "I am excited, happy, sad to leave my friends and nervous."

> A wide range of feelings and ideas were expressed. Many children held mixed feelings, for example: 'I am excited, happy, sad to leave my friends and nervous'.
>
> (Ashton, 2008, p. 178)

The feeling of anxiety before starting secondary schooling is familiar, according to Tilleczek and Ferguson (2007). In the literature, Risquez et al. (2008) stated that there exists an "emotional paradox" for students, who are both excited and anxious, but also doubtful and hopeful (Tilleczek & Ferguson, ibid). In the same line, Van Gennep (1908), in his theory of "rites of passage," described the preliminary or the separation phase during which the primary education culminates with the PSAC examinations. Some students 'look forward' to joining secondary school (Akos & Gallassi, 2004; Galton, 1999; Kirkpatrick, 2004). Students look forward to a 'fresh start', believing that work in the secondary will be more challenging and exciting and they will get opportunities to make new friends and have positive academic experiences (McGee et al., 2004; Tilleczek & Ferguson, 2007). This view is also shared by Kirkpatrick (2004) where students show optimism about secondary school. Findings from this study corroborate with the above literature where some participants were excited and looked forward to starting secondary school. However, they expected mathematics to be easier. This experience of excitement and looking forward is termed as the liminal rites (transition rites), a period of uncertainty, by both Van Gennep (1908).

This primary-secondary transition affects students' lower secondary mathematics achievement (Simmon et al., 2017). The participants selected for the present study were thosewho worked well in the end of primary school examination but experienced a significant decline in their mathematics achievement during the first year of secondary. This means that the primary-secondary transition may influence their achievement. Prior research shows that there is a reciprocal effect between mathematics achievement and student engagement (Reschley & Christenson, 2012). This literature suggests that student mathematics engagement is an antecedent and at the same time a consequence of mathematics achievement. The literature also suggests that there is an effect of transition on student engagement in mathematics. Therefore, in the context of this study, it would be essential to have deep understanding of the mechanisms through which the experience of transitioninfluences student engagement, particularly on Mathematics.

In the next chapter, findings relative to RQ2 will be presented, analysed, and discussed.

SUMMARY

In this chapter, the findings relating to RQ1 of this study were presented, analysed, and discussed. Two global themes were identified during the data analysis firstly, limited overlap between students' expectations before moving to secondary school and their lived experience during their primary-secondary school transition. Secondly, **s**tudents' experience of and engagement in mathematics during the primary-secondary transition. In another words, the effect the primary-secondary transition has on student engagement in mathematics is sought. Together, these two themes capture the essence of students' experience during the transition to secondary and their engagement in mathematics during this period. The data shows that participants create expectations about the secondary school they are about to move. These expectations are either positive or negative.

Once at the secondary school, the experience of the new environment is different from what was expected, which results in students' disillusion or frustration or dissatisfaction. In some cases, the dissatisfaction is because of the allocation of the school. Consequently, there is a change in students' perception of secondary school. Interestingly, the findings suggest that some participants experienced a 'cultural infatuation' when allocated a top-rated school. This indicates that the honeymoon phase startsduring the pre-transition phase. In Chapter 5, findings related to students' experience of and engagement in mathematics during the transition period will be discussed.

Chapter 5: Findings and Discussion related to RQ2

5.1 INTRODUCTION

In this chapter, the psychosocial factors influencing student mathematics engagement, during the primary-secondary school transition are discussed. It provides a nuanced understanding of the mediating mechanisms through which the complexities of students' perceived experiences of transition affect students' mathematical engagement. In this section themes have been discussed thus allowing me to address RQ2.

In a systematic literature review on primary-secondary transition, Jindal-Snape et al. (2019, p. 39) caution that in the international context, "*most studies suggest that students experience a dip in school engagement and motivation in secondary schools; however, it is not clear whether this is due to the transition itself or other developmental changes*". Martin, Way, Bobis & Anderson (2015) have expressed a similar concern about how to 'disentangle' the effects of transition students perceive on their mathematics engagement during the primary- secondary lectures. Prepositions are important from other factors (which is also my concern in this study). The use of two identified conceptual frameworks, Kahu & Nelson (2018) and Risquez et al. (2008), has helped in the presentation and analysis of the findings related to thepsychosocial factors influencing student mathematics engagement. Mathematics teachers' instructional practices.

5.2 MATHEMATICS TEACHING AT SECONDARY SCHOOL

5.2.1 PERCEIVED INSTRUCTIONAL PRACTICES OF MATHEMATICS TEACHERS IN THE SECONDARY SCHOOL DURING THE TRANSITION PERIOD

When asked about how they found mathematics teaching in the secondary school, two participants had this to say:

> *LA1: In Form I when we started, I did not understand because the method was different. We were doing a different method in the primary. In secondary a different method.*

LA5: In primary, when they taught, we were motivated to do the homework. In secondary, they teach using different methods. Now they ask us to do thisor that. Some (students) *were saying they will not do the homework. It's too tiring.*

Findings suggest that students perceived disparity in the teaching methods between primary and secondary school mathematics. Not understanding the topics were found to demotivate students to complete homework. These findings are consistent with Attard (2010) where the different pedagogies experienced by the students during the primary-secondary transition influenced their understanding of mathematics. The latter in turn, influenced theirengagement in the subject causing a fluctuation in students' attitude during the whole year (Attard, ibid).

The evidence suggests that there is a pedagogical gap between primary and secondary schools' mathematics teaching. Galton et al. (1999) highlighted that a pedagogical bridge should exist between primary and secondary to smoothen the transition between the two stages. The data also shows that students are used to a single teacher teaching different subjects. Some participants reported they would have preferred only one teacher in the secondary. The justification provided by them relates to the diverse teaching approaches used by the teachers in the secondary.

Furthermore, to the question whether the mathematics teacher used any teaching aids to teach mathematical concepts, some students perceive mathematics teaching too teacher centred and lacking stimulations to maintain attention. The responses of some participants are given below:

LB4: The teacher does not draw any pictures. He writes the title (of the topic) *on the board, there are little explanations, examples, and practice.*
LB2: There are no diagrams. Only calculations now.
MC1: She must explain. She must write on board. She speaks too fast. I do not understand.
MG1: The teacher does not teach much.

MG2: He writes notes on board. Asks us to copy. Then he explains and give homework. Yes, when we finish copying then he explains.

From the responses of the participants, it is inferred that, contrary to primary school, mathematics teachers in the secondary, do not use any resources or manipulatives other than 'chalk and talk ' in the teaching of the subject. Therefore, the lack of stimuli does not cater for

the interest and needs of the students. Moreover, the participants reported that mathematics teachers spent less time teaching.

Some participants commented that primary school teachers used drawings to make things more visual during their lessons as opposed to secondary mathematics teachers. The latter teachers taught very procedurally as testified by the statement of LB2.

> *LB2: And in Grade 6, there where diagrams and then they were drawing diagrams, then they were writing. Now, only calculations.*

The finding concurs with Attard (2010) who states that students miss the 'hands-on' approach in the secondary that engaged them in the primary. However, the data is contrary to what Payneeandy (2003), found in Mauritian primary schools that teaching is mere transmission of knowledge where students' main form of learning is memorization. According to Chacko (2003), teachers' instructional practices are influenced by various factors, the most significant being the expectations set by public examinations. The current PSAC examination (as the former CPE examination) at the end of primary school in Mauritius is a high-stake examination where parents, teachers and students give high importance.

According to Wall and Alderson (1993, p.5), '*a test will influence what teachers teach'* and '*a test will influence howteachers teach*'. This influence of examinations on the teaching and learning is termed as the 'backwash or washback' effect. It is the positive or negative effect of examinations on the teaching and learning process. Barnes (2017) acknowledges the importance that washback plays in the relationship between assessment, teaching, and learning. In the same vein, Harlen (2004) argues that when the examination is high stake and used for both certification and selection purposes, teachers adopt a transmission style of teaching. However, the above findings do not indicate that mathematics teaching in primary schools is procedural whererote memorisation is favoured over conceptual understanding. But these findings are related to 11-12 years old participants who might be limited in their judgement between procedural and conceptual teaching.

Furthermore, to the question about the teaching of mathematics in the secondary school, LA2 and LA3 had this to say:

> *LA2: The primary teacher used interactive whiteboard. It attracted our attention*.
>
> *LA3: Yes, and then we know what is happening.*

The current study also indicates that some primary school teachers were concerned about students' understanding of mathematical concepts and used interactive whiteboard and visuals to teach them. In such cases, participants reported better understanding of the concepts and better attention during the lesson thus indicating that students were behaviourally engaged in the lessons but not necessarily cognitively engagement. It should benoted that secondary school classes are, very often, not equipped with any technological facilities as is the case in the primary schools. So, since the data is from the students' perspective, it is challenging to infer whether the mathematics teachers are willing or not to use technology in class.

However, from the participants' perspective, secondary school teachers tended not to use any technological tools or resources. Two things are critical here, firstly, the willingness of teachers to use technological tools and secondly their availability. Bholoa, Ramkalawon and Purdasseea (2014) carried out a study on the awareness, readiness and expectation of mathematics secondary school teachers and students about the integration of tablets in mathematics classes. It was found that experienced teachers were less ready to integrate tablets in their mathematics lessons.

According to Piaget's cognitive developmental theory, adolescents (at the age of 11+) move from concrete operational stage of development to formal operational stage where they can think abstractly (Ganeson, 2006). This theory coupled with the theory of constructivism require students to engage in both concrete activities as well as abstract thinking. However, if the teacher's epistemological beliefs about mathematics is inconsistent with the above theory,s/he will adopt a teacher-centered approach to teaching where lecturing and rote memorisation of mathematical content are emphasized instead of conceptual understanding. However, this approach to teaching makes mathematics learning boring and uninteresting.

In addition to some students who perceived mathematics teaching at secondary school to be too teacher centered and boring, they also found the pace to delivery of lesson too fast for them to understand.

> *MC1: She must explain. She must write on board. She speaks too fast. I do not understand.*

On the contrary, primary school teachers did not rush with the syllabus. As discussed earlier, there were no period system and only one teacher was teaching all subjects. Therefore, this allowed the teachers more flexibility and were in control with the completion of syllabus.

LB1: The primary teacher took a bit more time to teach. He was teaching slowly for everyone to understand. There was no period system as in secondary. We could do any subject that we wanted. Then in secondary, we go a bit quickly according to its period. And then he did not give the appropriate technics. It is not very easy for me to understand.

One explanation could be that the small amount of time (5 periods of 35 minutes each per week) allocated to mathematics in secondary schools and the restricted time for the completion of the syllabus compel teachers to rush with the lessons. However, the participants indicated that this led to difficulties in understanding the concepts of some topics in mathematics especially the news ones, like algebraic expressions, integers, sets, and equations, introduced in Grade 7. Not understanding the concepts mat lower students' self-efficacy and hinder in their cognitive engagement with the lessons. One of the most significant influences impacting on student mathematical engagement is the teacher and his teaching practices or pedagogy (Attard, 2011).

5.2.2 TEACHING OF SOME MATHEMATICS TOPICS PERCEIVED AS BORING AND UNINTERESTING

When asked about their experience of mathematics in secondary school, the data suggest that many participants perceived a lack of pedagogical continuity between primary and secondary school mathematics and found the class boring and uninteresting. The following comments attest the above.

MB4: The mathematics class is boring.

LA3: Class boring. I feel sleepy.

LA4: The class was sleepy. Right now, we will enter the mathematics class.As soon as you enter, you get a terrible smell in the class. When you go in class, you already feel asleep. Cannot concentrate then.

LA5: The teacher focuses more on giving notes than on solving problems. We do not want to work. Feel sleepy in class.

Congruent to the findings of the current study is Gotz, Frenzel and Pekrun (2007) who found that students are bored on average 50% of the lessons in class. The focus of this current study is not the time partitioning of mathematics lessons and finding the patterns of engagement or disengagement, neither was it about the prevalence of boredom. Nonetheless, boredom is an

important variable to investigate in understanding student engagement or disengagement in particular that of mathematics (Yazzie-Mintz & Mc Cormick, 2012). As per the interview extracts, certain mathematics classes were found to be boring. Two reasons were identified in the data. Firstly, the teaching practices of the teacher and secondly, the spiral nature of our curriculum where certain topics are repeated in the secondary schools. While spiral teaching is encouraged in our national curriculum in order to help student revisit and extend the mathematical concepts learned earlier, it seems to 'backfire' with the students who worked well in the end of primary examinations.

For Macklem (2015), boredom in the classroom was not taken seriously and was often neglected. MC, however, complained that the teacher did not make the lesson interesting.

MC1: The teacher could make the class more interesting.

The response is in line with (Macklem, 2015) who states that "*when it* (boredom) *was addressed, teachers were targeted for not presenting interesting material and not using engaging teaching techniques*", p. 72). Boredom is now considered as both internally and externally caused. Nett et al. (2011) recommend taking boredom seriously even though avoidance of the situation is difficult for every student or every class at all times.

Interestingly, Xie (2021) found that engagement is key for not feeling bored. In the literature, boredom is conceptualised as a negative deactivating emotion detrimental for persistence (Tulis & Fulmer, 2013) resulting in the disengagement of students (Xie, ibid). Students may be behaviourally engaged but not cognitively engaged in the mathematics lessons. Linnenbrink and Pintrich (2003) use the terms 'hands-on' and 'minds- on' for students to engage cognitively in lessons. They further assert that "s*imple attention in terms of the students having their eyes on the teacher and not talking to other peers may not be enoughfor learning"* (p. 124). Not engaging cognitively in mathematics lessons may obstruct the development of metacognitive skills in students necessary to extend their mathematical knowledge in subsequent years (Linnenbrink & Pintrich, 2003). Since emotion is one of the mechanisms to student mathematics engagement in Kahu and Nelson (2018) framework, questions can be raised about the causes of students' emotional experience of boredom. However, Kahu and Nelson (ibid) posit that the four psychosocial constructs are intertwined and rarely function in isolation. Since this study was carried from the students' perspective, the 11-12 year old's rarely held themselves responsible for their disengagement with mathematics. Only MA1 perceived that some students are not dedicated enough towards to their studies.

MA1: The students also do not do their best. They do not follow the class when the teacher is teaching. They shout in the back (of the class). Theythrow bits of paper and all. This did not happen in the primary.

In a study conducted by Brisette and Snow (1993), they found that secondary school students found their mathematics lessons boring as they considered them to be neither entertaining nor conducive to their social life. The current study indicates that, for some participants, the antecedent of boredom is the monotony and lack of involvement in mathematics class. The data also resonate with those of Daschmann et al. (2011). In their study, 1380 German students from Grades 5 to 10 aged 10-15 years were given a 51 items questionnaire asking the factors that may elicit boredom in class. It was found that the lack of involvement of students and monotony are the aspects of instructional quality that mediate boredom in mathematics class. In addition, for Daschmann et al. (ibid), students usually cite aspects of instruction when asked for antecedents for their boredom in class. From the above discussion, it can be inferred that boredom might act as a mediator between teacher's instructional practices and mathematics disengagement.

In addition to teacher's instructional practices, the findings suggest that students were bored and disengaged from class when mathematics topics/concepts, from primary school, were taught again from the primary. When asked about the reason for this disengagement is their perceived mastery of the topics already covered in the primary.

MA1: When the teacher was explaining something new, I followed the class. When he was teaching topics from primary only then my mind was in the clouds…because I already know it.

This finding agrees with Schagen and Kerr (1999), who state that repetition of work without additional challenge is one of the most critical and reliable factors explaining the decline in students' performance during transition. This might be particularly true for more able students who might get bored and put off by having to repeat work done in the primary (Pell et al., 2007). As seen earlier, this is pertinent to the present study. To smoothen the transitionbetween primary and secondary school mathematics, curriculum continuity was ensured, and spiral approach adopted in the NCF secondary (NCF secondary, 2017). As such, many topics,already covered in the primary (for example, HCF, LCM, percentage, rate, ratio among others) are deliberately included in Grade 7 syllabus. However, in the local context, no administrative

bridge (Bore & Fuller, 2007) is put into place so that essential information is transferred from the feeder primary school to the student's secondary school. Consequently, this absence of the administrative bridge often results in secondary school teachers being unaware of the topics in mathematics taught in the primary school. Moreover, to avoid disparity among students from various feeder schools, a 'tabula rasa' (fresh start) approach isadopted in the teaching of the topics. Students reported being bored and uninterested when topics are repeated. It cannot be said that the same is true for the traditional students[5].

5.2.3 THE PERCEIVED EXPERIENCE OF SOME NEW TOPICS IN MATHEMATICS INTRODUCED IN SECONDARY SCHOOL

Consistent with existing literature, students found certain mathematics contents in Grade 7 different to the primary. Nearly all the participants interviewed perceived the new mathematics topics introduced in the secondary school, like negative numbers, sets, algebraic expressions, inequalities, and equations as difficult and challenging, and struggled to understand. Some of the responses are given below. To the question about the difficulties andchallenges experienced in mathematics, the following responses were obtained:

> *LA1: Sir, we have problems in algebra, sets, integers* (negative numbers), *equation of lines, ratio, and inequality.*
>
> *LA2: Yes, but where there is to equate in the question, (I) do not understand… And then (in secondary) we got new chapters where they ask some expressions, HCF, sets and all. Which means there are algebraic expressions.*
>
> *BB1: Mathematics in the secondary is a bit difficult. Now they include alphabets. It was not there previously.*
>
> *LA1: I did not understand the topics*
>
> *LB1: Sir, I have problems in equation of lines, negative numbers, ratio, and inequality.*
>
> *BA4: Now we are doing that (algebra). We need time.*

[5] It should be reminded that the participants of this study are those who worked well and have a high self-competence. That is, they think they know. The spiral curriculum may be relevant for the traditional learners ('average and below average learners').

The lack of understanding of the new topics in mathematics especially algebra are perceived to negatively impact on their performance as attested by LA3.

> *LA3: I did not understand algebra and sets. My performance declined because of algebra.*

The findings corroborate with the report on National Form III 2015 examination (MoE, 2016), prepared by the quality assurance and inspection division, which stated that "many students faced difficulties in dealing with Integers and Algebra" (MoE, 2016, p. 4). A markeddifference between primary and secondary curriculum is the introduction of the strand of 'algebra' in Grade 7. In addition to the 4 strands of content carried forward from the primary, algebra is introduced during the first year of secondary. In line with Maudy, Didi, and Endang (2018), the findings suggest that students experience a difficult transition from arithmetic to algebra. Despite the NCF secondary (2015) underscores the spiral nature of the mathematics curriculum and advocates continuity across grade levels, the introduction of negative numbers and algebra causes discontinuity in the curriculum in Grade 7. Pramesti and Retnawat (2019) state:

> Many studies mention the difficulties of students in learning algebra in the process of mathematization everyday sentences to mathematical forms, understanding algebraic equations, arithmetic operations, understanding the meaning of symbol equal to and meaning of variables.
>
> (Pramesti & Retnawati, 2019, p. 2)

However, Tall (2002) states that long term cognitive development always faces discontinuities. With the educational reform in the local context where education in Mauritius is made compulsory till the age of 16, these discontinuities cannot be avoided. Findings reveal that the students face double transition. Firstly, an institutional transition that ismoving from one school setting to another and secondly a cognitive transition in mathematics (Guedet et al., 2016) that is, the transition in the ways of thinking required to cope with the new topics in secondary school.

In line with Maudy, Didi, and Endang (2018), this study found that students perceive algebra asdifficult. However, the current study does not reveal the nature of the learning difficulties[6].

[6] The abstract nature of the topics might explain why algebra is perceived as difficult by students and are disliked (Olubukola, 2015). Another possible explanation is provided in the study of Sitrava (2017), where students have difficulty in understanding the letters in algebraic expressions. According to Sitrava (ibid), students take the letters in algebraic expressions as the first letter of words or numbers.

The lack of understanding is attributed to the gap in transition from arithmetic to algebra. Kahu and Nelson (2018) suggest that new learning experience has the potential to challenge students' ways of being and thinking. Therefore, the perceived difficulty in the cognitive transition in mathematics (Guedet et al., 2016) is found to impact on their self-efficacy and sense of belonging in the classroom (Kahu et al. 2019).

> *LB2: My primary teachers' son was admitted to the same school. The teacher told us that we would not encounter any difficulties if we can adapt ourselves to mathematics. I thought there is nothing to worry it would be same as in the primary. But here, the book is so thick and then, when I look at the topics, I'm shocked.*
> *MB1: I find that it was more comfortable in CPE. Now it is more complicated.*
> *MC3: Each time, it becomes bulky and more difficult.*
> *MC4: For me also, it is becoming more and more difficult with time.*

However, the pedagogical approaches adopted to teach mathematics might be the reason for students not understanding the new topics rather than their novelty. Even in primary, at some point in time, the topics were new to them. Nonetheless, the data indicates that the experience of curriculum continuity results in an academic shock in the participants.

Therefore, students in the first year of secondary may be lacking the metacognitive skills necessary to complete the more complex tasks resulting in a decline in their self-concept which in turn triggers a decrease in achievement (Eccles & Wigfield, 1993). Reschley and Christenson (2006) stated that transition might influence student engagement and consequently on learning. Literature suggests difficult transitions can lead to disengagement, negative attitudes towards school, reduced self-confidence, and reduced levels of motivation, particularly in mathematics education (McGee, Ward, Gibbons, & Harlow, 2003).

The findings revealed that the difficulties in mathematics were associated with a lack of understanding of topics introduced in the secondary like algebraic expressions, sets, algebraic equations, integers, and problem solving, which were also perceived to be complicated. The finding corroborates with the National Form III 2015 examination (MoE, 2016), prepared by the quality assurance and inspection division, which stated that "many students faced difficulties in dealing with Integers and Algebra" (MoE, 2016, p. 4). The first three topics are

introduced in the strand of algebra in Grade 7 (NCF, 2017). It is not in agreement to NCTM (2000) where algebra is introduced in Grade 7 and not at the primary level. NCTM (2000) state that:

> Although many adults think that algebra is an area of mathematics more suited to middle school or high school students, even young children can be encouraged to use algebraic reasoning as they study numbers and operations and as they investigate patterns and relations among sets of numbers.
>
> (NCTM, 2000, p. 3)

Despite that NCTM (2000) highlights that algebraic reasoning could be introduced to young children, the findings of the current study are congruent with findings from Maudy, Didi, and Endang (2018) which indicate that students perceive algebra as difficult. However, the current study does not reveal the nature of the learning difficulties[7]. The lack of understanding is attributed to the gap in transition from arithmetic to algebra. This is relevant to the current study as all the topics mentioned by the study participants, are introduced in Grade 7. Findings discussed earlier in this chapter suggest that the discontinuity in thecurriculum coupled with student' experience with the subject may contribute to students not understanding topics requiring algebraic reasoning. In line with this, Blanton et al. (2015), found that:

> Typical elementary mathematics curricula and instruction may not adequately prepare students to successfully navigate the significant transition from the concrete, arithmeticreasoning of elementary school to the increasingly complex, abstract algebraic reasoning required for middle school and beyond.
>
> (Blanton et al., 2015, p.76)

The data further revealed that not understanding the 'new topics' created frustration instudents and fear of examinations. Furthermore, I prompted during the interview to ask the participants some simple arithmetic operations involving negative numbers. To my great surprise, those participants unanimously gave wrong answers.

[7] The abstract nature of the topics might explain why algebra is perceived as difficult by students and are disliked (Olubukola, 2015). Another possible explanation is provided in the study of Sitrava (2017), where students have difficulty in understanding the letters in algebraic expressions. According to Sitrava (ibid), students take the letters in algebraic expressions as the first letter of words or numbers.

This confirms the saying of participants that the topic 'Integers' is a topic where theystruggle. As an experienced former mathematics teacher, I can state that students' negative experiences in the topic can hinder further learning of mathematics particularly algebra.

Recently, in the primary school books in Mauritius, 'Bar Models' were introduced in Grades 4, 5 and 6 to help students solve problems without using algebraic notations. In a recent study, Thirunavukkarasu and Senthilnathan (2017) found that the use of bar model was more effective in the teaching of algebra than the traditional 'chalk and talk'.

5.2.3.1 DIMINISHED STUDENT SELF-EFFICACY IN MATHEMATICS DURING TRANSITION

Although participants entered secondary school with the view that mathematics would either be same or more accessible than it was in primary school, the data suggest that after starting secondary schooling, many participants found it 'difficult'. The comments of some participants below attest this fact.

> *LB3: I find mathematics difficult.*
>
> *MG1: Difficult.*
>
> *MG2: Very difficult. Forget while learning.*

Participants declared that they were more confident to pass mathematics in primary school than in secondary school. This was confirmed by other participants.

> *BA3: I do not know. I try but cannot do it.*
>
> *MC5: I try but I cannot.*
>
> *MC3: Me, I cannot think. Other questions I can do them but when they are difficult, how to say, get stressed.*
>
> *LA1: Sir, we have problems in equation of lines, ratio, and inequality.*
>
> *LA2: Yes, but where there is to equate in the question,* (I) *do not understand.*

This change in perception that mathematics is 'difficult' is caused in part by their perceived experienceduring transition. This interaction between school and student factors is found to influence

student self-efficacy (Kahu, Picton & Nelson, 2019). Student self-efficacy is found to influence all the three dimensions of student engagement (behavioural, emotional, andcognitive) (ibid).

Another participant made a similar comment.

> *LA1: Primary was easier…. (In secondary) it's a bit different. We have many new chapters.*

LA3 subscribed to the idea put forward by his primary school teacher that one needs more logical thinking to be able to succeed in mathematics.

> *LA3: Study new things which need much logic.*

Logical thinking is perceived to be the pre-requisite to overcome learning difficulties in algebra. This study suggests that some participants associate the difficulty they were encountering in mathematics to the new topics included in Grade 7. The comments of MG1, MG2 and MC3 attest this fact.

> *MG1: Yes, I liked mathematics in the primary.*

> *MG2: There were a few chapters. But here in Form 1, we must study many chapters, different chapters.*

> *LA1: Primary was easier because in primary we learned easy things.*

According to the participants in the focus group interview, they never copied homework from their friends as they completed their mathematics exercises on the same day in class.

> *BB1: I do not revise maths* (because) *I do not understand.*

> *LC1: I was studying more in CPE. In Form One, I reduced a bit because in CPE there was a big exam, not in Form I.*

It is evident that the 'new topics' were perceived as difficult. Participants from School B stated that not understanding the 'new topics' created frustration as they feared to struggle in the examinations. This is obvious from the comments of LA1 and LA5.

> *LA1: Frustrated because I won't do if I got theses in the exams.*

> *LA5: Me too. If by chance I get these in the exams, and I do not know, also if the question isdifficult, I will lose marks.*

It was found that some participants were motivated to learn mathematics and at first, persevered with the tasks. In contrast, however, the findings also show that the participants were easily discouraged when they perceived their efforts as unfruitful. They gave up soon after leaving the exercises undone. Leaving the homework incomplete was common among the participants from this study as exemplified by the comments of MA1 and MC5.

Persevering on the tasks but not successfully completing them created frustration in the respondents. Nonetheless, it was found that some the participants admitted that they experienced a dip in performance in mathematics because not enough time and effort was dedicated by them as evidenced by the comment of MC1 and MC2.

> *MC1: not enough for me.*
>
> *MC2: Becoming more difficult. I must study now.*
>
> *LB2: We must revise frequently. Sir, I also struggle in exams. For example, for my first test I scored zero marks. For the exams I got five over ten. The third test I got 21.*

The marked difference between primary and secondary curriculum is that algebra is introduced in Grade 7. According to Pramesti and Retnawati (2019, p. 2), '*many studies mention the difficulties of students in learning algebra in the process of mathematization everyday sentences to mathematical forms, understanding algebraic equations, arithmetic operations, understanding the meaning of symbols equal to and meaning of variables'*. Not able tocomplete homework or understand certain topics in mathematics impacts on their self- efficacy and sense of belonging in the classroom (Kahu et al. 2019). According to Linnenbrink and Pintrich (2003), low self-efficacy led to the feeling of helplessness andpremature admission of defeat. Furthermore, those who doubt their ability to complete tasks are less likely to persevere and apply cognitive and metacognitive strategies (ibid).

The introduction of algebra is one of the effects of the primary-secondary transition that affects the teaching and learning of mathematics in Grade 7. In Singapore, this is counteracted by teaching pre-algebra courses in the primary. This could be one solution to theproblem in the local context hence increasing their self-efficacy in the subject.

5.3 STUDENTS' PERCEIVED EXPERIENCE OF MATHEMATICS TEACHER-STUDENT RELATIONSHIP IN SECONDARY SCHOOL

In this section, I discuss findings of students' perceived experience of their relationship with their mathematics teacher during the primary-secondary transition. When asked about their relationship with the mathematics teacher, there was a tendency to compare with their primary school teacher. The findings suggest that students found the relationship with their primary school teacher stronger than the secondary school teachers including that of mathematics. Some extracts of students' responses are given below.

> *LA3: The relationship we had in CPE (Grade 6), that relationship with the teacher, here we do not have.*
> *MB2: We were closer to the primary (school) teacher.*
> *LB1: We had better relations with the primary teacher.*
> *MB1: Here, the relationship is different.*
> *MB2: The primary teacher was friendlier (than the secondary*
> *LA1: Primary teacher very close relationship with all students.*
>
> *LB2: In primary, the teacher treated as his children. He was very friendly and very close to us.*

Teacher-student relationship as perceived and reported by the students is an indication of affective engagement (Reschly & Christenson, 2012). Moreover, the poor teacher-student relationship indicates that students experience an emotional shock which can impact on their adjustment to the new environment as illustrated in the U-Curve theory of Risquez et al. (2008). One explanation might be that in local primary schools, there is a practice that the same teacher teaches several subjects and stays with the same class for three consecutive years from Grades 4 to 6. Whereas, in secondary schools, teachers might change every year as attested below:

> *LB2: We had the same teacher since Grade 4. Here* (in the secondary), *teachers change every year.*
> *LC1: The primary* (school) *teacher was our principal teacher. We spent the whole day with him (*both) *at school and during tuition* (private coaching) *classes.*

The data suggests that the experience of prolonged interaction with the primary schoolteacher was key to build a strong bond. Additionally, as seen in the previous chapter, students

spend more time doing mathematics, on a daily basis, with the primary school teacher. To explain the difference between the relationship with primary and secondary school teacher, MG1 said that "*we are with him* (secondary school teacher) *only two periods* (that is 70 minutes) *during the day. In the primary, we were with him* (primary school teacher) *the wholeday".* The response of LA2 confirms that of MG1 and other students.

> *LA2: Suppose we did not understand something, she had all the time. She would explain from morning till afternoon until we understood. Miss asked us to come at 8.00 am till school assembly that is from 8 am to 9 am. She would give tuition-free of charge. She asked all who were struggling to come. She said I would help you. All were coming. Then after 3.30 pm, whenthe school was over, she would give private tuition from 4.00 to 5.00 pm.*

The significant amount of time spent with a single primary school teacher, increases the chance of building a positive teacher-student relationship (Baker, 1999) contrary to thesecondary school teacher where the contact time is significantly lower.

> *LB4: The primary teacher considered the students like his children. He spoke well. Very friendly, we are more comfortable with the primary teacher. If the same* (primary) *teacher who taught Grades 5 and 6 taught us in the secondary, it would have been better for us. He would teach well. He would look for other methods on the net.*

According to Nichols (2008), student-teacher relationship is one of the main factors that influence the degree to which students feel a bond with their school community and determines their scholastic wellbeing. In the same line, Kahu and Nelson (2018) proposed wellbeing as one of the mediators between the psychosocial influences and students engagement. According to them, the interaction between institutional and student factors facilitate student engagement. Therefore, a good teacher-student relationship impacts positively on student engagement (Xerri et al., 2017), but also on student mathematical engagement (Attard, 2010) especially during the transition to secondary school (Jindal-Snape & Foggie, 2008). In addition, a poor teacher-student relationship can also negatively impact on student mathematics engagement. According to Reeves & Tseng (2011), level of engagement increase or decrease depending upon the rapport between the teacher and the students among other factors. Similarly, Kahu and Nelson (2018) situate student engagementwithin the individual student as "*an individual student's*

psychosocial state" (p. 59). In line with prior research, the data indicate that poor teacher-student relationship influences student mathematics engagement through the poor pathway of scholastic wellbeing.

The data suggest that the experience of social and emotional shock by students due to the alienating behaviour of mathematics teachers influence their adjustment to the new environment. According to Gablinske (2014), "*the interactive relationships should be based on respect, trust, caring and cohesiveness*" (p. 22). Findings reveal that primary schoolteachers were perceived to be caring, and respectful. However, commenting on their poor relationship with their mathematics teacher, some participants reported that their secondary school mathematics teacher did not even know them or disliked them.

> *MB3: The* (mathematics) *teacher does not know us well*
> *LB3: He* (the secondary mathematics teacher) *does not know us and does not motivate us.*
> *LB2: The primary* (school) *teacher was here to support us in all our problems. He offered an end of term lunch to all pupils in the class.*
> *LA4: Only cares one section of the class. The teacher did not care for us.*
>
> *MB1: He does not like us.*
>
> *MA1: He does not like all the students. One or two students in the class familiarise with him.*
> *MB2: He likes nobody…. During the correction of homework when we tell him that we did not understand, he says after so much explanation, you did not grasp anything.*

Teacher's unsatisfactory behaviour was also experienced by LA1. For him, the secondary school mathematics teacher does not even know his name.

> *LA1: In Grade 6, we had a good teacher. He knew me. However, in Form I* (Grade 7*),* (The mathematics teacher), *he does not know me well. He does not even know my name.*

LA1 has a sense of alienation due to the perceived poor relationship with his mathematics teacher. One possible explanation of this fact might be that in the Mauritian context, the teacher

student ratio is usually 1 to 40. Moreover, the class teacher has only six periods of 35 minutes per week to teach mathematics. Adding to this, the teacher teaches in several classes during the week. It is therefore, challenging for the teacher to remember the names of every student in all the classes he teaches during the year. Klem and Connell (2004) state that students need to feel teachers are involved with them and care for them. This fact is also reported by Strahan (2008). He reveals that in various case studies, in America, whereteachers, who were successful in transforming reluctant students to engage in work, established a strong relationship with those students.

> Teachers in these case studies demonstrated warm, supportive relationships by showing a deep knowledge of individual students. Not only could they describe in detail the emotional, physical, cognitive, intellectual, and family needs and circumstances of students in their classes, they addressed these needs by responding to students as individuals.
>
> (Strahan, 2008, p.4)

Therefore, teachers need to know their students well to help them engage. In addition, the data also indicates that some students did not engage with mathematics which in turn influenced the teacher's engagement within the mathematics class. Responding to the question about teacher's classroom management, the following responses were obtained by BA1 and BB1 which attest the above.

> *BA1: Some students are noisy in class. Then the teacher does nothing. She just sit at her place and yell that we must be silent. I sometimes cannot concentrate (because of the noise) and she just asked us to be silent.*

> *BB1: The teacher must be able to control the class. Discipline the class a bit…The students are too talkative in class. The lady teacher does get time to teach. The exercise that should be completed in 5 minutes, they take 20 minutes. So, a lot of time is wasted in the maths class. The lady teacher cannot work. We can neither finish the book nor revision. There are students who sit in front and talk. Some use mobile phones in the maths class. In our class, there are issues every day. Today itself, there was a class test but early in the morning they summoned us to the office. Swearing and all, every day there are problems.*

Reeves and Tseng (2011), highlight this bidirectional influence between student engagement and teacher-student relationship. They used the term 'agentic engagement' as students' influence on their learning environment including teacher engagement. That is, students and

teachers influence the engagement of each other. Hence, confirming the complex and dynamics interaction between the institution, teacher, and the student.

Coad and Jones (1999), on the other hand, conducted a case study in which they compared the approaches used in the teaching and learning of mathematics in a secondary school to those used in its feeder primary schools. They concluded that different external influences might drive the similarities and differences in approach. One external force driving the primary teachers to engage more than their secondary counterparts might be the high-stake national examination. Whereas in Grade 7, examinations are held at the school level. According to Amrein and Berliner (2002), there is evidence that high stake examinations, like the one in the primary, results in a slight increase in student learning. This means that expectations differ between these two stages. In cases where the relationship between the teacher and students is strong, the teacher has high expectations of the students and communicates his/her expectations to them. For Erogan and Kurt (2015), teacher's beliefs and their expectations of students influence their ability to create an interactive environment.

West et al. (2010) found that if the teacher- student relationship and their transition experience are negative, then students' wellbeing can be harmed. Prior research shows that wellbeing mediates the influence of the combined effects of student and school factors on student engagement. Therefore, the negative influence of poor teacher-student relationshipcan lower students' wellbeing which in turn impact on student mathematics engagement.

Moreover, data shows that those who experienced mathematics 'teacher turnover' during their first year of secondary schooling perceive it as a challenge to their adjustment to the new environment.

> *LB2: We cannot adapt when teachers change.*
> *LB1: When we have just adapted with one, we have a new teacher. It becomes difficult to adapt to the new one.*

The findings also reveal that the students' experience of different mathematics teachers during Grade 7 has a negative effect on their academic adjustment. It seems that the experience of 'teacher turnover' during Grade 7 is perceived as an added stress by some respondents during their adjustment to the new environment. It is, however, unknown how widespread is the practice of 'teacher turnover', in other Mauritian schools, during term time. A study by Dolton and Newson (2003, p. 139) shows that "*high levels of teacher turnover can be shown to have*

detrimental effects on pupil progress and achievement". And it can be a risk factor on students social and emotional wellbeing due to the limited time to build a strong bond with the teacher.

However, a question can be asked to what about the extent this turnover can influence student's engagement and achievement in mathematics. In any case, as per the responses of the students, it does affect them to adapt during the transition period hence indicating that the policy decision must be taken to avoid mathematics teacher turnover during the first year of secondary. Therefore, the lack of opportunities for students to develop strong connectedness with their mathematics teachers may also influence their emotions and belonging to the class. Kahu & Nelson (2018) considered emotional and belonging as two essential components of the educational interface. According to them, both can influence students' outcomes through their impact on students engagement. Additionally, LA2 perceived his primary school teacher to be more dedicated in her work and providing both emotional and academicsupport to students outside school hours.

Patrick, Anderman, and Ryan (2002) highlight the importance of perceived teacher support in enhancing students' socio-emotional well-being. This fosters a feeling of confidence and self-worth and encourages persistence in times of difficulties. Similarly, Midgley et al. (1989), mentioned that if students perceived their teacher to be very supportive, they have higher levels of interest and value, and enjoy their schoolwork and have greater expectations of success (Goodenow, 1993).

5.3.1 PERCEIVED ADMONISHING BEHAVIOUR OF MATHEMATICS TEACHERS TOWARDS GRADE 7 STUDENTS

The data reveal that some students perceive their primary school teacher as protective, supportive, caring and motivating as reported by LB2 and LB4. They found primary school teacher talked gently to parents without denigrating the students, despite their performance was declining.

> *LB2: In the primary, when we were not performing well, it was apparent in our behaviour. The primary school teacher used to call our parents at the school. The teacher talked to our parents alone. Then, they asked us to come.*

A similar comment was made by LB4.

> *LB4: Teacher was not telling the truth* (to the parents) *that we are not working well. He said that your child is working but he can improve.*

Data also reveal that the primary school teachers were concerned about the declining performance of the students but were very gentle in handling the situation with parents. In the Mauritian context, the end of primary school examination is high stake, and everyone is concerned with the performance of students. Some participants perceive their primary school teacher to be more caring and exhibiting high expectations, whereas the secondary school mathematics teachers are perceived to be 'very strict' by most of the participants.

The above finding concurs with Jindal-Snape and Foggie (2008) and Ashton (2008) that some Grade 7 students perceive their secondary school mathematics teachers stricter than the primary school teacher. As mentioned earlier, one explanation might be because students spend more time with the primary school teacher in contrast to the secondary school teacher. Students who perceive their teachers to be caring about them, respect, and praising them, tend to like school more than those who do not (Hallinan, 2008). Prior research like Bolhius and Voeten (2004), shows the direct influence of teachers' attitude and beliefs in shaping classroom practices. Teacher attitude is also found to influence students' attitude (Mensah, Okyere & Kuranchie, 2013) which, in the local context, it was evident in the primary schools. On the other hand, the perception students have of some of the secondary school mathematicsteachers is in line with Wenham (2017), which states that well controlled, strict, and silent classroom environment is an effective system of classroom management and discipline within the classroom. But students experience stress, anxiety, and frustration.

In another study conducted in Peru by Cueto et al. (2010), concerning students transiting to urban high schools, however, students reported that secondary school teachers were dynamic, carried fun activities, and they explained well whereas in the present study I found no such responses from the participants. On the contrary, teacher's admonishing and dissatisfactory behaviour was apparent in the responses of some students.

To the question about their mathematics teacher's behaviour towards them, MB4, MC1 and LB2 had this to say:

> *MB4: He talks harshly with us…. Sometimes, he is very disrespectful to us.*
> *MC1: Suppose you do not know something or have not taken notes, you get remarks in your copybook.*
> *LB2: In Form I* (Grade 7)*, he was writing remarks in the copybook for minor things. Suppose you talk in class, he wrote too talkative, disturbing in class.*

The findings resonate with the study of Tobbell and O'Donnell (2013) which states that there islack of respect and trust from secondary school teachers towards students. In this study, however, the responses indicate the attitude and behaviours of mathematics teachers and not that of other subject's teachers. Nonetheless, the lack of positive attitudes and behaviours of secondary school mathematics teachers towards the students is consistent with Marshall & Hargreaves (2008) and is considered as one of the factors related to negative transition to secondary school by Jindal-Snape (2019). In addition, the mathematics teacher's attitude towards the students add to the list of factors that cause students' social and emotional shock as described by Risquez et al. (2008). For Marciniak (2015, p. 55), "*some teachers see discipline as the main goal of their lesson. They see their role in the classroom firstly, for controlling and maintaining discipline and secondly, for teaching itself*".

Participants perceived that the mathematics teacher was so strict that they are not given the opportunity to interact or discuss problems with their peers during lesson time. Teacher-centered approach is the preferred teaching strategy of mathematics teachers where students are passive recipients of knowledge in the mathematics classroom.
The extracts from the data testify the above.

> *MC1: Teacher does not like it if we discuss. There is no group work in class.*
> *MB2: Suppose a friend wants to discuss a problem, the teacher asks us to bring our report book. He says you are too talkative.*
> *MB1: we cannot do group work.*
> *LB2: The teacher puts remarks in our copybooks for trivial things.*

This finding is in line with Marciniak (2015) who states that:

> Disciplined students sitting silently in the classroom do not necessarily mean that they are learning. They may be afraid of the teacher. The fact that some teachers do not have to cope with discipline problems during lessons does not mean that they are effective teachers. It happens because students are afraid to learn, it is better in their opinion to sit silently and do nothing in order not to make the teacher angry.
>
> (Marciniak, 2015, p. 55)

As soon as the teacher's explanations were over, students were given classwork and no interactions with peers were possible.

> *MB2: Yes. As soon as he gives classwork, he asks us to remain silent.*

MC2: Everyone must remain silent. No one has the right to laugh or anything.
MG2: We are afraid. He may shout at us.
LB1: I am sometimes scared.

The perceived admonishing behaviour of mathematics teacher resulted in some students adopting a coping strategy of avoidance. LB2 said: *LB2: We go and see whether the teacher is absent.*

Those students were so fearful with the mathematics teacher that they never asked questions even in cases where they struggled with their task or lacked understanding of certain concepts. Participants also complained that their mathematics teachers were not willing to explain the topics again, where students faced difficulties in understanding the concept/topics and struggled with the tasks.

LA2: When we do not understand, we ask him to re-explain the topic. He never explain again.

MB2: The teacher should have re-explained when we did not understand.

The participants perceived that the teacher blamed them for not understanding the topics in mathematics.

MB3: The teacher says you do not know such a basic thing?
MB2: He says that you should know these things.

Similarly, LA3 reckoned that the teacher explained only once, and it was over. He gave homework as soon as the explanation was over. When the students requested the teacher to explain again, the answer was 'NO'.

LA3: Explains only once and it is over, and he starts giving works to do. When requested to re-explain, he says no.

The students are found to adopt a '*reactive attitude'* (Jones, 2015, p. 23) towards their mathematics teachers blaming them rather than adopting an 'objective attitude' and

acknowledging their low engagement in their studies. MA1, for example, acknowledged that some students are also not entirely dedicated to their studies.

> *MA1: The students also do not do their best. They do not follow the class when the teacher is teaching. They shout at the back (of the class). They throw paper balls and all. This did not happen in the primary.*

On the other hand, it should be reminded that the participants in this study are aged 11-12 years and questions can be raised whether they can be expected of high self-assessment abilities. The perceived teacher's negative behaviour may be in response to the behaviour of the students themselves. This might be the reciprocal effect of students' behaviour on teachers' engagement.

The above comments show that in certain classes, students are also to be blamed for their poor performance in mathematics. Students do not engagement in the class when the teacher is teaching, and they are very noisy. MA1 further state that this type of behaviour is not to be seen in the primary. However, questions could be raised about why these things happen in certain classes but not in others. It is essential to understand what has changed in a few months interval that these students who behaved well in the primary suddenly start misbehaving in the mathematics class. Since no follow up questions were asked concerning the behaviour of students in other classes, it is difficult to say whether this is recurrent in higher grades within the same school or in other classes. However, it is interesting to note that, this is consistent with Schlechty (2002) in that where classroom management issues, andretreatism and rebellion are easily observed, the classroom is off task. Students have diverted attention and do not commit themselves to the tasks/subjects at all which means that a right balance should be found between a silent class and a noisy one. Both have been found to be detrimental to students' mathematics engagement.

5.3.2 PERCEPTION OF A LACK OF COLLABORATIVE LEARNING IN MATHEMATICS CLASSROOM

In many schools, a silent class is demanded by the heads of schools. For them, if a class is silent, teaching is effective, and learning is taking place. This is done for two main reasons, firstly, because in the Mauritian context, in some schools, classes are separated by plywood and noise from one class affects the other. Secondly, for some, effective teaching can only happen if the class is silent. For heads of schools, discipline means 'control of learners' (Belle,

2017). In this study, the findings provide an insight from the students' perspective of the situation. LA4 from school B, for example, revealed that there were single desks seating arrangements in the classroom. According to him, mathematics teacher's admonishing behaviour and the seating arrangement prevent students from interacting with each other and no discussion or collaborative learning is possible in the mathematics classroom. LA4, reported that sitting beside a more able individuals would be a definite advantage in the advancement of their mathematics learning.

> *LA4: In Form I, our desk was not double. They were separate student desks where you sit alone. They were not aligned together. Suppose we are sitting next to someone able in mathematics, suppose he is intelligent in mathematics, then I ask him, he will help because the teacher that we had in Form I was so strict that when we asked him something, he scolded us. We did not want to ask.*

There is a perceived experience of a drastic change in the way they learn mathematics as compared to the primary school. The finding is consistent with Attard (2010, p. 58) who noted that, in the Australian context, "*the relationships students experienced in the mathematics classroom changed dramatically for the participants as they made the transitionto secondary school. Coming from a school where they were expected to work cooperatively, the students were initially faced with working on an individual basis*". A change from a more collaborative and teacher dependent learning environment to a more autonomous learning system is found to be challenging for the students during the transition period.

For Leraas et al. (2018), numerous factors influence student participation within a classroom. According to them individual characteristics and classroom dynamics like "classroom connectedness" and "teacher-student relationship" are among the several factors that influence student participation within a class. Leraas et al. (2018), stated that classroom connectedness may be a better predictor of student participation than other classroom factors. Taken together, the research indicates that a classroom environment where there is mutual respect and care between students and the teacher (that is high degree of both classroom connectedness and rapport) is conducive to classroom participation and learning (Rocca, 2010).

In line with the above literature, the findings revealed that a few mathematics teachers, especially from schools A and B, wanted the class to be silent. The data shows that participants perceived the class management style adopted by some mathematics teachers in the

participating secondary schools did not facilitate the learning of mathematics. From the students' perspective, the teachers were authoritative and strict which reflected in their negative attitude and behaviours towards the students. According to the participants from the two schools, they were not given the opportunity to interact with peers and discuss problems during the lesson. Teacher-centered approach was the preferred teaching method where students were passive recipients of knowledge in the mathematics classroom. The extracts from the data testify the above.

> *MC1: Teacher does not like it if we discuss. There is no group work in class.*
> *MB2: Suppose a friend wants to discuss a problem, the teacher asks us to bring our report book. He says you are too talkative.*
> *MB1: we cannot do group work.*
> *LB2: The teacher puts remarks in our copybooks for trivial things.*
> *MB2: Yes. As soon as he gives classwork, he asks us to remain silent.*

Even if there is an extensive body of empirical research testifying the effective of teaching for active learning, data from the current study shows that mathematics teachers in secondary schools adopt a traditional transmission model of instruction. In the same line, Sidelinger and Booth-Butterfield (2010) recognised student-to-student connectedness to be strongly related to student involvement irrespective of class size. Therefore, preventing students to interact might act as a barrier in their mathematics learning. Whether the same situation prevailed in other subjects is, however, unknown. Nevertheless, peer support is found to be positively related to student engagement (Veiga, 2004; Juvonen et al., 2012). Furthermore, according to Lester & Cross (2015), found that "*peer support was the most significant protective factors for students' mental and emotional wellbeing over the primary-secondary transition period"* (p. 10). In addition, Samuelson, (2012) state that high levels of peer support could compensate the perceived negative teacher-student relationship. Therefore, the lack of peer support in face of challenging mathematical tasks (found in this study) might trigger students'disengagement through the inhibition of two pathways to student mathematics engagement namely emotion and wellbeing.

5.3.3 NOISY CLASS

The degree of classroom control desired by teacher differs from teacher to teacher (Kaplan 1990, p. 332). Data from the current study shows that some students perceived their mathematics teachers as very strict in class and not allowing any interaction. However, in few

cases where students reported that the teacher was overwhelmed by the indiscipline in class, the teacher had classroom management issues. There was a perceived experience of the inability of mathematics teacher to maintain discipline, and the class was vociferous. This is evidenced by the comments below.

> *LB2: For us, Mr Ajay (Fictitious name), all students were coming in class without any problem because he had a table for himself. Whenever we have completed homework or not, he would show to the parents when they come for the results. Then Mr Ajay went on leave, and we got a lady teacher. The lady teacher was unable to control the class—a lot of indiscipline every day. I did not understand what she was explaining. I accept, I was also messing around. But we were not able to concentrate. Then got Mr Ajay again. He also was explaining. Yes, but when we missed that, it was very difficult for us to re-adapt.*

This finding is in line with that of Belle (2018a) where discipline is a major problem in Mauritian secondary schools. Commenting on teachers' willingness and ability to maintain discipline in class, Belle (2018b) state that:

> The educators' lack of classroom management skills and of learner discipline management skills, feeling of disempowerment to use their authority over the learners, and their unwillingness to discipline learners are the attitudes that encourage learners to manifest a lack of discipline.
>
> (Belle, 2018b, 43)

Furthermore, according to Belle (ibid), in Mauritius, the unwillingness of teachers to collaborate with the heads of schools to maintain learner discipline are because of the lack of a school discipline plan and various laws like Rights of the Child, the Child Protection Act and the Ombudsperson for Children Act that protect the children.

Firstly, the data shows that not unable to maintain discipline in class has the adverse effect on the effective teaching of the subject in class. This is attested by the extract below.

> *LB1: When the teacher explains they are shouting at the back of the class, threw pieces of paper.*
>
> *R: The teacher does not say anything?*
>
> *LB1: He controls, but when he turns his back, they start again.*
>
> *BB1: The students talk a lot. The lady cannot teach. The classwork, which is*

supposed to be completed in five minutes, they take 20 minutes. So, a lot of time is wasted in class. The lady was unable to work. We could complete neither the book (syllabus) nor the revision.

What students do or display affects and transforms what teachers do and vice versa (Reeve, 2013). This reciprocal influence between student engagement or disengagement is termed agentic engagement by Reeve and Tseng (2011). And secondly, the finding suggests that the students who want to learn the subject are incapable of concentrating. This is evidenced by the comments below. But also, some students blamed the teacher's teaching.

BB1: Sometimes, I cannot concentrate because the environment is not conducive. At times, I do not understand when the lady teacher teaches.

The inability of the teachers to maintain discipline in class has detrimental effects on the teaching and learning process. The classroom climate is determined by the reciprocal effect of teacher factor and student factor. A disconnect can be experienced by the students when their pre-secondary perceptions and experience of the primary does not meet their experience in the secondary. Skinner and Belmont (1993) highlighted the reciprocity between teacher support and student engagement where the more students are engaged, the more they receive support from the teacher and *vice versa*. Thus, suggesting that the relationship between students' experience of support and engagement is bi-directional as explored by Council and Wellborn (1991). A similar finding was obtained in the Mauritian context by Allybokus (2015). She found that students already engaged influenced teachers' role in class. However, the above literature do not explain what happens when the students are not engaged.

MA1 criticised the teachers in the secondary for the poor performance in mathematics. He stated that in both primary and secondary schools, teachers want their students to pass, but the secondary school teachers do not do their best to support them to succeed.

MA1: In both schools (primary and secondary), they (teachers) want the students to pass, but they do not do their best for them (the students) to succeed.

The students are also not entirely dedicated to their studies, as indicated by the comment made below by participant MA1. According to this participant MA1, the students must also be blamed for poor performance in mathematics. They do not concentrate in class when the

teacher is teaching, and they are very noisy. MA1 further states that this type of behaviour is not seen in the primary.

> *MA1: The students also do not do their best. They do not follow the class when the teacher is teaching. They shout in the back (of the class). Theythrow bits of paper and all. This did not happen in the primary.*
>
> *Researcher: So, is your teacher unable to control the class?*
>
> *MA1: He controls. But when he turns around, they start again. Every time he turns around, they start again.*

Students defy the authority of the teacher in the class and do not engage in the subject. The data also shows that the only measure that the secondary school teachers possess as punishment is writing remarks in the copybooks. However, this is not a deterrent measure as the students do not fear the remarks.

> *MA1: No, it does not affect the students. They will get only a remark, that's all.*

Not concentrating in class and making noise in the presence of the teacher are behaviours that defy the authority of the teacher. Such behaviours are not present in the primary. In primary school, some teachers have recourse to corporal punishment even if it is illegal. This finding is in line with the finding for my MA thesis (Purdasseea, 2008), where the participants unanimously acknowledged the experience of corporal punishment during their primaryschool days. Nowadays, the incidence of corporal punishment has dropped. Nevertheless, some participants mentioned the teacher beat them during their time at primary school. One example is LB3.

> *LB3: Here, they do not beat. In the primary, we were beaten to make us understand. (The teacher) was beating, but it does not mean that we did not like him because we were with him 3-4 years.*

This finding resonates with Belle (2018b) where teachers and heads of schools are less backed by the Ministry of Education as there are no robust plan to counteract the issue of discipline.

> State secondary school principals in Mauritius are struggling to address the learner discipline problem successfully. They have limited authority since all decisions concerning school matters are taken by the Ministry of Education and Human Resources, Tertiary Education and Scientific Research and imposed on them to implement. This constitutes a major barrier for principals to manage learner discipline effectively.
>
> (Belle, 2018a, p. 43)

Another study carried in Mauritius by Ramharai et al. (2006) reported the rise of indiscipline in our secondary schools.

> We can conclude that indiscipline and violence are on the rise and have become real headaches for stakeholders. Some aspects of this issue (such as defiant, disobedience, disrespect, indifference to school, absenteeism, abuse in the use of mobile phones, lateness, use of foul language and aggressive attitudes) are gaining momentum with the connivance of the authorities who are unable to grapple with the situation and bring solutions.
>
> *(*Ramharai, Curpen, Mariaye & Ramful, 2006, p. 196)

Moreover, the students are well protected by law in place in the country that is why secondary school teachers refrain from using corporal punishment.

Comparing this situation to Schlechty (2002) levels of engagement, the classroom is like an off-task classroom where issues of classroom management, and retreatism and rebellion are easily observed. Students have diverted attention and do not commit themselves to the tasks/subjects at all. Another possible explanation could be the teachers' teaching practices. Ramharai et al. (2006) remind us that the pedagogy affects discipline in classroom and disciplinary outlooks in turn determine the nature of pedagogy used in the classrooms.

5.4 STUDENTS' PERCEIVED EXPERIENCE OF INADEQUATE ACADEMIC SUPPORT IN MATHEMATICS

This study reveals that students perceive inadequate teacher academic support in the learning of mathematics in the participating secondary schools, especially when students faced difficulties in completing their home assignments or when topics /concepts were not adequately understood. The findings suggest the emergence of two distinct situations. Firstly, students reported seeking but not receiving adequate levels of academic support from mathematics teachers. Secondly, students deal with this situation by adopting maladaptive coping strategies

like subsequently not seeking help from their mathematics teacher or copying homework to avoid remarks.

5.4.1 SEEKING BUT NOT RECEIVING ADEQUATE ACADEMIC SUPPORT FROM MATHEMATICS TEACHER.

Students emphasized the need for additional support to understand the concepts which were, inadequately explained by the classroom teacher. Students reported the unwillingness of their mathematics teachers to explain the topics again where they faced difficulties understanding and struggled with the home assignments. The comment of BB1 attests the above:

> *BB1: In primary school we were learning all subjects with the same teacher. He was teaching mathematics in detail. When we did not understand, he asked us to stay back during the break. But not in secondary. He* (the mathematics teacher) *explains each topic only once and not in much detail.*

The perceived lack of dedication of some mathematics teachers is evidenced by the following comments.

> *LA3: Explains only once and it is over. And he starts giving tasks to complete. When requested to re-explain, he says no.*

> *MB2: The teacher should have re-explained when we did not understand.*

Even if sending students on board would generally be taken as an opportunity for students to share their solutions to the whole class and develop metacognitive skills, it was, however, perceived as a bad practice by the respondents.

> *MG1: No, he does not correct our copybook. He sends students on board.*

> *MB2: During the correction of homework when we tell him that we did not understand, he says after so much explanation, you did not grasp anything?*

> *LA1: He (the teacher) asked a friend to help me. He asks our friends to help us. Even they do not know much.*

LC1, for example reported that he was learning more in primary school.

> *LC1: He says, start in class and complete at home. He gives remarks in the school journal if homework is not completed. I was learning more in primary.*

In addition, data suggest that corrected test scripts were returned with no feedback.

LB3: In primary it was not at all like this. After the teacher returned our scripts, he corrected all the questions on board. He showed us all our mistakes.

MA1: They (teachers) want the students to pass, but they do not do their best for them (the students) to succeed.

The perceived experience of diminished teacher academic support can be explained by the perception of negative teacher attitude by the students. Mathematics teachers were described as strict and inhibiting peer interaction and active participation in the classroom. As mentioned earlier, students may be behaviourally engaged but not cognitively engaged.

This finding is congruent with Klem and Cornell (2004), who underscore the importance of teacher support on student engagement. This view is also supported by other studies where there is an indirect effect of teacher emotional support on students' motivation and engagement (Cooper, 2013; Eccles & Wang, 2014; Ruzek et al., 2016). In the American context, Klem and Cornell (2004), found that students, in the American context, with lower levels of teacher support are 68% more likely to disengage from school. They also found an indirect link between students' perceived experience of support and academic performance through student disengagement. It means that student disengagement acts as a mediator between students' experience of low levels of teacher academic support and their academic performance. Furthermore, Linnenbrink and Pintrich (2003) highlight that negative classroom experiences in mathematics lower students' self-efficacy beliefs. Therefore, providing a socially supportive environment could be effective for preventing of stress and its negative influence on student engagement (Reschly & Christenson, 2012) especially in mathematics.

Also, Lee and Smith (1993) indicate that the simultaneous presence of teacher support and instructional approaches focusing on learning with high expectations have far more significant combined effects on student outcome than their effects acting separately. Skinner and Belmont (1993) highlighted the reciprocity between teacher support and student engagement where the more students are engaged, the more they receive support from the teacher and vice versa. Thus, suggesting that the relationship between students' experience ofsupport and engagement is bi-directional (Council & Wellborn, 1991).

In a study in the USA, Brenner, Boyle and Bakhtiari (2017), associated the significant decline in students' achievement across the transition to secondary school to disruption in supportive relationships. The above finding concerns students who experienced a significant decline in

mathematics achievement. Links can be made, in mathematics classrooms in Mauritius, between teacher support and the decline in achievement in mathematics. Most of the students do not take tuition in Grade 7, and same was the case for the participants in this study. Consequently, they rely on their classroom teacher for support. However, data show that, at times, they do not get the adequate support required for the students to understand the topics and alleviate their struggle with their homework. Seeking help is an adaptive coping strategy in face of difficulty (Baker, McNeil & Siryk (1985). However, following the lack of adequate teacher support, students seek help from individuals outside school.

5.4.2 THE PERCEIVED LACK OF PARENTAL SUPPORT

Due to the lack of adequate support from the classroom teacher and/or classmates, it was evident from the study that many participants sought help from individuals outside the classroom. Students approached parents and peers for academic support needed to advance their mathematical understanding after seeking but not receiving adequate levels of support from teachers. Students assumed that help from parents and peers would fully compensate for the lack of teacher support, however, the academic support offered by parents and peers was at best partial and was, overall, insufficient to advance their mathematical learning. The incompetence of the parents to help students in their secondary mathematics homework was due to the parents' low educational level. This finding is related to the direct effect model conceptualized by Grolnick and Slowiaczek (1994) where the direct teaching of content by parents affects students' schooling.

> *LB2: In Grade 6 my parents were helping me. But now it is a bit difficult. They do not know themselves.*
>
> . *BB1: No, they do not help, sometimes they encounter problems themselves. Then I look for solutions in the books.*
>
> *BC2: My parents do not help. CPE yes because should get a good school. But in Grade 7 no.*
>
> *MA1: Nobody helps me at home. My mother studied up to grade 6, my father Form 3. I must manage by myself.*
>
> *MC1: Suppose I am sitting and watching television, he asks me whether I complete my homework. If I say no, he asks me to go and complete my*

homework…each time he says go and do your homework go and do your homework. No one helps me do my homework.

The decrease in parental involvement adds to students' frustration. The teaching and learning process are thought to be restricted to school only. The students blame their teachers for the lack of understanding, for not completing their homework and for their low performance.

LB3: Previously, in Grade 6, my parents were helping me. It (mathematics) became a bit difficult. They do not know.

MC1: Suppose I am sitting and watching television, he asks me whether I complete my homework. If I say no, he asks me to go and complete my homework…each time he says go and do your homework go and do your homework. No one helps me do my homework.

Other participants in similar situations wanted to get support after school hours. However, as LB1 mentioned, it is not always possible to find a mathematics teacher for Grade 7, in his locality.

LB1: There is no one in my village to give tuition.

MA1: My mother studied up to Grade 6. My father, Grade 9. I must manage by myself.

While comparing the relationship between the different types of support provided by parents, peers, and teachers, Wentzel (2016) found that teachers were the most important source of instrumental support (providing time and skills) and informational (providing guidance and advice to solve problems) support (Tardy, 1985) as compared to parents and peers. In the same line, for Malecki and Demaray (2003), the most important type of support that teachers can provide is informational support. High level of family support could have a compensatoryeffect for the poor teacher-student relationship. However, where both teacher-student relationship and family academic and emotional support are inadequate, students are at a risk of disengaging.

5.4.3. THE CONSEQUENCES OF PERCEIVED EXPERIENCE OF INADEQUATE ACADEMIC SUPPORT

Moreover, the data shows that where the homework was incomplete, the learning difficulties remained unaddressed. Also, a reduction in teacher engagement, over time, was reported by

participants, for example, the mathematics teacher stopped checking the copybooks of students for homework and in some cases the teacher did not re-explain the topics in which students encountered difficulties. In cases where the teacher did checked copybooks for homework, some participants declared that by fear of remarks in their 'school journal', they copied the homework from their friends' copybooks though, they mentioned that this practicewas rare.

> *MG1 and MG2: A few times when we do not know, we ask the copybook of friends.*
>
> *MG2: No. Not too often…. Not to get remarks.*
>
> *LB2: If I feel a bit lazy, I leave blanks. Tomorrow morning, I will ask the copy book of someone. But if my mood is good, I ask my cousin I ask him to help me on Skype.*

The findings reveal that students are superficially engaged in mathematics. They attempt to solve mathematics problems, but give up when experiencing difficulties (Ingram, 2013). As seen earlier, participants were found to have low levels of self-efficacy in mathematics. Linnenbrink and Pintrich (2003) state that low levels of self-efficacy led to feeling of helplessness and early admittance of defeat. It was interesting to note that one participant, LB3, used a 'Google App' called 'Photo Math' to scan his homework and find the solution on the net to avoid remarks from the classroom teacher. In the local context, this applicationis very famous among students.

> *LB3: I do not feel like following the class well. See in Play store there is an app called 'Photomath'. Put the camera on the problem, it scans it and showsyou the solution. I myself did not know it existed. I found it on the net. Then I downloaded the app…. I do not used the app to understand the solution. Just not to get remarks.*

The findings suggest that some students adopt cheating as a maladaptive coping strategy for the lack of adequate support. In an informal conversation with secondary school teachers, they mentioned that many students in Mauritian secondary schools, use 'Photo Math' application to solve mathematics problems. The teacher's strategy to control the classroom byrepressive measures proved to have a detrimental effect as the students had recourse to cheating by copying homework or using software which enables them to find the solution of

problems on the net. However, in these cases, the problem of not understanding the topics remained unsolved which can impact on their further learning of mathematics. Skinner & Pitzer (2012) mention that students' adoption of maladaptive strategies hinder the building of academic buoyancy or everyday resilience (Marti & Marsh, 2009). Academic resilience is defined as the ability to successfully deal with setbacks and challenges (Martin & Marsh, 2009, p. 72). It was challenging to use coping and academic buoyancy with the framework adopted in this study.

Furthermore, where homework was left incomplete or students were unable to understand certain concepts, the findings suggest that the teacher scolded them. In a study, Myers et al. (2007) investigated the link between undergraduate students' perception of their instructors' aggressive communication and their involvement in and out of the classroom. The results indicate that instructors' verbal aggressiveness negatively impacted on students' participation in classroom. The findings of the current study align to the above study. Therefore, in the context of this study, it can be assumed that the adverse effect of teachers' interaction can have a more significant impact on young adolescents. Furthermore, in cases of difficulty, neither the classroom setting, nor the teacher allowed students to interact with peers. It is found that some students remained silent and did not seek support from the classroom teachereven if they did not understand a concept or when the homework was left incomplete. Not seeking support from the classroom teacher became problematic as the data shows that wherethere were incomplete tasks, the mathematics learning difficulties remained unaddressed.

> *LA2: Wanted to shirk maths classes but never did it.*
>
> *MG2: When the maths teacher is in class I wait when it (the class) will be over. …I do not want to enter his classroom. Not because of my results but because it is difficult.*
>
> *LB3: For maths, it takes a bit time to do the calculations. We do not have only one teacher's homework. If we concentrate on maths then the other subject, we will not be able to cope.*

Moos and Ringdal (2012) highlighted the importance teacher's support of metacognitive monitoring which can lead to students developing self-regulated learning. Delfino, Dettori, and Persico (2010) argue that competencies with the process of learning, such as students' ability to self-regulate their learning, should be a central, explicit aim within education. Despite that

some students experience a lack of support; they persevere with their homework but leave the tasks undone after struggling for some time.

> *LB4: I try and see. Then I leave the problem.*
>
> *BC2: Sometimes I persevere but if it is too complicated, I leave it. I am not anxious. Either I do it or leave it blank.*
>
> *BC1; I keep on trying. If I cannot, I leave it. I take my copybook, I revise. I copy all the questions and do it. Then I open the copybook to check whether they are correct or not.*
>
> *MA1: I give a lot of efforts but a few times when I see I am not successful, I leave it.*
>
> *BA4: I did not have any friends. I leave in the north and all my friends got a school in the north itself. Only I shifted and came here. It was really very difficult to make friends.*

From the students' perspective, the rate of completion of homework is significantly reduced due to the lack of academic support both at school and outside school. This view is, however, not shared by their teachers. In workshops organized by MIE, teachers complain about the changing attitudes of our students in schools. For them, it is becoming increasingly difficult to make students concentrate in classrooms and do homework. One example was BA3, who persevered with her mathematics homework trying to solve the problems. However, in cases where the participants were unsuccessful, the tasks were left undone. Giving up in the face of challenge might be the consequence of a lack of metacognitive skills to bounce back and re-engage in the task. Linnenbrink and Pintrich (2003, p. 130) state that "*students who doubt their capabilities are much less likely to be cognitively engaged and use less adaptive strategies for learning*".

The data also indicates that certain students facing difficulties were left without support to complete their homework. Interestingly, it is found that some students motivated to learn mathematics and persevered with their homework trying to complete by themselves until they realised that their efforts were ineffective. They soon gave up and the tasks were left incomplete. According to Martin & Marsh (2009), students' everyday resilience and academic buoyancy can help them bounce back from the setbacks and failures (as experienced by participants in this study). Academic buoyancy is "*students' ability to*

'bounce back' when they face minor and major academic adversity" (Martin & Marsh, 2009, p. 354) like failure and challenging mathematics tasks.

In this regard, Skinner and Pitzer (2012) argue that coping strategies like help seeking or giving up can help or hinder in building of everyday resilience and academic buoyancy (p. 31). However, it is found that due to the experience of inadequate academic support during the primary-secondary school transition, students adopt maladaptive coping strategies like giving up the challenging tasks and copy homework. These strategies can impede the building of academic buoyancy. This study is conceptualisedin a rich multicultural context with diverse types of school and student profiles. The type of students selected and the context in which the study is carried out, the lack of academic buoyancy can be said to mediate the influence of inadequate academic support on student mathematics disengagement.

SUMMARY

It seems that not obtaining adequate support reduced students' self-efficacy in mathematics. The very limited academic guidance offered by parents and peers, coupled with students' reluctance to revert to teachers for support following previous failed attempts to secure help from teachers, meant that the difficulties students faced when trying to advance their mathematical learning remained unaddressed. The outcome of this was that students were not able to understand new mathematical concepts being introduced to them which resulted in students lacking confidence in their mathematical ability, not knowing how, or where, to obtain the support needed to help them progress, leading to disengaging with the subject. Moreover, cases of cheating by either copying homework from friends' copybooks or using the "Photo Math App" were reported where teachers checked copy books for incomplete homework. Some classrooms were silent where no interactions were possible between students. It is found that the interaction of both school and student factors interact together to influence student engagement. The findings are conformed with Kahu & Nelson framework where the influence of this interaction is mediated by four psychosocial factors namely emotions, self-efficacy, belonging and wellbeing.

Chapter 6: Conclusion

6.0 INTRODUCTION

Since mathematics is a gatekeeper to many high paying jobs, mathematics is highly valued worldwide (Anderson, Valero & Meaney, 2015). However, negative feelings are common in mathematics (Martinez-Sierra & Gonzalez, 2016). Student engagement in mathematics lessons and tasks is more than ever essential, especially for secondary students, where teachers have complained continuously about their lower levels of engagement. The purpose of this study was to investigate, from the participants' perspectives, to understand the mechanism(s) through which their experience of primary-secondary school transition influence their engagement in mathematics lessons and tasks.

This goal fits the philosophy and strategy of the interpretive research paradigm. Epistemology of a socio-constructionism where the importance of context is key. To access the meaning of participants' experiences, findings emerge through the interactions between the research and the participants as the research progress (Creswell, 1998). The phenomenon is contextually bound. As Kahu and Nelson (2018) point out, individuals experience their education in an educational interface which is dynamic and results from the complex interaction between institutional and student (structural and psychosocial) factors. This interaction influences student mathematics engagement mediated by four intertwined psychosocial pathways.

Prior research shows that the primary-secondary transition affects students' achievement. Moreover, research also shows that there is a reciprocal effect between students' engagement (in this case, mathematics) and students' achievements (Reschley & Christenson, 2012). It means that students' engagement influence student outcome, but at the same time, it is a consequence of mathematics achievement. The literature also suggests that there is an effect of transition on student engagement in mathematics. Therefore, student mathematics engagement can be thought of as a mediator between students' experience of transition and student outcome.

The following research questions were formulated to guide this study.

RQ1: How do first-year students perceive and experience transition from primary to secondary school?

RQ2: How does students' perceived experience of the primary-secondary transition influence their engagement in mathematics?

In this chapter, a summary of the key findings, and the implications for practice and policy are highlighted. I also present the limitations of this study, together with a reflection of my EdD journey.

6.1 KEY FINDINGS

RQ1: How do first-year students perceive and experience transition from primary to secondary school?

- A pre-transition phase was found to exist where students construct perceptions and expectations about secondary schooling. This period coincides with Risques et al. (2008) 'honeymoon phase' with the feelings of excitement and happiness on joining the next stage. Parents, peers, and primary school teachers were found to play a key role in shaping the participants' perceptions of secondary schooling (Grolnick & Slowiack, 1994) and of mathematics taught in secondary school. While there is an effort from these individuals to prepare the students for the transition to the next stage, they might create a wrong and distorted image of secondary schools in students.
- Students about to move to secondary school are quite diverse in their feelings about the allocation of school. Some had positive feelings, felt proud and had a sense of achievement due to the allocation of elite and highly regarded secondary school. These feelings are necessary to build a sense of competence (Cornelle & Wellborn, 1991; Strahan, 2008) and school belonging (Korpershoek et al., 2019).
- Whereas others felt disappointed, unsatisfied, and frustrated with the allocation of school (Erichsen & Bolliger, 2010; Kim et al., 2017) and wished to move to a perceived better elite school indicating that there is a further categorisation of these types of schools in the community. Diverse reasons were put forward to explain their dissatisfaction.
- The participants found the pre-transition phase was a period of uncertainty and expressed concerns about secondary schooling. These concerns are categorised in three distinct groups, namely, academic, social and organisational (Akos & Galassi, 2004).

Further concerns about the workload in mathematics (Smith et al., 2019; Smith et al., 2008; West, Sweeting & Young, 2010) were also expressed.

- Data revealed that once at the secondary school, participants experienced a different situation, and their perceived experience of the new environment did not match their expectations. The limited overlap between the students' pre-secondary perceptions and their experience of transition results in a disconnect resulting in a culture shock (academic, social, and emotional) (Risquez et al., 2008).
- Some students wanted a continuity in the teaching practices particularly in mathematics where they wished their primary school teachers to continue teaching in Grade 7. They presumed that this would act as a pedagogical bridge (Bore & Fuller, 2007) to help in their adjustment to the new school.

RQ2: How does students' perceived experience of the primary-secondary transition influence their engagement in mathematics?

- Findings suggest that students perceived disparity in the teaching methods between primary and secondary school mathematics. The pedagogical gap (Bore & Fuller, 2007) experienced by the students during the primary-secondary transition influenced their understanding of mathematics which in turn impacted on their engagement in thesubject (Attard, 2010).
- Contrary to primary school, students reported experiencing instrumental approach to teaching of secondary school mathematics. Students were found to miss the 'hands on' and 'minds on' activities (Linnenbrink & Pintrich, 2003). Furthermore, a reduction in teaching time was experienced due to the specificity of the secondary school curriculum. Teachers were perceived to rush to complete the syllabus which led to students experiencing difficulties in understanding some topics in mathematics especially algebraic expressions, integers, sets, and equations. These students experienced a difficult transition from arithmetic (primary school mathematics) and algebra (Maudy et al., 2018). Self-efficacy and sense of belonging was found to mediate their cognitive engagement (Guedet et al., 2016).
- Nearly all the participants interviewed perceived the new mathematics topics introduced in the secondary school, like negative numbers, sets, algebraic expressions, inequalities, and equations as difficult and challenging, and struggled to understand.

Findings suggest that students experience a difficult transition from arithmetic to algebra (Maudy, Didi, & Endang, 2018).

- Where topics already covered in the primary were re-explained in secondary school, students found the lessons boring and uninteresting and disengaged cognitively from the class due to a perceived mastery of the topics (Schagen & Kerr, 1999).
- Students found the relationship with their primary school teachers stronger as compared to the secondary school teachers including that of mathematics (Reschly & Christenson, 2012). The significant amount of time spent with a single primary school teacher, increases the chance of building a positive teacher-student relationship (Baker, 1999) contrary to the secondary school teacher where the contact time is significantly lower.
- Some students perceive their primary school teacher as protective, supportive, caring and motivating as opposed to the lack of positive attitudes and behaviours of secondary school mathematics teachers towards the students (Marshall & Hargreaves, 2008). These teachers were perceived as strict and coercive.
- Mathematics teachers were described as strict and inhibiting peer interaction and active participation in the classroom. The preferred teacher-centered approach tomathematics teaching and stressing on a silent class, rendered students to be passive and hindered their cognitive engagement. The negative classroom experience was found to impact on students' self-efficacy in mathematics.
- The finding suggest a perceived experience of inadequate teacher academic support. Participants sought help from individuals outside the classroom. Students approached parents and peers for academic support needed to advance their mathematical understanding after seeking but not receiving adequate levels of support from teachers. Students assumed that help from parents and peers would fully compensate for the lack of teacher support, however, the academic support offered by parents and peers was at best partial and was, overall, insufficient to advance their mathematical learning. The incompetence of the parents to help students in their secondary mathematics homework was due to the parents' low educational level.
- Diminished parental involvement frustrated students and learning mathematics was restricted to school only. Teachers are held responsible by students for their lack of understanding in certain topics, incompletion of homework and low performance.

- Although participants entered secondary school with the view that mathematics would either be same or more accessible than it was in primary school, the findings suggest that after starting secondary schooling, many participants found it to be "difficult'. Participants declared that they were more confident to pass mathematics in primary school than in secondary school. The negative classroom experience lowered their self-efficacy in mathematics.
- Due to lack of academic support, students adopted maladaptive coping strategies like giving up and copying home assignments when faced with difficulties in completing challenging tasks.

6.2 MY CONTRIBUTION TO KNOWLEDGE

1. Many studies focused on slow learners or traditional students. This study centered on a particular group of students who excelled in the end of primary school examination in all subjects including mathematics (obtaining A or A+) but experienced a significant decline in their performance in mathematics as they progressed to secondary school. While the same situations are experienced by all other students, it was essential to investigate the factors that stand out for this profile of students in a multicultural island state.

   It is found that these students have high self-concept and high expectations about their secondary schooling. The findings suggest that these students were unanimously disappointed and frustrated about their school allocation which indicates that they started secondary school with low school belonging. The latter is found to be a key factor in mediating their (dis)engagement in mathematics.
2. Kahu and Nelson's (2018) conceptual framework was used to understand the phenomenon of significant decline in mathematics test scores of those students selected in this study. They posit that student engagement (including student mathematics engagement) can be facilitated by the interaction between institutional and student structural and psychosocial factors through for intertwined mediators.

   This current study revealed that negative classroom experiences like weak teacher student relationship, instructional practices, and discontinuities in the curriculum, resulted in a culture shock and lowered their self-efficacy. Consequently, students

adopted adaptive coping strategy like support seeking and reverted back to their teachers and parents. Following the experience of inadequate academic support, students adopted maladaptive strategies like avoidance (not seeking help overtime) and giving up in face of challenging tasks. These strategies either help or hinder the building of academic buoyancy (responsible for students to bounce back and re- engage with their studies).

However, during analysis and interpretation of data, the linearity of the conceptual model was found to be limiting factor to map the findings from this study. Despite that it was neither my intension nor the scope of this study to extend this model, however, the model was restraining when students experienced setbacks and used coping strategies, adaptive and maladaptive, to help or hinder the building of academic buoyancy or everyday resilience. The latter eventually leads to emotional and cognitive engagement or disengagement. It is established that engagement and disengagement are two different subscales. While Kahu & Nelson's model helps better understand students' engagement.

It has been challenging to fit the two constructs of coping and academic buoyancy within a linear conceptual model of student engagement. A cyclic model that would fit the type of data that emerged from this current study would help better understand students' disengagement and re-engagement.

6.3 IMPLICATIONS FOR PRACTICE AND POLICY

Stakeholders (teachers, heads of schools and the ministry) should be made aware of the continuity/discontinuity paradox that exists while students are starting their secondary education. Despite that mathematics curriculum designers at the Mauritius Institute of Education (MIE) are aware of maintaining continuity in the curriculum, this idea seems to backfire in the case of these students who worked well at the end of primary school examination. It is thus recommended that

- Students have experienced great learning losses due to the Covid-19 pandemic. Both students and teachers have been compelled to online teaching and learning without

proper capacity building of teachers. Teachers could be educated, through workshops, how to engage students in mathematics during online teaching.

- Since the findings from the current study indicate that some students perceive mathematics teacher as strict and less supportive, the MIE could conduct regular workshops with teachers teaching mathematics to Grade 7 students to facilitate their adjustment in class as they move from primary school.
- Design a programme to prepare students for the transition to secondary School. Information could be provided about the academic, social, and organisational factors to students. These could be talks organised in Grades 5 and 6.
- Summer programmes must be designed and implemented to students who remain idle after the PSAC examinations for more than two months. Thus, preparing the students for academic life in secondary. For ease of implementation, these could be e-learning programmes or aired on national television.
- Deloading of Grade 7 mathematics syllabus to give more space for conceptual understanding of the new topics.
- New teaching strategies must be devised and implemented for the teaching of topics that are abstract in nature like algebra, sets, solving equations and integers.
- Changes in the teaching practice between the two stages led to a discontinuity in the pedagogy used at both levels. In order to curb the effects of bullying, there is a need for an induction programme at the start of Grade 7. The school should involve the school prefects (older students). This will help to provide a safe and supportive environment for the newcomers. Social activities could be organised for a more extended period of time involving old and new students.
- Administrative bridge - files, including their progress files and health cards, should move from primary to secondary school.

6.4 SUGGESTED AREAS FOR FURTHER RESEARCH WORK

The Kahu & Nelson (2018) conceptual framework was found to be limiting to include construct like coping and academic buoyancy and resilience. Further, research focusing on thepossibility of integrating academic buoyancy and resilience as mediating factors should be explored.

This study focused on giving voice to students to get an insight into their perspectives of students' engagement in mathematics after transiting to the secondary school. The findings

revealed that teacher characteristics constitute a significant factor influencing students' engagement. Therefore, future research could involve a larger sample size including both teachers and students and extending the study to other regions of Mauritius.

Due to the Covid-19 pandemic, staggered and online classes have forced students into a new normal worldwide. Students are said to experience great learning losses. How students experienced this transition, and they are coping with the situation and its influence on the engagement (particularly in mathematics) is a new direction ofresearch that could be explored. This research would give insight into the factors that help or hinder students' resilience into this new normal.

6.5 LIMITATIONS OF THE STUDY

1. Only individual and group interviews were used as a method of data collection. Alternative methods of data collection could have been used. Despite that, Lewis and Porter (2004) mention that alternative methods may not be enough to make all participants' experiences meaningful, the need of individual participants' needs must be assessed and addressed.
2. This phenomenological study was conducted from the students' perspective focusing on their perceived lived experience. Other perspectives could be sought.
3. The system of pseudonyms could be made easier.

6.6 CONCLUDING NOTE: A REFLECTION ON MY RESEARCH JOURNEY

My research journey has been a journey of personal growth. It has been a change not only in my knowledge and understanding of how to do research but a continuous churning of myself as a researcher. Being a former mathematics teacher and presently a teacher educator, I started this journey with many preconceptions about research, mathematics teaching in schools and myself. Undertaking this research has enabled me to learn the complexity of doing qualitative research.

I started my journey with a naive interest in the topic primary secondary school transition. Overtime, I constructed new knowledge. My experience of research in assignment 3 triggered joy and satisfaction while interacting with new people and unpacking their perceived experiences of a phenomenon. While the metaphor of a journey depicts the linearity of movement from one point to another, mine has been with various twists and turns similar to the chaos in the milk pot during the churning process. In this context chaos does not necessarily mean disorder. Before the journey could begin, certain decisions needed to be taken for example the title. My interest in both school transition ad student mathematics engagement has brought me to integrate both in a single study. The initial task was quite daunting. I had the impression traveling through a dense forest where there is no clear cut path. But continuous support from my supervisors helped correct and give direction to my dissertation.

The greatest difficulty I encountered was to position myself ontologically and epistemologically. I experienced tension between research in social sciences and my background from science, pure mathematics, and biology. However, overtime and engaging with the literature, I finally found my way through the dense forest. This metaphor of a traveller through the dense forest depicts well my journey through EdD. Getting lost, sometimes, I was frustrated, tired, and wanted to rest but the supervisors were there to urge me to continue and sustain my motivation.

While engaging with the transcripts, analyzing the data, and adopting a hermeneutic circle as a strategy and I can use the metaphor of climbing a hill or a tree to have a holistic view and making sense of the situation, and looking for my way through the dense forest. Two turning points impacted on my journey. Firstly, change in supervisor when nearing submission of the phases was challenging and stressful. And secondly, the Viva acted as an eye opener which made me realize that the transformation process from milk to butter was not complete and my destination was near, but I was not there yet.

With the completion of this thesis, while acknowledging my growth as a researcher, I also remember the words of a wise man who told me when I was a child "*a litchi branch always bends down when it bears a lot of litchis. Always be humble*." When I look back to when I started this journey, it seems long and difficult but a rich experience and memories to cherish.

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APPENDIX 1

PARENTAL CONSENT FORM FOR PARTICIPATION IN A DOCTORAL RESEARCH STUDY

Dear parent,

I, **Sooryadev Purdasseea**, Lecturer in the Mathematics Education Department at the Mauritius Institute of Education (MIE), am carrying out are search in relation to my Professional Doctorate in Education (EdD) at the University of Brighton. The aim of my research is to seek clarity about why students are disengaging in mathematics in secondary school even after performing well at the end of primary school examinations.

I would be grateful if you could grant me the permission to carry out interview session(s) with your child

……..… of …..……as part of the work. The interview(s)will be conducted during break/recess for [redacted] the rector/the Ministry has already given the permission. In so doing, the normal activities of your child at school will not be disrupted.

The interview would normally be of 30 -45 minutes of duration and will be audio recorded and would consist of topics/issues such as student engagement in Mathematics, learning of Mathematics, time spent doing mathematical tasks, motivation to learn mathematics and so on. The findings from the interview(s) will be beneficial to the school in addressing the difficulties in learning mathematics.

I would like to reassure you that your child's name and other personally identifiable information will not be referred in the thesis or any publications. The responses will be kept confidential, and anonymity of your child will be ensured. Any audio recordings will be destroyed once they are typed up, it will not be possible to identify participants from interview notes or transcripts, and that all data will be stored on a password protectedcomputer. All records of the interviews will be destroyed three years after the end of the study. The participation of your child is voluntary. S/he has the right not to participate at allor leave the study at any time. Deciding not to participate will not harm his/her relationship with the teacher and school.

I thank you for your collaboration and hope to obtain a positive response.

CONTACTS FOR QUESTIONS OR PROBLEMS?

Contact me at 57775263 or 4183432 if you have any queries concerning the research.

If in case you want to raise certain issues about the research to a person other than me then you can contact my local supervisor Dr Hemant Bessoondyal, Mobile 5 792 9911.

……

- [√] Tick as appropriate

1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason. ☐
3. I agree to take part in the above study. ☐
4. I agree to the interview being audio recorded. ☐
5. I agree to the use of anonymized quotes in publications. ☐
6. I agree for the interview(s) to be carried out at school ☐ OR at the place of the student (in the presence of the parent / carer/responsible adult ☐

Signature:_____ Date: _____

APPENDIX 2

Letter for Access to School

24 June 2016

Through

The Director

Mauritius Institute of Education

Reduit

Mr Despois,

Ministry of Education and HR, Tertiary Education and Scientific Research

MITD House

Phoenix

Dear Sir,

Access to secondary schools for Doctoral research

I am Sooryadev Purdasseea, Lecturer at Mauritius Institute of Education (MIE) at Reduit. I am currently doing my professional Doctorate in Education at the University of Brighton, UK. My supervisors are Prof Carol Robinson, Prof David Stephens both from University of Brighton and Dr Hemant Bessoondyal from MIE. The title of my research is '**Shift in students' engagement in Mathematics after transition from primary to secondary school: a case study**'.

As you are aware that disengagement is a major issue in our schools. By this study, I seek to get deep insight on the reasons behind the shift in engagement in mathematics in secondary schools and inform policy makers about ways to smoothen transition from primary to secondary and help teachers engage students in classroom and increase academic achievement.

I would be grateful if you could grant me a letter of consent for access to the following secondary schools:

1.
2.
3.
4.

for implementing questionnaire and interviewing mathematics teachers and Form I and Form II students who worked well in mathematics at CPE level but who are actually struggling or not engaged in mathematics.

My research will not in any way disrupt the teaching and learning at the school. Informed consent from parents will be obtained before interviewing students of Form I and Form II. All ethical

considerations like informed consent, anonymity of participants and confidentiality of responses will be ensured.

I thank you in anticipation.

Yours faithfully,

Sooryadev Purdasseea

Ed D Student

University of Brighton

APPENDIX 3

List of Questions

Questions	Rationale
What was your feeling when you came to know that you were allocated this school?	Their perception of their new school before joining
Now how you view this school?	Whether their perception has changed
What were your feelings about mathematics before joining secondary school?	Students' perception of mathematics before joining
How you spent your time during the two and a half months holidays? Were you studying mathematics?	Summer dip: to find whether the two and a half months is a period of rest for the students
What can you say about your adaptation to this school?	Their perceived experience of transition
Describe one mathematics lesson in secondary. How was it in the primary? How did you find the lesson? the mathematics teacher used any teaching aids to teach mathematical concepts?	Their experience of mathematics
Do you encounter difficulties in mathematics? Can you name a few topics?	Emotional engagement in mathematics
Do you like mathematics? What do you see as the difference between primary and secondary maths? What you like or dislike about primary mathematics? And secondary maths?	Emotional engagement in mathematics
Why do you think your test results are poor in mathematics?	How they perceive their decline in performance
How much time you spend doing mathematics homework? How has this varied from the primary?	Behavioural engagement in mathematics
Do you understand the explanations of your mathematics teacher? Are the explanations clear?	Their cognitive engagement in the subject.
How is your relationship with senior students at school?	School culture. Whether they arevictims of bullying. School belongingness and wellbeing
Can your mathematics teacher manage your class?	Classroom environment and students' emotional engagement

How is your relationship with him/her?	Teacher-student relationship
Do you miss your friends from primary? Do you have a friend in Form I with whom you share your secrets?	Making friends. Whether they suffer from socio-emotional shock during transition
Does it happen that you do not follow the class? Why? And When?	Disengagement in class
What are the subject that you study in grade 7? How you find them?	Workload in secondary
Does your teacher start a topic right from the beginning? How do you think he should have continued his explanation from where you stopped in the primary? Does he bring any teaching aids in class?	Instructional approach used by mathematics teacher
Do you find the classwork and homework in mathematics? Do you think that what you have learned in primary is being used in the secondary? Do you persevere with a task even if it is challenging? What you do when you have difficulty solving a problem?	Emotional engagement
How do you find your mathematics teacher? Do you ask questions when you do not understand a particular topic?	Relationship with teacher
Does your teacher motivate you to learn mathematics? Do you do all your homework? Why?	Perceived attitude, behaviour of teacher towards students
What sort of relationship do you have with your Maths teacher?	Teacher-student relationship
Do you do all your homework, or you select the ones that suit you?	Engagement in mathematics tasks
Does anyone outside of school support you with Maths? How do they support you? In what ways do you find this helpful? Are there any ways in which you feel people don't support you? How? Why does this make you feel unsupported?'	Support at home

Fredericks et al., 2004	Walberg's Model of school productivity (1980)							
	Environmental Characteristics				Student Characteristics			
	Quantity of instruction	Quality of instruction	Home environment	Mass Media	Ability	Motivation	Class/social environment	Peers
Behavioral Engagement	How much time you spend doing mathematics homework? How this has varied from the primary?		Does anyone outside of school support you with Maths? How do they support you? In what ways do you find this helpful? Are there any ways in which you feel people don't support you? How? Why does this make you feel unsupported?'	Are in Facebook? How much time spend on internet per day?		Do you do all your homework, or you select the ones that suit you? Would you take initiatives if given the opportunity?	What sort of working relationship do you have with your Maths teacher? Would you say this isthe same for most of your peers?'	'Can you tell me about how you felt when you first started this school – how did you find the lessons? How did you find making new friends?'
Emotional Engagement					Do you like mathematics? What do you see as the difference between primary and secondary maths? what you like or dislike about primary and secondary maths and why, and	How do you find mathematics? And your teacher? Do you feel you can do mathematics well? Why? Are you involved in extracurricular activities? Are you anxious with mathemati	Do you like your school? Your mathematics teacher? Why? How is he different from your primary school teacher? Do you like the school? Why?	Do you miss your friends from CPE? Do you have a friend in Form I with whom you share your secrets?

					what students see as supporting their learning in primary and secondary school and why/how their learning was supported.	cs? Are you anxious while doing mathematics? If I ask you to rate your interest in mathematics, how you would rate yourself?		
Cognitive Engagement	Does it happen that you do not follow the class? Why? And When?	Do you understand the explanations of your mathematics teacher? Are the explanations clear?	Does your teacher start a topic right from the beginning? How do you think he should have continued his explanation from where you stopped in the primary?		Do you find the classwork and homework in mathematics challenging or are they too easy to complete? Do you think that what you have learned in primary is being used in the secondary? Do you persevere with a task even if it is challenging? Why this is so? Do you try really hard to complete the tasks	Does your teacher motivate you to learn mathematics? Do you do all your homework? Why?	How do you find your mathematics teacher? Do you ask questions when you do not understand a particular topic?	

					or give up easily?			

APPENDIX 4

Student Information sheet/ Consent form

Dear Student

I, **Sooryadev Purdasseea**, Lecturer in the Mathematics Education Department at the Mauritius Institute of Education (MIE), am carrying out research in relation to my Professional Doctorate in Education (EdD) at the University of Brighton. The aim of my research is to seek clarity about why students are disengaging in mathematics in secondary school even after performing well at the end of primary school examinations.

I would be grateful if you could participate in interview session(s) which is part of the work. The interview(s) will be conducted during break/recess for which the rector/the Ministry/MGI has already given the permission. In so doing, your normal activities at school will not be disrupted.

The interview would normally be of 30-45 minutes of duration and will be audio recorded and would consist of topics/issues such as student engagement in Mathematics, learning of Mathematics, time spent doing mathematical tasks, motivation to learn mathematics and so on. The findings from the interview(s) will be beneficial to the school in addressing the difficulties in learning mathematics.

I would like to reassure you that your name and other personal details will not be referred in the thesis or any publications. Your responses will be kept confidential (even your class teacher will not have access to it). Your identity will be kept secret. Any audio recordings will be destroyed once they are typed up. It will not be possible to identify you frominterview notes or transcripts. All information you provide will be stored on a password protected computer. All records of the interviews will be destroyed three years after the endof the study. Your participation is voluntary. S/he has the right not to participate at all orleave the study at any time without any consequences. If you choose not to participate, it will not affect your relationship with the teacher or school.

I thank you for your collaboration and hope to obtain a positive response.

I, ...agree to participate in the interview.

Date: …….