

CHAPTER 5

SELECTION AND APPLICATION OF THE RESEARCH METHODOLOGY AND DATA COLLECTION STRATEGIES

5.1 INTRODUCTION

This chapter discusses the research methodology used during the collection of data. The chapter also describes the processes followed as a response to the specific aim and objectives of the study.

The collection of data for this investigation is based on qualitative data collection techniques and strategies. Emphasis is laid on the following aspects: the data collection techniques and strategies applied; content validation of inventories; the composition of the research sample and selection of the participants; data collection processes; the conducting of the individual and focus group interviews and the method of data analysis.

5.2 DATA COLLECTION TECHNIQUES AND STRATEGIES APPLIED

5.2.1 REASONS BEHIND THE CONDUCTING OF A QUALITATIVE INVESTIGATION

The researcher's intention to discover the opinions of blind learners and their educators prompted the selection of qualitative data collection techniques and strategies. The merit of this method of data collection is that it provides insight into the difficulties which blind learners experience during biology learning mediation. Qualitative data collection techniques and strategies are significant because they are interpretive and constructivist in nature and they shed much light on the learning mediation experiences of educators and learners. Quantitative methods would have shed less light than qualitative techniques, which have the capability of enhancing the researcher's tolerance of ambiguity, and his sensitivity, sound communication recording, empathy and listening skills.

The researcher distinguishes three distinct characteristics of qualitative data collection techniques and strategies which are significant in conducting research. They relate to the researcher as an instrument, as a data collector and as a data processor. Quantitative methods are not characterised by the features discussed above. Quantitative methods take positivist and traditional stances. Further, these methods are deductive and predictive in approach, thus causing them to rely on experimental designs and statistical correlations. Qualitative data collection techniques and strategies, however, are frequently inductive in their approach, implying that they are naturalistic and that their significance can be derived from in-depth study of very few cases.

Regarding quantitative methods, Smit (2001:56) argued that their assumptions about the world are based on a logical positivist philosophy. This implies that social evidence is a single objective reality which is separated from the feelings and beliefs of individuals. He added that qualitative research is based on a naturalistic phenomenological philosophy. It is assumed that realities are socially constructed by the individual and by society.

Quantitative investigation methods establish relationships that are important for explaining causes. These are what Smit refers to as “measured social facts”. In contrast, the purpose of qualitative data collection techniques and strategies is to acquire an understanding of the social phenomenon from participants/respondents themselves.

Through employing quantitative methods, the researcher tests hypotheses, while in qualitative data collection techniques and strategies, hypotheses are generated. Through quantitative methods, researchers search for causal determination, predictions and generalisations of anticipated findings. Qualitative researchers strive for enlightenment concerning, and a better understanding of, researched issues.

Quantitative data gathering methods and processes are uncompromising because there are set steps and procedures for guiding the researcher. The researcher has to abide by them. In qualitative data collection, techniques and strategies, processes, steps and procedures enjoy greater flexibility.

Quantitative data collection techniques and strategies detach the researcher from reality while qualitative data collection techniques and strategies encourage positive interaction between the researcher and participants. Qualitative data collection techniques and strategies are important for the development of context-bound generalisations, unlike quantitative data collection techniques and strategies, which are successful in the development of universal context-free generalisations. Pertaining to qualitative data collection techniques and strategies, the researcher’s values and principles guide and shape his research conclusions. What makes this possible is the fact that the researcher himself or herself constructs the reality of the inquiry.

There are also two other reasons that should be listed: Blind and visually impaired learners would have found it very difficult to work through quantitative questionnaires independently without the help of an assistant. The limited number of teachers working in the field also made the use of quantitative techniques less significant.

Owing to these factors, the researcher decided primarily to use qualitative data collection techniques and strategies. Focus groups and interviews with educators and learners comprised the primary data collection strategy.

5.2.2 FOCUS GROUP INTERVIEWS

Cohen, Manion and Morrison (2001:267) define the term “interview” as “...(a)n interchange of views between two or more people on a topic of mutual interest, (which) sees the centrality of human interaction for knowledge production and emphasizes the social situatedness for research data.”

By conducting focus group interviews, which are different from one-on-one interviews, the researcher sought to obtain an understanding of the problems experienced by educators and blind learners during the mediation of life science related subjects. The data collection technique or strategy is user-friendly. It allows the researcher to assess problems, concerns, new products, programmes or ideas by interviewing a purposefully sampled group of people rather than each person individually.

McMillan and Schumacher (2001:455) and Cohen, Manion and Morrison (2000:288), considered the following as advantages of focus group interviews:

- ❑ Interviews create a social environment in which group members are stimulated by the perceptions and ideas of each other;
- ❑ The perceptions and ideas of different people increase the quality and richness of data;
- ❑ The more the group interacts, the higher the quality of data and outcomes;
- ❑ The strength of the group lies in focusing on a particular issue, therefore yielding insight that might not have been available in a straightforward interview;
- ❑ Focus group interviews are economical as regards time because they produce a large amount of data in a short period of time.

The researcher used the semi-structured interview method at nine schools (four in Gauteng Province and five in Limpopo Province), discussed thoroughly later in this work (resulting in a total number of 17 educators and 104 learners interviewed). In total, the respondents (educators and learners) numbered 121. The researcher deduced that the largest group of learners was in the GET Band, followed by those in the FET Band.

Based on the advantages alluded to above, the researcher believes that the interview mode of data collection was ideal for this research because of the following factors:

- ❑ It is unrestrictive. Therefore, it allowed the researcher to make use of supplementary modes of data collection.
- ❑ Through it, one gains large amounts of information quickly.
- ❑ The researcher obtains a wide variety of information from a large number of subjects.
- ❑ It enables and enhances immediate follow-up questions and any necessary clarification.
- ❑ The researcher (interviewer) and participant (interviewee) always agree on follow-up interview sessions should the need arise.
- ❑ An interview that is supplemented by other modes of data collection (such as direct observation) allows the researcher to check and verify the descriptions given against other facts.
- ❑ It accords the researcher opportunities to describe and analyse the situation, event or process.

- Finally, the research methodology is successful because of its simple stages/phases of data collection, which comprise searching, collecting data, observing, interviewing and interpreting. It is flexible, thus enabling the researcher to adjust strategies as he hears or sees unexpected data, which he then wishes to use in future.

5.2.3 DIRECT OBSERVATION

The researcher also used direct observation (at one school in Gauteng Province and another in Limpopo Province) as another method for collecting data. Direct observation was important because it focused on the structure of the lesson and the determination of common and uncommon activities. Cohen, Manion and Morrison (2001:305) maintain that observational data are attractive because they afford the researcher the opportunity to gather “live” data from “live” situations. The researcher is further given the opportunity to look at what is taking place in situ, rather than relying on secondary resources. This enables the researcher to understand the context of the programmes, to be open-ended and inductive, to see things that may otherwise be unconsciously missed, to discover factors that participants may not freely talk about in interview situations, to move beyond perceptions-based data (e.g. opinions in interviews), and to access personal knowledge. The researcher used a sighted observer to observe on his behalf because he could not technically observe, owing to his blindness. He used her notes and verbal explanations to be in touch with what was happening during various activities.

Dyer (1979:158) argued that direct observations are ethically effective in situations where the researcher wishes to study specific aspects of human behaviour. In this instance, for example, the researcher wished to observe, know and understand the specific techniques and practices blind learners use during the learning mediation of biology and other life sciences subjects. Direct observations paid attention to the way educators explained certain things to learners, the techniques they used during learning mediation, how they created learning and observation opportunities for their blind learners, and so forth. It was decided to take photos because the main purpose was to reveal very effective techniques and practices where outcomes were being achieved, or unsuccessful techniques or practices where outcomes were not being achieved. The purpose of using the tape recorder and the videotape was to capture valuable “auditory and visual” information from educators, lessons and focus groups for analysis or synthesis of data. The interview schedule or inventory for educators and focus groups was based on the National Curriculum Statement and Science Process Skills and in particular on the learning outcomes and assessment standards for Grade 12.

5.2.4 FOLLOW-UP TELEPHONE INTERVIEWS

It was necessary for the researcher to conduct a follow-up interview to crosscheck respondents’ responses and comments recorded during the individual and focus group interviews. Comments and responses were interpreted and taken into consideration when data was analysed. However there were still a number of issues that remained unclear to the researcher and needed crosschecking in terms of his interpretation of the observations against respondents’ personal opinions.

5.2.5 THE USE OF QUESTIONNAIRES OR INVENTORIES IN THE COLLECTION OF DATA

Questionnaires and inventories are useful in collecting data since they mark “...(a) move away from seeing human subjects as simply manipulable and data as somehow external to individuals and towards regarding knowledge as generated between humans, often through conversations” (Cohen, Manion and Morrison 2001:267). Through questionnaires and inventories, people exchange views on a topic of mutual interest; therefore, their interaction enhances a sense of social situatedness. According to the researcher, social interaction is essential in any learning situation, but especially in a situation involving the blind because interaction will accord them opportunities to communicate and access information verbally. The purpose of using the semi-structured questionnaire in a qualitative research was to help the researcher as well as to protect him from deviating too much from issues investigated.

5.3 INTERVIEW SCHEDULES

5.3.1 SCHEDULING OF INTERVIEWS AND RELATED ACTIVITIES

Because the Department of Education granted the researcher only two months to conduct his research at schools for the blind, interviews took place during the period September and October 2003. Follow-up interviews with educators were conducted telephonically on 17 September 2004 to verify the researcher’s observations and interpretations. Follow-up interviews focused specifically on questions listed under 5.3.2 (c). Educators and focus groups were free either to participate or not to participate.

Prior to the interviews, the researcher’s role was that of:

- Preparing the interview schedule or inventory;
- Suggesting and scheduling dates for interviews;
- Notifying, in good time, participants (educators and focus groups) about interview dates;
- Confirming with principals the availability of participants during interview sessions;
- Furthermore, the researcher negotiated in advance with principals of targeted schools regarding suitable, quiet places for conducting interviews.

Before the commencement of the interview, the researcher:

- Checked the recording equipment so as to be aware of its current condition;
- Gave a short explanation of the purpose/aim of the project and some general guidelines for the interview process.

During the interview, the researcher:

- Facilitated interview sessions as a means to avoid lack of direction;
- Triggered responses by asking direct and follow-up questions;
- Monitored the sighted observer and the photographer to ensure that they met the objectives of the interviews and investigation;

- Finally, the researcher transcribed recorded information into Braille and compiled a report based on the participants' responses.

5.3.2 THE CONTENT VALIDATION OF THE INVENTORIES

Mouton (2001:108) maintained that “(d)ata come in different formats and have different properties: ...” Interview schedules or inventories, direct observations, notes, focus groups, educators, audiotapes, videotapes, questionnaires and photos were all not only methods but also techniques of triangulation. This was a way to verify or falsify the data collected. Furthermore, the research's trustworthiness lies in the fact that the researcher provided evidence that is reliable in terms of the resources in which the data were collected. The findings of this research provided a foundation to work from in the improvement of the facilitation/learning mediation of biology for blind learners in the Outcomes-based Education and Training classroom. Mohlala (1994:37) argued that qualitative inquiries should attempt to establish the “...(t)ruth value of the study, its applicability, its consistency, and its neutrality.”

The research continued to search for the “truths” stated in the Department of Education's National Curriculum Statement Grade 10-12 (schools) Biology Life Sciences Draft (2002:3) that education has the ability to “(i)mprove the quality of life of all citizens and free the potential of each person.” It further sought to establish whether everyone (blind learners included), actually has “...(t)he right to further education which the State through reasonable measures, must make progressively available and accessible”

White Paper 6 of the Department of Education (2001:30) argued that, “(c)entral to the accommodation of diversity in our schools, ... is a flexible ... assessment policy that is accessible to all learners, irrespective of the nature of their learning needs.” White Paper 6 attributes the problem of possible inaccessibility to the fact that the curricula “...(c)reate the most significant barrier to learning and exclusion for many learners”

Because the researcher is blind, he recognises that he might have been subjective when interpreting or analysing visual data explained to him by a sighted assistant and therefore might have biased the research. There is a possibility that certain questions might also have been biased by what the researcher wanted to find. What accords this work reliability, however, is that the participants themselves made some of the recommendations.

5.3.3 INTERVIEW SCHEDULE OR INVENTORY FOR EDUCATORS

Even though it does not appear to be a normal practice for researchers to explain and justify the content validation of any measuring instrument that is to be used in a qualitative investigation, the researcher, in this regard, is compelled by circumstances to explain and justify the content validation of the measuring instrument used. The researcher does so in order to give a good indication of the reasons why a number of questions were selected. The fact that the researcher did not follow the normal practice does not mean that

the researcher is not aware of the fact that only measuring instruments used in quantitative investigations have to be content validated.

To justify why these questions were used in triggering responses from participants as well as acquiring valuable data, reasons and questions are listed in the following paragraphs.

Learning outcome 1: Scientific investigation

The first eight questions are based on learning outcome 1, where learners who have attained this outcome are able to confidently explore and investigate natural phenomena relevant to the life sciences by using an inquiry process, and communication skills. National Curriculum Statement Grade 10-12 (schools) Biology Life Science Draft, (2002:10) stated that, “(w)hile learners use process skills to investigate, reflect, analyse, synthesise and communicate, they study life, the environment and technology.”

1. What type of simple tests and surveys do you do with your blind learners?
2. What do you do as an educator to give your blind learners an opportunity/opportunities to distinguish between similarities and differences?
3. Are you acquainted with science process skills?
4. Can you give me examples of how you go about applying the following science process skills in the mediation of biology to blind learners when they have to:
 - i. Measure the distance from one object to another;
 - ii. The mass;
 - iii. Growth; and
 - iv. Change in shape?
5. How do you create a capacity in learners in order for them to observe biology phenomena?
6. Can you explain to me what you do to give blind learners the opportunity to record data correctly?
7. What techniques and skills do you apply to make tabulation to blind learners possible?
8. What learning mediation strategies have you developed to achieve the science process skills discussed previously?

Learning outcome 2: Constructing science knowledge

Three questions (questions 9-11) are based on this learning outcome. Learners who have successfully attained this outcome are able to construct, interpret and apply scientific, technological and environmental concepts to explain natural phenomena relevant to life sciences. Life sciences further entails the construction of scientific knowledge from what learners already know, through collecting information and experiences from the world around them and linking this with their previous experiences (recognition of prior learning).

It is indicated in the Department of Educations National Curriculum Statement Grade 10-12 (schools) Biology Life Science Draft (2002:11) that collecting information and experiences involves using inquiry and the thinking process to interpret, apply and extend learners’ understanding of concepts, principles, laws, theories and/or models. The same document further argued that when learners share experiences they reach

“... a common understanding, and the individual makes sense of how life, environmental and technological phenomena are bound together.”

1. Which methods and sources do you use to access information in unfamiliar and complex settings?
2. What do you do to give blind learners an opportunity to describe and explain concepts, principles, laws, theories and models in unfamiliar and complex settings?
3. What are the strategies you apply in the classroom to give blind learners opportunities to accumulate information for investigation purposes?

Learning outcome 3: Science, society and environment

One question is based on this outcome. Learners who have attained this outcome are expected to demonstrate an understanding of products created from the interrelationship of science, technology, indigenous knowledge, the environment and society. Learners are further expected to identify the aforementioned links and comprehend what they accurately mean.

1. What do you do as an educator in learning mediation to give the learners the opportunity to predict outcomes of a certain intervention?

Learning outcome 4: Science, society, attitudes and values

Both the penultimate and the last questions are based on this learning outcome. According to this outcome, learners who have attained it are able to demonstrate an understanding of ethics, of biases and of the contested nature of changes in knowledge in the life sciences. This outcome further raises the learner's awareness of the existence of the different viewpoints of individuals in a multicultural society. The Mentioned National Curriculum Statement Grade 10-12 (schools) Biology Life Science Draft (2002:12) stated that learners, through this outcome, are equipped with skills to plan investigations, conduct, collect and manipulate data, analyse and synthesise data, explain patterns, etc.

1. Do you as an educator find blind learners being capable of easily designing and analyzing life science programmes?
2. What are the strategies and techniques you apply in the classroom to give blind learners the opportunity to express or reflect on the mediation in the science process skills?

5.3.4 INTERVIEW SCHEDULE OR INVENTORY FOR LEARNERS

All questions in this section were formulated based on the outcomes discussed in the previous section.

1. What type of simple tests and surveys do you conduct as blind learners?
2. Are you acquainted with science process skills?
3. Can you give me examples of how you go about?
 - i. Measuring the distance from one object to another;
 - ii. Measuring the mass;

- iii. Measuring the growth;
- iv. Measuring change in the shape.
4. Do you undertake scientific excursions or field trips?
5. Are opportunities created for you to observe biology phenomena?
6. Can you explain to me how you go about plotting and recording the data correctly?
7. What techniques and skills do you apply when you are required to make tabulations?
8. How do you go about interpreting the collected data?
9. Can you describe and explain concepts, principles, laws, theories and models in unfamiliar and complex settings?
10. How are you exposed to similarities and differences?
11. What are the strategies you apply in the classroom to create opportunities for yourselves to accumulate information for investigation purposes?
12. What does your educator do to create opportunities for you to predict outcomes of a certain intervention?
13. How simple or difficult is it for you as blind learners to analyse, synthesise, hypothesise, design, interpret and evaluate the life sciences programme?
14. What is correctly or incorrectly done during learning mediation in the classroom?
15. Which methods and sources do you use to access information in unfamiliar and complex settings?

5.3.5 FOLLOW-UP INTERVIEW

As a supplement to the initial questionnaire, the researcher conducted a follow-up telephone interview on 17 September 2004 to crosscheck educators' responses.

This verification was prompted by educators' responses and comments, recorded during the individual and focus group interviews, which were interpreted and taken into consideration when the data was analysed. However, a number of issues remained unclear to the researcher and he had to crosscheck his interpretation of the observations against respondents' personal opinions. The researcher interviewed the same number of respondents during follow-up interviews.

Below is the list of questions that he used to verify his observations.

- Drawing remains a problem to blind learners and in my investigation I discovered that learners are given "ready made drawings" and not taught how to draw. Is it therefore sensible for the blind learner to draw objects and observations, and if not what other activities are there to supplement a loss in drawing ability? How often do you use tactile diagrams and do learners have the capacity to draw and interpret tactile diagrams? Do you have equipment to produce tactile diagrams?
- My observation is that many educators engage their blind learners very seldom in practical work, field trips or related activities. This observation was supported by some educators and by some learners participating in the focus group interviews. What is your opinion regarding this statement or observation? If you would take your whole year's activities into consideration, what would you

regard as the ratio between theoretical work and practical work in the teaching of the life sciences to blind learners?

- I got the impression when I looked at the practical activities blind learners were involved in, that the activities were limited to very simple and elementary exercises that called for very little minimal intellectual challenges or advanced problem solving skills. How would you respond to such an observation? Does it carry weight and if so, what would be the main reasons for such an observation?
- When I spoke to the learners I got the impression that very few of them had access to subject-related information, with specific reference to computers, encyclopedias and recent publications. However, when I spoke to the educators many of them indicated that such information systems were available to their learners at all times. Learners also complained that the information in Braille was outdated and limited. How would you respond to these observations? Do you actually facilitate the use of additional information technology systems or do you assume that the learners will access such systems independently?
- Many educators indicated that they adapt the traditional facilitation strategies (such as demonstrations) to enhance learning for the blind learners. The learners on the other hand indicated that many of the activities relied heavily on “tell and talk” activities. Could you please indicate to me through the use of good examples how you actually go about adapting the traditional strategies? If you would argue that it remains the main task of the educators to engage blind learners in “tell and talk” activities instead of engaging them through adapted strategies, please feel free in confirming or rejecting this observation.
- Do you know of any workshops or have you ever been invited to workshops where the development of adapted learning facilitation strategies was shared with educators?
- It was not clear to me whether at your school blind and partially sighted learners were sharing the same classroom. What is the situation at your school? How is it then possible for learners to follow a co-operative learning strategy when all learners are blind? How are responsibilities shared?
- I got the impression that not much is done by educators to stimulate and develop the senses of blind learners during the teaching of the life sciences. How would you respond to this observation?

5.4 THE COMPOSITION OF THE RESEARCH SAMPLE AND SELECTION OF PARTICIPANTS

5.4.1 TYPE OF SAMPLING

(a) SOUTH AFRICAN SCHOOLS FOR, OR WITH SECTIONS FOR, THE BLIND

There are 20 schools for/with sections for the blind in South Africa, as illustrated in the following table:

PROVINCE	NAME OF THE SCHOOL	NUMBER OF SCHOOLS PER PROVINCE
Eastern Cape	Efata School for the Blind & Deaf Zamokuhle Senior Secondary School Khanyisa School for the Blind	03
Western Cape	Athlone School for the Blind Pioneer School	02
Northern Cape	Re-Tlameleng School	01
KwaZulu-Natal	Arthur Blaxall School Ethembeni School	02
Free State	Thiboloha School for the Blind and Deaf Bartimea School for the Blind and Deaf	02
Gauteng	Filadelfia Secondary School Prinshof School Sebonile School S’Nethemba Learning Centre (former Katlehong school)	04
Limpopo	Bosele School for the Deaf & Blind Letaba School for the Handicapped Siloe School Setotolwane Secondary School Tshilidzini School for Special Education	05
Mpumalanga	Silindokuhle School	01

Before one decides on the type of sampling to be used, he/she has to be guided by what the appropriate sample size should be, depending on the purpose of the study, the nature of the study and the population under scrutiny, the number of variables researchers set out to investigate in their analysis and the types of statistical tests that they wish to carry out. All these factors, as stated by Cohen, Manion and Morrison (2001:93), should inform researchers’ decisions about sampling sizes prior to the research undertaking.

For this study, the researcher chose convenience sampling, often called accidental or opportunity sampling. It involves the choosing of the nearest individuals to serve as respondents and continuing the process until the required size has been obtained. Cohen *et al.*, (2001:102) remarked, “(t)he researcher simply chooses the sample from those to whom she has easy access.” Because of financial constraints and the long distances, which the researcher avoided covering when visiting schools for the blind, he chose nine schools in Gauteng and Limpopo provinces (four and five respectively) because he has easy access to them.

Furthermore, to supplement the criteria discussed above regarding sampling, the researcher used the criteria discussed below when choosing participants:

- Whether educators merely offered life science subjects or specialised in life science subjects.
- Whether learners followed the science stream at their respective school.
- In addition, learners were chosen according to their degree of blindness, which in this instance is defined as 100% blindness or light projection, meaning that vision does not play any significant role during the learning mediation of biology or elsewhere.
- Whether participants would be accessible to the researcher.

- Participants had to express some ideas about how to alleviate some of the educational problems of blind learners in South Africa.

5.4.2 POPULATION FROM WHICH THE SAMPLE WAS DRAWN

The population for this study was drawn from the following:

- Experienced interviewer/s;
- Nine focus groups totalling 104 learners; of these 104 learners 44 are from Gauteng and 60 from Limpopo.
- Of these 9 educators (4 Gauteng and 5 from Limpopo) Nine educators from nine schools for the blind (note: although the educators who were interviewed were 17 in number, the profiles included in this study are only of those who were directly involved with the mediation of science related subjects/learning areas. Hence, only nine profiles appear in this work. The profiles that have been omitted are of those educators who have merely shown interest and are not directly mediating biology to blind learners).

The following table illustrates the profiles of educators who participated in this study.

RESPONDENT	QUALIFICATION	GENDER
R1	B.Ed. and Diploma in Science and Mathematics	Male
R2	Senior Teachers Diploma	Female
R3	Primary Teachers Diploma	Female
R4	Senior Teachers Diploma	Male
R5	Primary Teachers Certificate	Male
R6	Primary Teachers Diploma	Male
R7	Primary Teachers Diploma	Female
R8	Senior Teachers Diploma	Male
R9	B.Ed.	Female

5.5 DATA COLLECTION PROCESSES AND THE APPLICATION OF THE FOCUS GROUP

Before one discusses the processes and procedures followed in the collection of data, the phrase “*focus group*” and its importance has to be clarified. McMillan and Schumacher (2001:455) defined a focus group as: “(a) ... strategy for obtaining a better understanding of a problem or an assessment of a problem, concern, new product, program or idea by interviewing a purposefully sampled group of people rather than each person individually. By creating a social environment in which group members are stimulated by the perceptions and ideas of each other, one can increase the quality and richness of data through a more efficient strategy than a one-to-one interview.”

The researcher intended to stimulate particular discussions on given themes or topics through facilitating interactions, so that these interactions could lead to the acquisition of valuable data and to effective outcomes. In addition, the researcher envisaged a strategy capable of yielding insights that might have not otherwise been available in a straightforward interview.

Written permission, with guidelines for conducting the research, was obtained from the National Department of Education. Letters of permission are contained in the appendix. The aims of the research were explained to the Department of Education. During each interview, the same aims were again explained to educators and learners (focus groups).

Though photos were taken during this exercise, the only intention was to reveal very successful techniques and practices where outcomes were being achieved, and also unsuccessful techniques and practices. The headmaster compiled a list of individual learners in order to seek permission from their parents to use their children's photographs in this work. No names of participants were mentioned in this research. Cohen *et al.*, (2001:61) argued that: "... (t)he obligation to protect the anonymity of research and to keep research data confidential is all-inclusive. It should be fulfilled at all costs unless arrangements to the contrary are made with the participants in advance. The essence of anonymity is that information provided by participants should in no way reveal their identity. Where this situation holds, participants' privacy is guaranteed, no matter how personal or sensitive the information is."

Audio and videotapes were destroyed after the analysis of the data. All developed photos and negatives were destroyed except for those that have been used in this work to strengthen its arguments. Participants' faces appearing on the photos used were blocked out to guarantee their anonymity.

During the process of accumulating information, the researcher was also concerned about how well informed the participants in this study were about what they were getting themselves into; that is, the mediation of biology to blind learners in an Outcomes-based Education and Training classroom. Secondly, he was concerned about their perceptions regarding the activities and goals of the research.

5.6 METHOD FOR ANALYSING DATA

Ary, Jacobs and Razavieh (2002:465) pointed out that: "(t)he final activities in qualitative inquiries are analyzing and interpreting the data collected and presenting the results. ... data analysis is the heart of qualitative research and the process that most distinguishes qualitative from quantitative research." This is the most significant process for researchers. They systematically search, re-search, arrange and rearrange the data in order to comprehend the data clearly, so that they can present what they have learned to others. The process is intended to guarantee that field notes, interviews, transcripts, audiotapes, observer comments and other data are put into a readable form ready for analysis. To achieve the expected outcomes, notes, photos, audio and videotapes were analysed or interpreted. From the observations and findings, recommendations were made.

Data analysis involves coding, which authors such as Bogdan and Biklen (1992:166); McMillan and Schumacher (2001:467); and Ary *et al.*, (2002:466) refer to as coding, classifications, topics or categories. McMillan and Schumacher (2001:467) defined coding as "... the process of dividing into parts by a classification system."

According to McMillan and Schumacher (2001:467), researchers develop a classification system through the use of one of the following three strategies:

- ❑ Segmenting the data into units of content called topics (less than 25-30) and grouping the topics in larger clusters to form categories; or
- ❑ Starting with predetermined categories of no more than 4-6 and breaking each category into smaller subcategories; or
- ❑ Combining the strategies, using some predetermined categories and adding discovered new categories.

Ary *et al.*, (2002:466) maintained that coding enables the researcher to “...(p)hysically separate material bearing on a given topic from other material and is a crucial step in organizing the data.” According to Bogdan and Biklen (1992:166), in order for the researcher to develop each coding category, he/she has to search through his/her data for the regularities, patterns and topics his/her data covers, and then write down words and phrases to represent the topics and patterns perceived. “These words and patterns are coding categories. They are a means of sorting the descriptive data ... collected so that the material bearing on a given topic can be physically separated from other data.”

The reason why the researcher, who is blind, decided to do the coding of the described information in the text and did not list it as a separate unit in the appendix is that it would have been very difficult for him to have worked across different documents (sections) and built his syntheses into a separate chapter.

In this study, the researcher has used the constant comparative method because it combines inductive category coding with simultaneous comparison of all units of meaning obtained. The researcher’s role was to examine each new unit of meaning (topics or concepts) and to determine its distinctive features.

5.7 SUMMARY AND CONCLUSION

Aspects outlined at the beginning of the chapter were discussed. The researcher contends that qualitative data collection techniques and strategies are effective in facilitating and uncovering the intricate phenomena hidden in data, in an investigative way.

Qualitative data collection techniques and strategies enabled the researcher to describe educators’ and focus groups’ understanding and experiences of the learning mediation of biology. The researcher presented a logical argument as to why qualitative data collection techniques and strategies were the tools preferred over quantitative data collection techniques and strategies.

The researcher is positive that the data analysis proved to be a fundamental act of the research process because it made it possible for the researcher to make sense of the investigation, to interpret and theorise the acquired data. During the process itself, the researcher played an instrumental part in organising, describing and synthesising data, once he had read all the acquired data by means of careful Braille transcripts, divided

data into meaningful and logical units, constructed and refined categories, and so on. The researcher strove to reflect respondents' perceptions. After the completion of the interviews, the researcher had in his possession approximately 9 hours of audio-taped information. The analysis was done to ensure that the significance of the data could be perceived.

The following chapter will provide a detailed report on and discuss the empirical investigation. Answers will be furnished to questions raised in some of the subsections of this chapter.