CHAPTER 6
CASE STUDIES

The case studies of nine student teachers are discussed one by one according to their groups, i.e. ‘reluctant’; ‘indifferent’ and ‘enthusiastic’. I explain the ways in which they were classified as ‘reluctant’; ‘indifferent’ and ‘enthusiastic’ in terms of their responses to an initial question about their interest in science teaching. In some cases, background to the students’ homes and cultures are provided if these are different from an urban, English-speaking environment such as the one in which the university is situated. Students’ words are quoted verbatim, with some spelling corrections, and little attempt is made to analyse or compare findings at this point. Analyses and comparisons are handled in the following chapter.

6.1 Introduction

These studies set out the stories of a number of individual students. I discuss three reluctant students first. Later I present the case studies of three student teachers, one from each group (reluctant, indifferent and enthusiastic). The identities of these students were (and are) influenced by their religious or ethical beliefs; so I have named the group belief systems. Finally, I report the case studies of three different students, initially enthusiastic who encountered trajectory disturbances. All students within the groups are discussed in alphabetical order of their first names.

The previous chapter reported a number of student responses to a question regarding what the student expected from the course. Below, the responses of the case study students to the question are reported. Their groupings are provided in brackets.

Gareth - ‘I want to make it interesting and hands on in the hope of my learners being interested and possibly passionate about our world and nature and the environment and how science is part of it.’ (Initially enthusiastic but encountered trajectory disturbance)

Heather - ‘I have little knowledge in this learning area and it can be very boring. Teachers are usually boring as well. I am not really interested in this learning area.’ (Initially reluctant but embarked on a peripheral trajectory)

Janet - ‘I really enjoy teaching the sciences and have taught them in many school experiences.’ (Initially enthusiastic but encountered trajectory disturbance)

Martin - ‘Beside the fact that I only have science up to Grade 9, I really enjoy the sciences.’ (Initially enthusiastic but encountered trajectory disturbance)

Ntsako - ‘I find it extremely difficult and it is for intelligent people only’. (Initially reluctant but embarked on an inward trajectory)

118 These are described in this chapter.
119 These, as mentioned previously, are pseudonyms.
Phumlani - ‘I want to know about the environment and how to go on excursions.’ (Initially enthusiastic but encountered trajectory disturbance)
Sarah - ‘I don’t know the subject well enough and I always found it very complicated / difficult’ but I would like to learn more about it’. (Initially indifferent but embarked on a peripheral trajectory)
Shanti - ‘I really am scared of this course. Science is difficult.’ (Initially reluctant but embarked on a peripheral trajectory)
Xoleka - ‘It is the least of my interests and it concerns me that now I have to teach it even though I don’t like it.’ (Initially reluctant and finally reluctant)

According to these initial comments about science and science teaching, I divided them into sub-sets as follows:
- Reluctant - comprising Heather, Ntsako, Shanti and Xoleka (negative science identity).
- Indifferent – comprising Sarah (indifferent science identity).
- Enthusiastic - comprising Gareth, Janet, Martin and Phumlani (positive science identity).

6.2 Reluctant students
6.2.1 Heather
Heather is a 21 year-old English-speaking White female student, and as such has enjoyed some level of privilege, living in an area of choice and attending a functional school. She lives with her parents and siblings in one of the formerly ‘White only’ areas on the East Rand. She attended a Model C school where she studied physical science and mathematics up to Grade 9. She studied both life sciences and geography up to school leaving level achieving 65% and 70% in these disciplines respectively. She majors in English at university. She scored 20% on the diagnostic pretest and 45% on the STEBI instrument. I have included her in the ‘Reluctant’ group on the grounds of her critical incident and of some of her remarks about how she found (physical) science ‘dull and boring’.

6.2.1.1 Critical Incident
’I always found natural science at school very difficult. I therefore hated the subject and at the end of Grade 9 it was the one subject that I knew I would not take any further. My most vivid memory of natural science at school would be when (teacher’s name) was my teacher in Grade 9. She never made science fun or exciting. I was always in trouble for talking and messing around. I know now that I did this because I was bored in her class. I clearly remember writing a class test that was so hard and long – I failed that test! My mark was

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120 It is understood that these categories are not always clear-cut and that some overlap exists.
34%. I remember (teacher’s name) giving me back my test and looking at me like I was stupid.

6.2.1.2 Responses to children’s drawings of science teachers

Her responses to the DAST-T focus on several issues, namely the teacher, the children, the environment, the pedagogy.

Drawing 1

‘In figure one the science teacher ‘does not look like she knows what she is doing. She is clearly teaching in a boring way. The child has drawn the teacher sitting at her desk, showing that she does not get up from her desk to teach. I believe that a teacher should get up from the desk to teach. A teacher should also be well prepared for his / her lessons.’

Drawing 2

In figure two the children look unhappy. There are no pictures illustrating H₂O. I think that a teacher should use colour and pictures in all lessons. The teacher should have interesting things to show water for the lesson. In this picture, science looks very boring.’

Drawing 3

‘In figure three the teacher looks very nice. She wants children to find science fun and interesting. She is using science equipment in the lesson which makes it fun. The pupil who drew this picture enjoys science. I do think that learners should be sitting in groups, so that lessons can be discussed. Each group should be able to work with the science equipment so that they have a chance to see how the equipment actually works.’

For each drawing, Heather made some critical remarks, commenting on what should take place in a primary science classroom. She commented on both content and pedagogy.

6.2.1.3 Letter to Parent

Dear Parent

Thank you for your letter regarding your son Gavin. Gavin has been a pleasure to teach this year. He has grown in confidence and has shown a great interest in his studies at school, especially science.

He actively participates in discussions in class, which I encourage in my lessons. It is wonderful for me to know that my pupils are discussing the day’s events with their parents. This is giving the educators an indication of the high level of interest which the new curriculum (Outcomes Based Education) is giving the learners. Outcomes Based Education teaches the learners at an early age, the practical understanding of the subject matter being taught in class. This will, in their later years, give them a strong foundation.
Gavin is not a good candidate for detention as he is a hard working student. Gavin is a positive influence in the class. I am sorry to hear that Gavin burnt his fringe and jersey during the science lesson. I will discuss this with Gavin and find out exactly what happened.

I would like to take this opportunity to thank you for taking the time to write to me regarding Gavin’s progress. I am confident that you will continue to support Gavin in his school’s activities.

Yours faithfully,

Grade Four H.O.D.

It is clear from her letter that Heather was making attempts to align her ‘teacher’ and ‘science teacher’ identities in that she showed concern for the child’s physical safety and also for his intellectual growth.

6.2.1.4 Teaching Experience

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TABLE 6.1 Heather’s second and third teaching experiences

In these teaching experiences, Heather showed no sign of engaging with the practice of science teaching.

6.2.1.5 Self Portrait

Her drawing, true to her stated preferences, is in full colour. The learners are in groups, working with equipment, a scenario she has expressed as desirable. The teacher is large and is standing in front of the class, giving an instruction which is about safety. Safety rules and another colourful poster are displayed. From her self-portrait, it seems that as far as belonging in imagination is concerned, Heather is very competent.
6.2.1.6 Fourth Year Decisions

- Advanced Study
She chose to study English at this level.

- Learning Area
She chose the economic and management sciences and languages learning areas in her final year and was awarded distinctions for each of these.

- Independent Research
She conducted research on languages in classroom teaching and passed well.

![Figure 6.1 Heather's self portrait](image)

**FIGURE 6.1 Heather's self portrait**

- Teaching Experience
Heather was awarded distinctions for her final teaching experiences.

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**TABLE 6.2 Heather's final teaching experiences**

6.2.2 Ntsako
Ntsako is a Black female student aged 20 years whose first language is Xitsonga, and she speaks, writes and understands English very well. She attended a Model C school where
she was taught in English according to South Africa’s language policy. Here she studied science up to Grade 9 where her science teacher was a Black male.\textsuperscript{121} She did not study any of the sciences at school-leaving level, although she studied Geography in Grade 12. She majors in Economic and Management Science and isiZulu at university.

Ntsako’s grandparents lived in the north eastern part of South Africa in what is now Limpopo Province. Thus the heartland of her culture is in a remote rural area of the country. This area borders Mozambique, Zimbabwe, Botswana and Swaziland and houses part of the world famous Kruger National Park. Many of the people in that area speak as a first language Xitsonga\textsuperscript{122} which is one of the eleven official languages of South Africa. This language is spoken in eastern Limpopo and Mpumalanga, areas near the border of the country of Mozambique, as well as in southern Mozambique and southeastern Zimbabwe.

Xitsonga speakers are usually very multilingual, speaking several SA official languages such as English, some Afrikaans, sometimes sePedi and possibly Tshivenda as well as one or two Nguni\textsuperscript{123} languages or dialects. The reason for this is that the ethnic group (Tsonga / Shangaan) is a small one comprising only about 6% of the SA population. Therefore in order to communicate with others, Xitsonga speakers who travel out of the area pick up other SA languages. Apart from that, Afrikaans and English exert dominant influences, and are at least understood (if not spoken fluently) by most South Africans. Thus Ntsako is able to major in isiZulu even though it is not her home language.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{xitsonga_language_use_map.png}
\caption{Xitsonga language use}
\end{figure}

\textsuperscript{121} I mention this point specifically because it has relevance to her critical incident
\textsuperscript{122} I have recently learned that Xitsonga and Tshivenda are not rated very highly among Black South Africans, possibly because they originate in rural areas.
\textsuperscript{123} The Nguni languages are isiZulu, isiXhosa and isiSwati
Ntsako and her mother, who is also a teacher, live in Soweto in Gauteng Province in South Africa, having moved to the city for economic reasons. They retain their language at home but speak English and / or other official languages when communicating with other people outside their friendship circles. Ntsako is aware of the cultural practices of her grandparents and remembers some of the ways the local indigenous plants are used for food, shelter and medicinal purposes. Even though she was brought up as a Roman Catholic, her family still observes a number of cultural practices such as a yearly family get-together where traditional sorghum\(^{124}\) beer is brewed and the ancestors are asked for their blessings.

On the diagnostic concept pretest she answered one question (on photosynthesis) correctly, achieving 20% overall. She scored 27% on the STEBI questionnaire – a score well below the class average. The point here is that in both conceptual understanding and confidence, she achieved very low scores. She was very reluctant to attend the science methods course, claiming that she was unable to learn or to teach the subject. At this point she exhibited a negative science / science teacher identity \textit{refusing to engage} with the practice.

6.2.2.1 Critical Incident
She was very willing to share her school science experience (critical incident), the full transcript of which follows below:

\begin{quote}
I won't forget my science teacher calling the boys to do experiments all the time. He said it out one day that 'Name a female scientist'. Of course we did not know one but he said 'None'. Then he said that the reason why he calls boys for experiments all the time is because girls know nothing about science and that most scientists are males. This really gave me a negative attitude towards science because I know that I was a girl and I know nothing about science. So I never concentrated in class because science was not for me I was a girl and I would never be a scientist so why bother?
\end{quote}

It comes as no surprise that Ntsako did not like science and science teachers. However, she participated in the methods course, and completed all assigned tasks. It is to the next of these that I now turn.

6.2.2.2 Analysis of children's drawings of science teachers
The student teachers were required to provide a written analysis of each of the drawings provided.

\(^{124}\text{Sorghum is a plant similar to maize.}\)
Drawing 1

‘This represents a teacher-centred lesson, whereby the teacher didn’t prepare for the lesson fully, and now because she didn’t involve learners in the construction of knowledge, she is stuck. Or it could be that the educator did not research about the topic and now she is stuck. And teaching behind the desk.’

Drawing 2

‘The educator just asks (tells) the learners what the lesson is about. The educator does not move from the known to the unknown. The learners look very miserable could be because the educator just asks “What is H₂O?” Now the learners are frustrated because the educator just bombards them with a question they know nothing about. The learners look frustrated because they are miserable due to the fact that they are embarrassed because they don’t know the answer.’

Drawing 3

‘This is a science lesson whereby the educator is bombarding the learners with questions. I think the smile on the teacher’s face is not a smile of a great lesson, but if you look at the classroom, only 2 out of 12 children have their hands up. The teacher is just happy that at least there are one or two learners that understand and that’s fine with the teacher. What about the rest of the class? The boy at the back could be playing a game? The children have got all the information on the wall e.g. Periodic Table, but there could be a lack of skill. These are difficult questions.’

I found her comments very perceptive. Ntsako, despite her initial dislike of science, was engaging in boundary work between science teaching and elementary teaching.

6.2.2.3 Letter to Parent

Dear Parent,

Parents’ concern really excites me because it is the only way we as educators get to communicate with parents. In natural science, we are all about hands-on and we believe in learners doing things by themselves in order to understand things better. I agree with you that when we were at school, our teachers told us about it and we wrote it down, but things have changed. In modern teaching we are focusing on learners becoming active participants in constructing knowledge. Learners must not just be passive recipients because it has been scientifically proven that learners learn and understand better what they see and do themselves. The olden days, teaching and learning was boring and stressful because we had to regurgitate what we were taught. You must admit that if Gavin was bored in class, he wouldn’t come home to share what he had learned because he would have found it irrelevant.

Natural science is a learning area that requires learners to experiment on their own. When we teach learners and they are just listening and writing down, they get irritable and bored and they start getting distracted. You need to understand that learners come to school with
different learning abilities, some children are capable of writing but some children show their understanding and intelligence in activities that they do with their hands. We make sure that the children are safe when doing experiments and we are facilitating them all the time, mam believe me when I say they are safe. Sometimes in Natural Science we teach them about hazards and dangers of materials such as matches, so not only are we teaching them subject content but life skills and safety are incorporated. We never do anything that puts the learner’s life in danger.

Gavin was probably so excited and fascinated by what he was doing that he burnt his hair and jersey. I’m really sorry about that but I will never put a child in detention or give them a smack for learning and enjoying what I am teaching. Instead it gives me so much pleasure to know and see that I have taught a child something new for the day, and I would rather give myself a pat on the back. Yes, Gavin is correct, they are allowed to talk. In today’s learning, we allow learners to work in groups and this requires them to share ideas and discuss what they are learning. This helps the learners because the weaker children are helped and they understand better what is explained by their peers.

You have just given me a brilliant idea. I think that organising a natural science expo at the school will be the perfect opportunity for parents to come and see for themselves exactly what their children are doing, and the parents themselves will engage in this. I am sure that you will be proud of your son and you will take pride in what he is capable of. I think a measure of this success should be checked in Gavin’s grades. I would highly appreciate it if parents and educators came together for the success of teaching and learning.

Yours sincerely

6.2.2.4 Teaching Experience

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TABLE 6.3 Ntsako’s second and third school experiences

6.2.2.5 Self Portrait

As can be seen from the figure, Ntsako drew a science teacher facilitating a practical science lesson.
6.2.2.6 Fourth Year Decisions

- **Advanced Study**
  Ntsako elected to study *isiZulu* at the advanced level for which she achieved 81%.

- **Learning Area**
  She studied *Economic and Management Sciences* and *Natural Sciences* learning areas for each of which she gained distinctions.

- **Independent Research**
  She conducted her independent research project on ‘code switching’\(^{125}\). Code switching is of great significance in South African educational circles at present because the majority of South Africans are not taught in their home language. Language itself is, and has been for many years, a contested area and a site of struggle in this country. This project (assessed by a colleague) was considered of a sufficiently high standard to be published.

\(^{125}\) In this particular case, this means switching from English (the language of learning and teaching) to another, indigenous language or languages.
Natural Sciences (Learning Area)
  o Alternative Conceptions Presentation
  She was nervous about this assignment because, not having studied the sciences, she felt at a disadvantage. However, she discussed the life concept\textsuperscript{126} and was awarded 24/30 (80\%) for her presentation.
  o Sci Bono
  Ntsako worked with several other girls to produce a ‘circus’ of five simple, hands-on activities appropriate for primary school children. She made every effort to produce work of a high standard, despite having been in hospital with pneumonia the preceding week.
  o Examination Equivalent
  This piece of work illustrated a successful attempt to link science with everyday life. Ntsako’s choice for her virtual field trip was ‘Science Kitchen Day’, which integrated not only the natural science themes\textsuperscript{127}, but other curriculum areas as well.

Teaching Experience
She was awarded a distinction for her final teaching experience and achieved distinctions for seven out of eight of her final examinations, thus graduating with distinction. In addition, she was the recipient of a major prize awarded to an outstanding student.

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TABLE 6.4 Ntsako’s final teaching experiences

She is now teaching science, mathematics and English at a state school in Soweto, not far from her home.

6.2.3 Xoleka

This student is a 21 year-old Black female whose first language is isiXhosa. Her family lives in the area which was formerly known as the Transkei (an ‘independent’ homeland) and is now part of the Eastern Cape. The former Transkei is home to many heroes like Nelson Mandela, Oliver Tambo, Steve Biko and others and is thus of great historical and political interest. People from the Eastern Cape are proud of their heritage and of their connection with the home of Black consciousness.

\textsuperscript{126} This concept, too, is well researched and documented in the literature. See, for example, Berthelsen, B. (1999) Students’ Naïve Conceptions in Life Science. MSTA Journal, 44(1) (Spring ’99, pp. 13-19.)

\textsuperscript{127} Life and Living; Planet Earth and Beyond; Matter and Materials; Energy and Change
Xoleka attended a Model C school in the Cape and her English is excellent. Of the sciences, she studied only Geography during her final school year, electing to major in English and Economic and Management Science at university. Like Ntsako, being multilingual, she is able to major in a language other than her mother tongue. She was quite unequivocal about science stating that it is ‘the least of my interests’ and expressed anger at ‘now being forced to teach it even though I don’t like it’.

On the diagnostic concept pretest she did not answer a single question correctly. She scored 28% on the STEBI questionnaire – which like that of Ntsako, is a score well below the class average. On being questioned about her science teaching confidence, she exhibited extremely low confidence levels. Her antipathy to science remained with her for the duration of the course. When asked why she disliked science so much, she had this to say:

‘It is complicated. It is difficult. It has mathematical parts’

6.2.3.1 Critical Incident
The full transcript of this exercise follows below:

I didn’t do science in high school but I remember back in primary where we did quite a lot of experiments, they were fun but it somehow got more difficult and I started to lose interest as it became more and more complicated. Primary school was a long time ago and I don’t have a vivid idea of what really went on in my science class but I know that till this day I have the same mentality that I had when I was in primary, that science is difficult.

It proved difficult to talk to Xoleka and to get to know her. She was very angry at ‘being forced to do science’ and I suspect that I was included in her antipathy. Her coldness
towards me could have stemmed from resentment towards my being of European descent. I cannot be certain on this issue. However, she too participated in the methods course to a certain extent and completed most of the assigned tasks.

6.2.3.2 Analysis of children’s drawings of science teachers
Xoleka did not complete this task.

6.2.3.3 Letter to Parent
Dear Parent,

I sincerely apologise about Gavin’s school jersey and fringe. However, I must inform you that learners as opposed to back in your time are now encouraged by our new National Curriculum Statement to explore and experiment by themselves, for themselves and we give out instructions and monitor.

It is the child’s responsibility to listen carefully to the instructions to avoid burning of jerseys and fringes. I cannot look at one learner when I have a class of thirty five. Just to remind you that we are qualified teachers who know exactly what they are doing and bringing fumes that would choke learners to death would be absurd. May I please politely ask you not to tell me how I should do my job, I do not appreciate it.

We follow the law as the school and I would not give him a smack and yes learners are allowed to talk, how else could they engage in group discussions and class debates? I am afraid that you will be hearing more stories about trying things out for themselves, however this time around I will be more vigilant.

PS Maybe the reason he likes coming to school is because he is having fun and enjoying the hands on learning as opposed to writing down notes.

6.2.3.4 Teaching Experience

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TABLE 6.5 Xoleka’s second and third teaching experiences
Despite the clear instruction to draw yourself teaching a good science lesson – we see a science room admittedly quite adequately equipped but with no humans or other animals and no plants. However there are shelves with and for equipment and there are posters. Perhaps she was not quite sure of what was expected because she did not participate in the previous activity.

6.2.3.7 Fourth Year Decisions

- Advanced Study
  She studied economic and management sciences and English at the advanced level. She passed satisfactorily.

- Learning Area
  She chose economic and management sciences and languages learning areas which she passed adequately.

- Independent Research
  She chose to work on an English language issue.

- Teaching Experience

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TABLE 6.6 Xoleka’s final teaching experience
6.3. Belief systems
In this section, I discuss one student from each of the categories Reluctant, Indifferent and Enthusiastic. The reluctant student is an individual, not discussed with the three reluctant students above. Her history is similar to those of the other three, but I am not pursuing these similarities at any length at present. As well as their attitudes towards science and science teaching, they are very different in other ways. One is an Asian female, one is a White female and the last is a White male. However, a very interesting point, both of commonality and of difference, is that each has a religious, faith-based or ethical identity which exerts an influence on other identity aspects. This issue will be elaborated later.

6.3.1 Reluctant Shanti
Shanti is a 23 year old girl of Indian descent and her home language is English. ‘Indians’ first arrived in South Africa as labourers to work in the sugar cane fields of KwaZulu-Natal and also in the mines and on the railways elsewhere in the country. She is a descendent of these people, as I am a descendent of a Welsh coal miner. She lives in a suburb of Lenasia, a previously ‘Asian’ township south of Johannesburg. The people of Lenasia form a cosmopolitan community of different religions, occupations and social strata.

The traveling distance from Lenasia to the University is over 20 km and the traffic flow is slow and stressful, so students from the area usually form ‘lift schemes’ to share the financial as well as the wear and tear burdens. Shanti is a practicing Hindu, and is proud of her heritage and cultural traditions\(^{128}\). She occasionally travels to University with a group of Muslim girls (also from Lenasia) so a lift club identity may come to the fore at these times. At other times she leaves home at 6 am in order to catch buses which will reach university in time for the first lecture at 8 am. Thus even though apartheid is no longer on the statute books, ‘non-Whites’ are disadvantaged or at the very least inconvenienced by the old Group Areas Act. Being Hindu, she is a vegetarian (although not a vegan) with great respect for life.

She studied biology at school, achieving a C in the final examination. However, she chose not to study life sciences at university because she does ‘not like killing and dissecting things’\(^{129}\). She majors in economic and management sciences and English at university. On the diagnostic concept pretest she achieved 32%, scoring well on questions 1 and 2, possibly reflecting an interest in life sciences. She scored 30% on the STEBI questionnaire which, like the scores of Ntsako and Xoleka, fell below the class average. This student entered the methods course exhibiting some diffidence about the

\(^{128}\) A tradition in question relates to the funeral mentioned later. She had specific tasks to perform as a niece of the deceased.

\(^{129}\) We do not dissect whole animals, but she had the idea (stereotype) that this is what happens in biology classes.
physical sciences especially the mathematics components, remarking that she ‘was scared’. However, she participated in all activities, missing only one session in order to attend a family funeral.

6.3.1.1 Critical Incident

Her critical incident reads as follows:

I remember a very interesting part of science in grade 6. I was being taught about animals with shells i.e. crustaceans. The teacher asked me to get a crab so I went to the river (near where I live). I used a stick with a bit if fish to catch a crab. It was really exciting and I took it to school. I looked after it but a week later my teacher kept it and didn’t feed it or put it in water every day, so it died. I was really upset.

My other experiences were not as exciting. I only used a microscope this year and mostly we studied the periodic table which I did not enjoy because I never knew how to balance equations. I will always remember how we studied the different parts of the crab.

Her critical incident related a long-remembered experience which she enjoyed until the animal died. In it was not an altogether happy experience because in her own words, she was ‘upset’.

6.3.1.2 Responses to children’s drawings of science teachers

Drawing 1
There is no content in this picture because the teacher does not know what to teach. Perhaps she does not know what syllabus to teach. There are also no learners in the class which shows that the learners do not want to be there. Maybe they feel invisible. Also the teacher is sitting and as a student teacher I feel this creates a negative impression towards the learners because learners enjoy interacting with the teacher instead of being distanced from them.

Drawing 2
The lesson is about H$_2$O which is the atomic numbers for water but the learners do not understand because they are not smiling or enjoying the lesson, they seem sad and confused. She (the teacher) hasn’t even written ‘water’ on the board to explain what H$_2$O really means. And the teacher looks really confused and unsure of the content.

Drawing 3
This lesson is really learner-centred as it is about the periodic table and you can see the teacher is happy about teaching the content, she has many resources like test tubes and the periodic table. She seems excited which makes the learners excited and they are answering

\[^{130}\text{This experience took place during the part of the methods course conducted by my colleague, described in chapter one.}\]
questions and involved in the lesson. The lesson is about the different elements and weights of units on the periodic table.

Shanti was quite critical of the first two scenarios, sympathising with 'confused' children. She was supportive of the teacher in the third diagram, remarking approvingly on the presence of AV aids.

6.3.1.3 Letter to Parent

Dear Parent

Thank you for your letter of concern. I appreciate you taking the time to inform me about your son, Gavin’s problem. I can assure you that Gavin is in no way in danger. As our country has recently changed its curriculum, we are instructed as educators to facilitate all learners. I understand your concern about Gavin doing too much work and the educator doing too little. However, it takes a lot of preparation for us educators to create these activities. The new curriculum requires us to allow learners to gain knowledge from their participation in class. Therefore, educators are obligated to do these experiments and we do assist learners. It is also up to the learners to be responsible when conducting experiments.

I would like to remind you that Gavin enjoys these lessons and participates in every lesson. I am sorry for the broken jersey and hairdo. I will re-imburse you for the costs, if you need it.

6.3.1.4 Teaching Experience

<table>
<thead>
<tr>
<th>TEACHING EXPERIENCE 2</th>
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<td>Archeology</td>
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TABLE 6.7 Shanti’s second and third teaching experiences

Although Shanti chose a variety of learning areas, she conformed to similar types of school.

131 See explanation and description in the following chapter under 7.6.2.1
6.3.1.5 Self Portrait
Like the drawing by Ntsako (discussed previously), this scene has many elements appropriate to inquiry science teaching and learning. The teacher is interacting with the learners who are conducting some investigation in groups with appropriate science equipment, offering comments and answers to the teacher’s question. The environment is a pleasant one, with posters and pictures. The periodic table occupies a prominent position which is not taught in local primary schools.

![Figure 6.6 Shanti's self portrait](image)

6.3.1.6 Fourth Year Decisions

- **Advanced Study**
  Shanti elected to study English at the advanced level for which she achieved 57%.

- **Learning Area**
  She studied Economic and Management Sciences and Languages learning areas for each of which she was awarded over 80%.

- **Independent Research**
  Her research project focused on aspects of primary education where she also gained a distinction.

- **Teaching Experience**

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TABLE 6.8 Shanti’s final teaching experiences
She has been appointed to the teaching staff of a primary school in Lenasia. For several reason/s, (discussed later) she retained her ‘Indian’ identity and teaches where she grew up.

6.3.2 Indifferent Sarah

Sarah is a White female student whose first language is English. She is orthodox Jewish and her religion means a lot to her as she frequently affirms. She attended a private orthodox Jewish school where, due to the nature of the school, she did not interact with a wide cross-section of society. She lives with her family in one of Johannesburg’s affluent formerly all-White areas. She enjoys her life at university, and is interested in learning about different cultures, a new opportunity for her. She takes pleasure in and is committed to learning and teaching.

She opted to conduct her teaching experience elective in the United States of America. When I first was informed about her trip, I was surprised, thinking that such an adventure must have been a far cry from her usual experiences. However, I learned later that she went to the United States to stay with relatives and to be introduced to the man she was eventually to marry. Marrying while young is an aspect of her culture which I did not realise until she told me of her engagement some time later.

She did not study geography, life sciences or physical sciences at school leaving level but studied mathematics, obtaining 89% in the final examinations. In tune with her non-science identity, at university she opted for languages and history, demonstrating her interest in the humanities. She scored 62% on the STEBI instrument and 25% on the conceptual understanding diagnostic pretest. It is surprising that her STEBI score was as high as 62% given the other factors.

Despite her positive attitude and vibrant personality, her comment the first time we met went along the following lines:

“I am not good at science and I am not the best science teacher.”

At this point, Sarah was defining herself in terms of what she is not. As Wenger (1998) contends, ‘Our identities are constituted not only by what we are, but also by what we are not. (p.164). However she, too, indicated that she would like

‘. . . to learn more about it so I can teach it confidently.’
This comment suggested that she had a fairly open mind about science. The issue of confidence appeared important to Sarah. For example, she commented on one occasion that her science teachers at school did not seem confident, speculating that lack of confidence could result in ‘dull and boring lessons’.

This student entered the science methods course not so much with a negative view of science but with vague memories of unexciting routine. Unlike many other student teachers she did not voice fear of the mathematical aspects of science because she achieved a high distinction in her school-leaving mathematics examination. It appears that her experience of school science was one in which science was dissociated from everyday relevance and meaning. As such, it was easily forgotten.

6.3.2.1 Critical incident

‘In Grade 6, going to the lab and watching [teacher’s name] mixing all different liquids in a beaker and asking the class to explain in scientific terms what had happened when one liquid was mixed with another.’

Unlike Ntsako, Sarah did not talk about humiliation or insult. Her critical incident was hardly critical, compared with that of Shanti, it seemed rather bland. I would argue that this very blandness played a role in Sarah’s view of science. Thus her imagined view (and heretofore experience) of science as dull and boring could not be aligned with her image of herself – vibrant, spontaneous and an exciting teacher. Sarah certainly participated in the methods course and not in silence. Although the work she produced was not always distinctive, her enthusiasm was infectious.

6.3.2.2 Responses to children’s drawings of science teachers

Drawing 1

‘Figure 1 shows the teacher’ lack of confidence in her subject matter’

Drawing 2

‘Figure 2 shows the teacher just rambling on, the learners look miserable and unstimulated.’

Drawing 3

‘Figure 3 shows an excited teacher performing scientific experiments – with learners who are actively engaged with the task at hand.’

6.3.2.2 Letter to Parent

Dear Parent

Thank you for your letter. I would like to express my pleasure that you show such an interest in addressing your child’s education.
True, my method of teaching has become incredibly practical. I, as an educator believe that for learners to take the subject material to heart, they are required to "feel" literally what they are learning. This hands-on approach encourages the learner to explore and interact – sharing their experiences. This is where the 'talking' would come in handy.

Most, importantly, I believe that the mere fact that your son is enjoying school every day is enough of a reason for me to carry on with my existing teaching methods.

Yours sincerely

6.3.2.4. Teaching Experience

<table>
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<th>DETAILS</th>
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<td></td>
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TABLE 6.9 Sarah's second and third teaching experiences

6.3.2.5 Self Portrait

Her drawing, reproduced below, illustrates many aspects of science teaching and learning as required by the new curriculum, and supports the views she expressed in her letter.

FIGURE 6.7 Sarah's self portrait
6.3.1.6 Fourth Year Decisions

- **Advanced Study**
  
  She chose English for the advanced study component and passed satisfactorily

- **Learning Area**
  
  Sarah chose to study languages and passed well with 70%.

- **Independent Research**
  
  For her independent research project, Sarah investigated certain aspects of independent schooling in South Africa.

- **Teaching Experience**

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**TABLE 6.10 Sarah's final teaching experiences**

6.3.3 Enthusiastic Martin

Martin is a White, urban, English-speaking male student of middle-class background. He lives in a suburb of Johannesburg where he attended a Christian School which is associated with a Protestant132 Christian sect. At school, he studied biology but not physical science. He achieved 44% on the diagnostic concept pretest and 86% on the STEBI – B, indicating that he is quite confident about teaching natural science despite not having studied the physical sciences at school-leaving level. He is very interested in the life sciences, studying this discipline at university where he achieves good grades, but he is not as passionate about the discipline as are some other students. However, like some of the other students, he would prefer to teach in a secondary school and registered for the Bachelor of Education degree specialising in primary teaching because that was the only way he could study life sciences at an advanced level.

During his time at university he was employed on a part-time basis as a junior housemaster at a nearby private boys’ school133, and lived in the hostel. Despite his interest in life sciences he is violently opposed to the theory of evolution and, in accordance with the tenets of his religion, believes that the Earth was created in seven 24-hour periods. His identity, therefore, is primarily Christian with interest in the created

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132 Some would say ‘fundamentalist’.
133 Interestingly, the school is a church school with ties to the Anglican (Episcopalian) branch of the Christian faith, whose theological underpinnings are quite different from those of the sect to which he belongs.
world. There is no possibility of integrating his religious beliefs with the scientific view of
the age of the Earth and the origins of life. Using Gee’s terminology, one could describe
these two aspects of his A-identity as mutually affirming provided that it is understood that
species did not come about by natural selection.

6.3.3.1 Critical Incident
It is possible that he misunderstood the question which referred to an ‘experience’. He
wrote about an experiment regarding transpiration giving the instructions in the Aim;
Apparatus; Method . . . format on how to conduct the experiment. Like one or two of the
other students he has re-imagined a past world and his own experience, but at a mundane
level.

6.3.3.2 Responses to children’s drawings of science teachers

Drawing 1
The first picture indicates an educator who has no idea what she is doing with regard to
science.

Drawing 2
The second shows an educator standing in front of the board teaching, but teaching subject
matter that is hardly appropriate for her grade.

Drawing 3
The third figure represents a teacher that is comfortable and happy both with the subject
matter and her class.

6.3.3.3 Letter to Parent

Dear Parent
I thank you for your concern expressed in the letter I received last week. The following letter
serves to substantiate the reasoning behind my teaching.

I am so happy that Kevin is so keen on coming to school. The progress he is making in class
and the results of his test are something I hope you as parents are proud of. The word
‘science’ means ‘to know’ and I try to incorporate the inquisition that this statement suggests
into each class. The minds of young learners are ripe with the desire for knowledge and I
feel that it be my mission in life to facilitate this. I, too, could give the learners the curriculum
and let them write as if that’s all school was for. The passion of the young learners would
dissolve and my job would become nothing more that your average desk job where paper
pushing and big thick glasses, so I can see the paper in front of me, are the order of the day.

Experiential learning is the term used to describe the type of learning I subscribe to within my
class. If you parents allowed your child to use matches under your supervision, then he
would know it goes WHOAFF. Maybe your style of parenting should be brought under the microscope. If you are not sure of what a microscope is, then book an appointment and I'll show you instead of my teaching.

If your husband has any further issue please allow him to come and see me. I would like to hear from him personally.

6.3.3.4 Teaching Experience

<table>
<thead>
<tr>
<th>TEACHING EXPERIENCE 2</th>
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<td></td>
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<td>LO</td>
<td>Games</td>
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TABLE 6.11 Martin's second and third teaching experiences

6.3.3.5 Self Portrait

His drawing shows a teacher, positioned centrally, but among the pupils and their activities. There is science equipment on a bench and the pupils are actively involved conducting some investigation. In this drawing, he indicated a good understanding of inquiry pedagogy.

6.3.3.6 Fourth Year Decisions

- Advanced Study
In his fourth and final undergraduate year at university, Martin followed his science interests. He chose to study life sciences at an advanced level which he passed satisfactorily.

- **Learning areas**
  He studied the natural sciences and life orientation learning areas. Details of his work in the natural sciences learning areas are listed below.
  - **Alternative Conceptions Presentation**
    He discussed pupils’ misconceptions about microbes (viruses and bacteria mainly). He handled the topic competently, answering questions confidently and showing evidence of research into the subject. He emphasised avoiding infection by (i.e.) one’s own actions, making a strong point about HIV and AIDS being related to ‘irresponsible sexual behaviour’. I make this point specifically because a strong ‘abstinence’ view is not a universal phenomenon among young people today.
  - **Sci Bono**
    Martin worked with another male student (Gareth) and together they facilitated a hands-on demonstration which illustrated the production of carbon dioxide during a simple chemical reaction. However, their explanations were more suited to secondary school pupils, yet another illustration of Martin’s interest in secondary, rather than primary, education.
  - **Examination Equivalent**
    Martin went beyond life science in this project and constructed a virtual field trip to outer space, where pupils ‘visited’ several planets and some moons. The work was thorough, but a little too fact – dominant.
    He was awarded a distinction for this learning area.

- **Independent Research**
  As previously mentioned, his independent research report dealt with teaching evolutionary theory and its effect on school pupils of different ages. He used a pre- and post-test design, the findings illustrating some shifts in pupils’ beliefs. He ended his research report with a plea for alternative methods to be sought in teaching about the origin of life. Again he emphasised his strong *alignment* with the discourse of creation.

- **Teaching Experience**
  According to university regulations, he conducted his final teaching experience in a primary school.
TABLE 6.12 Martin's final teaching experiences

It should be noted that Martin, like Gareth (described later), was actively encouraged by school authorities to teach natural sciences. He has accepted a post at a secondary Christian School, similar to the one he attended. He has agreed to teach a subject called ‘life studies’ which encompasses religion education, healthy diet and lifestyles as well as outdoor pursuits, sporting activities and exercise. He will not, therefore, teach life sciences and will avoid the creation / evolution conflict. When telling me about his appointment, he commented that these arrangements were ‘better.’ After the examinations, he became engaged to be married to a young fellow student of similar convictions.

6.4 Trajectory disturbance

6.4.1 Enthusiastic Janet

Janet is a White, urban, English-speaking female student of middle-class background. She lived with her parents and sibling in a previously ‘white’ suburb on the East Rand. As such, she is part of the dominant White South African culture, in terms of education, language, lifestyle and access to residential area of her parents’ choice. In Gee’s terminology, her D-identity is ‘good student, promising teacher’. In her final school-leaving examinations she achieved distinctions (over 80%) for both physical and life sciences and a B (70% to 80%) for mathematics. She majors in life sciences at university, having achieved distinctions (over 75%) in all examinations thus far.

She achieved 83% on the diagnostic pretest instrument and scored 94% on the STEBI instrument. She is very enthusiastic about teaching and about science and mathematics. Her supervising teachers and tutors during teaching experiences praise her unstintingly. Her fiancé is a teacher of mathematics and supports her efforts generously, as do her parents. During her first school visit when she was in her first year of study, her fiancé confided that she ‘was bouncing off the wall in her excitement’. She has authored her identity as science student and prospective science teacher in positive terms.

134 This means all subjects, not only life sciences
6.4.1.1 Critical Incident
She chose a Grade 10 chemistry demonstration which she witnessed while still at school. This experiment involves the burning (oxidation) of various elements like sodium, calcium, magnesium, phosphorus. These investigations are very dramatic\textsuperscript{135} and have become part of ‘school science folk lore’ over the years. Nevertheless, despite the ‘whiz-bang’ nature of the reaction, I believe that the incident is a bit mundane. However, she was able to imagine herself back in time, seeing science in a positive way.

6.4.1.2 Responses to children’s drawings of science teachers

Drawing 1
‘This drawing shows a lesson which is teacher-focused with no learner interaction. The teacher doesn’t seem to know what she is talking about and the learners don’t feature’.

Drawing 2
‘The teacher seems to be some sort of alien who is frightening the children. The learners seem to be confused and upset. This could be because the concepts she is teaching are too difficult for learners to grasp.’

Drawing 3
‘This lesson looks fun, interesting and interactive. The teacher looks happy, friendly and well-prepared. For this reason, the learners are enthusiastic and want to get involved’.

6.4.1.3 Letter to Parent

Dear Parent
Firstly, I would like to thank you for your letter and your deep concern for Kevin’s education. I do apologise for any inconvenience and worry caused as a result of my lesson. However I strongly believe that it is vital for learners, including Kevin, to be hands on in their process of learning. Furthermore the aim of education now is not what it used to be. We are trying to develop active learners as opposed to passive recipients. In our country it is vital for learners to develop critical thinking skills and become active citizens in society. It is for this reason that we as teachers encourage the learners to participate fully in all lessons.

With regard to the actual experiment mentioned in your letter, I truly believe it was a valuable activity. I can assure you that the learners were given proper instructions and precautions. The materials used in the experiment were not ones which would give off poisonous or toxic fumes. As for Kevin burning his hair, I am afraid that he disobeyed the instructions and ignored the precautions and unfortunately got his fringe burnt but I believe it was punishment enough for him and that’s why I allowed him to carry on. I don’t want my learners’ mistakes

\textsuperscript{135} The oxidation (burning) of magnesium which intrigued Janet produces a brilliant White flash, guaranteed to have an effect on any one witnessing the reaction for the first time.
to hinder their learning. He misbehaved; he reaped the consequences and then continued learning.

I truly believe, as do most educators nowadays, that learners should be given an opportunity to discover things for themselves and develop an understanding of concepts by themselves. Teachers then build further knowledge onto that and help the learners with their discoveries.

I believe that there is a time for the teacher to stand up and talk while the learners take notes. However, there is also a time when the teacher should stand back and allow the learners to not only learn by themselves but also from their peers and also to have fun while learning.

I will continue to conduct experiments and activities that are learner-centred. However, I will monitor them even more closely. However, learners must learn to follow my instructions and precautions (which are clear and have a purpose). I trust that Kevin has learnt his lesson and will follow the rules thus preventing this inconvenience happening again for you.

Thank you again for your concerns. Please feel free to come in and meet with me if you are still anxious about my lessons. I will be more than happy to speak with you.

Yours sincerely

PS. Kevin is a wonderful boy and I am so glad he likes to come to school.

### 6.4.1.4 Teaching Experience

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**TABLE 6.13 Janet’s second and third teaching experiences**

Janet’s history seemed to be a major success story. Her school achievements are followed by equally high achievements in academic studies at tertiary level. She sees herself as a good science student, her own experiences as a school pupil continuing on the same high note at university. In a different *imagined* world, she sees her future self as a promising science teacher.
As can be seen from the figure, Janet has represented herself and her class of children in a way which has similarities to Drawing 3. The teacher is in the front of the class near a chalkboard and the pupils are sitting singly in rows. The teacher is asking a closed question about water and a pupil is giving a correct answer. There appears to be a bench with apparatus on one side, but there is nothing on the pupils’ desks. She provided a written description of the scene as follows:

‘Within my class, I want to be friendly yet professional i.e. be approachable so that learners feel comfortable answering and asking questions. The class is colourful; the work on the chalkboard is legible and large. I am focusing on the learners giving input before actually moving on to more formal work. Learners feel comfortable to answer questions and are all relatively happy.’

Up to a certain point, i.e. the elective secondary school teaching experience outlined above, Janet’s trajectory moved straight ahead in an uncomplicated way. This teaching experience, however, provided different opportunities and steered her towards a different professional identity.

6.4.1.6 Fourth Year Decisions
In 2009 Janet accepted a mathematics and natural science / life science post at the secondary school where she conducted her elective. She decided to continue her studies by correspondence. From the outset, she displayed many of the instincts of a good teacher and little has changed. What has changed, however, is the level at which she has
chosen to work. Her great interest in the sciences as a discipline has stimulated her move to secondary education where she believes she can increase the depth of knowledge of her pupils.

Janet is now married and is teaching happily at the secondary school which offered her the permanent post. After completing some courses by correspondence, she returned to the University of the Witwatersrand School of Education in a part-time capacity to complete an advanced study in life sciences, for which she was awarded a distinction. As a practicing (although not fully qualified) teacher, she was allowed to conduct her final teaching experience at ‘her’ school. She taught life sciences and mathematics and was awarded a distinction.

6.4.2 Enthusiastic Phumlani

Phumlani is a Black male student aged 21 years whose first language isiSwati\textsuperscript{136}. His home is in a rural area of what is now Mpumalanga,\textsuperscript{137} parts of which border on Swaziland. This region was previously known as the eastern Transvaal. Like many other students, he does not have English as a first language and his family background is subsistence farming / working class. He attended a rural school in Mpumalanga where he studied mathematics, life sciences and physical sciences. In the final (matriculation) examination, he achieved very low grades in all of these disciplines\textsuperscript{138} but was allowed to register for the life sciences course at university.

One might have expected him to fit into a marginal position as far as dominant educational culture is concerned, when one considers that he has moved from a rural area to an urban university where English is the language of learning and teaching. This was not the case as will be explained.

The first year life sciences course focuses on biodiversity, ecosystems and certain biomes; one of which is the ‘bushveld’ (grassland / savannah) which occupies much of Mpumalanga. He is knowledgeable about indigenous plants and animals and during his life sciences studies he brought interesting, local knowledge to the class discussions relating several stories and legends around indigenous flora and fauna. He even presented me with a gift of jam made by his mother from the fruit of an indigenous tree\textsuperscript{139}.

\textsuperscript{136} This is the indigenous language of Swaziland and also an official language of South Africa.
\textsuperscript{137} Mpumalanga is a word in isiZulu meaning ‘the place where the sun rises’ which is highly appropriate for an eastern area of the country.
\textsuperscript{138} less than 40%.
\textsuperscript{139} A Marula (\textit{Sclerocarya birrea}) tree, as it happens, the fermented fruit of which is well known for its alcoholic properties.
His nature (Gee 2001) identity as a rural learner enhanced rather than detracted from his institutional (ibid) identity.

Also in his first year of study, he and a friend participated in a ‘clean up’ campaign removing litter from a local park. He was able to embrace aspects of science as part of his life world because it is part of his everyday experience. As Kozoll and Osborne (2004: 170) put it, ‘science is found in [these] numerous spaces and as part of [these] numerous identities’. In other words, at the time, he authored a successful science student identity because he believed science was part of his life world.

He was a very enthusiastic student, participating in all activities competently. He is interested in many aspects of the natural sciences and is eager to teach within the Learning Area as evidenced by his 94% STEBI-B score and that he expressed no concerns about teaching natural sciences. However, he achieved only 28% on the diagnostic pretest. He completed the first year of Life Sciences at WITS School of Education successfully and proceeded to the second year where he was less successful.

6.4.2.1 Critical Incident
He participated fully in all aspects of the natural sciences course, at times taking on the role of broker, encouraging less enthusiastic students to join him. The transcript of his ‘critical incident’ follows below:

My most memorable science was when I failed genetics in second year. I was very disappointed because now I will never know how light people produce dark offspring.

6.4.2.2 Responses to children’s drawings of science teachers
His responses to the drawings reveal that he is quite well aware of the content required in the intermediate phase. In other words, paraphrasing the RNCS, he knows about science.

Drawing 1
This is a picture of a student teacher waiting for the teacher to come to the classroom. He/she must teach them natural science and does not know how to teach it, that’s why she needs help.

Drawing 2
It’s a lesson about matter and materials. The teacher is using symbols to represent water (H₂O). The learners do not understand the symbols. That’s why they are frowning. The teacher should have used words since it’s a primary school. The learners couldn’t understand what he is teaching.
Drawing 3

The lesson is about Planet Earth and beyond. She is teaching them about planets. It's also about Matter and Materials because a periodic table is on the wall. She is also teaching about weight and units.

He responded to all three drawings, and in different ways. He considered the first drawing to be that of a student teacher; he was critical of the teaching methods in the second drawing and focused on the subject matter of the third drawing.

6.4.2.3 Letter to ‘parent’

Dear Parent
I’m writing this letter in response to your letter concerning your son Kevin who burnt his hair by mistake.

Firstly, I would like to apologise for what happened to Kevin. Today learners must learn something practically, that’s what I was trying to do. I thought that by letting them set the fire they will have a clear understanding of how things burn.

Outcomes based education allows learners to learn by practicing unlike learning theoretically like before as you used to learn in your days. Next time I will make sure that it won’t happen when they do a similar thing like that.

Yours sincerely

His response made some attempt to explain the pedagogy and also to reassure the parent.

6.4.2.4 Teaching Experience

Interestingly, he stuck to Model C schools for most of his teaching experiences but was very eager to return to a rural school for his elective in order to give something back to his community. As can be seen from the summary on the following page, at the rural school, where one teacher may teach several classes in the same room at the same time, Phumlani helped wherever he was needed and moved from age-group to age-group most of the time.
<table>
<thead>
<tr>
<th>SCHOOL TYPE</th>
<th>LEARNING AREA</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEACHING EXPERIENCE 2</td>
<td>Model C LLC (E) HSS (G)</td>
<td>Adjectives Provinces and capitals</td>
</tr>
<tr>
<td></td>
<td>Model C LO HSS (G)</td>
<td>Stereotyping Earthquakes and cyclones</td>
</tr>
<tr>
<td>TEACHING EXPERIENCE 3</td>
<td>Model C LLC (E) MLMMS</td>
<td>Adjectives Polygons</td>
</tr>
<tr>
<td></td>
<td>Rural school in Mpumalanga</td>
<td>General teaching of all subjects and a variety of classes</td>
</tr>
</tbody>
</table>

TABLE 6.14 Phumlani’s second and third teaching experiences

6.4.2.5 Self Portrait

His drawing illustrates someone teaching from a chalkboard to a group of children seated (or standing) in rows. The teacher is certainly upright and appears in control, but it seems that Phumlani’s imagined world of science teaching does not embrace much learner-centred activity.

Phumlani, despite not studying the physical sciences at school, found great encouragement while studying life sciences. His out-of-school knowledge of ecology, for example, was affirmed when the class studied the savannas of Southern Africa and he was able to make significant contributions to class discussions. At the time, he saw himself as a successful life sciences student. He made a connection between school and
out-of-school knowledge, thereby engaging in some boundary work. Unfortunately, his life science student identity took a blow from the previous year’s lack of success.

6.4.2.6 Fourth Year Decisions
Phumlanzi moved out of the sciences in his fourth year of study, and continued to study isiZulu as an academic major. He plans to return to Mpumalanga when he qualifies and remains eager to help young children understand more about the flora and fauna of the local region.

6.4.3 Enthusiastic Gareth
Gareth is a White, urban, English-speaking male student of middle-class background. He lives in the hostel of the private boys’ school where he and Martin are employed as house masters; a position of some privilege, which may not be as easy for Black students to attain, and certainly impossible for young women to attain. At 25 years, he is a little older than the other students, and has been employed as a technician (not as a teacher). He studied both life sciences and physical sciences at university, achieving satisfactory grades, although he is passionate about life sciences.

During the time he was an undergraduate, the university did not offer life sciences as a discipline to secondary teachers-in-training beyond a certain level, whereas primary teachers were able to continue their studies in this area for a further six months. For this reason, Gareth cancelled his registration for secondary school teaching, registered as a primary student teacher, and completed all life sciences modules offered at the time. His decisions illustrate clearly his strong attachment and loyalty to the life sciences. He is expressing his identity as a life scientist or as one interested in this discipline.

His comment on entering the methods course was ‘I want to make it interesting and hands-on in the hope of my learners being interested and possibly passionate about our world and nature and the environment.’ He achieved 48% on the diagnostic pretest instrument and scored 93% on the STEBI instrument.

6.4.3.1 Critical Incident
It is possible that he misunderstood the question which referred to an ‘experience’. He wrote about an experiment (potato osmometer140) which he enjoyed while at school. From his description, nothing significant can be drawn from this ‘experience’, other than that he really enjoys life sciences – which he frequently affirms.

140 This is a demonstration of the movement of water through a hollowed-out potato.
6.4.3.2 Responses to children's drawings of science teachers

Drawing 1
This drawing shows a teacher who is mean and angry and just sits in front of the class.

Drawing 2
This teacher is also in front of the class, teaching off the board. This is a lesson on water but the learners are unhappy. This shows passive learning.

Drawing 3
The teacher is happy and friendly, BUT is standing in front of the class. She is teaching off the board. The learners have their hands up and are unafraid, BUT passive.

His responses to the DAST-T were all quite critical of the teaching methods suggested in the drawings. With reference to Drawing 1, however, he made no comment about the absence of learners. For Drawing 2, apart from stating that the learners look unhappy, he made no further comment specific to this particular drawing. For Drawing 3, he noted that the learners are not scared of the teacher but made no comment about the periodic table. However, unlike many other students he commented that all the lessons depicted ‘the teacher is at the front of the class, teaching off the board or behind their desks’ and that the learners are taught through ‘passive learning’.

6.4.3.3 Letter to Parent

Dear Parent

Thank you very much for your letter and letting me know your and your husband’s concern over your son’s education.

I realise that the way Kevin is learning is very different from the way you and your husband were taught at school. But it has been proven that children learn more when they learn from practical exercises where they get first hand knowledge of new ideas. This is linked to the new system of education implemented in South Africa called Outcomes-Based Education.

Especially concerning science and technology much of the work is taught through practical investigations that need to be done by the learners themselves. After these investigations are done, then the newly discovered information is consolidated in their books. I also think that it is a good opportunity to learn to be careful and responsible when working with potentially dangerous experiments. I think your son’s new enthusiasm for coming to school to learn proves that this method of teaching encourages learning.

If you would like to discuss this in more detail, please make an appointment to see me.

Yours Sincerely
In this response to the ‘parent’, Gareth has explained his teaching methods quite adequately and invited further communication.

6.4.3.4 Teaching Experience

From the table, it can be seen that at the end of his second year of study, Gareth changed emphasis from secondary teaching to primary teaching. This switch was done in order to accommodate the advanced course in life sciences.

<table>
<thead>
<tr>
<th>SCHOOL TYPE</th>
<th>LEARNING AREA</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model C High</td>
<td>LLC (English)</td>
<td>Poetry</td>
</tr>
<tr>
<td>Model C High</td>
<td>LLC (English)</td>
<td>Creative writing</td>
</tr>
<tr>
<td>Model C Primary</td>
<td>LLC (English)</td>
<td>Poetry</td>
</tr>
<tr>
<td>Model C Primary</td>
<td>NS</td>
<td>Human Body</td>
</tr>
</tbody>
</table>

**TABLE 6.16 Gareth’s second and third teaching experiences**

6.4.3.5 Self Portrait

The drawing shows an outdoors lesson in a garden with pupils independently examining plants. The teacher is ‘supervising learners in school garden’, and the learners are ‘in school garden identifying plants and categorising them into dicotyledons and monocotyledons according to the type of leaves and features learned in the previous..."
lesson’. These learners are pictured with notebooks in hand, examining the plants in the garden.

Although this drawing illustrates a lesson where learners are actively engaged with the material and therefore very unlike the transmission stereotype, it is acknowledged that application of what was learned in class (according to one of the captions) is not the highest level of enquiry.

6.4.3.6 Fourth Year Decisions

- **Advanced Study**

In his fourth and final year he elected to study *life sciences* at the advanced level. At this stage of his studies, his interests were very clear. His options were directed towards study and research (with a view to teaching) in the life sciences. His science teaching trajectory continued in an uncomplicated way for the first few months of the year. Later, there were significant changes. For example, he achieved a good grade in the first section of the advanced life sciences course i.e. 70%+, and a very poor grade in the second and final section i.e. 40%.\(^{141}\)

- **Natural Sciences (Learning Area)**

  - **Alternative Conceptions Presentation**

    He discussed pupils’ misconceptions about a biological process namely respiration. He handled the topic competently, answering questions confidently and showing evidence of research into the subject.

  - **Sci Bono**

    Gareth worked with Martin and together they facilitated a hands-on demonstration which illustrated the production of carbon dioxide during a simple chemical reaction. However, their explanations were more suited to secondary school pupils.

  - **Examination Equivalent**

    Gareth’s virtual field trip was an excursion to rock pools, with very appealing pictures and some challenging questions for pupils. He has traveled quite extensively and visited many coastal areas. His choice of site possibly encouraged him to recognise his own experience, to create images of the past and to link them with future possibilities in his teaching practices.

\(^{141}\) Personal issues regarding his forthcoming marriage intervened at this point. During this time, a slight trajectory interruption intervened, but did not deter Gareth permanently from his chosen path.
• **Independent Research**
  His research report involved pupils’ alternative conceptions about the human body. As previously mentioned, students have a wide choice when choosing this research project and it seems safe to conclude that he chose a topic in a discipline of great interest to him, namely life sciences. For this project, he conducted field work using a questionnaire and produced well analysed results. However, the work was submitted late for which he was penalised.

• **Teaching Experience**

<table>
<thead>
<tr>
<th>TEACHING EXPERIENCE 4</th>
<th>SCHOOL TYPE</th>
<th>LEARNING AREA</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model C Primary</td>
<td>NS</td>
<td>Energy transfers Magnetism Mammals</td>
</tr>
<tr>
<td></td>
<td>Model C Primary</td>
<td>NS</td>
<td>Ecosystems Biodiversity Acids and Bases</td>
</tr>
</tbody>
</table>

**TABLE 6.17 Gareth’s final teaching experience**

I did not tutor Gareth on his final teaching experience, but was informed by his tutor that he did not give of his best and seemed distracted. It was unfortunate that he did not achieve a distinction for his teaching experiences. It may be deduced that towards the end of his final year, Gareth’s attention was not entirely on his studies. In addition to the unexpected shortcomings mentioned above\(^{142}\), he did not pass one of the ‘Studies in Education’ courses and was obliged to repeat same the following year.

He planned to marry in the January following his official final year of study later told me that he found it difficult to concentrate when wedding plans were taking place at the time. It seemed that merging two important aspects of his life was proving quite challenging. He has postponed his planned course of study for an honours degree in science education, and is now travelling with his wife in the South East Asia.

Their experiences illustrate the ways in which people ‘*make history under conditions not of their making*’ and how varied the trajectories of these students are, even though the early (pre–science course) histories of some may be very similar.

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\(^{142}\) These include late submission of work, poor achievement in second half of advanced study and mediocre teaching performance.
These three students entered the natural sciences methodology course with very different views about science and the teaching of science. Their differing religious / moral views exerted great influence on their teaching identities, such that they graduated as teachers with diverse identities.

One student (Shanti) was put off science by cruelty to - or at least indifference to - animals but then learned that such behaviour is not the norm. Moreover, she was introduced to conservation principles and was able to integrate her ethical beliefs with an interest in life sciences. The second student (Sarah) found several science connections with aspects of Jewish identity and became The third student (Martin), despite his great interest in the life sciences, clung fiercely to a creationist (rather than evolutionary) identity and opted not to teach life sciences, finding other routes to meet his interest in the living world.

6.5 Final Note
Although the methods course was not investigated as an intervention, it is of interest to examine in graphical format, as seen in Table 6.12, the pre-test and post-test scores of the case study students on the content knowledge diagnostic test. Significantly, every one of these students demonstrated better understanding of the concepts tested on the post test than on the pre test. I shall return to this point in the following chapter.