CHAPTER 7

OTHER ELEMENTS IN THE ZOOM: THE SCHOOL SETTING
AND LESSONS AT SETTLERS

Learners’ perspectives in Umhlanga were teased out within a context of (i) all the lessons observed (ii) the treatment of the everyday by learners and the teacher and (iii) the views espoused by learners about the value of the everyday during the interviews. This chapter parallels Chapter 4 in that it introduces Settlers and discusses the context within which lessons at this school took place. As was the case in Chapter 4, this chapter is mainly descriptive and lengthy. It is however, necessary to outline the wider context in which observations for this study were made.

I use Bernstein’s constructs of classification to
1. Distinguish between lessons which incorporate the everyday and those which did not.
2. Describe the extent to which the contents of each lesson were insulated from each other.

From this discussion, it will be possible to observe the type of the everyday or the everydayness of the context summoned in Settlers’ lessons and therefore address key question 1.

As in Chapter 4, Bernstein’s theory of classification will guide my movement from ‘all the lessons’ observed in Settlers to lessons which incorporated the everyday. I will thus distinguish between weakly classified lessons, which draw in the everyday and strongly classified lessons, which bracket off non-mathematical everyday.

Within each lesson, I will explore the teacher-learners balance with regard to a say over various aspects of the lesson, including the correctness of a response. I will still use Bernstenian concept of framing, which addresses the pedagogic discourse in the classroom. As pointed out earlier, Bernstein recognizes the dominance of the regulative discourse over instructional discourse, a point he communicates with his formulation ID/RD. Using a classroom as a context, ID/RD implies that learning is not only
influenced or determined by content, or instructional discourse; it is also influenced by the classroom context in which instruction takes place, or the regulative discourse. For this study though, whether and to what extent the classroom context will influence the learners’ perspectives on the everyday is a matter for exploration. What is certain though, is that aspects of the classroom context constitute other elements of the zoom. In other words, they have an indirect bearing on the classroom events.

The discussion in this chapter will be argued along the following main themes:
1. Description of the school, which will outline the physical and social setting within which the school operates and
2. Description of the lessons observed; in order to locate and explore lessons which incorporate the everyday.

### 7.1 DESCRIPTION OF SETTLERS SECONDARY

*Location and infrastructure:* The school is located in a predominantly white suburb called Kloof, about fifteen kilometers west of the major city, Durban, in the province of Kwazulu-Natal. Like Umhlanga, Settlers is an electrified, double-storey building whose infrastructure is modern and well maintained. Unlike Umhlanga, it has 20 classes ranging from Grade 8 to Grade 12 and the enrollment for 2003 was about 350 learners. The school administration block is detached from the classrooms and houses a staff room, the principal’s office and the secretary’s office. There was a total of 26 teaching staff personnel, the majority of whom were white. At least three black staff members at the school were non-teaching personnel (a gardener and two cleaners). The school has a chapel, computer room and a swimming pool. There was also a store-room which we used to keep data-collection equipment.

Movement in and out of the school premises was well monitored. Any visitor was required to identify themselves through an intercom located at the gate. Once identified, the school administrator opens the gate by means of a remote control. Viewed from outside, the school blends well with the clean, quiet surroundings of the Kloof area.
The learners and the classroom: The school fees of R3 000 per annum suggests that most students are drawn from families that are relatively economically well-off. All learners were required to wear a uniform, grey trousers or black trousers (for boys) and black or grey skirts (for girls), white shirts and a black ties. There was a special uniform for the Grade 12’s. These were white jerseys printed with a slogan ‘Class of 2002’. The categorization of students according to their grades extended to school’s tuck-shop which had clearly designated areas for learners of different grades.

The Grade 8 class, which we observed, was made up of twenty-eight learners: Nine boys and nineteen girls. Amongst these girls, three were black (two were Zulu and one was Asian). All learners were fluent in English. Learners’ acknowledged the teacher’s entry and presence in the class by standing up until otherwise advised by the teacher. Behind the door of the classroom were printed the rules of the classroom. According to these rules, learners were required to stand up and wait for the teacher to greet and instruct them to sit down.

The Grade 8 classroom in which lessons were observed was equipped with movable chairs and desks, all faced towards the chalkboard; an intercom to enable communication to and from the school administration block, a fan, lights and curtains. This desk arrangement, according to Meighan (1986: 86) announced a learning message whose instruction was ‘sit and listen’.

This class was meant to cater for high achievers in mathematics. However, in practice, it seemed to be a mixed-ability class. This point was alluded to by one of the learners during the interview, Lucy. She felt that this was a class with “different types of people”, she elaborated, “We got the clever people and the good people and then the bad people” (Post lesson Interview 5, Settlers: line 372 – 374). Mr. Smith indicated though, during the interview, that they streamed learners on the basis of the math scores they obtained during a school-monitored test. However he admitted that the class was, in practice, a mixed-ability. He said, “Ability wise, I can see kids that are there – they are struggling, and they should probably be in a B class” (Teacher interview, line 24).
The Teacher: Mr. Kevin Smith, the mathematics teacher whose Grade 8 class we observed, was a senior teacher who had been at the school for the past twelve years. He had a four-year teaching Diploma through Etude College of Education, a college which was meant for the training of white teachers in line with the previous apartheid policy. My relationship with Kevin Smith was quite different to a relationship I had with Bulelwa. Our conversations were confined to observing him teach, issuing and collecting a teacher questionnaire; and not on personal matters regarding where he stays, his favourite sport or his family*. We related more on a researcher-teacher basis. Using Kevin’s first name, in my view, would deceive this professional relationship. It would conceal the different ways in which I related to the two teachers, yet, as Usher (1996: 36) maintains, “there is general skepticism about the very possibility of value-neutrality and a ‘disinterested’ stance”.

Because this study took place after the phasing in of Curriculum 2005 in Grade 8, I was particularly interested in Mr. Kevin Smith’s views on the new curriculum. I was also interested in his views on the role of the everyday in mathematics. Regarding the new education system, Mr. Smith was fairly critical. He particularly felt that mathematics did not lend itself to OBE because the openness of the new education system exposed mathematics to “abuse”. He was very certain that he would not implement the new system of teaching in his class until Grade 12 assessment procedures were themselves changed (Sethole, 2004:24). His main concern was that Grade 8 mathematics should introduce learners to ways of assessments legitimized in Grade 12 (matric). He said:

We are still linked to this matric syllabus….matric exam. If that changes, then I’ll feel happy with a lot of stuff they (the education department) are doing but they haven’t changed that and what they are asking people to do now...(pauses), that you will still be able to write the same matric exam. I want someone to turn around and say, ‘...Well, in the matric exam in 2005 this is what is going to be examined.’

[Teacher interview, Settlers, line 153]

* I am not suggesting that my relationship with Mr. Smith was supposed to be social or personal. I am however, emphasizing that it was not; and I thus related differently to him than to Bulelwa.
Regarding the everyday in mathematics, Mr. Smith valued the incorporation of authentic contexts but he felt that the learners’ ability to execute a mathematics procedure correctly was more important than obtaining a realistic answer. For example, I asked him how he would feel about a maths problem whose ultimate answer suggested that one CD costs R3 (an unrealistic price).

I will probably want it to be more accurate. Quite often I use examples of what you would expect. I want them to pick up 3 CDs cost R9 one CD cost R3. For me the procedure is important not the actual problem. It’s just that I know these kids buy CD’s or they buy shoes with exorbitant price. I want to relate to an everyday experience to bring it… (He doesn’t finish the sentence) What I am actually saying: “this is where you are using maths in real life without saying this is maths in real life”. To me it’s the procedure that’s more important. I would prefer them to sit there and say I am realistic (We all laugh). I know this weekend I bought a CD and it cost me R130 and you are telling me it costs R9! I prefer them to do that but if it helps them to know if 3 CDs cost R9 to get one it costs R3, I need to divide by 3, for me that am the key issue.

[Teacher interview, Settlers, line 392]

Umhlanga and Kloof drew from different communities and the degree of their material resouces differ. However, in terms of human resources, particularly mathematics teachers, they both had teachers considered to be good by the community. In relation to this study, however, there was a major difference between these two teachers. Mr. Smith was very skeptical of the new curriculum and was quite cautious in introducing it. Bulelwa, on the other hand, was fairly embracing of the new curriculum and willing to try some of the ideas she was exposed to in workshops in her own classroom. However, a common thread between them was some commitment that mathematics should bear some relevance to the learners’ lived experience, a point of interest for this study.

7.2. DESCRIPTIONS OF LESSONS AT SETTLERS

The fourteen lessons we observed at Settlers covered two main topics: Word problems and Euclidean Geometry. The following table outlines the way in which these two topics were spread across the fourteen lessons. Throughout these lessons, Mr. Smith used five worksheets.
Table 7.1: Topics covered by Mr. Smith in Settlers

<table>
<thead>
<tr>
<th>LESSON NUMBER</th>
<th>TOPIC COVERED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lessons 1 – 5</td>
<td>Using equations to solve word problems</td>
</tr>
<tr>
<td>Lesson 6</td>
<td>Space and Shape</td>
</tr>
<tr>
<td>Lessons 7 – 10</td>
<td>Naming and classifying sizes of angles</td>
</tr>
<tr>
<td>Lesson 11</td>
<td>Sketchpad (in the computer laboratory)</td>
</tr>
<tr>
<td>Lesson 12</td>
<td>Complementary angles</td>
</tr>
<tr>
<td>Lesson 13</td>
<td>Sketchpad (parallel lines)</td>
</tr>
<tr>
<td>Lesson 14</td>
<td>Completion of geometry worksheet</td>
</tr>
</tbody>
</table>

Details of Lessons 1 – 5:

For these five lessons, Mr. Smith used a six-page worksheet. The substance of the worksheet was to expose learners to the skill of converting word statements to mathematical equations. The worksheet consists of two main exercises. Exercise 1 incorporated a total of twenty-two tasks and Exercise 2 a total of twenty tasks. The main difference between these two lessons is that learners were left to their own devices to attempt tasks in Exercise 1 whilst Exercise 2 was preceded by an illustration of steps to be used when solving problems using algebraic equations. Thus, in engaging tasks under exercise 2, learners were explicitly advised to ‘use suitable algebraic equations to solve problems’. A more detailed analysis of the worksheet is provided in the following chapter and the whole six page worksheet is attached as appendix 7.1. Below, I provide the first two tasks from each exercise to give an indication of the type of tasks learners engaged.

Figure 7.1: Examples of two tasks from Worksheet 1 (See Appendix 7.1)

**USING EQUATIONS TO SOLVE WORD PROBLEMS**

**Exercise 1**

1. John's age is p years. Write down in terms of p:
   1.1 Sue’s age if she is 16 years older than John.
   1.2 John's age in 10 years time
   1.3 Sue's age in 10 years time.
   1.4 If their ages in 10 years time are added together, the total age is 52 years. Calculate John's present age by drawing up a suitable algebraic equation.
Exercise 2

In this exercise, draw up a suitable algebraic equations to solve the problems.

1. A farmer has 200 eggs. He packs the eggs into four boxes each of which contains the same number of eggs. If 8 eggs are left over, how many eggs can each box hold?

Lesson 1: Researchers were introduced and Renuka clarified the purpose of the visit to learners. Mr. Smith set the scene for the lesson by highlighting the importance of being able to set up equations on the basis of real-life information. To this end, he designed a mathematics task using Kelly⁴, one of the learners in class. His example was: “If Kelly is two years younger than her sister and their combined age is 28. How old is Kelly?”

As learners grapple with the task, he offers a solution and suggests that Kelly’s age should be considered an unknown $x$, her sister’s age will be $x + 2$. Their combined age yields $x + x + 2 = 28$, from which $x = 13$ and $x + 2 = 15$.

Mr. Smith introduced the second task based on another learner, Lucy. “Lucy is 7 years older than her sister and their combined age is 21. How old is Lucy (he writes on the chalkboard)”. He advised learners to try using his method, but he also encouraged them to use other methods.

One learner offered the following incorrect answer which Mr. Smith wrote on the board: $21 ÷ 2 = 10½ - 7$. Another learner offered an answer which Mr. Smith also wrote down on the chalkboard: Lucy’s age = $x$, Lucy’s sister’s age = $x - 7$. Therefore $2x - 7 = 21$

$\rightarrow 2x - 7 + 7 = 21 + 7 \quad \rightarrow 2x = 28 \quad \rightarrow 2x/2 = 28/2 \quad \rightarrow x = 14.$

He underlined the answer 14 and completed the task by writing the statement “Ruth is 14 years old”. He commented that learners’ would not be punished for not writing down the statement.

⁴ Not the learner’s real name.
For the third task, the teacher referred learners to task number 1 under exercise 1.

As learners engaged the task, he walked around and highlighted that there was no need to use $x$ as a variable, other symbols (like $p$ in this case) could be used. After a while, he led learners in a discussion and exhibited the method they needed to follow in solving the task. He wrote the following on the chalkboard: 

*Sue’s age* = $p + 16$; *John’s age (in ten years)* = $p + 10$; *Sue’s age (in ten years)* = $p + 16 + 10$. Their combined age in ten years is $p + 10 + p + 26 = 52$, $2p + 36 = 52$, $p = 8$.

He then gave learners a chance to do task 2 in exercise 1.

He walked around and monitored progress as learners engaged the task. In the meantime, he advised them to underline what is important. As learners engaged the task, Mr. Smith advised them to try and treat $x$ as a concrete value like 20 cents. The lesson ended while learners were busy with the task.
Lesson 2: In this lesson, the teacher introduced and led learners into using equations to solve word problems. For this lesson, three tasks were engaged. These were used both as exercises to test how learners should attempt word problems as well as platforms for teaching word problems.

The teacher greeted and called the class to order. He then asked for a volunteer to write on the board. The first learner quietly wrote down the answer 3x for 2.1.1. The second learners went over to the chalkboard and quietly wrote down the following responses 2.1.2 12x  2.1.3 3x  2.1.4 4 Chocolate bars + 3 sweets = R6; x = 40 cents. In reflecting on the solution, Mr. Smith pointed towards the importance of converting rands to cents. He performed the calculation in a similar way to which the learner did, however, instead of R6 he used 600 cents.

He gave learners a chance to reflect on task number 3, which read: The length of a rectangle is 1 metre longer than its breath. The perimeter of the rectangle is 42 metres. Let the breath of the rectangle be x. On the basis of this information learners were supposed to write down the length of the rectangle in terms of x; write down the perimeter of the rectangle in terms of x; write an equation for x and solve for it; write the dimensions of a rectangle. As learners engaged this task, Mr. Smith advised them to recall from the previous year that p = 2(l + b). He then illustrated that if the breath = x and length = x + 1 then perimeter = 2 (2x + 1) = 4x + 2.

Having briefly guided the learners, he led a classroom discussion during which one learner offered 4x+2 = 42 and the teacher wrote down the solution as 4x + 2 = 42; 4x = 40; x=20. Learners then continued to solve tasks 4 and 5 whilst Mr. Smith walked around to monitor progress.

† These tasks are a continuation of exercise 1, part of which is shown on page 148. I have used the numbering employed in the worksheet itself.
Mr. Smith then led the discussion in connection to the solution to task number 5. The task read:

5 The Dodgers Basketball team won 14 games more than it lost during the past season.
5.1 If the team lost x games during the season write down in terms of x:
5.1.1 the number of games the team won, and
5.1.2 the total number of games the team played
5.2 If Dodgers played 20 games during the season, use an equation to find the number of games won and lost by the team.

As learners engaged the task, Mr. Smith advised them to treat x as a number. He then wrote the following on the board.

<table>
<thead>
<tr>
<th>Lost</th>
<th>5</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Won</td>
<td>5 + 14</td>
<td>x + 4</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>2x + 4</td>
</tr>
</tbody>
</table>

He then moved around in class to monitor progress among learners. The lesson ended.

In sum, for this lesson, Mr. Smith continued to guide learners on ways of engaging word problems. He mainly focused on tasks 3 and 5 both of which incorporated eight word problems.

Lesson 3: Learners highlighted that tasks number 4 to number 6 were particularly difficult. Mr. Smith went through the tasks, starting with task number 5. In engaging it, he illustrated with the same table he had drawn the previous day. He then wrote on the board: The total number of games = 2x + 14. Since this is given as 20. He continued to write: 2x + 14 = 20; 2x = 6; x = 3. So the number of games lost is 3 and the number of games won is 17. He advised learners that it is important to attempt these questions, particularly for examination purposes. He also highlighted the value of making sense of
answers, even during examinations. For example, he advised learners not to accept a practically unrealistic answer such as 14 billion rands as an answer for home telephone bills.

He then proceeded on to guide learners through an illustrated example. The example read:

*David buys ice-creams and 4 cooldrinks for his friends at a cost of R20. If each cooldrink costs R2.30; find, by using an algebraic equation, the cost of each ice-cream.*

For this example, learners were not provided with answers per se, however, they were guided with respect to the steps they had to follow. These steps were: 1. Understanding the problem. 2. Identifying an unknown. 3. Listing the information given. 4. Forming an equation. 5. Solving the equation and 6. checking the feasibility of the answer. He exhibited a solution on the board and summarised it in the form of a table as follows.

<table>
<thead>
<tr>
<th></th>
<th>Number bought</th>
<th>Cost of each in cents</th>
<th>Total cost in cents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooldrinks</td>
<td>4</td>
<td>230</td>
<td>920</td>
</tr>
<tr>
<td>Ice-creams</td>
<td>3</td>
<td>360</td>
<td>1080</td>
</tr>
</tbody>
</table>

The second example in the worksheet is example 4. Learners were to use the six steps highlighted before in solving the following task: *Michael is two years older than Debbie and four year older than Tyla. If their ages add up to 45 years, how old is Debbie?* Mr. Smith briefly explained and reflected on the task with the learners. He then walked around to check how different learners deal with the task. The period ended on this note.

For this particular lesson, the teacher concluded tasks under exercise 1. Guided by the worksheet, he also introduced a formal method by which learners could solve word problems. Towards the end of the lesson, he provided learners an opportunity to ‘practise’ the method in one example.
Lesson 4: Mr. Smith greeted the class and indicated he had a sore throat. One learner volunteered to write down the solution to exercise 4 (form the previous day’s lesson) on the board. He set up the following table and explained to the class how he solved the task.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>x</td>
</tr>
<tr>
<td>Debbie</td>
<td>x - 2</td>
</tr>
<tr>
<td>Tylah</td>
<td>x - 4</td>
</tr>
</tbody>
</table>

\[3x - 6 = 45; \quad 3x = 51; \quad x = 17.\] Therefore Debbie is 17 years old. Mr. Smith briefly explained the solution to the learners and proceeded to the following task. (Exercise 2 task 1).

The task read as follows:

1. A farmer has 200 eggs. He packs the eggs into four boxes each of which contains the same number of eggs. If 8 eggs are left over, how many can each box hold?

He then led a discussion on this exercise and wrote the following on the board: *Total number of eggs in each box = x.*

\[\text{Total number of eggs is } 4x + 8.\]
\[4x + 8 = 200\]
\[4x = 192\]
\[x = 48.\] Therefore there are 48 eggs in each box.

Mr. Smith then led the discussion into the second task which read:

2. If you multiply a certain number by 3 and then add 4, the result is 19. What is the number?

In leading the discussion, the teacher also wrote the following on the board: Let the number be \(x\); \[3x + 4 = 19\]
\[3x = 15\]
\[x = 5\]

Learners were orientated to task number 3 (under exercise 2). The task read:

3. Michael spent 7 hours at the beach. If he relaxed in the shade reading for three
hours more than he surfed, for how long did he surf?

Having allowed some discussion amongst learners, Mr. Smith went over and wrote the solution on the board.

<table>
<thead>
<tr>
<th>Surf</th>
<th>x</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relaxed</td>
<td>x + 3</td>
</tr>
<tr>
<td>Total</td>
<td>2x + 3</td>
</tr>
</tbody>
</table>

He then wrote:

\[2x + 3 = 7\]

\[2x + 3 - 3 = 7 - 3\]

\[2x = 4\]

\[x = 2\] therefore he served for 2 hours and relaxed for 5 hours.

Learners were given an opportunity to attempt tasks numbered 4 and 5. Common to the two tasks is reference to ‘consecutive numbers’. The tasks were phrased as follows:

4. The sum of two consecutive whole numbers is 183. What are the numbers?

5. The sum of three consecutive even numbers is 102. What are the numbers?

He discussed the meaning of ‘consecutive’ with the learners and illustrated on the board that any three consecutive even numbers can be represented as \(x, x + 2\) and \(x + 4\). Thus the sum would be \(3x + 6\). He left learners to carry on the discussion on their own.

All the tasks treated in this lesson required learners to draw up algebraic equations and use formal methods as was illustrated to learners towards the end of the previous lesson (Lesson 3). Whilst he allowed learners to engage these tasks, Mr. Smith mainly led the class discussions and took the opportunity to further illustrate the ‘formal’ method of handling word problems.
Lesson 5: Mr. Smith called for a volunteer to illustrate how they had solved task number 7 which read:

7. Debbie bought 5 litres of milk and received R2.50 in change. The following day she bought two litres of milk at the same price per litre and received R7.00 in change. If she gave the shopkeeper the same amount of money each time, find the cost of a litre of milk.

One learner explained and exhibited her solution on the board.

\[ X = \text{litre of milk and } y = \text{amount of money.} \]
\[ 5x + 2.50 = y + 2x \]
\[ 5x - 2x + 2.50 = 2x - 2x + 7.00 \]
\[ 3x = 4.50 \]
\[ x = 1.50 \]

Mr. Smith approved of the presentation but hinted that x represented the cost of 1 litre of milk and not a litre of milk. Exercise 2 task 5 was also discussed. One learner shared with the rest of the class on how he solved the task. Mr. Smith wrote the solution on the board:

1st number = x; 2nd number = x + 2 and 3rd number = x + 4.
\[ 3x + 6 = 102 \]
\[ 3x = 96 \]
\[ x = 32. \text{ So the numbers are 32; 34 and 36.} \]

The teacher then asked for responses to task 6. The task read: The perimeter for a rectangular piece of land is 74m. The width is 7m less than the length. Find the dimensions of the piece of land.

He led the discussion and in the process drew a rectangle on the board marking the length and breath. He then wrote the solution on the board. \[ P = 2(l + b) = 2(x + x - 7) = 2(2x - 7) = 4x - 14 \]
\[ 74 = 4x - 14 \]
\[ x = 22 \]
Having written the solution on the board, Mr. Smith highlighted that the correctness of the solution can be tested by inserting 22 for x. He then asked for a volunteer to attempt task number 8 which read:

8. The length of a rectangle is 3m longer than the breath. If the perimeter is 45m, what is the length of the rectangle? One learner went to the chalkboard and wrote: \( b = x \); \( l = x + 3 \).

\[
\begin{align*}
4x + 6 &= 45 \\
4x &= 39 \\
l &= 9.75 \text{ and } b = 12.75
\end{align*}
\]

Mr. Smith approved of the solution and he advised learners to engage tasks 11, 12 and 13 on their own.

Mr. Smith announced that the next section would be on geometry. Most learners did not welcome this announcement. He asked learners to name concepts that they have been exposed to in Geometry. Learners mentioned concepts such as triangles, hexagons, angles etc. His aim was to indicate to learners that they knew more about geometry than they thought.

Mr. Smith concluded the lesson on using equations to solve problems. He introduced Euclidean geometry and tried to entice learners to believe they know more about geometry and thus they should approach it positively. He did so by asking one learner to name twenty ‘things’ he knew about cricket. When the said learner failed (to do this), Mr. Smith asked learners to name what they knew about geometry. Over twenty ‘aspects’ were mentioned, on the basis of which Mr. Smith pointed out that learners knew more about geometry than cricket.

As a way of setting the scene for Lessons 1 to 5, Mr. Smith rationalized the significance of word problems on the grounds that they would enable learners to deal with real life problems. He introduced learners to a set of mathematical steps and procedures they
could use to solve word problems or tasks which incorporated the everyday. He particularly emphasized the way in which tasks could be converted into equations or (mathematical statements) as well as how those equations could be solved. Mr. Smith also brought in the context of a cricket game in lesson five as a way to convince learners that they know more about geometry than they do about a sport as popular as cricket. Because of this porous boundary between mathematics and the everyday, some of the tasks in Lessons 1 to 5 could be categorized as weakly classified*.

Mr. Smith, therefore, used the everyday as a vehicle towards mathematics. Unlike Bulelwa, tasks used by Mr. Smith had traces of mathematics (like mathematical symbols) which announced their mathematical nature. Unlike Bulelwa, Mr. Smith summoned the everyday continuously from Lesson 1 to Lesson 5 without any punctuations. Like Bulelwa, Mr. Smith moved between tasks which did not incorporate the everyday (strongly classified tasks) and those which did. Whilst Bulelwa made this move between lessons, Mr. Smith made this move between tasks. In one lesson, for example, Mr. Smith would attend to a task that appealed to the everyday (like task 2 which summoned the chocolate context) followed by a task that did not (like task 3 which appealed to a mathematics figure – a rectangle). Bulelwa and Mr. Smith therefore exposed their respective learners to mathematics lessons that incorporated the everyday, however, it is important to note that

1. They summoned different types of the everyday.
2. They phased in the everyday in different ways.
3. Their movements between weakly classified tasks and strongly classified tasks were different.

The significance of this point is that learners in Umhlanga and Settlers were exposed to different settings and these might impact differently on how they view the incorporation of the everyday in mathematics. Mr. Smith indicated to learners that he would be open to their novel ways of engaging problems, however, learners’ influence on strategies to solve problems were minimal. Thus, Lessons 1 to 5 were strongly framed.

* I elaborate on this point in the next chapter.
Lessons 6 – 14

Lessons 6 – 14, as pointed out before, were insulated from Lessons 1-5 in terms of content. In none of these lessons was reference made to the everyday. Therefore the boundary between the everyday and the mathematics in these was insulated, rendering these lessons strongly classified. Since my study draws from lessons which incorporate the everyday, Lessons 6 – 14 had no significant bearing on my study. The significance of these lessons is, however, that they provide a complete picture regarding lessons which took place at Settlers. I therefore offer a brief discussion of these lessons in this section. A more detailed account is attached as appendix 7.2.

Lesson 6: This lesson was aimed at introducing and clarifying terminology used in geometry. It was, like the previous five lessons, guided by a worksheet. For this lesson, the teacher used a new worksheet entitled Shape and Space (see attachment 7.3). He handed out the worksheet and gave learners an opportunity to engage it. The exercise was specifically meant for learners to provide, in writing, meanings for geometric concepts such as line, intersect, bisect, angle, degrees, revolution, reflex angle, etc.

He then led a discussion concerning the definition of the concepts. Line was defined by the teacher as the distance between two points after one learner had suggested it as a distance between two lines. Angle was defined by the teacher as a rotated line. Some learners had suggested it to be a meeting of two lines. Degree was defined as a unit used to measure an angle and revolution was defined as a full rotation.

Mr. Smith dealt with the aspect of naming and classifying sizes of angles. He illustrated that in the following diagram (which he drew on the board), $\angle A$ is the same as $\angle BAC$.

However, he highlighted, $A$ needs to be named differently in the following diagram, it is no longer the same as $\angle BAC$. 
In relation to this diagram, $\angle BAC$, is not necessarily $\angle A$. A different type of naming may be used: For example $A_1$. He then left learners to engage the worksheet and discuss on their own.

This lesson was mainly aimed at introducing learners to terminology used in geometry, the drawings associated with the particular terminology and various ways of naming angles.

*Lessons 7,8,9,10,12,14*

During these six Lessons:7,8,9,10,12 and 14 learners engaged a ten-page worksheet from Lesson 5 to Lesson 14. Incorporated in the worksheet were at least 61 geometric tasks. The worksheet addressed the following aspects of Euclidean geometry

- Naming and classification of angles
- Calculating values of angles whose sizes are unknown, using geometric theorems and algebraic rules
- The two column statement and reason argumentation

The flow of lessons in which the worksheet on geometry was engaged (see attachment 7.3) was punctuated by Lessons 11 and 13. Lessons 11 and 13 were computer laboratory lessons during which learners were exposed to a geometry computer software, sketchpad. A computer laboratory-run lesson was a function of the laboratory’s availability. Thus, days 11 and 13 of data collection were the two days available for the laboratory visit. In other words, availability of the computer laboratory affected the sequence of Mr. Smith’s lessons.

In terms on not referencing the everyday, these lessons typify the nature of geometry lessons amongst learners in South Africa, about which Luthuli (1996: 17) asserts that
there is a “persisting opaqueness to school pupils with regard to the origin and intent of geometry riders”. In other words, Euclidean geometry remains a field about which learners make little connection with the everyday. Yet Freudenthal maintains that even for a field such as geometry, there is a need to draw from the everyday “If it starts off as grasping physical space, geometry is closely related to reality that day by day presents itself to the mind” (Freudenthal, 1973: 405).

In the teaching of these lessons, Mr. Smith exhibited a two-column approach to proving theorems during Lesson 8. For example, he gave a task which required learners to determine the value of x in the given figure.

\[
\begin{align*}
60 & \quad \text{Given} \\
\text{Therefore } X & = 30 \\
X + 140 & = 180 \quad \text{Adjacent angles on the line} \\
\text{Thus } x & = 40
\end{align*}
\]

Students were not as participative, did not seem to follow and no platform was created as well, for an alternative presentation of the proof. There was, throughout these lessons, more teacher-talk and very little interaction and discussion between Mr. Smith and the learners.
7.3 VOICE OF THE LEARNERS AND MESSAGE IN THE LESSONS

In the previous section, I have alluded to

1. The extent to which the everyday was recruited in the tasks, an aspect closely related to Bernstein’s notion of classification.
2. The extent to which learners had a say in the classroom proceedings. This is an aspect closely related to Bernstein’s notion of framing.

Recruitment of the everyday

Though I constantly make reference to 14 lessons, content-wise, these lessons can be split into two major categories: Lessons 1 to 5, whose main thrust is on word problems and Lessons 6 to 14, whose major thrust is on geometry. Between Lesson 1 and Lesson 14, Mr. Smith continuously highlighted the significance of formulating equations from a given context and solving them. A given context could either be the everyday (as was the case in some tasks between Lesson 1 and Lesson 5) or geometric figures (as was the case with some tasks between Lesson 6 and Lesson 14). Recruitment of the everyday may thus be seen within the context of enabling the mathematical skill of formulating equations and solving equations. This perhaps explains Mr. Smith’s preference for presenting monetary value in terms of cents and not rands. In everyday settings reference is made to two rands thirty (cents) as opposed to two-hundred and thirty cents. Via the recontextualising principle (Bernstein, 1996:184), this monetary value is appropriated and refocused for mathematical ends.

Lessons 6 to 14 are characterized by a sequence of geometry lessons whose flow was punctuated by Lessons 11 and 13 which were held at the computer laboratory. The difference between Lessons 11 and 13 on the one hand and Lessons 6,7,8,9,12 and 14 on the other, is on the basis of the teaching media. For all the lessons, the teacher used worksheets. However, for Lessons 11 and 13 he used a computer software programme in addition to the worksheets. The focus of my discussion though, is the extent to which the everyday was (was not) recruited. Geometry was defined in the worksheet, as a measurement of the earth. This, somehow suggested that this subject (geometry) is not
isolated from the real world or the everyday. However, no other reference was made to the everyday throughout Lessons 6 to 14. The lessons were based on abstract representations such as lines, points and angles, for example. I refer to these (lines, points and angles) as abstracts because their discussion was not made with reference to space or any real, tangible object.

The relationship between geometry and the everyday is at the centre of Freudenthal’s (1973) position on geometry. He argues for a geometry curriculum which is tied to reality. In this regard, the type of geometry curriculum espoused by Freudenthal stands in an open relationship with the everyday. It is thus, a weakly classified curriculum (Bernstein, 1971:205). However, Freudenthal is also aware of arguments against such a curriculum. He caricatures such an argument as follows:

If physical space is that important, let the physicists take it up. Are we not mathematicians? Are we not the architects of mathematical structures, and if physicists or anybody else can use them, let them take what they want. The quicksand of reality is no basis to build a mathematical system; mathematics should be protected against any contamination with the non-deductive germs

(Freudenthal, 1975:403)

The point I wish to make is that the everyday/mathematics relationship has also been reflected on with respect to geometry. The non-reference of space, the everyday or real life in these tasks is characteristic of a strong classification.

*Degree of learner participation*

Mr. Smith explained, during the interview, that the worksheets used were developed by one of his colleagues at the school. Mr. Smith himself had developed a worksheet that learners used for Lesson 11 in the computer laboratory. Therefore the teacher (or the mathematics department at the school) decided on the contents of the worksheet. In teaching, the structure and content of worksheets was closely followed. In this respect, a movement from one task to another was also a prerogative of the mathematics
department since it was members of this department who were responsible for the content and therefore order of tasks. Learners did not also have a say in the movement from one topic (word problems) to the other (geometry). Non-consultation with learners on the selection and the sequencing of tasks is common in South African schools. This observation suggests that the lessons were strongly framed in terms of selection and sequencing. Nevertheless, it does not suggest that the school was engaging an unusual practice.

Mr. Smith did allow learners an opportunity to engage the tasks and sometimes wrote the learners’ responses on the board. However, he was quite explicit in suggesting the thought process learners were to apply in order to engage the tasks in the worksheet and in representing their responses. For example, he suggested the use of symbols in the learners’ engagement with word problems. He also stressed the need for learners to underline their final answers when they generated solutions for tasks. Therefore, though there was an opportunity for learners to engage the worksheet, such engagement took place within the limits or bounds of Mr. Smith’s suggestions or preferred way of engaging tasks.

The overall substance of this discussion is that learners’ voices were not audible in relation to the sequencing of lessons, selection of topics and strategies to be followed in engaging the tasks. This highlights a relationship between the teacher and learners within a classroom context which is captured in Bernstein’s notion of framing. In particular, the teacher’s dominance over the sequencing, selection and strategies implied a limitation of options made available to learners. Such a reduction of options characterizes strong framing because whilst “Frame refers us to the range of options available to the teacher and taught in the control of what is transmitted and received in the content of pedagogic relationship. Strong framing entails reduced options.” (Bernstein, 2000: 33). In the case of Mr. Smith’s class, the foregrounding of the sequence, content and strategies constraint any possibility of exploring other options, characteristic of a strong frame.
From this discussion, it is possible to reflect these fourteen lessons against a classification-framing matrix introduced and discussed in Chapter 2. This matrix allows for a glance about the lessons in relation to the framing and classification.

Table 7.2 Framing-classification matrix for lessons at Settlers

<table>
<thead>
<tr>
<th></th>
<th>Strongly framed</th>
<th>Weakly framed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly classified</td>
<td>Lesson 6 to Lesson 14</td>
<td></td>
</tr>
<tr>
<td>Weakly classified</td>
<td>Lesson 1 to Lesson 5</td>
<td></td>
</tr>
</tbody>
</table>

As was the case with Bulelwa, Mr. Smith’s voice was significantly audible throughout the lessons.

CONCLUSION

This chapter was aimed at providing a description of Settlers Secondary School and context within which learners at Settlers experienced their lessons. I have paid particular attention to all the 14 lessons with a focus on the extent of learner participation with regard to the content and sequencing of lessons as well as the extent to which the everyday was recruited. Learners had little influence on the content and sequencing of lessons. In other words, the lessons were all strongly framed. With respect to recruitment of the everyday, only the first five lessons made reference to the everyday.

In terms of this broader context, there are some telling differences between Settlers and Umhlanga. Besides the different racial composition of these two schools, there is also a gap in relation to the social classes from which the two schools draw. However, in both schools, some space is created by teachers, though in different ways, for the incorporation of the everyday in mathematics. It is this drawing in of the everyday which is a crucial element of my research interest. In the next chapter I focus much more closely on these lessons and the type of classroom conversations they provoked amongst learners on the one hand and between the teacher and learners on the other.