Explicit academic vocabulary teaching of two Grade 4 Natural Science and Technology teachers in the North West Province

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DECLARATION

I, the undersigned, hereby declare that the work contained in this dissertation is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

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SUMMARY

Grade 4 learners in South African English medium primary schools face many challenges. They are confronted with various content-areas and the immense task to acquire the academic vocabulary of each content-area. Domain-specific textbooks and content-area lessons are filled with academic vocabulary crucial to the acquisition of conceptual knowledge and understanding (Antonacci & O'Callaghan, 2011). This is exacerbated by the fact that for many Grade 4 learners, English is also a Second Language (SL). Learners need strong academic vocabulary knowledge in order to make sense of academic texts, complete academic tasks or activities and achieve academic success (Antonacci & O'Callaghan, 2011; Gardner, 2013; Marzano & Pickering, 2005; Nation, 2001; Snow, 2010). Therefore, a need exists for the explicit teaching of academic vocabulary in the content-area classroom, which includes the effective use of a number of language learning strategies (Oxford, 2013).

Research has continually established that the scope of learners' vocabulary knowledge relates greatly to their reading comprehension, conceptual knowledge, school success and success beyond the classroom (Gardner, 2013). Vocabulary learning, as well as vocabulary teaching, is thus central to this study. Various components play a role in learning vocabulary, such as, comprehensible input, the negotiation of meaning, noticing and awareness, interaction, feedback and output (Mackey, Abbuhl & Gass, 2012). Research has found that the use of learning strategies is very important for optimal word acquisition, but that these strategies need to be explicitly taught (Oxford, 2013). There is an urgency to teach vocabulary explicitly and effective instruction must include the use of various teaching strategies. This study consequently looked at effective vocabulary teaching programmes and possible examples of teaching strategies that could be used in the Grade 4 Natural Sciences domain.

A qualitative case study research design was used in this study. Two Grade 4 Natural Sciences and Technology teachers at two English medium primary schools in the North West province were used in this study. Their lessons were observed over a period of four weeks where the researcher made use of an observation matrix to establish whether the teachers focused on the development of the learners' academic vocabulary knowledge of the Natural Sciences domain. Two sets of semi-structured interviews were conducted. The interviews were tape-recorded and transcribed.

Various documents were also analysed to ascertain what the beliefs and national goals are in terms of academic vocabulary teaching. The data were analysed by means of content analysis and by following the steps in Creswell's (2009) qualitative data analysis process. After analysing the data, it became clear that the policy document (South Africa. Department of Education, 2011b) and Teacher's Guide (Adatia, Barker, Clitheroe, Cohen, De Villiers, Joannides, Van Zyl, Visagie, & Webb, 2013b) are not sufficient for teaching academic vocabulary. Other problems were also discovered: the Learner's Book (Adatia, Barker, Clitheroe, Cohen, De Villiers, Joannides, Van Zyl, Visagie, & Webb, 2013a) does not focus on the development of academic vocabulary; the teachers do not plan for the teaching of academic vocabulary; there is a lack of explicit teaching of vocabulary; teachers lack the motivation and responsibility to teach academic vocabulary, they are unaware of the types of academic vocabulary and its importance for learning; they believe that the explicit teaching of academic vocabulary is time consuming in an already full curriculum; they are unaware of the national goals and guidelines as outlined in the policy document (SA. DoBE, 2013b); they are not trained in Intermediate Phase teaching methodology; they lack personal proficiency and struggle to effectively teach through the medium of English.

Both teachers could benefit from an intervention programme on the learning of academic vocabulary and training in how to select academic vocabulary and how to teach vocabulary learning strategies.

Keywords:

Explicit vocabulary teaching and learning; vocabulary acquisition; teaching and learning strategies; academic vocabulary; Natural Sciences domain; Grade 4 teachers; English Second Language Learners (ESLLs); Interactionist Approach.

OPSOMMING

Die meerderheid Graad 4-leerders in Suid-Afrika wat deur medium van ’n tweede taal akademiese onderrig ontvang, staar groot uitdagings in die gesig. Daar word van sulke leerders verwag om beide die akademiese leerarea-inhoud, sowel as die akademiese woordeskat van die leerarea in hul tweede taal te bemeester. Vakspesifieke handboeke en leerarea- lesse is gevul met akademiese woordeskat wat noodsaaklik is vir die verwerwing van konseptuele kennis en begrip (Antonacci & O'Callaghan, 2011. Leerders moet 'n sterk akademiese woordeskat hê om sin te kan maak van akademiese tekste, akademiese take of aktiwiteite te voltooi en akademiese sukses te bereik (Antonacci & O'Callaghan, 2011; Gardner, 2013; Marzano & Pickering, 2005; Nation, 2001; Snow, 2010). Om hierdie rede is daar ’n behoefte aan beide die direkte onderrig van akademiese woordeskat, asook die doeltreffende gebruik van ’n aantal taalaanleerstrategieë in die leerarea-klaskamer (Oxford, 2013).

Navorsing wys daarop dat die omvang van leerders se woordeskat effektief verband hou met hulle leesbegrip, konseptuele kennis, skool-sukses en sukses buite die klaskamer (Gardner, 2013). Verskillende komponente speel ’n rol in die aanleer van woordeskat. Mackey *et al*. (2012) wys op die belangrikheid van betekenisvolle insette, (input), interaksie tussen gesprekvoerders, terugvoer en uitsette of reaksie deur die leerder. Ander navorsers, soos Oxford (2013), het bevind dat direkte of eksplisiete onderrig van leerstrategieë ook ’n belangrike rol speel in die optimale aanleer van woordeskat. Die belangrikheid van die effektiewe onderrig van woordeskat staan dus sentraal tot hierdie studie en daar is gevolglik gekyk na verskeie woordeskat-onderrigprogramme asook moontlike voorbeelde van onderrigstrategieë wat gebruik kan word in die Graad 4 Natuurwetenskap-leerarea.

Vir die empiriese gedeelte van hierdie studie is daar gebruik gemaak van ’n kwalitatiewe gevallestudie navorsingsontwerp. Twee Graad 4 Natuurwetenskap en Tegnologie-onderwysers, vanaf twee verskillende Engels-medium primêre skole in die Noordwes-provinsie, het deelgeneem aan die studie. Hulle lesse is oor ’n tydperk van vier weke waargeneem en gerekordeer. Die navorser het gebruik gemaak van 'n waarnemingsmatriks om vas te stel tot watter mate die onderwysers gefokus het op die ontwikkeling van die leerders se akademiese woordeskat, asook die gebruik van onderrigstrategieë om die aanleer van woordeskat te bevorder. Twee stelle semi-gestruktureerde onderhoude is gevoer. Die onderhoude is op band opgeneem en later getranskribeer.

Verskeie dokumente is ook ontleed om vas te stel wat die filosofie en nasionale doelwitte in terme van die onderrig van akademiese woordeskat is. Die data is ontleed deur middel van inhoudsontleding en die stappe in Creswell (2009) se kwalitatiewe data-analise proses is gevolg. Na 'n ontleding van die data was dit duidelik dat die beleidsdokument (SA. DoBE, 2011b) asook een van die onderwysershandleidings (Adatia *et al*., 2013b), nie voldoende leiding ten opsigte van die onderrig van akademiese woordeskat verskaf nie. Ander probleme wat identifiseer is, wys dat onderwysers nie doelbewus beplan vir die onderrig van akademiese woordeskat nie en dat hulle van mening is dat die direkte onderrig van akademiese woordeskat tydrowend is. Verskeie ander faktore, soos die gebrek aan opleiding in taalaanleerstrategieë; die gebrek aan persoonlike taalvaardigheid in die medium van onderrig; en ’n gebrek aan kennis oor die rol van verskillende tipes akademiese woordeskat in effektiewe leer, speel ook ’n rol.

Dit kom voor dat beide onderwysers baat sou kon vind by ’n intervensieprogram wat fokus op die effektiewe onderrig van akademiese woordeskat binne die Natuurwetenskap-leerarea.

Sleutelwoorde:

Direkte onderrig en leer; eksplisiete onderrig; woordeskataanleer; onderrig-en-leerstrategieë; akademiese woordeskat; Natuurwetenskap-leerarea; Graad 4-onderwysers; Engels tweede taal-leerders; Interaktiewe-onderrigbenadering (Interactionist Approach).

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ABBREVIATIONS

BEd:	Baccalaureus Educationis degree
CAPS:	Curriculum and Assessment Policy Statement
CAQDAS:	Computer Assisted Qualitative Data Analysis
DoBE:	Department of Basic Education
EFAL:	English First Additional Language
EL:	English Language
ESLLs:	English Second Language Learners
HED:	Higher Education Diploma
LINCS:	Link-Imagine-Note-Construct-Self-interest
LoLT:	Language of Learning and Teaching
PIRLS:	Progress in International Reading Literacy Study
SA. DoBE:	South Africa Department of Basic Education
SFAS:	Semantic Feature Analysis Strategy
SL:	Second Language
SLLs	Second Language Learners
TIMSS:	Trend in International Mathematics and Science Study

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CHAPTER 1

CONTEXTUALISATION AND GENERAL PROBLEM STATEMENT

"Without grammar very little can be conveyed, without vocabulary nothing can be conveyed"
(Wilkins, 1972:111).

1.1 Introduction

Learning a content-area also involves learning and acquiring the vocabulary of the content-area (Gardner, 2013; Rollins, 2014). In Grade 4, South African learners have to make a huge leap from Foundation Phase with its four content-areas to the Intermediate Phase with its six content-areas (SA. DoBE, 2011b:6). One of these content-areas, namely, Natural Sciences and Technology consists of two domains. In the Natural Sciences domain alone the learners are introduced to Geography, Life Sciences and Physical Sciences content matter with a great number of academic vocabulary that they have to acquire. It is also in Grade 4 where the learners are expected to learn through the medium of English. It is also where the majority of the Grade 4 learners are required to switch to their SL and are expected to learn through the medium of English.

Vocabulary learning and teaching are two fundamental concepts of this study. The aim of this study was to explore and describe the teaching practices of two Grade 4 Natural Sciences and Technology teachers regarding academic vocabulary teaching in the Natural Sciences domain in two schools in the North West Province.

This chapter provides a basic orientation and overview to this study. Aspects that will be addressed in this chapter include:

- the orientation and the general problem statement;
- the primary and sub-research questions;
- the aims of this study;
- the clarification of terminology;
- the research design;
- an outline of the chapters.

1.2 Orientation and general problem statement

Recent large-scale national and international research projects have clearly revealed that the majority of South African learners have very low literacy and numeracy levels (Howie, Van Staden, Tshele, Dowse & Zimmerman, 2012; Mullis, Kennedy, Martin & Sainsbury, 2006). According to the results from the Progress in International Reading Literacy Study (PIRLS) 2006 and 2011, South African learners achieved the lowest scores of the forty countries that participated, with approximately eighty percent, failing to reach the Low International Benchmark compared to only six percent of international learners. This despite the fact that grade 5 learners were tested in South Africa, but Grade 4 learners were tested elsewhere. According to Howie *et al.* (2012:6) the reason for the poor performance of South African learners might be that the majority of them have not mastered the basic reading skills required for decoding and basic comprehension. They show little evidence of the higher levels of reading and learning that involve engaging with, using and analysing texts (Janks, 2011).

The results of the TIMSS (Trend in International Mathematics and Science Study) tests (1995; 1999; 2003; 2011) paint an equally dismal picture. Dempster and Reddy (2007) show that South Africa has consistently been the lowest-performing country in Mathematics and Science. According to Reddy's (2006) national report on the grade 8 learners' performances in Mathematics and Science in the TIMSS tests in 1995, 1999; 2003, the majority of these learners struggled in all three domains that were assessed, namely, factual and procedural knowledge (vocabulary knowledge), as well as conceptual understanding (comprehension) of the subject matter. Many researchers primarily blame South Africa's language policy and learners' and teachers' poor proficiency in the medium of instruction for the learners' poor performance (Uys, Van der Walt, Van den Berg & Botha, 2007). Although South Africa has a multilingual language policy opting for mother tongues instruction where possible, almost eighty percent of all South African learners start using their second language, English, as the Language of Learning and Teaching (LoLT) in Grade 4 (SA. DoBE, 2011a). This means that they need to acquire a high level of competence in English in order to effectively learn in content-areas (Howie *et al*., 2012). Reddy (2006) also blames learners' poor language skills for their poor academic performance in Mathematics and Science, emphasising the importance of understanding academic vocabulary and the academic concepts of Mathematics and Science in order to show competence in application and reasoning.

International studies conducted by Moji and Grayson (1996), as well as Rollnick (2000), confirm the importance of attaining proficiency in both the language of instruction and the language of Science.

Valdes (2004) and Weideman (2006) refer to it as *academic language proficiency,* which involves having knowledge of "complex syntax and academic vocabulary" and to be able to communicate in "a complex discourse style" (Krashen & Brown, 2007:1). It could also include the ability to understand and to use academic vocabulary in different contexts in order to attain, process and construct subject matter information in both spoken and written form, using appropriate learning strategies (Krashen & Brown, 2007:1). According to Scarcella (2011) the enhancement of academic vocabulary should be one of the primary goals of education since it underpins literacy in and meaningful engagement with the subject content. Unlike communicative proficiency, academic language proficiency is not only acquired, but develops through formal and explicit instruction at all stages of the education process (Cummins, 2008; Scarcella, 2011).

Greenwood (2010), Hedrick, Harmon and Wood (2008) and Spencer and Guillaume (2006) all argue that limited academic vocabulary will take its toll on both reading performances and learning across the curriculum. These researchers uphold that teaching and learning academic vocabulary is an area of concern and is a critical aspect of knowledge building. Hedrick *et al.* (2008) further emphasise that it is the core to internalising the language of specific subjects and thinking critically in different content-areas.

The Natural Sciences and Technology domains are compulsory for all learners in the Intermediate and Senior Phases. Both these domains have been prioritised by the Department of Basic Education (DoBE) with a view to develop a scientific generation (SA. DoBE, 2011b:12). Considering the importance of not only the explicit teaching of academic language skills, but in particular the explicit teaching of academic vocabulary, it is of the utmost importance to provide Grade 4 learners with the necessary academic vocabulary in order for them to make academic progress in the Natural Sciences domain. Both language and subject content teachers should then take responsibility for improving learners' academic vocabulary through utilising appropriate teaching strategies (Uys, Van der Walt, Botha & Van den Berg, 2006; Van Rooyen & Jordaan, 2009).

1.3 Primary research question

The following research question was investigated to further support the incentive for this study and will prove to be the driving force in this study: *To what extent are two Grade 4 Natural Sciences and Technology teachers in two schools in the North West Province explicitly teaching academic vocabulary in the Natural Sciences domain?*

In order to answer the main research question the following sub-questions needed to be addressed:

1. What does the field of literature suggest regarding the teaching of vocabulary in the content-area classroom in terms of the teacher's responsibilities and the use of effective teaching and learning strategies?
2. What are the national goals and guidelines regarding vocabulary teaching in content-area classrooms?
3. What academic words do Grade 4 learners need in order to learn academic content in the Natural Sciences domain?
4. What kind of support do the Grade 4 Natural Sciences and Technology teachers receive in how to select and teach academic vocabulary?
5. How do teachers prepare for teaching vocabulary in the Natural Sciences and Technology classroom?
6. What do teachers believe about the teaching of academic vocabulary in the Natural Sciences and Technology classroom?
7. What teaching practices do the teachers follow or apply?

These questions guided the researcher in identifying aims for the study and also during the research process.

1.4 Aims of the study

The aims of this study were to:

- conduct a survey on the role of academic vocabulary for learning purposes in the academic context;
- determine the national goals and guidelines with regard to vocabulary teaching across the curriculum;
- establish what academic vocabulary is regarded as crucial for Grade 4 learners to know;
- determine what kind of support the Grade 4 Natural Sciences and Technology teachers receive in how to select and teach academic vocabulary;

- study the Grade 4 Natural Sciences and Technology teachers' personal lesson plans;
- establish what the teachers' attitudes and beliefs are about the teaching of academic vocabulary in the Natural Sciences and Technology classroom;
- examine the actual teaching practices of two Grade 4 Natural Sciences teachers in terms of the resources and methodology used for the explicit teaching of academic vocabulary in their classrooms.

1.5 Clarification of terminology

- For the purpose of this study, *explicit teaching* refers to when content-area teachers make use of direct instructional approaches to teach targeted words (Armbruster, Lehr & Osborn, 2001). It also entails the development of independent word-learning strategies that the learners can use when they encounter unknown words in textbooks, other print materials and media (Beck, McKeown & Kucan, 2005; Beck & McKeown, 2007; Stahl & Fairbanks, 1986).
- Researchers tend to define *academic vocabulary* within the context of academic domain knowledge and argue that domains "have their own lexicons or vocabularies" (Jetton & Alexander, 2004:17). According to Baumann and Graves (2010) academic vocabulary is commonly clarified in two ways, namely, as domain-specific words that are used in content-areas, like, Geography or Biology, or as general academic vocabulary that are broad all-purpose words that appear across different content-areas. However, Baumann and Graves (2010) argue that the academic vocabulary field is broad and consists of different categories.
- The *Interactionist Approach* refers to the innate (cognitive and constructivist) and environmental (social and active learning) factors that explain language learning and more particularly how learners learn vocabulary (Mackey *et al*., 2012). The Interactionist Approach is primarily focused on the link between communication and learning, as well as the mechanisms e.g. input, noticing, attention, feedback and output that mediate learning (Gass, 2003:224).
- *English Second Language Learners* (ESLLs). In accordance with international terminology the researcher preferred to use the term ESLLs instead of English First Additional Language (EFAL). ESLLs refers to learners that do not use English as their mother tongue, but as an additional language for a variety of purposes, including for learning purposes (SA. DoBE, 2011a).

1.6 Outline of the research design

This section of the chapter stresses the importance of the research design. To thoroughly address the research questions, an appropriate research design with complementary methodologies and processes had to be selected. In this section, these aspects are only outlined as a means of orientating the reader. Chapter 3 provides more detail as to how the researcher applied the research design in this specific study.

1.6.1 Research paradigm

According to Henning (2004:16), "the research methodological orientation of [a] study could best be developed along the various forms of research prominent in that paradigm". Therefore, it is imperative to have an understanding of the various research paradigms in order to identify and select the best paradigm that is aligned with particular research methodologies and methods. De Vos, Strydom, Fouché and Delport (2011:6-9) identify three main paradigms of Social Sciences: a positivist paradigm, which is driven by aims to observe a phenomenon by means of the senses; an **interpretivist paradigm**, which emphasises the meaningful empathetic understanding of the participants' "lived experiences, and a critical theory paradigm, which is concerned with the concepts: "dialectical materialism, class analysis and structuralism." This study is grounded in the interpretivist paradigm. Interpretivists deem that the subject matter of the Social Sciences is different from that of the Natural Sciences. Natural Sciences focus on the accumulation of verified facts that are submitted to empirical testing (De Vos *et al*., 2011:6). Social Sciences, on the other hand, is related to hermeneutics and deals with the study of the individual or group and the meaning they attach to lived experiences (De Vos *et al*., 2011:5; Flick, 2009:2). In this study the researcher analysed two Grade 4 Natural Sciences and Technology teachers' real life practices and beliefs regarding academic vocabulary teaching in the natural setting.

1.6.2 Research approach

In line with an interpretative paradigm, **a qualitative research approach** specifically seeks to interpret and understand behaviours and attitudes of individuals, ideally within the natural setting of the individuals where variables are uncontrolled (Merriam, 2009). Schensul (2012:87) describes the *qualitative research approach* as an approach that allows researchers "'to explore in detail social and organizational characteristics and individual behaviours and their meanings."

It is also theoretically guided which, in turn is guided by the scientific paradigm in which the study is grounded and it furthermore manages to involve important stakeholders in the research activities. According to Schensul (2012) qualitative research can be carried out through case studies, interviews with people who have relevant experiences, and observations in the places where participants live, study, work, shop and engage in leisure time activities.

1.6.3 Research methodology

Case study methodology is commonly defined as "an investigative approach used to thoroughly describe complex phenomena" in order to reach a better understanding of phenomena (Moore, Lapan & Quartaroli, 2012:243). It focuses on the "case, on a class or group of events, issues, or programs and how people interact with components of this phenomena" (Moore *et al*. 2012:243-244). Although case study methodology is often accused of 'generalisability' and producing "soft data, which lack rigour" (Denscombe, 1998:39), Merriam (2009) states that case study research produces a rich and holistic view of the phenomenon and offers various insights, which plays an important role in advancing a research field. Rule and John (2011:7) describe the strengths of case study research as "depth, flexibility, versatility and manageability". This makes a case study approach particularly suitable for a field, such as, education. This research study is embedded in **an intrinsic case study methodology**. In an intrinsic case study, the researcher examines the case, because he or she would like to learn more about the phenomenon and the meaning individuals attach to the phenomenon (Stake, 1995; Yin, 2003). During empirical research the researcher investigated the phenomenon of the explicit academic vocabulary teaching in two Grade 4 Natural Sciences and Technology classrooms

1.6.4 Population and sampling

In qualitative research, researchers generally make use of "non-probability and purposive sampling rather than probability and random sampling approaches" (Nieuwenhuis, 2010a:79). For the purpose of this study, the researcher applied **criterion sampling**, since the teachers and schools were selected according to specific criteria. Chapter 3 provides detailed information on how ethical clearance was first obtained and how the researcher selected the two teachers.

1.6.5 Data collection methods and tools

During the collection of data, the researcher used Lincoln and Guba's (1985) model to ensure the trustworthiness and credibility of this study. Other methods, such as, *member checks and efficient time spent in the field* were also used to ensure trustworthiness and credibility. In case study research researchers are advised to gather data from more than one source and to apply more than one method for the purpose of triangulation (Rule & John, 2011:61, 63). A literature review, document analysis, semi-structured interviews and non-participant observations were used to help answer the question: *To what extent are two Grade 4 Natural Sciences and Technology teachers in two schools in the North West Province explicitly teaching academic vocabulary in the Natural Sciences domain?*

- A **literature review** was undertaken in order to contribute to a clearer and deeper understanding of the essence and meaning of the problem that has been identified. In this study the researcher looked at various topics, namely, the importance of academic vocabulary knowledge; contextualisation of academic vocabulary; different categories of academic vocabulary; vocabulary learning; vocabulary teaching; planning for explicit academic vocabulary instruction; explicit vs implicit vocabulary teaching and teaching and learning activities and strategies. These various topics were surveyed by means of broad-based primary and secondary sources at the university's library.
- Various **documents** were collected, such as, the Natural Sciences and Technology Curriculum and Assessment Policy Statement (CAPS) Grades 4-6 document (SA. DoBE, 2011b), the lists of academic vocabulary provided by the Natural Sciences and Technology Intermediate Phase subject advisor of the North West Province (Selogiloe, 2013), the Learner's Book (Adatia *et al*., 2013a)[1], Teacher's Guide (Adatia *et al*., 2013b)[2] lesson plans and teacher resources. These documents shed light on sub-questions two, three, four and six that pertain to the national goals and guidelines with regard to vocabulary teaching across the curriculum, what academic vocabulary is regarded as crucial for Grade 4 learners to know and whether the teachers make provision for the teaching of academic vocabulary. The researcher did not make use of an instrument.

[1] Platinum Natural Sciences and Technology Grade 4 Learner's Book.
[2] Platinum Natural Sciences and Technology Grade 4 Teacher's Guide.

- For the purpose of this study two sets of **semi-structured interviews** with **semi-structured questions** (cf. Appendix B)[3] were conducted, to probe the teachers' attitudes, beliefs and experiences regarding the explicit teaching of academic vocabulary. One interview was held before and one after the lesson observations.
- **Non-participant lesson observations** were conducted by means of an **observation matrix** (cf. Appendix B) that served as a guideline. The criteria of the observation matrix were not fixed, but guided and reminded the researcher of the types of teaching strategies available in order to not miss out on strategies the teachers applied. The criteria were compiled by means of literature findings.

1.6.6 Data analysis

According to Corbetta (2003) qualitative data analysis is best achieved through an inductive process where the main purpose is to allow research findings to emerge from the reoccurring patterns and themes. There are different methods to analyse qualitative data, such as, hermeneutics, content analysis, conversation analysis, discourse analysis and narrative analysis. For the purpose of this study **content analysis** was used. Content analysis is "an inductive and iterative process" where the researcher looks for "similarities and differences in text that will corroborate or disconfirm theory" (Nieuwenhuis, 2010b:101). The researcher will look for these similarities and differences in such things as written documents, transcripts and visual media. Content analysis can also be applied when working with narratives or analysing qualitative responses in interviews. The process of doing content analysis is also referred to as "coding the data and arriving at themes" (Merriam, 2009:180). Reoccurring words or phrases are coded as categories and may become themes (May, 2001:191, 192). In line with Merriam (2009:139) the data analysis of this study was a cyclic process. Content analysis was guided by the research questions and done through coding the data systematically. Each document and transcript was colour coded and the researcher worked through three steps of coding the data: open-, axial and selected coding (Gibbs, 2007). Section 3.2.6.2 provides more detail as to how the researcher coded the data and applied the content analysis approach. This section also provides the codes and themes that emerged during the three steps of the data analysis process.

[3] The appendices are in CD format at the end of the dissertation. The information on the CD was not proofread and is seen as raw data.

1.7 Outline of the chapters

Chapter 1: Contextualisation and general problem statement.

Chapter 2: The role of academic vocabulary for learning purposes in the academic context.

Chapter 3: Research design and methodology.

Chapter 4: Qualitative research report and interpretation.

Chapter 5: Summary, limitations, contributions, recommendations and conclusion.

CHAPTER 2

THE ROLE OF ACADEMIC VOCABULARY FOR LEARNING PURPOSES IN THE ACADEMIC CONTEXT

"If language structures make up the skeleton of language, then it is vocabulary that provides the vital organs and the flesh" (Harmer, 1993:153).

2.1 Introduction

Academic vocabulary knowledge is increasingly identified as an element of academic literacy most important to contributing to learning success in subject domains that are academically challenging (Harmon, Wood & Hedrick, 2006; Irwin, 2008; Bravo & Cervetti, 2008; Gardner, 2013). Petty, Herold and Stohl already suggested in 1967 that ""[i]n the classroom [t]he achieving students possess the most adequate vocabularies', but also that "after schooling has ended, adequate vocabulary is almost equally essential for achievement in vocations and in society."" This is supported by research conducted by Harmon *et al*. (2006; 2008), Gardner (2013) and Rollins (2014) who are among the many researchers who maintain that conceptual understanding of domain-specific terminology in content-areas is critical for understanding and learning mass content-area matter. Harmon *et al*. (2006:3) state that "[v]ocabulary words are at the heart of learning in content-areas because new terms represent the concepts being taught….[s]o students need to acquire a thorough understanding of terms in order to build a foundation for further learning about a particular topic." Bravo and Cervetti (2008) argue that limited understanding of academic vocabulary can pose challenges for learners throughout their school years. They contend that learning the language of the domain is as important as learning the content itself. The vocabulary of the domain is "the surface level instantiations', which help the learners to form a deeper understanding of the content, concepts (conceptual understanding) and teacher lecture (ibid, 2008:131). As Vacca and Vacca (2005) state, words are labels for concepts, and so understanding the vocabulary is actually understanding the 'ideas' they represent.

The questions that need to be investigated refer to what research suggests regarding not only the role of academic vocabulary in successful learning, but what the term *academic vocabulary* constitutes. The researcher also needs to establish how vocabulary is acquired and what the body of research suggests about the teaching and learning of academic vocabulary. Lastly, the researcher must explore the strategies and methods (pedagogical implications) for teaching and learning.

2.2 Literature review

2.2.1 The importance of academic vocabulary knowledge

Researchers, such as, Beck, Perfetti and McKeown (1982); Heller and Greenleaf (2007); Klare (1984); Koda (2005); Nation (2001); Stahl and Fairbanks (1986) all argue that knowledge of vocabulary plays a significant role in reading comprehension. It is also a vitally important building block for literacy development. Beck *et al*. (1982:520) established, after introducing an extensive vocabulary teaching programme that learners' reading comprehension significantly improved. Klare (1984) indicates in his study that vocabulary knowledge is one of the factors that influences the learners' ability to read with comprehension and to read fluently. Koda (2005) states that vocabulary and reading comprehension are interdependent components and that poor reading comprehension can affect vocabulary exposure and learning. Stahl and Fairbanks' (1986) meta-analysis of vocabulary studies shows that English non-native speaking learners need ninety percent text coverage (e.g. one unknown word out of fifty) to gain adequate or close to adequate comprehension. This supports findings by several researchers (Schmitt & Meara, 1997; Qian, 2002) that vocabulary size is closely related to successful reading comprehension. Hu and Nation (2000:422) argue that although learners need to know the meaning of most words in a text in order to gain adequate comprehension, they still need other skills and knowledge. Hu and Nation's (2000) study is also aligned with Carver's (1994:432) findings with native English speaking learners:

> *When the material being read is relatively easy, then close to 0% of the words will be unknown, ... when the material is relatively hard then around 2% or more of the words will be unknown,...and when the difficulty level of the material is approximately equal to the ability level of the individual, then around 1% of the words will be unknown.*

Wittgenstein's (1958) statement: "The limits of my language are the limits of my mind. All I know is what I have words for", lay bare the importance of word knowledge. Expressive language (speaking and writing) requires a well-rounded vocabulary. Other researchers (Antonacci & O'Callaghan, 2011; Gardner, 2013; Marzano & Pickering, 2005; Nation, 2001; Snow, 2010) agree that vocabulary is the key factor for learners to communicate subject knowledge, understand challenging academic texts, solve problems and do well in tests. Harmon *et al*. (2006); Gardner (2013); Greenleaf (2010); Irwin (2008) and Rollins (2014) all agree that the understanding of subject-specific vocabulary in content-areas is fundamental for successful learning and school success.

In order for learners to increase their content learning and contribute in discipline-specific discourse, they need to understand the lexicon and language of the subject domains (Greenleaf, 2010). Irwin (2008:3) deems vocabulary knowledge essential for learners to eventually be in control of their own learning, to be "insiders not outsiders" to content-areas, such as, Mathematics and Science and to eventually master the content of these subject domains. Learners' knowledge of any topic or theme of a subject domain is encapsulated in their knowledge of vocabulary significant to the topic or theme (Marzano & Pickering, 2005). For example, learners who understand the content in Mathematics regarding data analysis and statistics have an understanding of terms ,such as, *mean, median, mode, range, standard deviation and central tendency* (ibid, 2005). The more learners understand these domain-specific and technical academic words the easier it is for them to comprehend information they read or hear about the topic. Conversely, without a basic knowledge of these words, learners will have difficulty understanding the concepts. In Science, for instance, learners' understandings of Science concepts are inextricably bound to their understanding of the vocabulary used to define and communicate the concepts (Rupley & Slough, 2010:100). Furthermore, academic vocabulary is linked by means of topics and themes (Bravo & Cervetti, 2008). If, for example, the learners do not understand the meaning of *mean* in Mathematics then the likelihood that they will understand the word, *median*, is low.

Successful functioning and achievement in all content-areas is linked to the acquisition of not only domain-specific and technical academic vocabulary, but also with general academic vocabulary specific to the outcomes of the content-area (Bravo & Cervetti, 2008:131). According to these researchers, limited understanding of general academic vocabulary can influence learners' ability to study effectively and can affect further learning in other content-areas. For example, having knowledge of what the general academic vocabulary, *summarise,* means is knowledge "that transfers across the curriculum and support academic success for years to come" (Boettcher, 2013:12). According to Boettcher (ibid) general academic vocabulary knowledge is used across different grades and throughout learners' school careers. Rupley & Slough (2010) maintain that learner's understanding of academic vocabulary is reflected in their performance in class and standardised tests.

Gardner (2013:90), as well as Rupley and Slough (2010) adds another dimension to the importance of academic vocabulary knowledge.

Rupley and Slough (ibid) argue that "vocabulary knowledge is a salient factor influencing success out of school" (Rupley & Slough, 2010:99) and that the mastery of academic vocabulary enables learners to experience not only societal wellness, but also economic success (Gardner, 2013). Gardner (ibid) concludes that academic vocabulary knowledge helps a learner to become a skilled academic reader, which is a requirement for excelling financially and socially in the outside world. Even before Gardner (2013), Cummins (2002) also concurred that academic vocabulary is significant in our daily tasks and can hold social, as well as emotional consequences. Individuals who can communicate precisely and effectively with appropriate vocabulary that fits the situation, are more likely to make a positive impression on employers, co-workers and clients (Cummins, 2002).

2.2.2 Academic vocabulary

Armbruster *et al*. (2001:38) define the general vocabulary of a language as "words we need to know" in order to communicate effectively. They point out that vocabulary can be divided into two components: the oral component, where words are used in the spoken form, and the listening and reading component, where meaning is made when the words are read or written. Graves (2003:11) classifies vocabulary into four components: words that are understood when they are heard ("receptive-oral"), words that are read ("receptive-written"), words that we use in our speech ("productive-oral") and words that are used when communicating or completing writing assignments ("productive-written").

Academic vocabulary, however, consists of words that are different from those words learnt from everyday interactions through leisure reading or just going about daily tasks (Freeman & Freeman, 2009). Within each content-area classroom, learners need to be able to communicate subject information adequately by making use of *academic vocabulary* (Antonacci & O'Callaghan, 2011:10). Within every subject discipline there is a specific set of words that represents its concepts and processes. These words are conceptually more complex than everyday vocabulary and, therefore, they are more difficult to learn (Antonacci & O'Callaghan, 2011:10).

Owing to the fact that academic vocabulary is often derived from Greek and Latin roots (Freeman & Freeman, 2009) these words often tend to be longer, more complex (containing prefixes and suffixes) and are more abstract than everyday vocabulary, making it much more difficult to understand e.g. amphibian, photosynthesis, ecosystem, chlorophyll (Harmon Harmon, Hedrick, Wood & Gress, 2005; Nagy & Townsend, 2012; Snow, 2010).

Academic vocabulary is, thus, defined as a 'specific type of English that consists of words commonly used in academic contexts' (Scarcella, 2003).

In her outline of academic language, Scarcella (2003) argues that competence of academic language consists of five components or dimensions, namely, the phonological, lexical, grammatical, sociolinguistic and discourse components. Not negating or minimising the importance of the other areas, it is with the lexical component, which refers to the vocabulary of academic English, that this study is concerned. It is clear that even within the domain of academic vocabulary, there are different features that need to be taken into account. The next section will, thus, look at models for categorising the different subdivisions of academic vocabulary.

2.2.2.1 Categories of academic vocabulary

In an attempt to supply a framework for analysis and teaching, researchers, such as, Baumann and Graves (2010); Donley and Reppen (2001); Harmon, Wood and Hedrick (2008); Hiebert and Lubliner (2008); Nation (2001) have all suggested models for categorising academic vocabulary. Although some researchers have identified more classes or categories, using different terminology to refer to the different groupings, the researchers agree on the core vocabulary contained within the concept "*academic vocabulary"*.

The model suggested by Donley and Reppen (2001) classifies academic vocabulary as consisting of two categories, namely, (a) content-specific and (b) general academic words. *Content-specific academic words* include all the technical terms and phrases that appear in content-area textbooks, whereas *general academic vocabulary* refers to all-purpose words that are encountered across the curriculum and used for specific purposes within a subject's context. Baumann and Graves (2010); Harmon *et al*. (2006); Hiebert and Lubliner (2008) and Nation (2001) all agree with this broad delineation, but feel that the field should be more specific to more accurately portray the complexity and width of the field of academic vocabulary. These researchers subsequently divided the field of academic vocabulary into several more categories.

Nation (2001) categorised academic vocabulary into three classes: a) high frequency words; (b) academic word families with low frequency word families; and (c) technical words. Similarly, Harmon *et al*. (2008) also acknowledged three classes, although the categorising of the types of words is a little different.

Harmon *et al.* (2008:155) outlined the field of academic vocabulary as consisting of (a) nontechnical terms; (b) word clusters (strictly speaking phrases or collocations, but functioning as single entities) with academically technical terms; and (c) symbolic representations. Hiebert and Lubliner (2008:111) on the other hand, restricted their classification to two groups of academic vocabulary: (a) general academic vocabulary with school-based vocabulary embedded in this category; and (b) content-specific vocabulary, which includes literary vocabulary or words specific to literature. Baumann and Graves (2010:9-10) suggest three types of academic vocabulary and conceptual representations. These are: (a) general academic vocabulary including the meta-language used by teachers across the curriculum for instruction purposes; (b) domain-specific vocabulary including literary vocabulary; and (c) symbols.

Table 2.1, below, summarises the different classes or categories into which different researchers delineated the field of academic vocabulary and illustrates how, despite the use of different terminology to refer to the clustering of types of words, these models in principal agree on what constitutes the field of academic vocabulary. Drawing on these existing models and by organising the different categories identified according to their content, the colour coding used in Table 2.1 illustrates where the different categories correspond. It becomes evident, for instance, that *school-task vocabulary,* as explained by Hiebert and Lubliner (2008) and *meta-language* depicted by Baumann and Graves (2010) refer to the same vocabulary. When the different categories are analysed and classified in terms of corresponding fields, a new, synthesised model or scheme emerges (cf. last column of Table 2.1), encapsulating the areas identified by the researchers. The synthesised model delineates the field of academic vocabulary into three categories (i.e. general academic vocabulary, domain-specific and technical academic vocabulary, symbols).

Nation (2001) is the only researcher who acknowledges the external, high frequency words that make up the syntax and general vocabulary of a language, such as, prepositions, nouns, verbs, and pronouns. It was, however, decided to depict the synthesised model as rooted within the field of what Nation (ibid) calls *high frequency words.* The model then presents a narrowing-focus of the field of academic vocabulary. Embedded in the high frequency field, the first field is called *general academic vocabulary,* since this is also the term most commonly used by other researchers. This field is expanded to include words that appear across several disciplines and different texts e.g. *data, research, method*. They are polysemous or general words with different meanings in different fields, and words that are used to describe processes and give instructions e.g. *compare, analyse* etc.

The next field is called *domain-specific and technical academic vocabulary.* This field encompasses six distinct categories with similar characteristics. First, it refers to what Harmon *et al.* (2008) call *academically technical words* or Nation (2001) refers to as *low frequency word families*.

Hiebert and Lubliner (2008) talk about *content-specific academic* words while Baumann and Graves (2010) apply the term *domain-specific academic words*. These words are specific to a content-area and are labels of simple and complex concepts e.g. *quadrant, solids, acids* etc. Although Nation (2001) and Harmon *et al.* (2008) categorise *technical words* separately, their classification has much in common with Bauman and Graves' (2010) definition of technical words. Bauman and Graves (ibid) clustered technical words with domain-specific academic words. Both Harmon *et al*. (2008) and Bauman and Graves (2010) found it necessary to distinguish a field of academic vocabulary that they call *literary vocabulary*. This field alludes to the specialised field of the English Language (EL) when studied as an academic subject. This field is mentioned separately because, unlike most other subject domains, subject-specific words, such as, *synecdoche*, *dactylic* or *iambic* do not appear in prose or poetry. Even though these words are part of the academic vocabulary of English literary studies, students seldom encounter them in the literature or poetry they study unless the text is about poetry or literature (Freeman & Freeman, 2009).

The focus finally narrows down to a focus on *symbols*. This category is different from technical words as these symbols are usually exclusive to a specific area. Although the symbols are strictly speaking not words, they represent concepts, ideas, principles and processes that might include drawings, chemical equations, formulas or diagrams (Damian, 2008:13). Together, these symbols form the specific vocabulary and the language of the topic or subject domain (Damian, 2008) that are typical and often unique to a specific subject domain (cf. Table 2.1 next page).

Table 2.1 Scheme depicting the field of academic vocabulary by different researchers

Nation (2001)	Harmon *et al*. (2008)	Hiebert and Lubliner (2008)	Baumann and Graves (2010)	Synthesised model
High frequency words are function words that provide the semantic structure of a language.				**High frequency words**
Academic word families are words that appear across several disciplines and different texts e.g. data, research, method.	**Non-technical words** are polysemy or general words with different meanings in different fields.	**General academic vocabulary** is relatively high frequency and dispersion words.	**General academic vocabulary** is frequent words across the curriculum that includes polysemous words.	**General academic vocabulary**
		School-task vocabulary is words that teachers use during instruction.	**Metalanguage** is words that are used to describe processes, structures or concepts that commonly occur in content-area texts e.g. calculate, compare, estimate.	
Low frequency word families consist of words that are technical in a specific subject, but have other meanings in other context.	**Word clusters or** word phrases appear frequently within a specific subject domain e.g., such as, product of, estimate the amount).	**Content-specific academic vocabulary** is low frequency and specific words.	**Domain-specific academic vocabulary** is content-specific or technical words.	**Domain-specific and technical academic vocabulary**
Technical words tend to belong to a certain subject domain or specialised theme e.g. Biology-meiosis.	**Academically technical words** are unique to the content-area and are labels of simple and complex concepts e.g. quadrant, solids, acids etc.	**Literary vocabulary** is novel category words, such as, verbs, nouns and adjectives. Synecdoche, pentameter etc.	**Literary vocabulary** is words that authors of literature use to describe e.g. characters, settings, actions.	
	Symbolic representations are specific symbols and abbreviations that simplify how concepts are described e.g. in Mathematics ≥, Δ, $\sum$, $a^2 + b^2$.		**Symbols are** icons, graphics or mathematical notations used in different content-areas instead of words.	**Symbols**

2.2.2.2 The significance of the synthesised model for categorising academic vocabulary

In view of the categories and criteria depicted in Table 2.1, Figure 2.1 (cf. Page 20), renders a graphic organiser of the synthesised model. This synthesised model for analysing the field of academic vocabulary (cf. Figure 2.1), may serve as a tool for both the analysis and the teaching of academic vocabulary within a specific subject. The model shows the range of vocabulary academic language situated within the broader, general, social vocabulary and syntax of the language. Apart from helping the teacher to categorise academic vocabulary, the model shows the ever-narrowing focus within the field of academic vocabulary - from general academic vocabulary to symbols. Research conducted by Donley and Reppen (2001) shows that learners acquire symbols and distinct content-specific vocabulary before they acquire general academic vocabulary. Several reasons are listed for this, but it appears that the narrowing focus in the field focuses the learners' attention on these words in order to take notice of them. Freeman and Freeman (2009:ch. 6) add that content-specific terminology and symbols are often "typographically enhanced", either printed in bold letters or italicised. This makes noticing of these words easier. For the same reason the teaching of general academic vocabulary is often neglected and merely an afterthought in content-area classrooms as it is assumed that learners have been exposed to those words before or frequently enough, or that is the responsibility of the language teacher to teach those words (Gardner, 2013; Irwin, 2008). The graphic representation (cf. Figure 2.2) depicts the role of the content-area teacher in also planning for and teaching the general academic vocabulary. In the case of Grade 4 learners who have just started learning through the medium of a Second Language (SL) as Freeman and Freeman (2009) point out, it may be crucial that the teacher's attention is also directed towards the identification and teaching of general academic vocabulary.

Flanigan and Greenwood (2007:228) point out that it is important that teachers should not only take cognisance of the fact that academic words belong to different classes or types, but that different types of academic words require different teaching strategies. Content-area teachers tend to treat all academic vocabulary similarly, using a "one size fits all" method that discounts learners' prior knowledge, the objectives of the lesson or the nature of the vocabulary themselves (ibid). The synthesised model helps the teacher to establish what needs to be taught and what type of vocabulary requires the most attention. Being aware of the different types of words also enables the teacher to make decisions about the most effective teaching strategy to employ for each individual word.

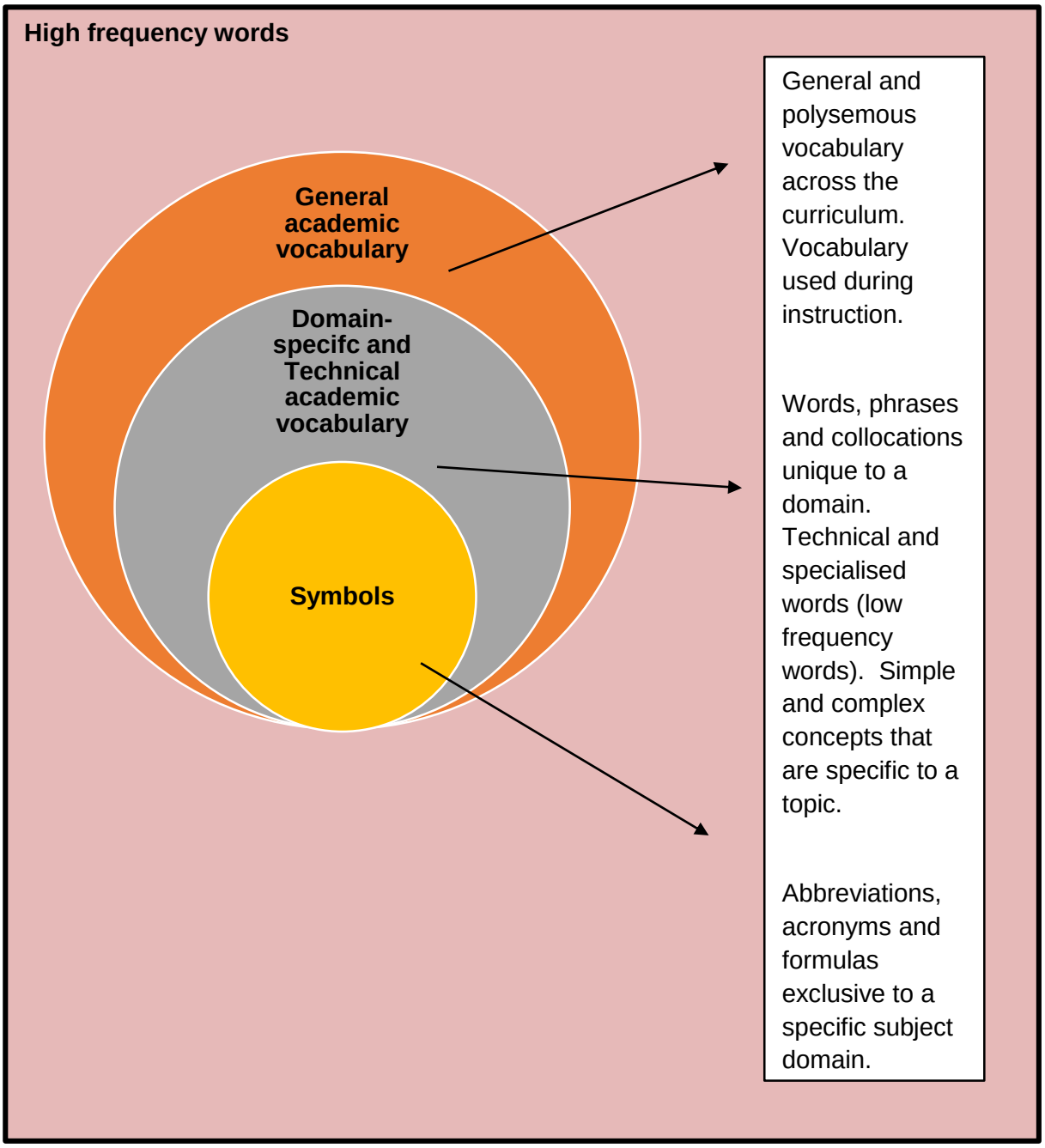


Figure 2.1 Synthesised model of the academic vocabulary field

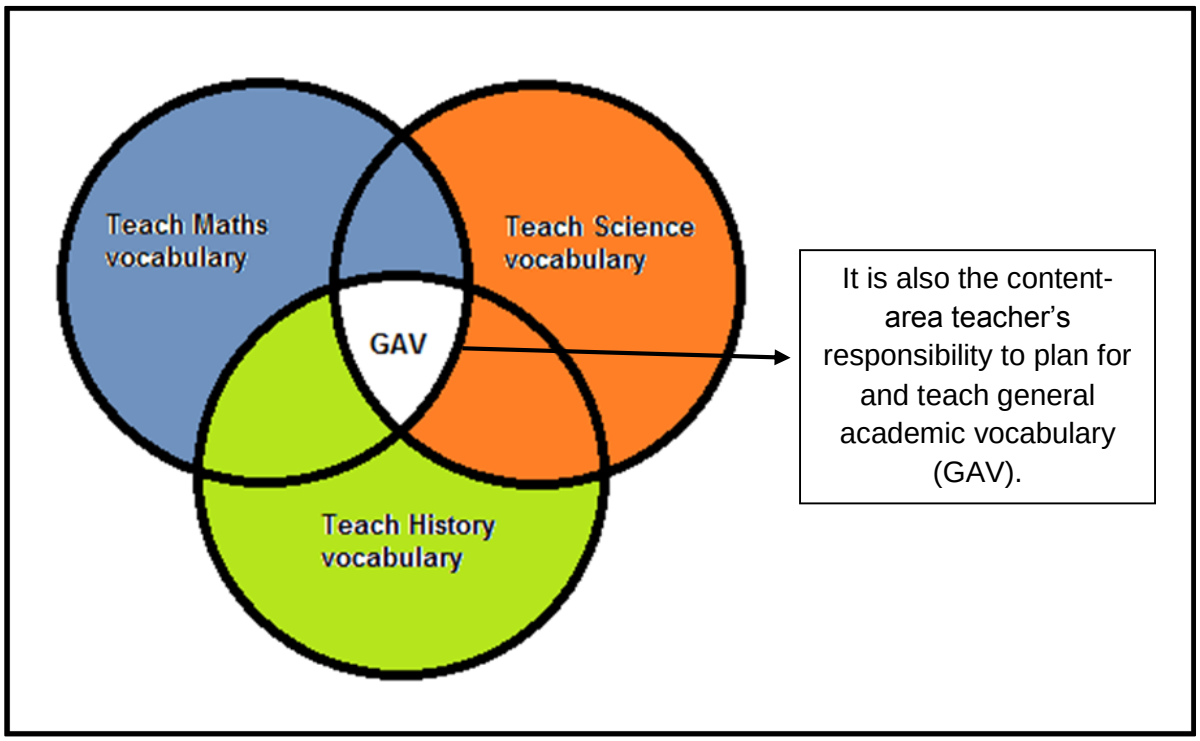


Figure 2.2 The responsibility of all teachers to teach academic vocabulary

2.2.3 Vocabulary learning

Freeman and Freeman (2009:ch. 6) unequivocally state: "The acquisition of academic vocabulary is complex." Qian (2002:515) argues that it is a non-linear, lengthy process where learners acquire a breadth, (knowing the meaning or having at least superficial knowledge of a number of words), and depth, (knowing a word well and to be able to use the word in different contexts) of academic vocabulary knowledge over time as the knowledge of words increases. Beck, McKeown and Kucan (2002); Graves (2006); Stahl and Nagy (2006) agree that knowing a word on an academic level is more than just knowing the word on surface level. Nagy and Scott (2000) explain several stages that describe the complexity of what it means to "know" a word. Firstly, word knowledge is "incremental", which means that learners need multiple exposures to a word in different contexts before they are able to know the meaning of the word. Secondly, word knowledge is "multidimensional". Words have various meanings and serve different purposes in different texts and even subjects. Thirdly, word knowledge is "interrelated" in that knowledge of one word connects to knowledge of other words.

The question is; how do learners learn all of these words?

Research within the field of academic vocabulary learning has in the past decades focused on two positions on how academic vocabulary is acquired: a) academic vocabulary can be either acquired implicitly and incidentally, b) or acquired explicitly and intentionally (Dakun, 2000:15). On one side of the debate, researchers, like, Krashen (1981) and Day and Bamford (1998) explain that the acquisition of vocabulary is "incidental" and "implicit", depending on the quality and amount of "comprehensible" input. Schmidt (1990:129), conversely, argues that even if the input is of the right quantity and quality, intake and internalisation are critical for acquisition to take place. In Schmidt's (ibid) view "subliminal language learning [implicit learning] is impossible", and "noticing is the necessary and sufficient condition for converting input to intake".

Supporters of the "implicit learning" position continue to maintain that learners learn academic vocabulary through self-selected reading materials, without any explicit vocabulary instruction (Day & Bamford, 1998). This hypothesis emphasises that reading of "massive amounts" of high interest "comprehensible" books will produce the vocabulary knowledge necessary for English Second Language Learners (ESLLs) to be able to master complex academic reading (Krashen, 1989). Researchers (Nagy, Herman & Anderson, 1985; Albrechtsen, Haastrup, & Henriksen, 2008:168) argue that academic vocabulary is rather "caught than taught," and acquired subconsciously by inferring and guessing the meanings of words from contexts. Nagy and Herman (1987) claim that extensive reading results in more effective vocabulary growth than explicit vocabulary learning programmes, which is not effective due to too many words and not enough time to learn academic vocabulary directly. They conclude that learners can more effectively learn unknown academic vocabulary through context and wide reading. However, Coady (1993:7), points out the beginner's paradox of incidental word learning through context and wide reading. He argues that:

> "[L]ess frequent vocabulary is almost exclusively encountered during reading. Consequently English as a second language (ESL) students have to read in order to learn the less frequent words. But the other side of the paradox is that all too often they don't know enough words to read well".

Learners who lack academic vocabulary from the outset are, thus, "less able to derive meaningful information from the context" of reading materials (Beck *et al*., 2002:4).

This vocabulary-reading-paradox suggests that ESLLs in particular need to be exposed to intensive instruction of academic vocabulary and related grammatical knowledge (Feldman & Kinsella, 2008:5), and that teachers cannot presume that more and unassisted reading will help them to grasp the meaning of important academic vocabulary (Beck *et al*., 2002:4).

For many ELLs, "the reading of more cognitively challenging texts, without explicit word consciousness may actually represent an oxymoron: reading in terms of comprehension may not take place at all, or with limited usefulness" (Gardner, 1999:60-61). Anderson (1996:74) highlights in his study that "playful, stimulating experiences with good books", are not enough for sustained academic vocabulary development. Linguistic evidence suggests that many specialised words (domain-specific and technical academic vocabulary) are not found in easy narrative reading materials (Gardner, 2004). Hulstjin (2001:274) emphasises and justifies explicit vocabulary learning, especially when it involves the learning of important academic vocabulary: He states: "..simply encouraging learners to spend much time on reading and listening, although leading to some incidental vocabulary learning, will not be enough in itself," and it "will almost always require attention and awareness" (Hulstjin, 2001:274). Teachers cannot presume that wide reading and unassisted reading is enough for enlarging leaners' academic vocabulary knowledge and that learners will learn "all the vocabulary and syntax from repeated interactions with good stories without regular analytic study and practice with the language" (Elley, 1991:378,379). Researchers (Biemiller, 2001; Coady, 1993; Kinsella, 2010), therefore, caution against over reliance on the notion that vocabulary is acquired implicitly. Milton and Donzelli (2013:460) quote several studies to validate their argument that "[v]ocabulary does not teach and learn itself". They emphasise the interactive nature of vocabulary learning and teaching by concluding that notwithstanding the input that the learner receives, new vocabulary needs to be explicitly noticed and deliberately learnt and practised by the learner. This raises questions about the actual process of learning involved in the learning of vocabulary.

Swain (1985) first brought attention to the importance of this kind of output and the processing of information when she formulated "The Output Hypothesis". Swain argued that even if learners were provided with "comprehensible input", acquisition may still be delayed if there is not a strong motivation or a need for explicit output. According to Swain *(*1985) it is the need for output that pushes the learner into processing the information.

In line with Swain's (1985) Output Hypothesis a study conducted by Ellis (1995) found that learners learnt more word meanings when they were required or forced to interact with the teacher by asking questions or providing answers upon which the teacher clarified, repeated and explained. Mackey *et al*. (2012:10) report that extended research over a number of years has proved not only that there is "a robust connection between interaction and learning", but it is now commonly accepted that "it is the learning of vocabulary that may receive the greatest benefits from interaction".

The Interactionist Approach, which is embedded in both a sociocultural and cognitive learning theory (Herschensohn & Young-Scholten, 2013) with its emphasis on the importance of modified input; the negotiation of meaning; the role of noticing and awareness, opportunities to produce output, and interactional feedback (Mackey *et al.,* 2012), therefore, offers important insight into the processes of vocabulary acquisition. By acknowledging both social and cognitive perspectives, it challenges the traditional Innatist Approach to learning, which upholds that language is acquired unconsciously, naturally, or implicitly. Nation (2001) describes the cognitive or psychological processes underpinning vocabulary learning as three distinct stages in vocabulary learning: a) a need to notice or become aware of the existence of words that are necessary for learning b) opportunities for retrieval of new knowledge and c) opportunities for using new knowledge creatively. Figure 2.3 provides a graphic representation of the Interactionist Approach to the process of (vocabulary) learning.

In line with Applied Linguistics principles, we need to investigate the pedagogical and methodological implications for what is believed about how learners acquire new vocabulary.

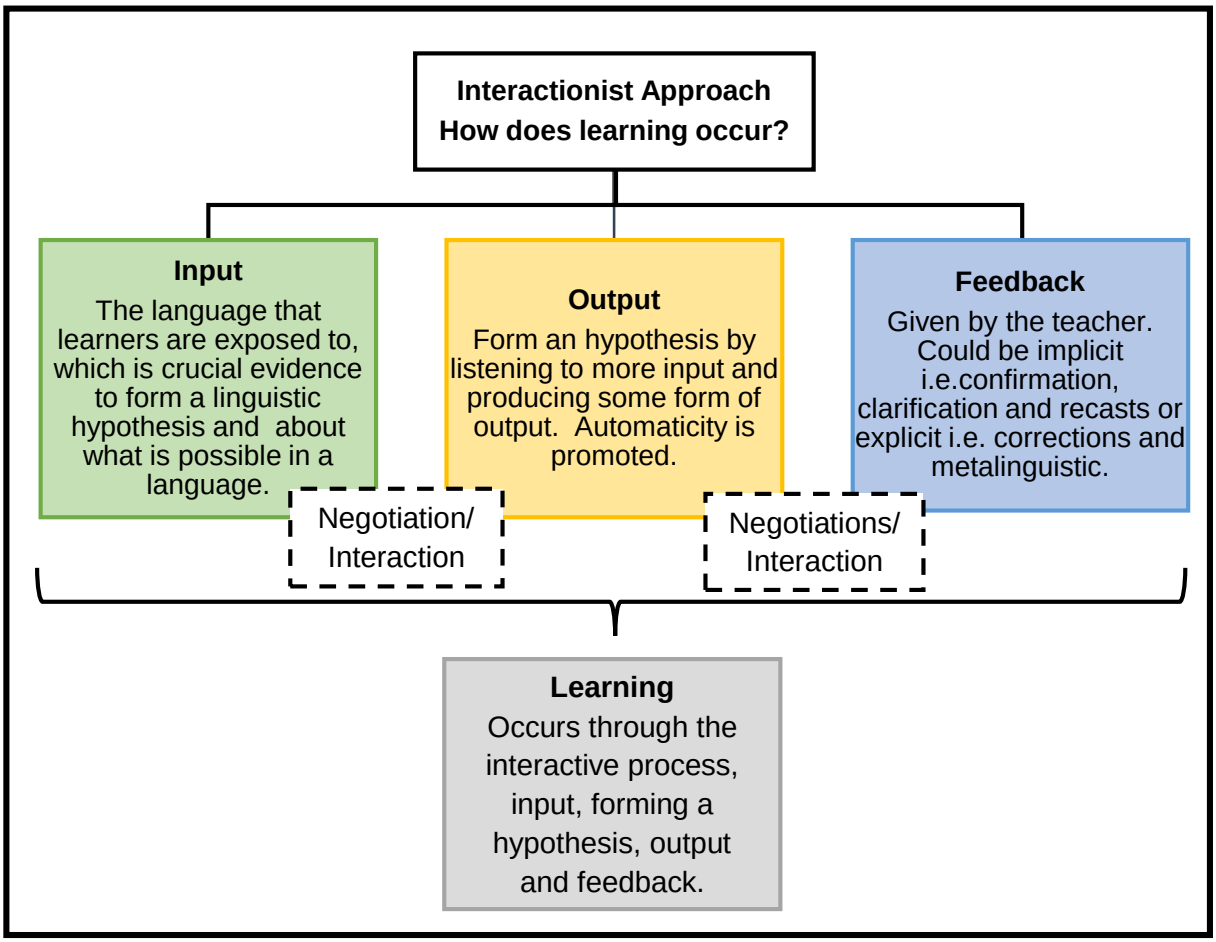


Figure 2.3 The Interactionist Approach of language learning

2.2.4 Pedagogical and methodological implications

In line with applied linguistic principles, decisions about pedagogy and methodology must be informed by what is believed about learning. Therefore, the decisions about vocabulary instruction will also be informed about what the teacher believes about the value of vocabulary instruction and the way in which learners acquire or learn vocabulary.

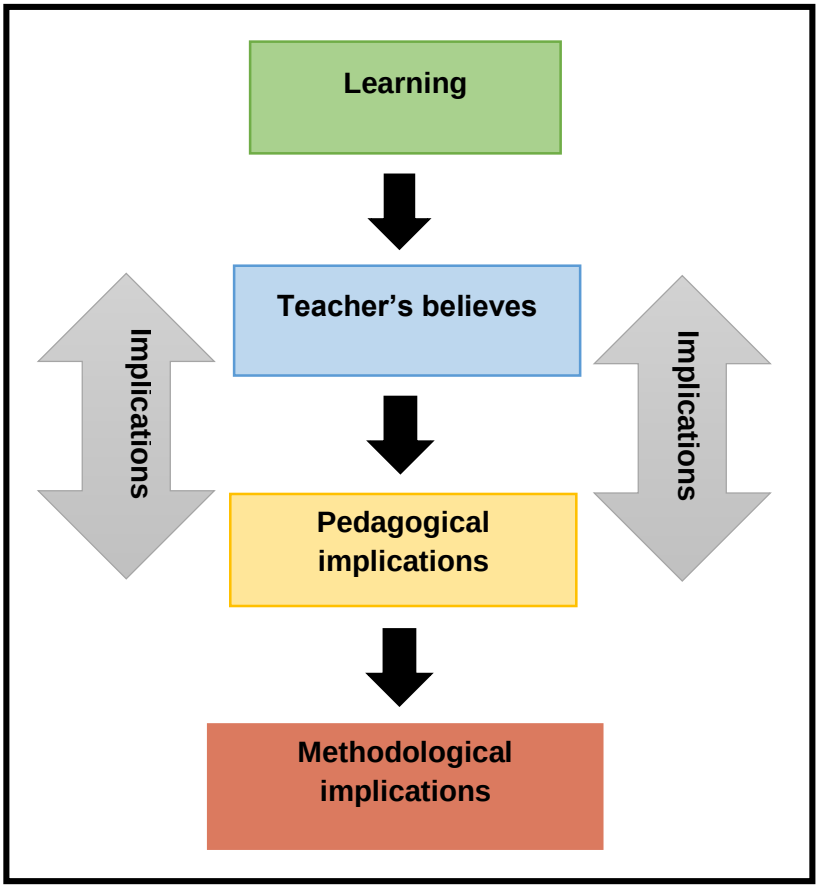


Figure 2.4 The relationship between learning and teaching

2.2.4.1 Explicit versus implicit teaching

Consistent with the debate about implicit or explicit learning the research field of vocabulary teaching has over the years focused on two main approaches: teachers can plan to teach vocabulary either implicitly or explicitly (Dakun, 2000:15). As a result, there has been ongoing debate about which of these two approaches to teaching vocabulary is more effective (Dakun, 2000:15). The implicit and incidental vocabulary teaching theory upholds that the meanings of new words are taught through the repeated coverage of the words in a variety of contexts (ibid, 2000:15).

Researchers, like, Anderson et al. (1996); Hirsch (2003); Nagy and Herman (1987); Stahl (1999); Stahl and Fairbanks (1986) accentuate the important role of implicit vocabulary instruction. This involves exposing the learners to different types of texts to challenge and help them to enhance their vocabulary knowledge (Baumann & Kame'enui, 2004:13). According to Stahl (1999:16) "vocabulary knowledge seems to grow gradually moving from the first meaningful exposure to a word to a full and flexible knowledge." This stance of vocabulary teaching is usually associated with Krashen's (1989) Input Hypothesis, which upholds that vocabulary learning takes place when the teacher provides the necessary "comprehensible input". Laufer and Nation (2012:167) explain that the 'vocabulary through input position' assumes a learner can infer the meaning of unfamiliar words from context and if not successful initially, further exposure to the word will finally result in acquisition.

Conversely, findings by Feldman and Kinsella (2008:8) and Hulstjin (1993) suggest that this kind of "contextual learning" is not always successful as "incidental learning from context is at best an inefficient and unpredictable process." Beck *et al*. (2002) agree, stating that their research indicates that the probability of obtaining the intended meaning of an unknown word from written context is extremely low, varying from five to fifteen percent. In Paribakht and Wesche's study (1997), university students' incidental, indirect learning of vocabulary over a three-month period was compared with the vocabulary knowledge of those students who received explicit, direct instruction during the same period. Paribakht and Wesche's (ibid) findings revealed that both approaches led to considerable gains in vocabulary size, but that implicit instruction through extensive reading often led to only a surface-level understanding of many academic words. Milton and Donzelli (2013:455) are adamant that researchers who assume that "large amounts of vocabulary can be soaked up without deliberate effort by learners or without the learners noticing that this is taking place, are quite wrong."

Several studies (Baker, Simmons & Kame'enui, 1995; Baumann, Edwards, Boland & Olejnik, 2003; Beck *et al*., 2002; Biemiller, 2001; Graves, 2006; Irwin, 2008) have recognised the importance of direct, explicit vocabulary instruction for immediate word learning, longer-term reading comprehension and academic success. An explicit and intentional vocabulary teaching approach endorses the theory that "awareness" is a condition for learning, and, therefore, "awareness raising" must be involved in teaching (Dakun, 2000:16). According to Beck *et al*., (2002), this "awareness raising" occurs when the teacher teaches specific academic words and pre-teaches words before reading or prior to assigning tasks.

This theory is consistent with a sociocultural and cognitivist theory of language learning, as exemplified by the Interactionist Approach (Sarem & Shirzadi, 2014). Oxford (2013:ch. 6) urges that direct vocabulary instruction should be integrated into all lessons as a 'crucial pedagogical component' and Gardner (2013:107) concludes that direct vocabulary instruction is not only "justified but essential in all academic settings". Beck *et al*. (2002:2-3) maintain that explicit vocabulary instruction is needed and wanted in all classrooms. They, therefore, encourage teachers to use "robust, vigorous, strong and powerful vocabulary instruction".

The next section focuses on the responsibility of the subject teacher for adopting an appropriate methodology for the explicit teaching and learning of vocabulary.

2.2.4.2 Planning for explicit vocabulary instruction

Haynes and Zacarian (2010:x) petition teachers not to necessarily do extra work, just to approach their teaching in a different way. They contend: "the techniques that work with ELLs will enhance your lessons such that every one of your English-fluent students will benefit greatly as well."

Given the fundamental role of vocabulary knowledge in nearly all aspects of academic competence, it is distressing that classroom research reveals a dearth of academic vocabulary instruction at *all* grade levels (Feldman & Kinsella, 2008:5). Feldman and Kinsella (2008) cite a study conducted by Durkin (1979) who established that upper-elementary teachers focus less than one percent of their overall reading instruction on vocabulary. Scott and Nagy (1997), documented the lack of vocabulary instruction in twenty-three ethnically diverse upper elementary classrooms and reported that only six percent of instruction in lessons was devoted to vocabulary.

In a follow-up study on the effectiveness of vocabulary instruction in elementary classrooms, Scott, Jamieson-Noel and Asselin (2003:282) established that only "1.4 percent of the time spent in school is used to develop knowledge of academic, discipline based vocabulary in social studies, science, maths or art" and that "most of the teaching time was rather devoted to mentioning and assigning rather than teaching" (ibid, 2003:269).

The scarcity of systematic, explicit vocabulary teaching has been well documented by other researchers, such as, Dutro and Moran (2003); Fillmore and Snow (2000); Gersten and Baker (2000); Scarcella (1996). Feldman and Kinsella (2008:5) observed that across all content-areas, teachers seem to lack the forethought and planning to establish, first of all, what *vocabulary to teach* and secondly, *how to teach academic* vocabulary.

Laufer and Nation (2012) argue that decisions about vocabulary instruction are often prompted by what the teacher believes about the importance of vocabulary instruction and the way in which learners acquire or learn vocabulary. Many teachers fail to plan for vocabulary instruction, because they still believe that learners will pick up new words as a "by-product" of exposure to input only (Laufer & Nation, 2012:167). These researchers (Laufer & Nation, 2012:167) find it alarming that even though "vocabulary is considered to be one of the most important elements in language learning" it is "largely left to take care of itself". Many other researchers (Nation, 2005; National Reading Panel, 2000; Sökmen, 1997) agree, cautioning that learners, especially ESLLs with limited or no knowledge of academic vocabulary, struggle to gain knowledge of words that are not explicitly taught. When the focus of instruction is placed on the Grade 4 learner who has to learn Natural Sciences through the medium of a SL, it is clear that the Science teacher's responsibility becomes even more challenging. For the Second Language Learner (SLL) it is not only the concepts that are new, but also the language and although *all* students need direct instruction in vocabulary, Haynes and Zacarian (2010) conclude that it is especially imperative for ELLs. Unlike home language speakers these learners have to master both the new language and academic content (Uys *et al.*, 2006). Cohen (2012) explains that Science as a discipline relies heavily on students' ability to understand new terms and concepts. Without a strong command of vocabulary, understanding new concepts would be nearly impossible (Cohen, 2012). Uys *et al.* (2006), thus, emphasise the importance of well-trained content-area teachers who know both their subject and the language of their subject and how to teach it. Freeman and Freeman (2009) emphasise that an effective vocabulary program depends on all subject teachers, using consistent, research-based methods for teaching the vocabulary of their subject areas.

A content-area teacher's challenge, as elucidated by Flanigan and Greenwood (2007:227-228) and Marzano (2009) reveal three main questions that need to be answered:

a) What words require explicit teaching?
b) How should such words be taught?
c) When during the lesson should these words be taught?

2.2.4.2.1 What to teach

The National Institute of Literacy (2007:7, 16) advises that content-area teachers need to select words that the learners do not, or may not know, but are important for conceptual understanding of the lesson content. "Teachers must explicitly teach and display vocabulary in class, as well as identify key terms, words, idioms, and phrases that are needed to learn and engage with the subject matter" (Haynes & Zacarian, 2010:19). Due to multiple demands on instructional time, it is crucial that content-area teachers focus on the academic words that learners are unlikely to learn incidentally. Without planning and identifying the most important academic vocabulary that need instruction and how to teach them, the teacher can fail to achieve all the lesson outcomes (Feldman & Kinsella, 2008:16).

Several wordlists for identifying the vocabulary that learners are required to master for academic literacy are readily available (Gardner, 2013:110). Although helpful and informative, these lists are elaborate and Cohen (2012) argues that in practice, many content-area teachers rely on the vocabulary highlighted by textbooks to determine what students must learn. It is worth mentioning, however, that textbooks often focus on content-specific terminology only (Freeman & Freeman, 2009). Gardner (2013) cautions that teachers seem more inclined to teach concrete subject-specific terminology than the more abstract general academic vocabulary or phrases appearing across the curriculum. On the other hand, content-area teachers often treat the domain-specific and general academic vocabulary equally, using the same method for teaching, teaching them at the same stage in the lesson, or allotting the same amount of time to the teaching of each word (Flanigan & Greenwood 2007:228). This "one size fits all" (ibid, 2007:228), treatment is too often utilised without considering learners' prior knowledge, the objectives of the lesson or the nature of the vocabulary.

The synthesised model for categorising *academic vocabulary* (cf. Fig 2.1) may prove to be a useful tool for analysing the academic text within a specific theme or context. This model may serve to raise teachers' awareness as to the general academic vocabulary, the domain-specific and technical academic vocabulary and the more specialised symbols that appear in the context of specific lessons. Applying the model enables the teacher to become aware, ultimately deciding what words are essential and crucial for understanding the context or what words are important, but may require less explicit instruction, due to the nature of the specific word.

2.2.4.2.2 How to teach vocabulary

According to Blachowicz and Fisher (2015) the answer to this question may be in methodology that focuses on negotiation, as well as meaningful and authentic tasks. Mackey *et al.* (2012) endorse this notion, stating that tasks that are interactive and have a definite outcome are particularly beneficial for vocabulary acquisition. Gardner (2013), thus, sums this up by saying that a combination of direct vocabulary instruction coupled with opportunities for interaction or productive tasks may provide the most successful results.

Thornbury (2011) explains that a teacher's challenge lies in selecting teaching activities, learning experiences and assignments and the planning of how they will be used in the teaching and learning process. The challenge for the content-area teacher is, thus, to identify a variety of teaching strategies that will promote a clear and deep understanding of the specific academic vocabulary, which may, in turn, have a positive effect on the learners' academic performance. The question of which instructional strategies or techniques and learning activities are most effective for vocabulary learning, not only in the language classroom, but also across all disciplines, is a matter that receives a great deal of attention from many language theorists and teachers (Blachowicz & Fisher, 2015; Macaro, 2003).

"Some words are just too important for not teaching", which means that teachers need to judiciously determine what words should be taught explicitly (Colombo & Furbush, 2009: 93). They advise the purposeful selection of only a few words and to focus on teaching one word at a time (ibid, 2009). Colombo and Furbush (2009) warn against a haphazard introduction of these important words, stressing that vocabulary instruction should be systematic and organised, necessitating meticulous planning. Many researchers (Freeman & Freeman 2009; Gardner, 2013; Graves; 2006; Laufer & Nation, 2012; McGuiness, 2004) agree on the importance of focusing on individual words when teaching vocabulary, adding that teaching and learning tasks should involve a focus on both form and meaning. "Where meaning has to be sought and explicitly linked with form, then a new word is more likely to be retained" and it enhances recall (Milton & Donzelli, 2013:457, 458-459). Learners must be guided to pay 'deliberate' attention to a new word: "its form, its context and possibilities of meaning" (ibid, 2013:457). Milton and Donzelli (2013:458) emphasise that learners need to do more than "note" form and meaning and not simply gloss the words over in the course of reading. If, in addition, "the sound form of a word is added to its written form, then processing is deeper and more likely to be retained" (ibid, 2013:458).

Tasks that focus on form and meaning may include semantic and concept mapping. These maps deepen the learner's understanding as they help to build schemata (ibid, 2013). Milton and Donzelli (2013) acquiesce that information is more likely to be retained when it is linked to pre-existing knowledge.

Bromley (2007); Cameron (2001); Linse (2005) and McGuiness (2004:ch. 8) point out that vocabulary knowledge is enhanced by 'multiple encounters' with a word. Effective instruction should ensure that academic vocabulary is revisited and recycled in different activities, using different strategies each time. Milton and Donzelli (2013:451) support the importance of repetition, but emphasise the difference between 'parrotting' and strategies for teaching and learning that ensure meaningful revisiting of specific words. This repetition of words also relates to the importance that Haynes and Zacarian (2010) place on the pronunciation of targeted words. They point out that it is important for the SLL to practise pronunciation and that pronunciation should be modelled and corrected by the teacher. However, such pronunciation tasks should focus on promoting oral discourse in a meaningful context and should never become a chanting exercise. It is now commonly accepted that the more learners repeat a word not only orally, but also through writing exercises, the meaning of the word will be acquired more easily (Rott, 1999; Webb, 2007; Zahar, *et al*., 2001). Hulstjin and Laufer (2001), explain the notion in more detail and propose that learners learn vocabulary more effectively when intention as to *why* they have to learn the words and their meanings are increased; when they have to *search* for the meanings of the words on their own; and when they have to match the information on the meanings of the words with the context in which they have to use the words. Schmitt (2000) remarks that there is an increasing awareness that orthographical (written-form) knowledge is a key component to both vocabulary knowledge and language processing in general, and that even if the writing activity is not focused on *meaning,* the writing and spelling of words may constitute an important learning activity. McGuinness (2004:ch. 8) supports this contention, postulating that it may be that "[v]isually guided movement, like, copying, boosts memory in a way that purely visual learning does not." All the activities mentioned imply the use of tasks that Mackey *et al.* (2012) define as co-operative tasks that have explicit outcomes.

Graves (2006) believes that, in addition to focusing on individual words, vocabulary instruction should be *word conscious*, setting learner tasks that will induce awareness of, and evoke an interest in, not only the history, but also the meaning, of words. Freeman and Freeman (2009) assert that becoming aware of and interested in the power of words will affect the vocabulary acquisition of both struggling readers and ESLLs.

Marland (2001) rightly argues that the disregard of explaining roots, prefixes and suffixes is one of the weaknesses in teaching the domain-specific and technical academic vocabulary of content-areas. He points out that in Mathematics for instance, teachers do not focus on defining the prefix, *poly,* first when explaining the meaning of the word *polygons*. According to Edwards, Font, Baumann and Boland (2004) helping learners understand the meaning of roots, suffixes and affixes increases their depth of vocabulary knowledge and the number of words that can be added to their vocabulary bank or lexicon. Graves (2006), however, cautions against the teaching of non-English roots, as they are often variously spelled and difficult to identify. Blachowicz and Fisher (2015) point out that teaching morphological awareness is very important to help learners to become aware of the importance of specific words and their meanings.

Oxford (2013) cogently argues for the inclusion of vocabulary learning strategies as a crucial pedagogical component. This view is supported by various researchers (Cameron, 2001; Chamot, 2004; Gardner, 2013; Graves, 2006; Greenwood, 2002:259) who reaffirm the necessity to teach learners relevant strategies that will encourage them to become active and self-directed in learning vocabulary. Although using clues in a text to infer meanings of unknown words may be one of the most important meta-cognitive learning strategies, Graves (2006) concedes that most ESLLs do not read well enough to use this strategy successfully. The teacher must, thus, be very judicious in his or her introduction of learning strategies and they have to be explicitly taught and practiced. Colombo and Furbush (2009) expand on this statement, warning that the teacher should not introduce more than one learning strategy at a time and should allow learners to practise and become acquainted with a strategy before moving on to a next one. Oxford (2013) lists a number of learning strategies also recognised by other researchers. Some of these are: using or creating vocabulary clusters or words; identifying sounds and images; keeping a vocabulary journal; and dictionary look-up; using graphic organisers; linking sounds and meaning etc.

August and Shanahan (2006:55) succinctly summarise the needs of their Second Language Learners (SLLs) when they say: “[ELLs] must be provided with strategies for figuring out and remembering new words. Also, they need much more exposure to new vocabulary and roots words to enhance their ability to make sense of new vocabulary. More importantly, they must be given multiple opportunities to use new vocabulary and practice it repeatedly.” Gardner (2013:110) concludes: “the teaching of words themselves and the teaching of strategies for independent word learning is not only justified, but may be essential in academic settings.”

2.2.4.2.3 When to teach vocabulary

Although there is no fixed procedure explaining what words to teach when, it seems that some vocabulary and some strategies may be better suited for teaching at the beginning, in the middle or at the end of the lesson. Haynes and Zacarian (2010) explain the importance of pre-teaching words. They point out that even though there are researchers who claim that pre-teaching may break the rhythm of a lesson, ESLLs may not possess the language skills to enable them to follow the lesson if important vocabulary has not been explained first, thus, regardless of the fact that some researchers argue that pre-teaching results in teaching out of context, they believe that it may be essential in certain cases. They comment: "Too often, teachers use the lesson's 'big idea' as a jumping-off point, but it is our experience that the ELLs won't even understand the big idea if the key concepts and vocabulary have not been taught" (ibid, 2010:56).

Consistent with their focus on pre-teaching words, reading instruction is frequently delineated into three phases: pre-activities, while-activities and post-activities (SA. DoE, 2011a:10-11). When considering Marzano's (2009) six steps or phases in which vocabulary and learning activities can be incorporated into a lesson, a delineation similar to the one for reading instruction emerges. Steps one and two that deal with the introduction of vocabulary may be seen as pre-teaching activities. Similarly steps three, four and five will continue during the while-teaching phase, while step six refers to post-teaching activities when the focus is on practising and reinforcing knowledge about new concepts and words.

Marzano's (2009) six steps strategy will now be demarcated in alignment with the pre-, while- and post-teaching phase of the lesson. In addition, it will be further enhanced by suggesting specific activities that may be employed during each of the stages or phases of the lesson. This list is by no means comprehensive or prescriptive in terms of the phase of the lesson as a teacher may often find that a strategy for teaching of learning may be suitable at more than one time and for more than one purpose. Laufer and Nation (2012) rightly comment that the identification of learning tasks for vocabulary learning is still a distinctly unexplored field in the debate surrounding vocabulary instruction.

2.2.5 Teaching and Learning activities

2.2.5.1 Pre-teaching activities

During the pre-teaching phase of the lesson, the teacher can follow Marzano's (2009) first and second steps. The teacher introduces unknown words or concepts that will be essential for understanding the contents of the lesson. Marzano (2009) believes that even during the introduction phase of the words, learners should perform interactive and productive tasks. Both written and oral skills could be employed at this stage, allowing the learners to talk about the new word, pronouncing it, relating what they understand, and writing it down for better recall of the new word. Marzano (2009) stresses that these activities do not entail a copying down of the words from the board, but should allow the learners to make connections and generate their own meaning. A vocabulary learning strategy that Marzano (2009) suggests in this stage is the use of a personal vocabulary journal. Such a journal is highly personal, but the teacher can supply headings for the journal that the learners can then develop with relevant information. Even though using a dictionary to look up the meanings of unknown words may seem like a good strategy, Freeman and Freeman (2009) explain that SLLs are struggling with words and often also with reading. Simply asking the learners to look up words in a dictionary may be ineffective and confusing. Other learning strategies that may be useful during this stage is to help the learners link the word to a word that has a similar sound or to ask them to visualise the word.

2.2.5.1.1 Keyword vocabulary

This teaching strategy is a very effective way of helping the learners to link word meanings to images. It includes three steps, namely, recoding, relating and retrieving. The teacher firstly writes the target word on the board, instructing the learners to listen to the sound of the word (recoding) and to create a mental picture of the word (relating). The learners then make suggestions. The teacher gives the word meaning and then asks the learners to modify the pictures they imagined. During instruction and when the learners have to complete activities the teacher reminds them to think of the word and the keyword image (retrieving) (Manzo & Manzo, 1990).

This teaching strategy could be used to explain concrete words, therefore, any domain-specific and technical academic word. Firstly, say the word, *solidify* aloud (Topic six – Materials around us, Adatia *et al*., 2013a:60) and then explain the word's meaning. Secondly, instruct the learners to brainstorm on mental pictures they associate with the word and draw their mental pictures e.g. an ice cube, ice cream on the blackboard or overhead projector. The pictures stay on the blackboard or overhead projector so that when the word is used during the lesson, the learners can look at the images.

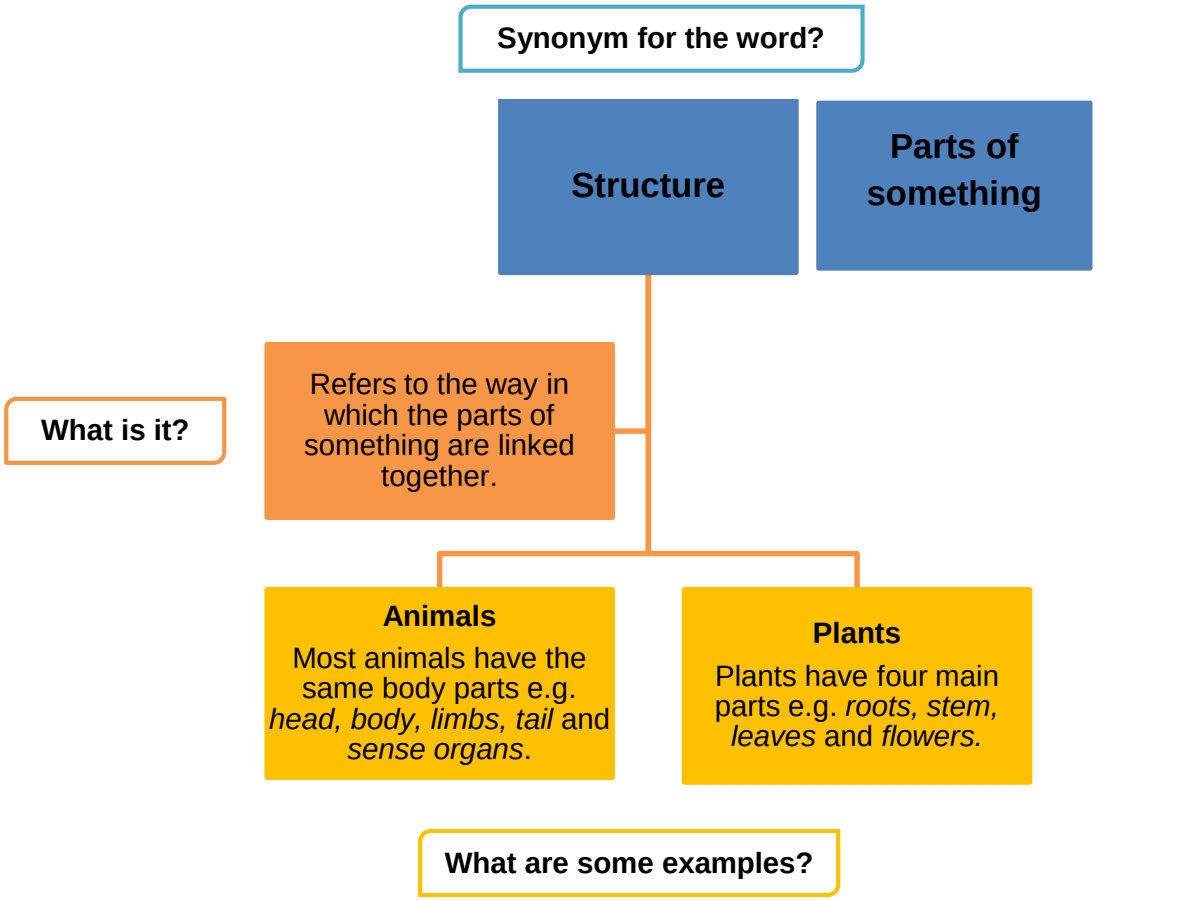
Figure 2.5 Keyword vocabulary, pictures for solidify (Manzo & Manzo, 1990)

2.2.5.1.2 The word map

It is important for the content-area teacher to use visual organisers to actively involve the learners. Words being simply labels for concepts, content-area teachers must determine the crucial concepts for their subject domain and demonstrate the word or labels for those concepts. The learners must be actively involved in "mapping/webbing/organising" (Greenwood, 2004:29). It is not very effective to supply the learners with a complete graphic organiser, therefore the word map strategy is useful for helping the learners acquire a general concept of a definition. "It makes them aware of the types of information that make up a 'definition' and how that information is organized" (Greenwood, 2004:29).

Firstly, inform the learners that a word map is a graphic representation. Secondly, introduce the map to the learners as a picture of what they need to know to understand the word, *structure* (Topic 2 – Structure of plants and animals, Adatia *et al*., 2013a:12) cf. Figure 2.6).

Thirdly, demonstrate the use of the map by putting the word in the central box. Ask questions to suggest words or phrases to put in the other boxes, which answer the three questions. A rich discussion should take place between the teacher and the learners. The learners work in pairs to discuss the keyword and answer the three questions. Finally instruct the learners to use the information to create a definition of the word.



Own sentence

We call the parts of something its structure. For example, plants have four main parts that consist of *roots, stem, leaves* and *flowers.*

Figure 2.6 Word map strategy of the word, structure, personalised from Greenwood's (2004) work

2.2.5.1.3 Vocabulary journal

Teaching the learners to keep a vocabulary journal of the newly learnt academic words allows integration with existing knowledge and meaningful learning. It helps the learners to keep track of important academic vocabulary and to make their learning experience of vocabulary personal (Larson *et al*., 2013). Since the vocabulary journal is a personal experience it can be utilised in different ways: the learners could record new words and learner-friendly definitions; write the words and then create a visual aid that relates to the words; create mind maps of the words, explain personal experiences connected to the words or share their vocabulary journal entries with the rest of the class. However, personal journal entries also hold disadvantages since the teacher needs to monitor it regularly (Graves, 2006). It may be time-consuming for Intermediate Phase learners to identify words for their personal journals; therefore, teachers will have to suggest words for the learners' journals and instruct them what they have to record (Graves, 2006).

The Natural Sciences and Technology teacher could make use of the vocabulary journal to teach the meaning of the domain-specific and technical academic vocabulary, *thermometer* (Topic six - *Materials around us*, Adatia *et al*., 2013a:65). Firstly, introduce the vocabulary journal to the learners and share the purpose of why this word is going to be recorded in their vocabulary journals. Thereafter, the meaning of the word needs to be explored by first looking at the definition on page 64- "We use a thermometer to measure temperature" (Topic six – *Materials around us*, Adatia *et al*., 2013a) and by focusing more explicitly on the word by looking at its spelling and the word parts – *thermo-meter.* Next, the learners have to form a sentence by using the new academic word and finally draw a picture in order to remember the word more easily. All these different steps of exploring the word in more depth need to be recorded in the vocabulary journal.

Definition:

A thermometer is an instrument that is used to measure the temperature of something.

Word parts:

Thermo - linked with heat or temperature

Meter - device, instrument

Sentence:

My mother used the thermometer to see whether I had a high fever or not.

Linking image:

Figure 2.7 Vocabulary journal entry of the word, thermometer, personalised from Larson's et al. (2013)

2.2.5.1.4 Signal words

Signal words or phrases are cues that help the learners to find the link between ideas. The teacher shows the learners examples of signal words and text organisational patterns in the passage before they have to read their passage. The teacher then uses a passage from their curriculum and asks the learners to highlight the signal words that have been found and then the teacher records them in a chart with the related text headings and topics (Harmon *et al*., 2006:171).

A passage on page 33 of the Learner's Book (Topic four – *Habitats of animals*, Adatia *et al*., 2013a) could be used. First read it out loud to the learners. Next, ask the learners to highlight the signal words or word clusters related to the heading namely, *different habitats*.

After reading the passage with the learners, fill in the chart on the blackboard or overhead projector to show the learners the relationship between specific words and also to point out contrasts and sequences (Harmon *et al*., 2006:171). Thereafter, the learners use the chart with all the vocabulary to create sentences and compare the different concepts: *Grassland habitats have mostly lots of grass and few trees. It is warm in the summer, with enough rainfall and cold during winters. The types of animals that could be found in this habitat are elephants, buffaloes, zebras and rhinos. Predators, like, lions prefer to hunt buffaloes and zebras and humans that are called poachers like to hunt and kill animals like elephants and rhinos.*

Table 2.2 Signal word classification chart of grassland habitats, personalised from Harmon's et al. (2006) work

Grassland habitats				
Characteristics	Lots of grasses	Few trees	Enough rainfall for grass to grow	It is warm in the summer and cold in the winter.
Types of animals that live in this habitat	Elephants	Buffaloes	Zebra	Rhino
Predators	Lions catch the animals that live in grasslands.			
Poachers	Kill rhinos for their horns and elephants for their tusks.			

2.2.5.1.5 Synonyms and antonyms

Learners could follow this academic vocabulary learning strategy by designing synonym and antonym organisers or making use of grids (Marzano, 2009). Some domain-specific and technical academic vocabulary are best understood when they are related to synonyms or antonyms (Blachowicz & Fisher, 2015; Marzano, 2009).

Marzano (2009) categorises the synonym strategy under his vocabulary teaching approach, which consists of six strategies that follow on each other to successfully make meaning of new words. In the first three steps the teacher provides a description of the word and then instructs the learners to reformulate the description in their own words and draw a visual representation of the word. The teacher subsequently broadens the learners' vocabulary knowledge by allowing them to complete a synonym and antonym word organiser.

The Natural Sciences and Technology teacher could use this organiser (cf. Figure 2.8) to explain the synonyms and antonyms of the domain-specific and technical academic term, *evaporate* (Topic six – *Materials around us*, Adatia, *et al*., 2013a:58). Firstly, explain that *evaporate* has a word with the same and opposite meaning. Secondly, draw the organiser on the blackboard or overhead projector and explain the word in context –"Liquids evaporate when they change into gases" (Adatia, *et al*., 2013a:58). Finally, test the learners' comprehension of the word by asking them to orally explain its meaning by replacing it with the synonyms and the antonyms. This will demonstrate their true comprehension of the word by using other words with similar or opposite meanings.

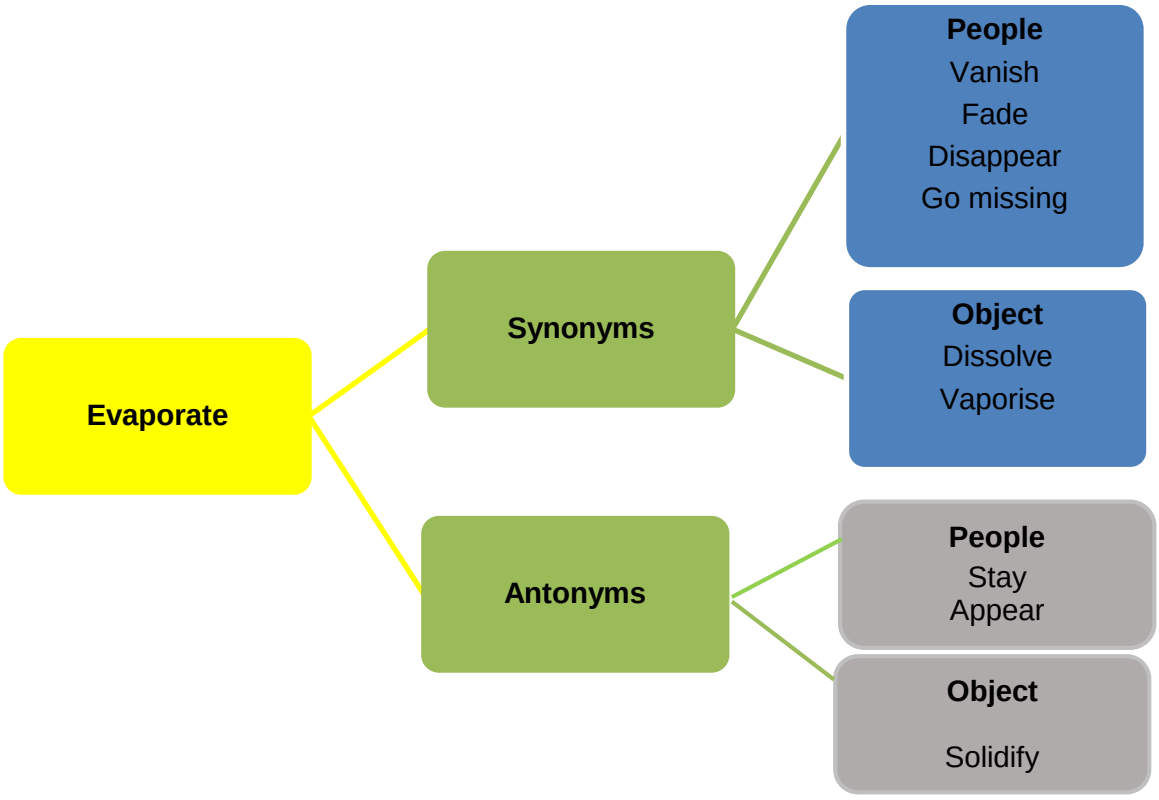


Figure 2.8 Synonym and antonym organiser of the word, evaporate, personalised from Marzano's (2009) work

2.2.5.1.6 Word questioning

Word questioning is a strategy that teaches learners specific vocabulary and promotes critical thinking about the words (Allen, 1999). Learners use a concept map that challenges them to define, analyse, synthesise and evaluate specific words in their reading and study unit. Similar graphic organisers include semantic maps or the Frayer concept map (Blachowicz & Fisher, 2015:114,117). It can also promote critical thinking about the newly learnt vocabulary. The teacher guides the learners to create a word questioning map and asks high level cognitive questions about the domain-specific academic word. This is also considered as a very important principle of the Interactionist Approach, where the learners should be able to learn new strategies that they can use to find the meaning of words.

The domain-specific and technical academic term, *habitat* (Topic four – *Habitats of animals*, Adatia *et al*., 2013:32) could be taught by teaching the Grade 4 learners to ask specific questions about the word. This strategy helps to develop their metacognitive skills, by learning to ask questions in order to find the meaning of a word. Learners have to ask and answer six questions. After the learners have completed the word questioning map (cf. Figure 2.9), the teacher could instigate an oral discussion where the learners' share their answers with the rest of the class. This provides an opportunity to test their comprehension of the newly learnt word.

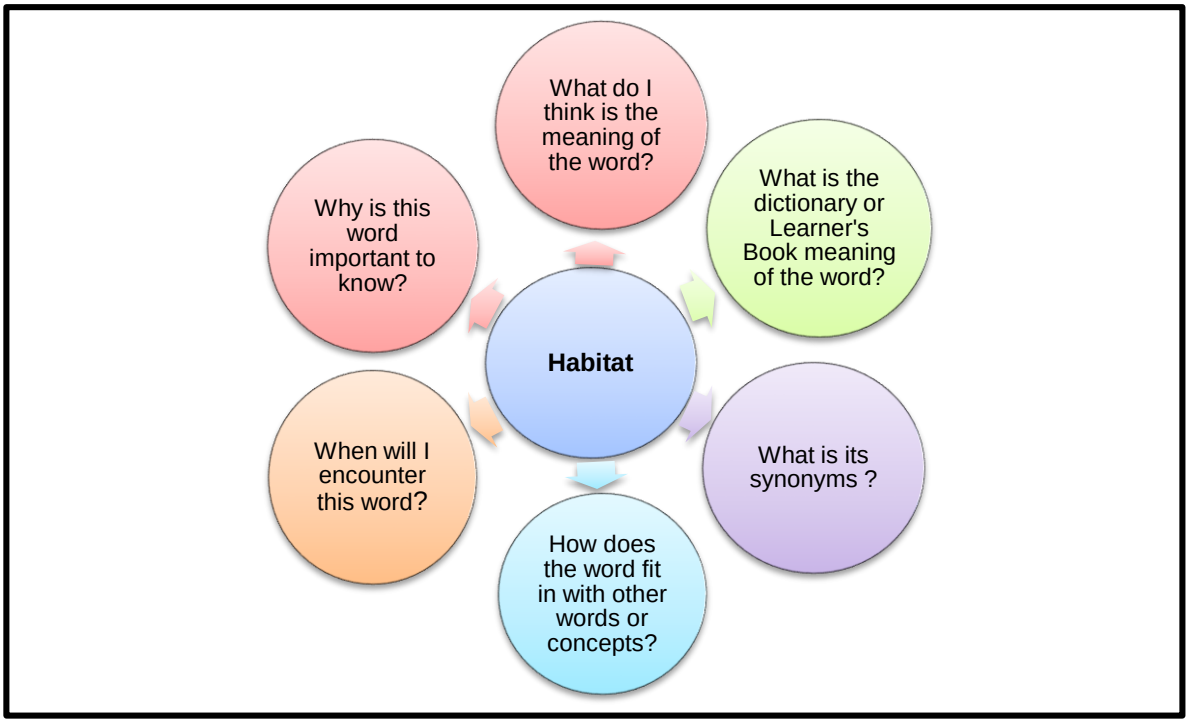


Figure 2.9 Word-questioning of the word, habitat, personalised from Allen's (1999) work

2.2.5.1.7 List-group-label and write

This is a categorisation teaching strategy that integrates vocabulary in the content-area classroom in a very effective way. Firstly, the teacher could identify the broad topic, namely, *Living and Non-living things* (Topic one – *Living and Non-living things*, Adatia *et al*., 2013a:2, 3, 9). Next, she can instruct the class to come up with related vocabulary. From there on the learners have to work in smaller groups to categorise the words into headings or categories. Thereafter, the learners read the passages on pages 2, 3 and 9 (Adatia *et al*., 2013a) and add new vocabulary to the categories. Finally, the learners have to construct a paragraph by making use of the labelled and categorised vocabulary (Taba, 1967).

Table 2.3 List-group-label and write vocabulary chart of Living and Non-living things, personalised from Taba's (1967) work

Topic:

Living and Non-living things

List: Make a list of all the words that you can think of that are related to the topic

alive, dead, trees, plants, animals, a pencil, desk etc.

Group and label: Combine the words into categories

Living things (alive)	
Examples	*trees, plants, animals*

Non-living things (dead)	
Examples	*a pencil, desk, wood*

Read: Read the assigned text and make sure the categories are correct. Add any new words while reading

Living things (alive)	
Examples	*trees, plants, animals*
Seven life processes	*breathe, grow, reproduce, feed, excrete, move, sense*
Sizes	*big, small*

Non-living things (dead)	
Examples	*a pencil, desk, wood*
Seven life processes	*none*
Sizes	*big, small*

Paragraph: Construct a paragraph by making use of the labelled and categorised vocabulary

Living things are things that are still alive, like: trees, plants and animals and they all differ in size. Living things carry out seven life processes, therefore, they can grow, breathe, reproduce, feed, excrete, move and sense. Non-living things, like, a pencil, desk or wood on the other hand are dead and do not carry out any of the seven life processes,

2.2.5.1.8 An interactive multi-sensory word wall

This is a way to present academic vocabulary to learners, while providing an on-going visual representation and helping the learners to develop "an understanding of, and fluency in key unit vocabulary" (Jackson, Tripp & Cox, 2011:46) and interaction with the word wall and displays support learning and teaching (Cambourne, 2000). This type of word wall includes a visual demonstration, like, a colour picture of the word or concept or the real artefact in a small plastic bag and a vocabulary label. The multi-sensory word wall in Figure 2.10 below has the real artefacts of all the tools the learners could use for protection, measuring, exploring and recording. The content-area teacher has, for example, placed a thermometer in a plastic bag and labelled the item as well.

Other examples of how the multi-sensory word wall can be utilised in the classroom is to categorise words in specific groups or headings i.e. *amphibians and reptiles* or the specific sequence of the life cycle of a plant i.e. *seed, seedling (sprouting seed), seed with a bud, seed with flowers*. Jackson *et al*. (2011:45) argue that displaying unorganised lists of vocabulary is traditional and ineffective. The content-area teacher could also use the multi-sensory word wall to revise words by pointing to the word wall. He or she could also remind the learners of the learnt academic words or using the word wall as an interactive tool, where they are challenged to brainstorm and to add new words to the word wall. The content-area teacher could also make use of specific questions and prompts when making use of the multi-sensory word walls (Larson *et al*., 2013:18). Examples of prompts and questions are:

- Copy the words from the word wall in your workbooks and discuss with your partner everything you know about the words.
- What words on the word wall do you think will be most relevant and helpful for today's lesson and why?
- Use two words from the word wall in two sentences.

Jackson *et al*. (2011:47) provide five criteria of what a good multi-sensory word wall should look like: words need to be aligned with current instruction; the words need to be visible from a distance; words need to be arranged to illustrate relationships, categories or sequences; the word wall needs to contain learner generated material and it needs to have colour pictures, photographs or actual items. This strategy is aligned with the Interactionist Approach as it provides the learners with the necessary visual exposure, awareness of important academic vocabulary and opportunities for interaction.

The teacher can make use of the criteria as explained by Jackson *et al*. (2011) and create a multi-sensory word wall that she can use for referring back or teaching domain-specific and technical academic vocabulary e.g. *germinate, seed, seedling* (Topic three – *What plants need to grow*, Adatia *et al*., 2013a:27) as she explains the stages of a plant's growth. Using this strategy the teacher needs to ensure that the colour pictures and examples (realia) of seeds are placed on the multi-sensory word wall.

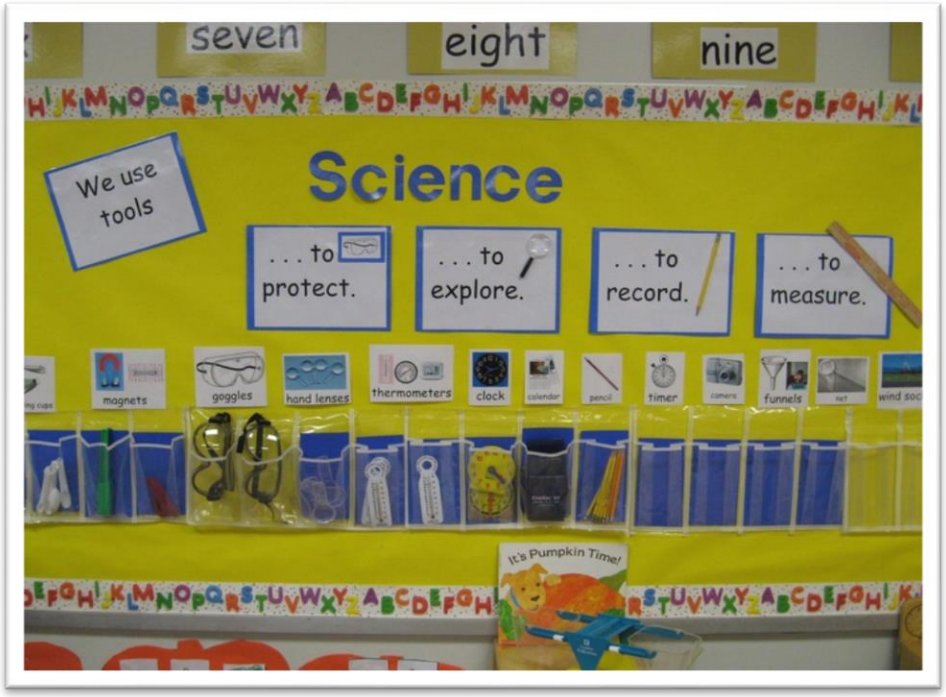


Figure 2.10 Multi-sensory word wall in the Science classroom (Jackson et al., 2011)

2.2.5.2 While-teaching activities

During the next phase of the lesson, Marzano (2009) suggests that learners are asked to create a picture, graph or symbolic representation of the word. Marzano (2009) does not specify the types of academic words that should be dealt with in each phase, but it seems natural that the teacher would focus on domain-specific and technical vocabulary and concepts first, before explaining words from the general academic, or even the symbol and abbreviations domain. On the other hand, the explanation of a particularly important polysemous word e.g. *cabinet* as used in the Social Sciences or History class (Harmon *et al*., 2008) as opposed to a *cupboard* may be important for creating understanding of the concept and, therefore, the content of the lesson.

Marzano (2009) suggests that the visual images could be recorded in a vocabulary booklet. It is important that this activity is seen as an interactive one where the learners are allowed to share or check their interpretation with peers or the teacher. Learners may also design a graphic organiser or mind-map to show how ideas and words are connected.

2.2.5.2.1 Code Switching

According to researchers (Cook, 2002; Rollnick, 2000; Setati, Adler, Reed & Bapoo, 2002), the practice of switching between English and the learners' home language can be a very effective teaching practice to increase the learners' understanding of English Science vocabulary. However, it has to adhere to certain principles (Liu, Ahn & Han, 2004): a) no translation; b) home language homogenous; c) teaching of the target language (SL). The teacher needs to switch between the learners' home language and SL. The learners' home language cannot be used predominantly as they need to be able to use their SL productively. All the learners should share the same home language, otherwise, some learners will feel excluded and experience learning problems. The main purpose of using code switching should be to develop the learners' SL and enhance their learning, not because of a lack in personal proficiency (Liu *et al.*, 2004). Moji and Grayson (1996) argue that variations in meaning get lost unless the teacher is skilled enough to explain the meanings from English to another language.

2.2.5.2.2 Concept circles

As another categorisation strategy, a concept circle helps the learners to form the conceptual relationships among identified words. The teacher starts by demonstrating four related words in each quadrant and then instructs the learners to identify the concept relationship among the words. The teacher could also put words in one quadrant of the circle and leave the other one empty. The learners then have to brainstorm and think of words that relate to the words in the quadrant and identify the overall concept that the circle represents (Vacca & Vacca, 2005:157).

The teacher can make use of this teaching strategy to allow the learners to study the words critically and conceptually. She or he can simply preview the reading passage with the learners and underline or highlight the key vocabulary. The meanings of the words are predicted based on the heading, subheading, pictures and captions. During reading, the learners confirm the meanings of the words. After the learners have read the passage, the teacher can provide them with the concept circle.

It is suggested that only three domain-specific and technical academic words i.e. *evaporating, condensing and solidify* (Topic six – *Materials around us*, Adatia *et al*., 2013a:58-60) should be placed in the concept circles. The learners then have to fill in the empty section with a word that relates to the terms in the concept circle. Lastly, the learners name the concept that all the words represent above the circle.

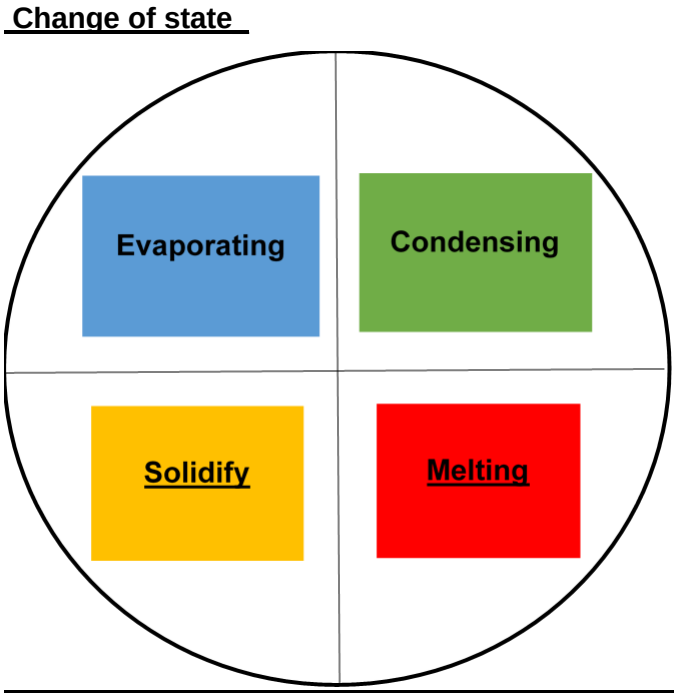


Figure 2.11 Concept circle of the words, evaporating, condensing, solidify and melting, personalised from Vacca & Vacca's (2005) work

2.2.5.2.3 The Semantic Feature Analysis Strategy (SFAS)

The primary purpose of this teaching strategy is to enhance the learners' depth of vocabulary by investigating the different features of related words or concepts (Tierney & Readence, 2005). Steps in the process include where the teacher shows the learners where the domain- specific and technical academic vocabulary share common features and lists the qualities and characteristics of the words (Greenwood, 2002:259). The learners may also be asked to add other features that distinguish one word or concept from another. A grid is used where the words or concepts are placed on the vertical axis and features on the horizontal axis.

This grid could be used to teach the different features of the different substances i.e. *solids, liquids* and *gases* in order to help the learners understand the meanings of each concept (Topic six - *Materials around us*, Adatia *et al*., 2013a:56). Firstly, draw the grid on the board and encourage an oral discussion on why some substances have different features or the same features. This grid can be placed on the word wall in order for the teacher to refer back to it and so that the learners have access to it when needed. Lastly, the learners use the grid with all the words to create sentences and compare the different concepts: *Gases, such as, perfume, can be smelt and most gases cannot be seen or felt. Like liquids, gases have no shapes, they flow and evaporate. Solids have fix shapes, they cannot flow or evaporate, but like liquids they can also be seen, felt and smelt.* This teaching strategy, thus, creates an opportunity for learners to produce output from their academic vocabulary knowledge as they participate in the oral discussion. Furthermore, it is advantageous as feedback is given on the learners' academic performance and it helps to summarise the content and vocabulary of the lesson.

Table 2.4 SFAS: The features of solids, liquids and gases, personalised from Tierney & Readence's (2005) work

	Flow	Evaporate	Fixed shapes	No shapes	See it	Feel it	Smell it
Solids	-	-	+	-	+	+	+
Liquids	+	+	-	+	+	+	+
Gases	+	+	-	+	-	-	- / + Perfume can be smelt.

2.2.5.2.4 Dictionary training strategy

Exploring dictionary entries can be an effective way of understanding a word in-depth (Pikulski & Templeton, 2004). Graves (2006) argues that the dictionary is more beneficial when the teacher teaches the learners to use it in context during or after reading, than supplying them with the list of definitions or asking them to look the words up before reading.

It is also better to use a learner friendly or even a picture dictionary in the case of younger learners. Teachers need to be aware that younger and ESLLs may find dictionary definitions troublesome as they contain vocabulary that these learners have not yet acquired (Gardner, 2013:127).

Dictionaries can provide learners with information about the history of a word and also explain interrelationships among words (ibid, 2004). For example, the dictionary entry "*predator*- an animal that kills and eats other animals" (OALD, 2005:1140), also provides the antonym for *predator* (an animal that does not kill and eat other animals) and the relationship between a *predator* and its *prey* (Topic four – *Habitats of animals*, Adatia *et al*., 2013a:32, 33). The dictionary may help learners to differentiate between concepts, provided the teacher supplies scaffolding (Pikulski & Templeton, 2004).

Learners also need other skills in order to use the dictionary, like, knowing how to alphabetise and knowing how to use the guide words at the top of each page to locate specific words. Teachers, therefore, have a very important role to fulfil and that is to show learners how to identify and select the most appropriate meaning of the word based on how the word is used in context (Stahl & Kapinus, 2001). Learners need explicit instruction in how to use what they find in a dictionary so that they can transfer that information into something useful. To help learners learn how to select the appropriate meaning in the dictionary (Graves, 2006), teachers can use the following steps;

- the learners read the sentence containing the unknown word.
- before the learners look up the unknown word in the dictionary, they need to think aloud and guess the meaning of the word based on the context clues they can find.
- they use the dictionary and read all the definitions for that word.
- next, the learners decide which definition makes sense within the context that the unknown word is used.
- if the meaning of the word is still unknown to the learners, they can discuss it with other learners and use other word-learning strategies, such as, morphological word analysis.

2.2.5.2.5 Venn-diagram

Making use of a Venn-diagram allows the teacher to visually demonstrate what, for example, the general academic term, *compare,* means (Topic one – *Living and Non-living things*, Adatia *et al*., 2013a:8).

An example is used where two concepts are compared to illustrate comparisons between two things (Nagy, 1988). In this way the learners will not only know what the meaning of *compare* is, but also learn the skill of comparing two things.

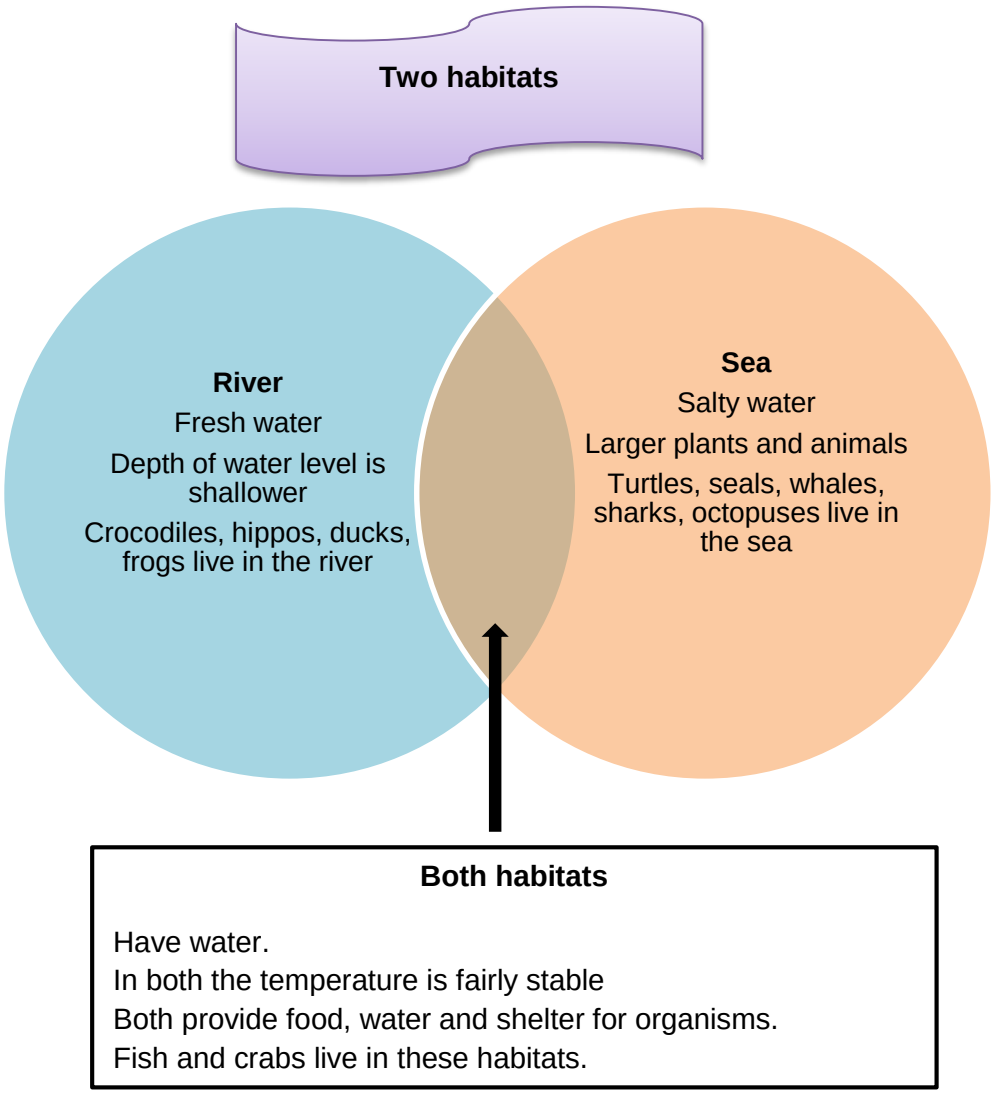


Figure 2.12 Venn-diagram of river and sea habitats, personalised from Nagy's (1988) work

2.2.5.2.6 First-hand experiences and print resources: creating pictures, graphs or symbolic representations

First-hand experiences allow the learners to observe record, contribute or manipulate some object or event that is critical for enhancing content-specific vocabulary (Carrier, 2012; Spencer & Guillaume, 2006:208). According to these authors, by using this strategy, the richer and more varied learners' experiences become, related to a specific concept, which leads to "more finely detailed and nuanced understanding of related terms" (Spencer & Guillaume, 2006:208).

Drawing is a useful technique for helping learners to record their new understanding of words (Spencer & Guillaume, 2006) and to develop a metaphorical understanding of words (Carrier, 2012; Spencer & Guillaume, 2006). This helps the leaners to form a visual representation of words and to internalise the meanings of words easier. Spencer & Guillaume (2006) explain that learners could create a drawing of what they have observed with added labels. As the learners create their drawings, the teacher monitors the learners' work and make sure that they use the correct terminology and labels (Spencer & Guillaume, 2006). Monitoring and feedback, as stated by the Interactionist Approach, are also critical, as the learners need to know whether their understanding and visual representation of the word(s) are correct or not (cf. Section 2.2.3).

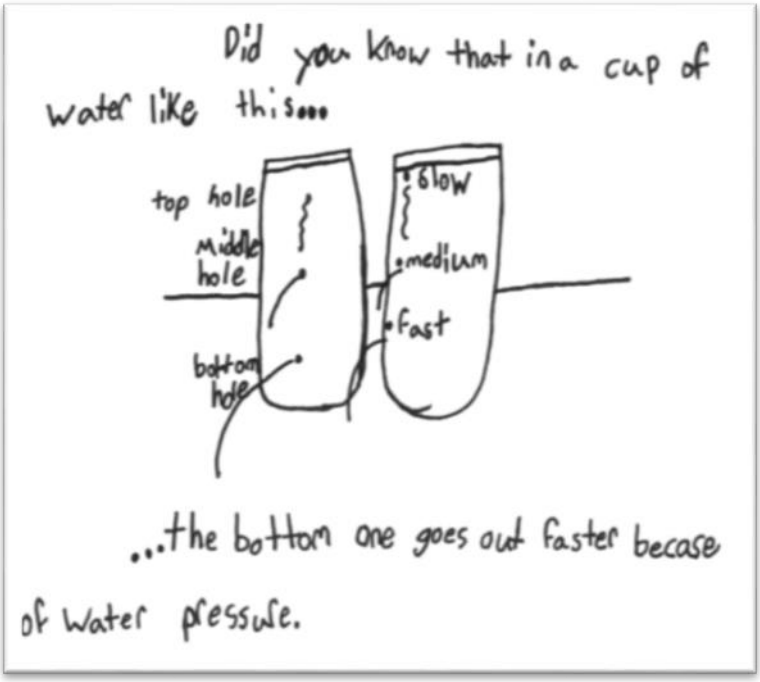


Figure 2.13 Example of an observation during an experiment and recording the vocabulary and findings (Spencer & Guillaume, 2006)

The teacher can both orally and in written form, explain to the learners that *condense* is when "[g]ases lose their heat" and "change back into a liquid" (Topic six - *Materials around us*, Adatia *et al*., 2013a:58). From there on make use of an experiment to practically explain the word, *condense*. The tools that will be needed to conduct the experiment are: a bowl, hot water and a plastic bag. The hot water needs to be placed into the bowl, thereafter the plastic bag needs to be placed over the bowl. After a few minutes, point to the gas that rises up to the plastic bag that is created by the hot water. Continue to explain that the gas will eventually lose its heat and form water drops or liquid on the plastic bag. Next, refer back to the written definition on the blackboard or overhead projector and ask them- *learners now when gases lose their heat and become liquid or water drops, we say that they…?* Finally the teacher can instruct the leaners to define the meaning of the word, *condense,* and draw a picture with added labels of what they observed, which metaphorically explains the meaning of *condense* and all the related vocabulary. It is important that teachers expose learners, and especially ESLLs, to visual realia particularly when it comes to teaching very abstract academic words or concepts. Visual realia also provide other opportunities to word learning, such as, hearing how the word is pronounced, seeing how the word is spelled and forming a visual representation of the word or concept.

2.2.5.2.7 Linear arrays

Linear arrays are more appropriate for displaying other types of associations among academic words. For example, many sets of words differ in degree and this strategy helps learners to see the subtle differences between words and realise that words have different shades of meanings (Nilsen & Nilsen, 2003). The association among such words can be illustrated visually by displaying it in a line (Allen, 1999:52). Use this strategy to illustrate the different nuances of the domain-specific and technical academic term, *damp* (Topic three – *What plants need to grow*, Adatia *et al*., 2013a:5). Explain it on the blackboard or overhead projector by drawing the keyword boxes and lines. For example:

Figure 2.14 Linear array of the words, "dry", "damp" and "soaking"; personalised from Allen's (1999) work

2.2.5.2.8 Context-content-experience graphic organiser

The rationale of the context-content-experience graphic organiser is to assist the learners to find different meanings of a word using the sentence(s) in which the meanings transpire (using the text context). The teacher could introduce the word to the learners and ask for possible meanings and then write the sentence(s) from the text where the word appears. The teacher can then instigate a discussion about the meanings by showing the learners how the context could be used to discover the meaning of a word. Together with the learners, he or she can look up the definition of the term in a dictionary and agree on a definition (finding a common definition). The teacher can now provide examples of how the word can be used in different contexts e.g. Language and Social Sciences and ask the learners to create sentences using the word in those different contexts. Finally, the learners have to use the information in the organiser and create a sentence to demonstrate how the word is relevant in the Natural Sciences domain (Allen, 1999:51). This strategy could be used to teach the domain-specific and technical academic term, *cutting* (Topic three – *What plants need to grow*, Adatia *et al*., 2013a:24).

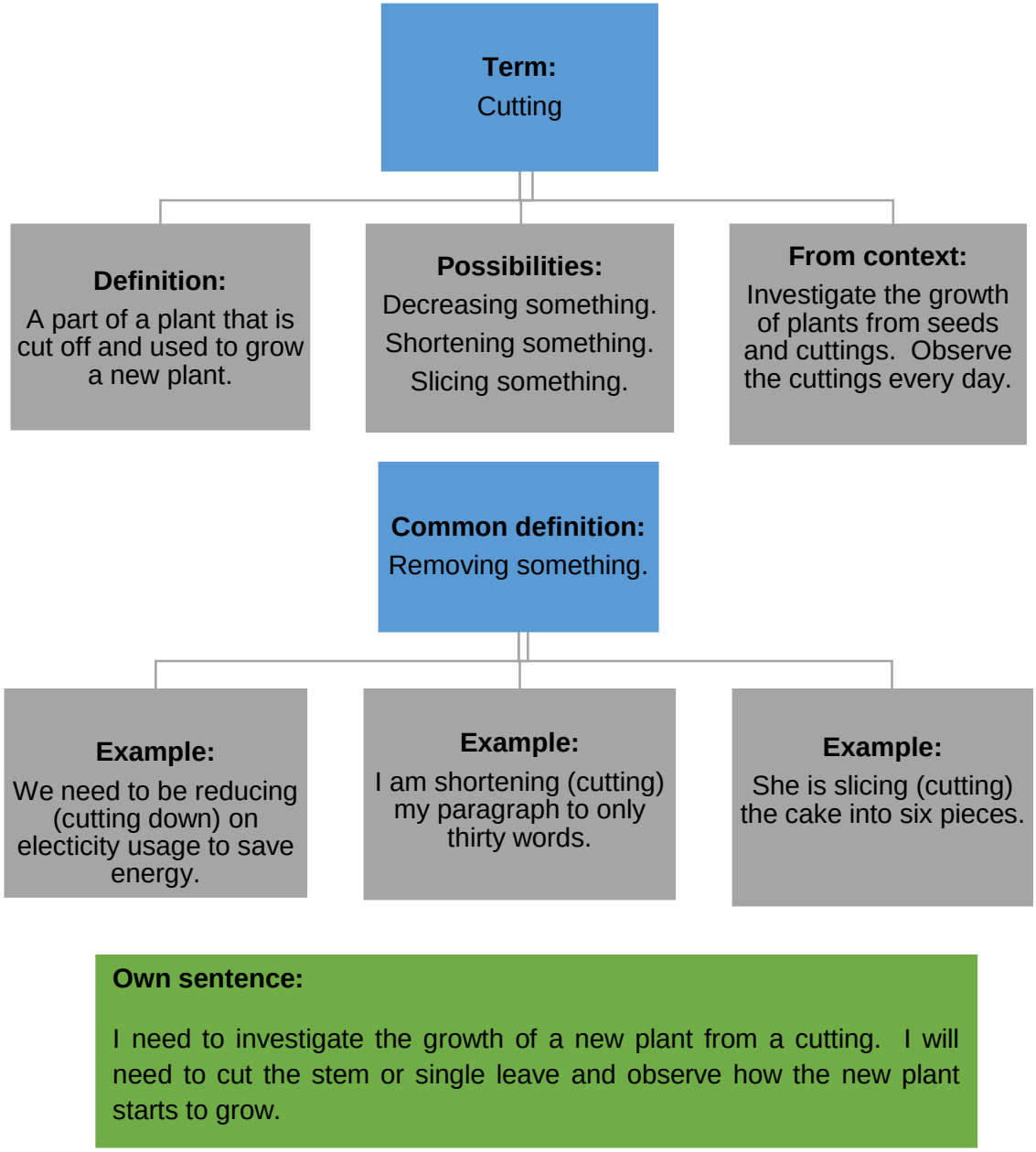


Figure 2.15 Context-content-experience graphic organiser of the word, "cutting"; personalised from Allen's (1999) work

2.2.5.3 Post-teaching activities

During the next phase, learners may be required to add information to existing knowledge e.g. the completion of a semantic map of a word as the lesson unfolds. In Marzano's (2009) last two steps he focuses on feedback, discussions and a number of activities that will consolidate and reinforce the learners' knowledge of the word.

Activities, such as, word games, research into the history or morphology of the word or even dictation exercises may be useful for revisiting, but also to create a deeper understanding of the word.

2.2.5.3.1 Teaching the history of words

According to Padak, Newton, Rasinski and Newton (2008:7) teaching a word's origins and derivatives will help the learners to understand an important linguistic principle and that is that words have a distinct logic, because their meanings are historically embedded. Academic textbooks have a number of words that come for Latin and Greek roots, because "words that are associated with scholarly, scientific, and technical advances are most often of Greek or Latin origin" (Padak *et al*., 2008:8). These researchers, therefore, urge teachers to share a word's history and origins to help the learners to form a better understanding of the meaning of the word (ibid, 2008).

A domain-specific and technical academic term, such as, *Impatiens* (Topic two - *Structures of plants and animals*, Adatia *et al*., 2013a:26) is a very specific Natural Sciences word to grasp that needs to be taught. By explaining the words' history to the learners will make it easier for the learners to remember the word. The teacher may write the word on the blackboard or overhead projector and ask the learners if they are familiar with the word, *impatient*, and then ask them to explain the word. Thereafter, the teacher can explain to the learners that this name of the plant also comes from the Latin word- *impatient* and the plant received this name, because the pods of the plant are impatient and immediately burst open when they are touched (Merriam-Webster online encyclopedia, 2015). Finally the teacher could show them an example of a pod of an *Impatiens* plant that acts 'impatiently' and bursts open when it is touched.

2.2.5.3.2 Graphic morphemic analysis

This strategy is better known as the strategy learners could use to analyse word parts, such as, roots, suffixes and affixes to find the meanings of words (Graves, 2006). Most domain-specific academic words have Greek and Latin roots. This is especially true when learners read or study the Science textbook. For example, the Greek root- *bio*, which means *life* or *living organisms* are encountered again and again in a typical middle school Science textbook (e.g., *biology, biologist, biosphere, biodegradable, biochemical, biofuel and biohazard*).

According to Edwards *et al*. (2004) helping learners understand the meaning of these root words will increase their depth and breadth of vocabulary knowledge. When using this approach, the teacher could generalise the word parts that the learners can apply to other words that are encountered in textbooks. The graphic morphemic analysis strategy uses an organised approach to deconstruct a word into different parts to figure out what the word means by using a graphic organiser (Baumann, Edwards, Font, Tereshinski, Kame'enui & Olejinik, 2002). Like morpheme triangles (Winters, 2009) and morpheme circles (Harmon *et al*., 2006), the graphic morphemic analysis strategy helps the learners to use a visual analysis to analyse the word from word relationships and contextual meanings (Baumann *et al*., 2002). When employing graphics as part of the strategy it provides learners with visual assistance that helps them see the meaningful parts of the word and construct meaning (ibid *et al*., 2002).

It is suggested that the teacher firstly, select a word and meaningful parts to analyse in isolation. The teacher then explains to the learners the importance of examining the parts of the word for example, *predict* (Topic six - *Materials around us*, Adatia *et al*., 2013a:64). The teacher points out that this strategy will help them to look at meaningful word parts to figure out this word's meaning. The teacher can then use a think-aloud strategy to demonstrate to the learners how to deconstruct the word, *predict* and model the deconstruction of the word on the blackboard or overhead projector. Using the graphic organiser (cf. Figure 2.16), the teacher shows them how to detach the prefix- *pre* from the root- *dict.* The think-aloud and saying the meaning of the root aloud is repeated after which the learners write the word in the appropriate box. Thinking aloud shows them how the prefix changes the meaning when it is added to the root- *a guess, to say something before it has even happened*. The teacher now writes the sentence that contains the target word (from context) in the appropriate box. Thereafter, all work together to analyse other words with the same root e.g. contradict, dictate, dictator. Finally, the teacher writes the dictionary definition in the appropriate box on the graphic organiser to make sure that the analysis is correct.

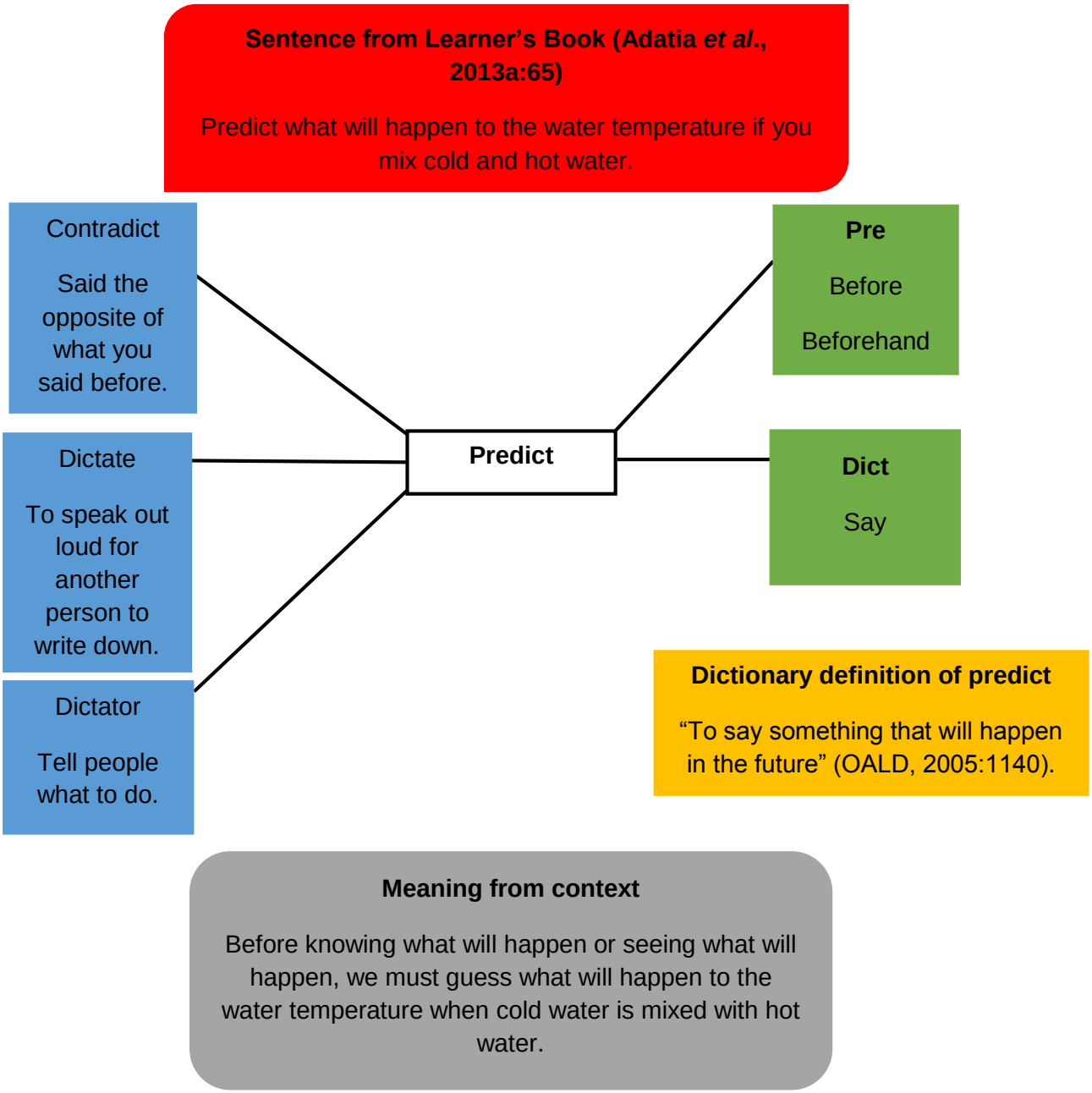


Figure 2.16 Graphic morphemic analysis of the word, predict, personalised from Baumann's et al. (2002) work

2.2.5.3.3 Link, Imagine, Note, Construct, Self-interest (LINCS)

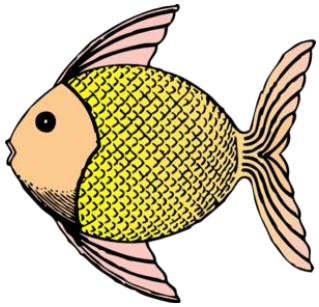
The LINCS strategy is a way for learners to learn the meaning of words through memory techniques (Foil & Alber, 2002:136). This strategy helps learners to make a link between the elements of words, visual images and prior knowledge. The Natural Sciences and Technology teacher could use this strategy (cf. Figure 2.17).

Firstly, the teacher can instruct the learners to write down the definition of the academic term, *scale* (Topic two – *Structures of plants and animals*, Adatia *et al*., 2013a:19) at the back of a card e.g. s*cales are hard external coverings of fish and reptiles*. Secondly, the learners must try to visualise the word and describe it to their partner sitting next to them. Thirdly, the learners have to think of other words related to this word e.g. *snakes, skin, hard plates, coat* and write it on the back of the card. Finally, the learners have to create a sentence at the back of the card with the word and the related words e.g. *fish and snakes have hard plates on their skins that are called scales, which protect their skin and attacks from other animals*. The learners then have to show the card to a peer in order for the peer to assess whether everything on the card is correct.

New word: Scales

Scales are hard external coverings of fish and reptiles.

Linking image:



Linking words:

snakes, skin, hard plates, coat

Construct sentence with linking words:

Fish and snakes have hard plates on their skins that are called scales, which protect their skin and attacks from other animals.

Figure 2.17 LINCS graphic organiser of the word, scales, personalised from Foil & Alber's (2002) work

2.2.5.3.4 Word-coding strategy

The word-coding strategy is to help the learners understand that many words have different meanings. The teacher may first identify polysemous words in a text and then explain their general meanings. Thereafter, the teacher can instruct the learners to work in pairs and complete a chart where they have to distinguish among the different meanings of a word (Pavio, 1990). This strategy could be used to help the learners distinguish among the many different meanings of the domain-specific and technical academic term, *energy* (Topic six – *Materials around us*, Adatia *et al*., 2013a:58) and to deepen their understanding of the word in the Natural Sciences domain. For example:

Table 2.5 Coding chart of the word, energy, personalised from Pavio's (1990) work

Word: Energy **Common meaning: The physical or mental strength that allows a person to do things.** **Natural Sciences meaning: The ability of matter or radiation to work, because of its mass or movement e.g. kinetic energy.**		
Other contexts	**Meaning**	**Picture**
Life skills	Natural enthusiasm and effort.	

Life Sciences	Physical and mental effort.	
Social Sciences	A source of power to provide heat or light e.g. solar energy.	

2.2.5.3.5 Find that word

This teaching strategy is used to motivate the learners to find the words they learn inside the class in contexts outside the classroom in order to raise the learners' word awareness, help them develop their vocabulary knowledge depth and enhance their appreciation for words (Richek, 2005:421). The teacher may require the learners to search for the words they have learnt in the class while free reading, reading other content-area books, listening to the radio or watching television (Richek, 2005:421). The teacher then allows the learners to orally share their word encounters with the rest of the class by illustrating the graphic organiser with the words they have found, where they have found them and in what kind of context (cf. Figure 2.18). The learners' findings could then be put up for display on a word wall or word bank that will encourage the searches for words outside the classroom and in different contexts.

For example, the teacher could instruct the learners to investigate in what other contexts the domain-specific and technical academic words e.g. *properties* and *substances* are used (Topic six - *Material around us*, Adatia *et al*. 2013a:56).

The learners could report back that another meaning for *properties* is a *person's belongings* or it could refer to *home estates.* The learners could have come across the word while watching television.

The learners could find the second word, *substances* or *substance abuse* in the Life Skills content-area, which refers to the use of drugs and alcohol. This is a very useful teaching strategy that not only ensures interaction among learners, but also interaction outside the classroom as they search for the words. It is an informal learning situation where the learners could come and share their findings of the words they found and receive feedback on their findings and experiences. This enhances the depth of their academic vocabulary knowledge (Section 2.2.3).

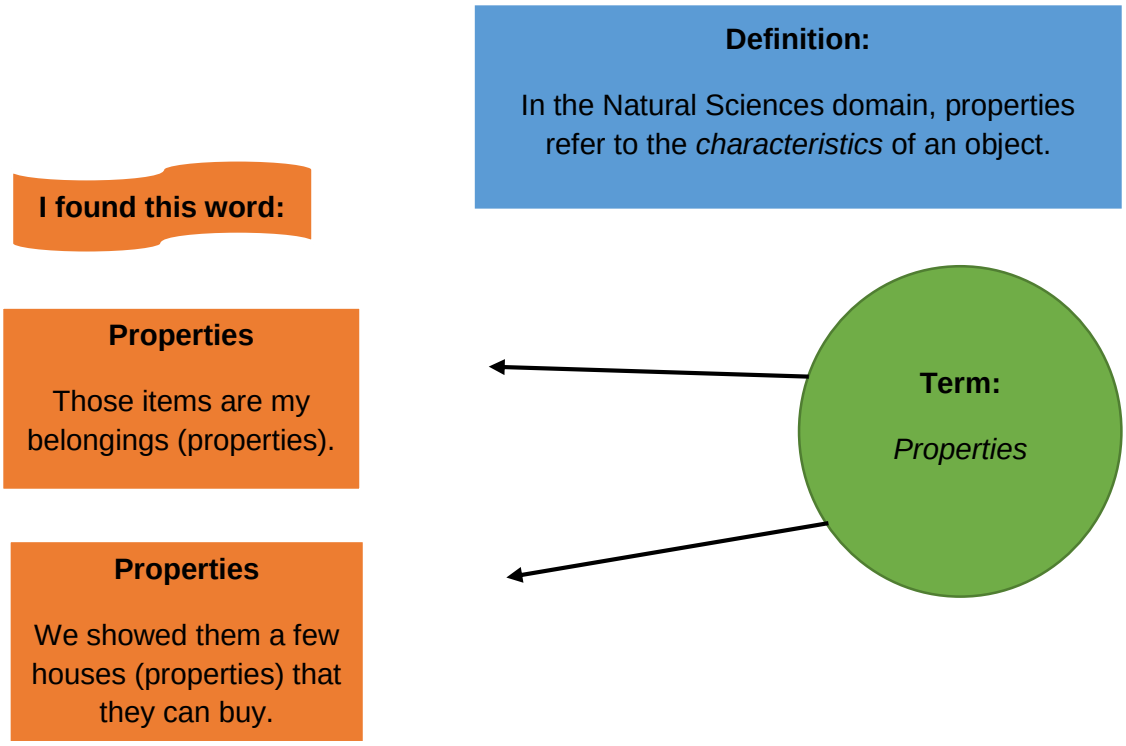


Figure 2.18 Find that word organiser of the word, "substances"; personalised from Richek's (2005) work

2.2.5.3.6 Word games

According to Blachowicz and Fisher (2004:219) "playing with language is one of the best ways to engage students with language and to lead them to deeper levels of understanding."

There is strong evidence that word play and games e.g. card games, riddles; charades and hang man form an important component of a word-rich classroom, develop learners' metacognitive skills, encourage interaction among learners and ensure practice and rehearsal of words (ibid, 2004:219). According to Towell (1997) riddles could easily be utilised in any classroom situation in order to introduce new words in unusual ways or at the end of the lesson to test the learners understanding of newly learnt words.

The teacher can create riddles to introduce the learners to, or recap on, important academic words, for example, *roots, leaves, stem* and *flower* (Topic two – *Structures of plants and animals*, Adatia *et al*., 2013a:12).
For example:

- roots – they function as an anchor to keep the plant upright.
- leaves – they are green and function as the plant's food storehouse.
- stem – it is brown and attached to the anchor of the plant.
- flower –it could vary in colour, it smells good and attracts the attention of insects.

Other word games that the learners could play to make sure that they receive multiple encounters with a word are: *the vocabulary cube game*, *spin the wheel game*, *word quizzes* or *role-play*. With the *vocabulary cube game* the teacher may instruct the learners to work in their groups and throw a cube and complete six instructions depending on which number the cube falls on. If the cube falls on the number, one, they have to make a connection with another word, number two: give their own definition of the word, number three: draw the word, number four: act out the word, number five: give a synonym or antonym of the word and number six: use the word in a sentence. *Spin the wheel* is an explanation and guessing game. The teacher can explain to the learners that they have to choose any word from the word wall and then spin the wheel. The learner must follow the instruction given on the wheel and explain the word to the group. The rest of the group then have to guess what word it is. This game provides different mental encounters with the word, which leads to better word retention (Hulstijn & Laufer 2001). The teacher could easily create a spinning wheel for his or her classroom as the one below (Figure 2.19).

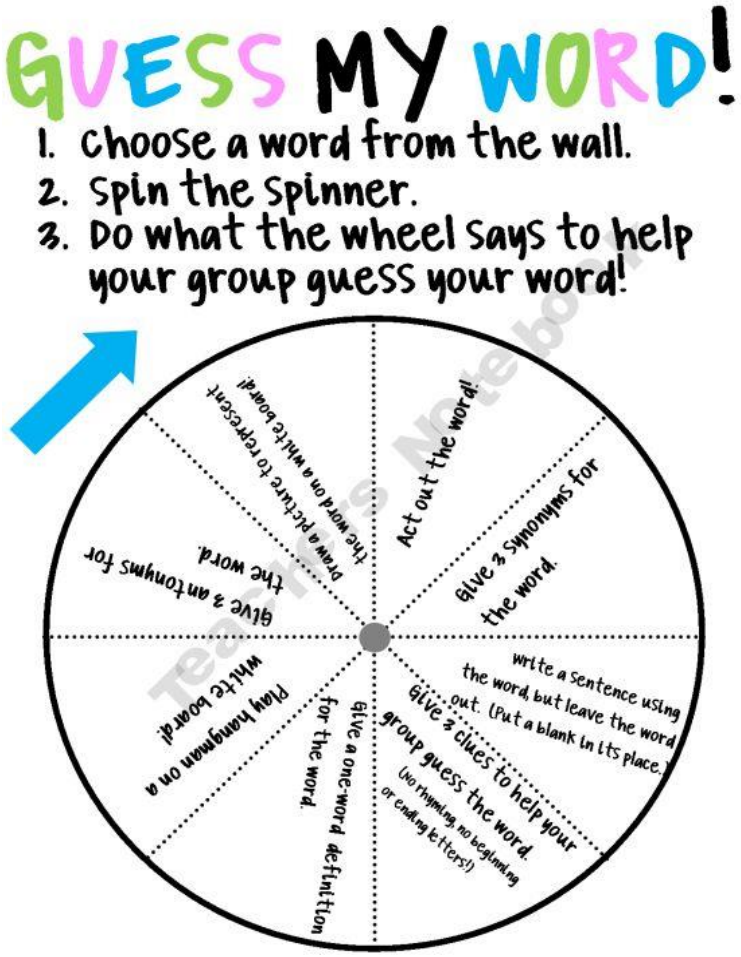


Figure 2.19 Spin the wheel vocabulary game

To play the game each learner is given a card that has a word on it, taken from the word wall. For example, the symbol ^{o}C (Topic six – *Materials around us*, Adatia *et al*., 2013a:63) or the general academic term, *observe* (Topic one - *Living and Non-living things*, Adatia *et al*., 2013a:6). Learner A reads the definition of the symbol and Learner B needs to investigate the word wall and choose a symbol from the word wall that matches the definition. If Learner B does not choose the correct symbol, Learner A reads a fact and Learner B tries again. If Learner B is still not able to provide the symbol after he or she is given the definition and facts on the card, Learner A tells Learner B what the symbol is. Thereafter, the roles are reversed and the process is repeated (Dominguez & Miller, 2011).

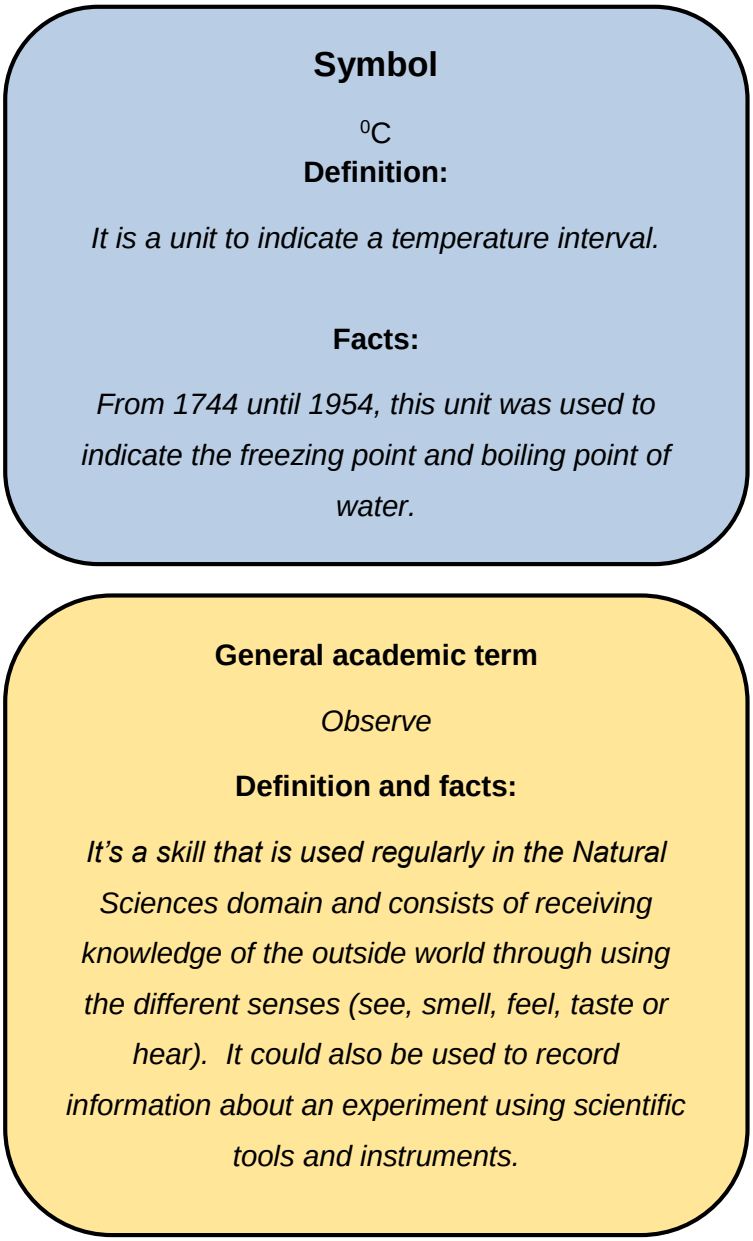


Figure 2.20 Word quiz cards (Dominguez & Miller, 2011)

According to several researchers (Carrick, 2001; Hoyt, 1999; Ladousse, 2004; Zwiers, 2008) role plays are effective as the learners not only interact with others using the appropriate vocabulary, they also improve their conceptual understanding of the words by acting out the meanings of the new vocabulary in different contexts. During role-play, the teacher will instruct the learners to work in their groups to create and act out stories about the water cycle (Topic six – *Materials around us*, Adatia *et al.*, 2013a:66).

Using some type of costuming, props or pictures on craft sticks, the learners have to use the correct vocabulary e.g. *evaporate, condensation, precipitation* and explain the travels of a water droplet through the water cycle. One of the learners can even be the water or droplet that moves through the cycle. The correct sequence of the stages in the water cycle is: a) the water from the see evaporates; b) clouds start to form, which is called condensation; c) raindrops form and falls on a hill, which is called precipitation; d) it runs into a stream, which flows into a river, a bay and then the ocean; e) the water from the ocean evaporates and accumulates in a cloud and the water cycle continues.

2.3 Conclusion

The literature review explored the theoretical underpinnings of academic vocabulary learning and teaching. In the context of this study, the literature review has highlighted that learners are supposed to read and make meaning of a large amount of academic vocabulary in their subject domains and without efficient academic vocabulary knowledge the learners will struggle to comprehend texts and achieve academic success. The literature highlighted a series of aspects as to how learners learn vocabulary, based on the principles of the Interactionist Approach i.e. *modified input, noticing and awareness, negotiation of meaning, output and feedback*. The theories on how learners best learn vocabulary, have direct implications for teaching practices in terms of (a) knowing how learners acquire and learn vocabulary; (b) knowing what words are important to teach; (c) knowing how to identify these words; (d) knowing how to teach for acquisition and learning academic vocabulary and finally (e) to find and employ effective and multiple strategies that will enable the learners to learn and improve their academic vocabulary in breadth and depth. Understanding what vocabulary to teach and how to teach it is vital for successful learning of academic vocabulary. The synthesised model for categorising the field of academic vocabulary evolved from an analysis of the body of research and categories of academic vocabulary identified by researchers.

The synthesised model of the academic vocabulary field starts with a focus on abstract words i.e. general academic vocabulary and narrows down to more concrete words i.e. symbols, abbreviations and formulas, which could be used as a framework to assist Natural Sciences and Technology and all content-area teachers to select academic vocabulary. Effective vocabulary teaching strategies and methods were also provided to demonstrate how content-area teachers could teach the academic vocabulary from the synthesised model.

Lastly, based on the research, it is clear that effective vocabulary instruction involves: a) linking the learners' background, lesson objectives, words and teaching strategies; b) integrating academic vocabulary with the learners' previous knowledge; c) creating a word rich and word conscious classroom environment; d) teaching the words that will enhance understanding and academic success; e) creating repetitive encounters with important academic vocabulary; f) helping the learners to use the academic vocabulary meaningfully; g) using effective and multiple teaching strategies and h) teaching the learners how to use strategies to learn academic vocabulary.

This chapter provided the necessary literature to plan and execute the research. The literature gave the researcher the necessary content and theoretical information to choose the best methodology and methods to conduct the research (cf. Chapter 3). It then enabled the researcher to interpret the findings by comparing the teachers' practices with what the research says in terms of vocabulary learning and teaching (cf. Chapter 4). Finally, a synthesised model of identifying academic vocabulary emerged from the literature and the researcher was able to provide suggestions for future research in terms of academic vocabulary learning and teaching in content-area classrooms (cf. Chapter 5). In the following chapter, the research design of this study i.e. research paradigm, methodology, sampling, data analysis and data gathering are discussed.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

In Chapter 2 the importance and implications of academic vocabulary knowledge in terms of reading comprehension, conceptual knowledge and academic success were argued. This chapter details the research design used to conduct this study. It includes a rationale for using an interpretivist paradigm and a qualitative approach. The data collection process, methods and tools, as well as the data analysis process and methods is described. The sampling process and the criteria that were used to select the participants are explained. Furthermore, the trustworthiness, credibility and ethical implications are also addressed in this chapter.

The large-scale National Annual Assessment project highlighted that the majority of Grade 4 South African learners have very low literacy and numeracy levels (Howie *et al*., 2012; Mullis *et al*., 2006). They ascribe it to poor factual and procedural knowledge (vocabulary knowledge), as well as lack of conceptual understanding (comprehension) of subject matter (Reddy, 2006). International studies, like, the PIRLS and TIMSS have shown that the proficiency in both the language as the medium of instruction and the language of a subject are very important aspects of academic success. According to research the enhancement of academic vocabulary should be one of the primary goals of education since it underpins literacy in and meaningful engagement with the subject content (Gardner, 2013; Irwin, 2008; Marzano, 2009; Scacella, 2011). The researcher, therefore, investigated whether two Grade 4 Natural Sciences and Technology teachers in two schools in the North West Province used effective practices to explicitly teach academic vocabulary in the Natural Sciences domain. The researcher also looked at the following sub-questions:

1. What does the field of literature suggest regarding the teaching of vocabulary in the content-area classroom in terms of the teacher's responsibilities and the use of effective teaching and learning strategies?
2. What are the national goals and guidelines regarding vocabulary teaching in content-area classrooms?
3. What academic words do Grade 4 learners need in order to learn academic content in the Natural Sciences domain?

4. What kind of support do the Grade 4 Natural Sciences and Technology teachers receive in how to select and teach academic vocabulary?
5. How do teachers prepare for teaching vocabulary in the Natural Sciences and Technology classroom?
6. What do teachers believe about the teaching of academic vocabulary in the Natural Sciences and Technology classroom?
7. What teaching practices do the teachers follow or apply?

3.2 Outline of the research design

A research design can be seen as being the general plan of a research study (Gay, Mills & Airasian, 2006:82). Using another comparison Mouton (2001) and Punch (2009) refer to a research design as the blue-print plan of how the researcher aims to conduct the research and it is a way of placing the researcher in the empirical world to demonstrate how the research questions will be connected to the research data. Punch (2006:48) argues that a research design should include the research paradigm, research approach, who or what will be studied, the tools and procedures that will be used to collect and analyse the empirical data. The following sections will explain the research design of this particular study.

3.2.1 Research paradigm

As described in Chapter 1, the research paradigm is determined by the research questions, aims and expected results of a study and consequently the researcher was mindful of all the research questions through the whole process of planning this research study. This particular study was grounded in the paradigm referred to in Chapter 1 as the **interpretivist paradigm** (De Vos *et al*., 2011; Lynch, 1966; Nieuwenhuis, 2010a). The interpretivist paradigm ultimately enabled the researcher to provide a rich and in-depth report on "the everyday lived experiences of [the participants] in [their] specific settings" (De Vos *et al*., 2011:8). In line with Wellington (2000:41), the researcher became the instrument through which the explicit teaching of academic vocabulary in two Grade 4 Natural Sciences and Technology classrooms was analysed, interpreted and reported. This was accomplished through analysing the relevant documents, the recorded lesson and the transcribed interviews.

3.2.2 Research approach

A qualitative research approach was followed. Since quantitative research observes data on a macro-level and provides limited holistic and in-depth explanations of social and behavioural problems, a qualitative study on a micro-level was rather conducted (Zainal, 2007:1, 2). As explained in Chapter 1, qualitative research is characterised by the attempt to make meaning of a phenomenon and to understand the participants' lived experiences (Merriam, 2009). In line with Merriam (2009), the researcher investigated a small group (micro group) and the purpose of the research was not to generalise the data and findings, but to investigate, describe and seek a deeper understanding of the Grade 4 Natural Sciences and Technology teachers' teaching practices. The focus of this approach was to conduct in-depth research and to consequently collect quality data in order to construct a rich description and report of the qualitative inquiry. An inductive approach was also used in collecting and analysing the data (cf. Sections 3.2.5 & 3.2.6). According to Creswell (2009:4) and Merriam (2009:64) qualitative research aims to inductively build from specific to universal themes, rather than to test ideas and hypotheses, as the researcher aims to interpret and make conclusions of the data. In this study the researcher did not approach the research problem with specific hypotheses. Rich literature concerning vocabulary learning and teaching was gathered first, then data were collected and coded. Afterwards the researcher came to conclusions of what was identified in the documents, as well as the interviews and what was observed in the Grade 4 Natural Sciences and Technology classrooms (Babbie & Mouton 2001:273).

3.2.3 Research methodology

An intrinsic case study methodology was followed as the researcher was interested in the case itself and there was a need to better understand the particular case. Case study research is used in qualitative and interpretive research. It serves to provide thorough descriptions of a small representative group (cf. Chapter 1) and "generates an understanding of and insight into a particular instance by providing a thick, rich description of the case" (Rule & John, 2011:7, 29). Case study research is defined as a "bounded system" (Merriam, 2009:43) as a specific phenomenon is investigated within a specific context, which means careful and thorough planning is needed.

In this study the researcher ensured that the research was ‘bounded’ by identifying the phenomenon i.e. *explicit teaching of academic vocabulary*, the participants i.e. two Grade 4 Natural Sciences and Technology teachers and the site i.e. two English medium primary schools in the Potchefstroom district. The phenomenon was also directly aligned with the research questions. The researcher made use of different data collection methods, like, documents, observations and interviews in order to identify and triangulate the underlining meanings and specific themes that described the phenomenon.

In this study the researcher consequently became "immersed" (Gay *et al*., 2006:402) and she deliberately "put [herself] in the shoes" of the teachers and their classroom circumstances (Babbie & Mouton, 2001:271) to gain a close and “insider” perspective of the phenomenon (ibid, 2001:271). The researcher’s intent was not to present data on a statistical level, create new theories or compare the two teachers’ practices that would have led to a generalisation of a good case versus a bad case. The researcher’s aim was simply to examine two cases in order to learn more about the phenomenon. Much can, however, be learnt from these two cases in this study and the personal experiences of the two teachers (Stake, 2005). The qualitative report of the two cases “can become a prototype” that can provide significant information for policy makers and other Natural Sciences and Technology teachers (Eisner, 1991:199).

3.2.4 Population and sampling

As part of the ethical procedures, permission to conduct research first had to be obtained. According to Punch (2009:50), social research intrudes on people’s lives, but qualitative research intrudes often more as “it deals with the most sensitive, intimate and innermost matters in people’s lives.” Permission was firstly requested from the North West University’s (Potchefstroom campus) Ethical Committee. After ethical clearance had been granted (cf. Appendix B), the researcher formally requested permission from the North West Department of Basic Education (DoBE) to conduct research in two English medium primary schools in the Potchefstroom district. A copy of the research proposal was attached to this formal letter, which specified the title and purpose of the research. Once the DoBE had granted permission (cf. Appendix B), the researcher was able to start with the participant selection process. The researcher used the following criteria that provided guidance in selecting two schools and two teachers for this study.

Schools:

- *The schools must be primary schools situated in the Potchefstroom region.*

  Primary schools were targeted as the researcher specifically focused on the Intermediate Phase (Grade 4). Grade 4 is considered as a crucial stage in the learners' academic career and teachers have an added responsibility to help learners to successfully make the transition from Grade 3 to Grade 4. This transition not only entails exposure to difficult academic subject domains, but also, for the majority of learners in South Africa, a switch is made from mother tongue education to Second Language (SL) medium of instruction. It is also a Grade where a strong basis needs to be developed to ensure the learners' academic success in the higher grades (SA. DoBE, 2011a:9-10). The schools were situated within the Potchefstroom district as they were the easiest to access to collect certain documents, conduct interviews on specific dates and to observe the teachers' lessons over a sufficient time period.

Teachers:

- *The teachers must be qualified, have more than five years of teaching experience and have to be willing to participate.*

  The researcher visited nine schools in the Potchefstroom district to ask the teacher' permission to partake in this study. The researcher did not exercise power over the teachers or force them to participate in the research. Only five teachers were willing to take part in the research, however, two willing teachers who also possessed the necessary qualifications and experience were eventually selected. Teacher A is a forty-year-old Setswana speaking teacher who has been teaching for ten years at an English medium primary school. Teacher B is a fifty-five-year-old Afrikaans speaking teacher who has thirty years teaching experience and has for the last seventeen years been teaching at an English medium primary school. Both teachers hold a four year Higher Education Diploma (HED) and BEd Honours degrees, which they obtained at different institutions. Teacher A majored in English and Geography, whereas Teacher B majored in General Sciences and Afrikaans.

- *The teachers must teach Natural Sciences and Technology*.

  The researcher examined the phenomenon in the Natural Sciences domain. Sciences is a priority subject as the Department of Basic Education (SA. DoBE, 2011b:12) strives towards developing future scientists and scientific literate learners that can make a contribution to a world of Science and Technology (SA. DoBE, 2011b:12).

- *The participants must teach through the medium of English.*
  Both teachers are teaching Natural Sciences and Technology through the medium of English and they both feel comfortable in doing so as they completed a compulsory course at different institutions to teach through the medium of English.

3.2.5 Data collection process, methods and tools

According to Krefting (1990) it is important that researchers should use various types of data collection methods in order to ensure the credibility and trustworthiness of the research findings. It is common for a research study to use multiple methods and tools in order to do cross-data validity checks. A literature review, documents, non-participant lesson observations and semi-structured interviews provided different types of data that helped to answer the sub-questions and eventually the main research question: *To what extent are two Grade 4 Natural Sciences and Technology teachers in two schools in the North West Province explicitly teaching academic vocabulary in the Natural Sciences domain?* A graphical representation of the data collection process (cf. Figure 3.1) and discussion of each of the data collection methods and the tools follow.

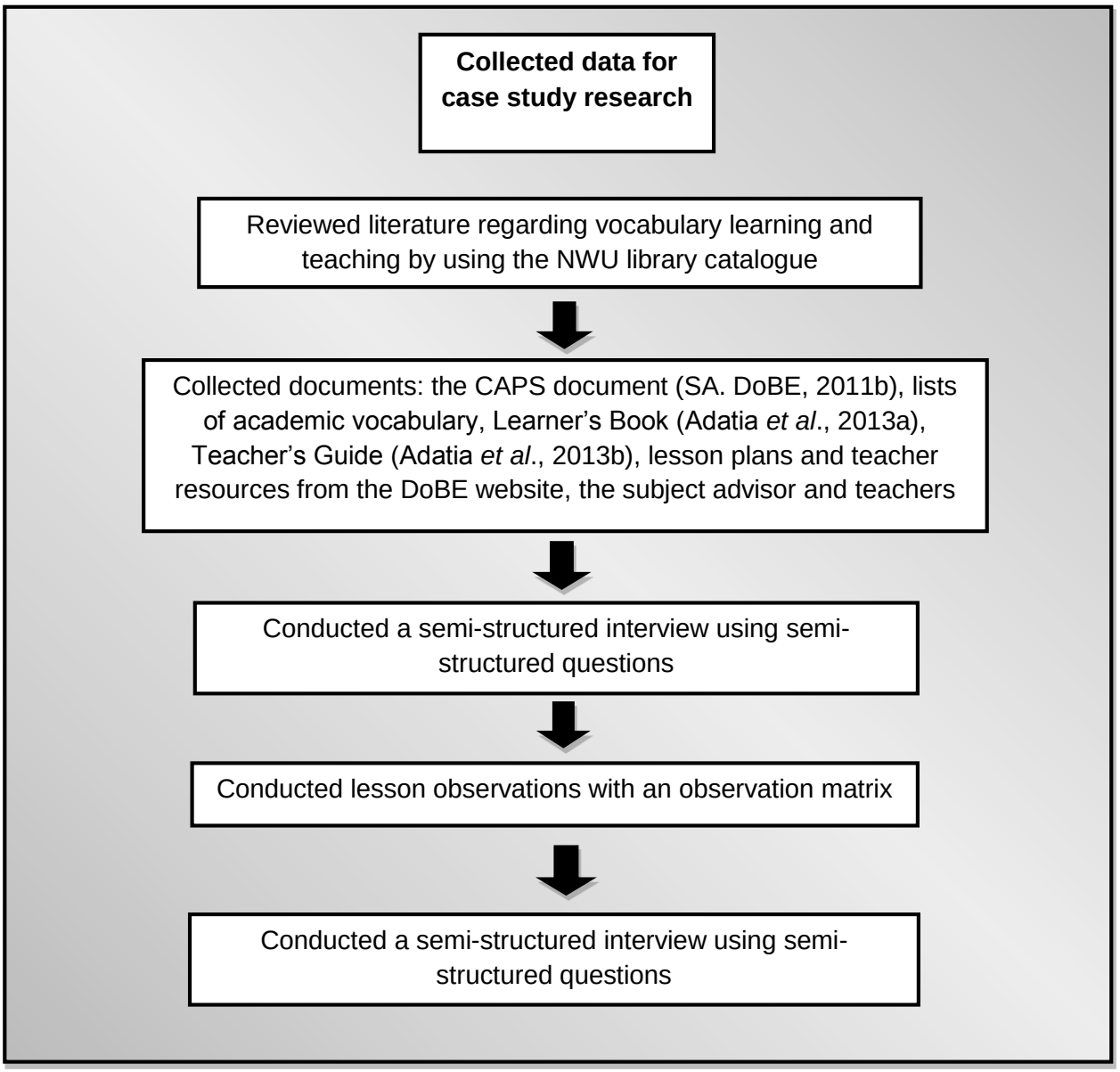


Figure 3.1 Data gathering process

3.2.5.1 Literature review

The steps referred to by Boote and Beile (2005:7-9) and Denscombe (2002:52) were followed to compose a comprehensive literature review. Firstly, the researcher familiarised herself with the different databases and types of literature searchers available at the North West University's library.

The key words applicable to this study were identified: *explicit vocabulary learning and teaching, the learning process, learning and teaching strategies, academic vocabulary, Natural Sciences domain, Grade 4 teachers, English Second Language Learners, Interactionist Approach*. The North West University library catalogue was used to search for literature, of both primary and secondary nature. Various on-line databases were consulted, such as, Ebscohost, Google Scholar, Eric (Educational Database), Academic Search Premier, HSRC Publications, Sabinet Online (Index to South African Publications) and JSTOR. Sources in educational articles and library books were also used. It helped to expand the search on sources and to find new and more information on the topic.

3.2.5.2 Documents

According to Bowen (2009) and Creswell (2009) documents hold various advantages and disadvantages. Documents can be analysed at a time that is more convenient for the researcher. They could provide information that is carefully organised and compiled, making it easy to use. Most documents are written evidence which saves the researcher time as it is already transcribed. It could also provide historical and detailed information of the phenomenon. Documents also hold disadvantages (Bowen, 2009; Creswell, 2009). Some documents are not easily accessible and could be private. Some documents are only created for specific purposes and not necessarily for research. There are also documents that cannot be used as they might be incomplete or inaccurate. In this study, various documents were collected as a source to provide data. The following documents were collected at the researcher's convenience and it was the most cost-effective way to collect data: The Natural Sciences and Technology Curriculum and Assessment Policy Statement (CAPS) Grades 4-6 (SA. DoBE, 2011b), lists of academic vocabulary, Learner's Book (Adatia *et al*., 2013a), Teacher's Guide (Adatia *et al*., 2013b), personal lesson plans and teaching resources. The CAPS document (SA. DoBE, 2011b) was downloaded from the website of the DoBE (http://www.thutong.doe.gov.za/) the academic lists were collected from the subject advisor of Natural Sciences and Technology in the North West Province (Selogiloe, 2013) and the prescribed books (Adatia *et al*., 2013a, b), lesson plans, and teacher resources were provided by the teachers. These documents provided data regarding the significance of academic vocabulary learning and teaching across the curriculum, what academic words needed to be taught, whether support is provided in teaching academic vocabulary and whether the teachers actually made provision for the teaching of academic vocabulary.

3.2.5.3 Semi-structured interviews and questions

According to Punch (2009) an interview is a well-known data collection method in qualitative research. It is an effective way to evaluate people's perceptions, meanings and situations and to construct an understanding of individuals. There are different types of interviews used for different purposes. Punch (2009:144) explains that there are structured, unstructured and semi-structured interviews. According to Creswell (2009) interviews could provide the researcher with in-depth information, which helps the researcher to gain valuable insights into the phenomenon. The researcher does not need many or expensive equipment, only a tape recorder and interview skills are usually used. Interviews have a high response rate, since the researcher schedules the interview(s) beforehand at a convenient time and place. On the other hand, interviews also hold disadvantages. They are very time-consuming and the interviews need to be scheduled at a time that is convenient for the participants. Interviews are usually conducted in a controlled environment as the participants might feel that they are being interrogated.

In this study two sets of semi-structured interviews were conducted on scheduled dates. The researcher posed semi-structured questions, which were easily adapted and made it possible for the teachers to freely give their opinions. The semi-structured interviews enabled the researcher to re-ask questions if something was not clear in order to arrive at rich and thorough descriptions of the phenomenon investigated (Peräkylä & Ruusuvuori, 2011). Firstly, a pre-lesson observation interview with semi-structured formulated questions was conducted. The questions focused on the attitudes, beliefs and practices of the teachers regarding the explicit teaching of academic vocabulary. A second semi-structured interview was conducted after the four weeks of observation. The semi-structured interview questions focused more on the teachers' changed perspectives and new insights to their teaching practices. The questions of the first semi-structured interview were developed from the literature in the field of vocabulary learning and teaching. The questions of the second semi-structured interview were informed by the answers in the first interview and the observations of the teachers' teaching practices (cf. Appendix B). The interviews took place in the teachers' classrooms, which were familiar to them and helped to create a relaxed atmosphere. With the teachers' permission, the researcher audio-taped all the responses during the interviews. The audio recorder was not visible and this also helped to make the teachers feel more at ease and to enhance their willingness to openly respond to the questions.

After conducting the interviews, the audio-taped data were regularly replayed and transcribed verbatim (cf. Appendix B). The teachers then received the opportunity to view the transcripts and to confirm the correctness of the transcribed data. This increased the internal validity of the data. The teachers were satisfied with the transcribed data. They were also satisfied with the fact that all data were held under strict confidentiality and names were not disclosed.

3.2.5.4 Non-participant lesson observations and an observation matrix

Observations are a well-known data collection method in the Social Sciences and have long been used by educational researchers (Punch, 2009). According to Gay *et al*. (2006:413) "the emphasis during observation is on understanding the natural environment as lived by participants, without altering or manipulating it." Another author, Merriam (1988), adds by explaining that observation enables the researcher to observe what really happens and to give a first-hand account of the phenomenon. According to Schumacher and McMillan (1993), observations are effective to use as the researcher can collect a considerable amount of data and record behaviour in the natural setting. They also maintain that observations could be ineffective to use as not all behaviour is easy to record or to make meaning of. The presence of the researcher could also influence the way the participants act.

Like interviews, there are also different types of observation. Complete observers are detached observers and only gain an "outsider perspective" of the phenomenon being studied (Punch, 2009). Participants as observers become part of the research process and work with the participants to design an intervention programme. This is usually found in action research (Nieuwenhuis, 2010a:85). Complete participants become both the participants and observers of the situation and gain an "insider perspective by becoming part of the natural setting" (Punch, 2009:158). This type of observation is not used commonly as it raises serious ethical concerns (Nieuwenhuis, 2010a). Observers as participants focus on their role as observer and stay detached and "[do] not influence the dynamic systems of the setting" (Nieuwenhuis, 2010a:85). They search for patterns, themes and categories in order to make sense of the phenomenon and the participants' experiences, perceptions and beliefs (Nieuwenhuis, 2010a). Non-participant lesson observations were used and formed a crucial aspect of this study as it allowed the researcher to develop an in-depth understanding of the teachers' teaching practices in terms of the explicit teaching of academic vocabulary.

There was no interference with the teaching and learning processes in the Grade 4 Natural Sciences and Technology classrooms. The researcher merely sat at the back of the classrooms and the lessons went ahead as if there was no one observing and recording the lessons. An observation matrix was used on which hand-written notes were made (Appendix B) to merely record what happened and not to judge the teachers or the content of the lessons. The criteria on the observation matrix were developed from the literature in Chapter 2 and the synthesised model (cf. Section 2.2.2.2). The criteria focused on four main themes, namely, what academic words were taught, how those words were taught, what learning strategies were taught, what activities and teacher resources were used to enhance the learners' academic vocabulary knowledge. The criteria only served as a guidance to observe what happened in the teachers' lessons. The criteria of the observation matrix were not fixed, but merely reminded the researcher on what to focus on and to not miss out on important data. Thus, the researcher did not come to the classrooms with preconceived ideas or hypotheses, as an inductive approach of collecting data were followed.

3.2.6 Data analysis

3.2.6.1 Data analysis method

In this study, the researcher planned to make use of Computer Assisted Qualitative Data Analysis (CAQDAS), namely, Atlas.ti 7, due to the extensiveness of the collected data and the complexity of the research questions. The advantages of using this software include making the task of the researcher easier, saving time, managing huge amounts of qualitative data and enhancing auditability of qualitative research (St John & Johnson, 2000). Some researchers have also asserted concerns regarding qualitative data analysis with the assistance of CAQDAS-, such as, ATLAS.ti (Bryman, 2008; Harding, 2013; Ryan, 2006; St John & Johnson, 2000). For instance, St John and Johnson (2000:393) list the following disadvantages of using Atlas.ti: "…it is increasingly deterministic and rigid processes, privileging of coding, and retrieval methods…and distraction from the real work of analysis". Another author, Ryan (2006), advises against the use of computer data analysis programmes, as the seeing and touching processes and outcomes of sorting are hidden from the researcher when a computer programme is used. He maintains that "the senses are blunted by the technology and you often miss out on making links between categories" (Ryan, 2006:99).

Due to the above listed disadvantages of using CAQDAS programmes the researcher decided to use a more "hands-on paper approach" (ibid, 2006:99) to analyse the data by using the **conventional content analysis method** (Hiesh & Shannon, 2005). Content analysis is a common qualitative analysis method and there are three types of content analysis methods (Hiesh & Shannon, 2005:1277). In conventional content analysis the codes and themes are directly derived from the data and is known as the inductive process. With a directed analysis method, the analysis of data starts with a theory that guides the initial coding process. A summative content analysis method involves counting and making comparisons of the keywords or content. The researcher's aim was to avoid using preconceived theories and instead she allowed codes and themes, as well as new insights to emerge from the collected data (Kondracki & Wellman, 2002). Content analysis enabled the researcher to manually and more easily analyse the typed lesson plans, teacher resources, transcribed interviews and typed lesson observations by using certain criteria. The researcher attempted to close the gap between the research focus and raw data through examining the content systematically and going through certain conventional content analysis steps (Morse & Field, 1995; Patton, 2002). The content was coded and re-coded until the researcher was satisfied.

3.2.6.2 Data analysis process

The qualitative analysis process can be described as a linear process (Creswell, 2009). However, Merriam (2009:139), refers to the qualitative analysis process as "mining data from documents", as qualitative data analysis expects the researcher to investigate information rich data in order to find the meaning and understanding that are embedded in the layers of data. This "mining of documents" usually involves the coding of data (Merriam, 2009:139) and presenting it in themes to display common relationships found in the data. This indicates that the qualitative data analysis process is more complex, cyclic and in-depth than a linear process. According to Leedy and Omrod (2010:152), there is rarely one single "right" way in which to analyse qualitative data, however, Henning (2004:101) maintains that data analysis requires "analytical craftsmanship and the ability to capture understanding of the [analysed] data. According to Creswell (2009) the researcher first needs to analyse the data from a broad perspective by taking the whole data set into consideration and then to narrow the focus towards a more in-depth understanding of the data. He states that although qualitative data analysis can be a linear process, that the steps are interactive. Researchers often need to go back to previous steps in the data analysis process.

Data, furthermore, need to be interpreted and "presented fairly, clearly, coherently and attractively" (Wellington, 2000:139) in order to identify findings and draw conclusions. Without reaching findings and conclusions, the data analysis process is pointless. The following section provides a graphical representation (cf. Figure 3.2) of the data analysis process of this study. The section also provides a discussion on the methods and software programmes that were used to analyse the data.

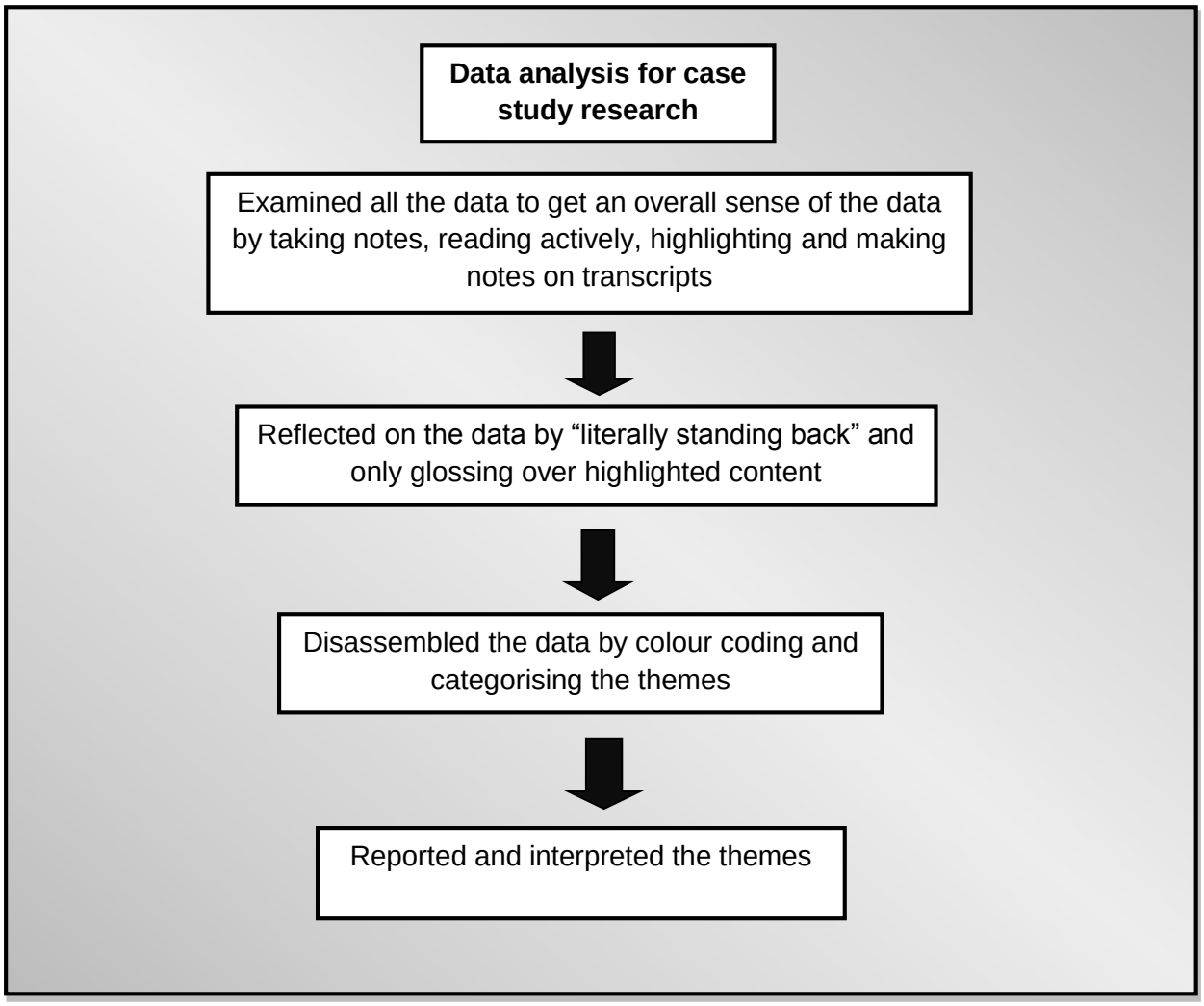


Figure 3.2 The qualitative data analysis process personalised from Creswell's (2009:185) and Wellington's (2000:135-141) work

The collected data were organised and then scrutinised accordingly:

There are three levels of coding, namely, open coding, axial coding and selective coding (Gibbs, 2007). The researcher began by reading through the data repeatedly to achieve engagement and gain a broad perspective before focusing on specific aspects and disassembling the data (Tesch, 1990). This first step, open-coding, (Gibbs, 2007) was then applied. Initial coding of data can become "overwhelming" (Pillow, 2002:396), but the researcher continuously focused on the research questions and aims. The data were read word for word to derive initial codes. The researcher thus allowed the data to “speak” and “name” codes (inductive analysis). Thereafter, words and short phrases were highlighted that appeared to summarise key thoughts or concepts. The CAPS document (SA. DoBE, 2013b) was read carefully by highlighting the text in colour that appeared to describe the words that would need to be taught in Grade 4. The national goals and guidelines regarding vocabulary teaching in content-area classrooms were also identified. The synthesised model and the subject advisor’s lists (Selogiloe, 2013) were scrutinised to first determine the different categories of academic vocabulary (Appendix B). The results were then used as guidelines to do a word search on the electronic pdf Learner’s Book (Adatia *et al*., 2013a) to search for the academic vocabulary from the first five topics that the teachers would had to teach. These words were categorised on an excel sheet and compiled in a word document (cf. Appendix B). The Teacher’s Guide (Adatia *et al*., 2013b) was analysed by highlighting text that described examples of how the Natural Sciences and Technology teachers should teach academic vocabulary. The lesson plans and teacher resources (cf. Appendix B) were also analysed manually by highlighting content that showed an explicit attempt to teach academic vocabulary in the Natural Sciences domain. After scrutinising the various documents, the content in each interview transcript that appeared to describe the teachers’ beliefs and practices, was carefully read and highlighted. In the margin of the text the researcher wrote a keyword or phrase that seemed to capture their beliefs and practices, using the participant’s words. The content in the lesson observations that appeared to describe the teachers’ teaching practices was then highlighted. After the open-coding process the researcher identified the following themes:

Table 3.1 Themes identified during the open-coding process

Step one	
1.	Teaching vocabulary across the curriculum.
2.	Socio-cognitive learning theory
3	Language skills.
4.	Knowledge of the learners' previous academic vocabulary knowledge.
5.	Methodological knowledge and skills.
6.	Knowledge and skills of how to teach through the medium of English.
7.	Knowledge of the nature of academic vocabulary and its significance.
8.	Knowledge of the national goals and guidelines in the CAPS document (SA. DoBE, 2011b).
9.	Knowledge of what academic vocabulary to teach and how.
10.	Pronunciation of academic vocabulary.
11.	Translation.
12.	Wordlists.
13.	Flashcards.
14.	Visual realia
15.	Prescribed textbook provided by the DoBE and other resources.
16.	Posters.
17.	Teaching approach when teaching academic vocabulary.
18.	Oral explanations.
19.	Repetition.
20.	Contextualisation.
21.	Closed-questions.
22.	Linking words with other content-areas.
23.	Labelled sketches.
24.	Synonym strategy.
25.	Syllabication.
26.	Phonemic symbols.
27.	Linear array strategy.
28.	Peer learning or teaching.
29.	Dealing with errors or mistakes.
30.	Fill in and matching activities.
31.	Labelling sketches.

32.	Copying from the projector.
33.	Comparing concepts.
34.	Pronunciation of academic vocabulary.
35.	You need to learn how to say these words in the English class.
36.	Strategies to explain academic vocabulary to the learners are good on paper, but not good in terms of implementation.
37.	There are too much for them to do.
38.	Where is the time going to be for this intervention programme?
39.	An intervention programme with regard to teaching academic vocabulary in the Natural Sciences and Technology classroom.

In step two of the data analysis process axial coding was used where the themes from the open-coding process were categorised in broader categories. Themes were categorised based on how the different codes were related and linked, in other words, some themes were grouped into meaningful clusters or split into sub-categories (Patton, 2002). Categorising themes is a "highly inductive" process and saturation point was reached when no new "information, insights or understandings" were available (Merriam, 2009:183). At the hand of axial coding the following compiled theme categories were identified:

Table 3.2 Theme categories as identified in step one

Step two	
1.	**National goals and guidelines** • Teaching vocabulary across the curriculum. • Socio-cognitive learning theory. • Language skills. • Prescribed textbook provided by the DoBE and other resources.
2.	**Knowledge and skills** • Knowledge of the nature of academic vocabulary and its significance. • Knowledge of what academic vocabulary to teach and how. • Methodological knowledge and skills. • Knowledge and skills of how to teach through the medium of English. • Knowledge of the national goals and guidelines in the CAPS document (SA. DoBE, 2011b).
3.	**Lesson plans** • Knowledge of the learners' previous academic vocabulary knowledge.

	• Pronunciation of academic vocabulary.
4.	**Teaching strategies** • Teaching approach when teaching academic vocabulary. • Contextualisation. • Linking words with other content-areas. • Closed-questions. • Dealing with errors or mistakes. • Oral explanations. • Translation. • Repetition. • Peer learning or teaching. • Linear array strategy. • Syllabication. • Phonemic symbols. • Synonym strategy.
5.	**Academic vocabulary learning activities** • Fill in and matching activities. • Labelling sketches. • Copying from the projector. • Comparing concepts.
6.	**Resources** • Visual realia. • Flashcards. • Posters. • Wordlists. • Labelled sketches.
7.	**Teachers' opinions** • You need to learn how to say these words in the English class. • Strategies to explain academic vocabulary to the learners are good on paper, but not good in terms of implementation. • There are too much for them to do. • Where is the time going to be for this intervention programme? • An intervention programme with regard to teaching academic vocabulary in the Natural Sciences and Technology classroom.

Finally, selective coding was done by re-evaluating the previous coding and making necessary changes, where needed. The data were also carefully inspected at this stage. At the hand of selective coding, the following grouped themes were identified to answer the research questions:

Table 3.3 Theme categories as identified in step two to answer the research questions

Step three	
1.	**Curriculum** **National goals and guidelines** • Socio-cognitive learning theory. • Teaching language across the curriculum. • Language skills development. • Prescribed textbook provided by the DoBE and other resources.
2.	**Teaching practices** **Lesson plans** • Knowledge of the learners' previous academic vocabulary knowledge. • Pronunciation of academic vocabulary. **Teaching approach and strategies** • Teaching approach when teaching academic vocabulary. • Contextualisation. • Linking words with other content- areas. • Closed-questions. • Dealing with errors or mistakes. • Oral explanations. • Translation. • Repetition. • Peer learning or teaching. • Linear array strategy. • Syllabication. • Phonemic symbols. • Synonym strategy. **Academic vocabulary learning activities** • Fill in and matching activities. • Labelling sketches.

	• Copying from the projector. • Comparing concepts. **Resources** • Visual realia. • Flashcards. • Posters. • Wordlists. • Labelled sketches.
3.	**Attitudes and beliefs towards academic vocabulary teaching and training** **Teachers' opinions** • You need to learn how to say these words in the English class. • Strategies to explain academic vocabulary to the learners are good on paper, but not good in terms of implementation. • There are too much for them to do. • Where is the time going to be for this intervention programme? • An intervention programme with regard to teaching academic vocabulary in the Natural Sciences and Technology classroom.
4.	**Training** **Knowledge and skills** • Knowledge of the nature of academic vocabulary and its significance. • Knowledge of what academic vocabulary to teach and how. • Methodological knowledge and skills. • Knowledge and skills of how to teach through the medium of English. • Knowledge of the national goals and guidelines in the CAPS document (SA. DoBE, 2011b).

Once the data had been analysed the researcher made use of the audit strategy as the major technique for establishing confirmation (Lincoln & Guba, 1981). This strategy involved external code checkers (language expert and study leader) (Olivier, 2014; Uys, 2015). They each read through the data, codes and themes. The researcher made appointments with each individual to discuss the codes and themes that they identified. The purpose of doing the external code checking, was not to demonstrate the trustworthiness of the coding, but to understand the data more clearly and in-depth (Lynch, 1996). This also helped to review the codes and themes, to possibly develop other themes, to reach various viewpoints on the same events or to maybe discover new research questions (Lynch, 1996).

The research process was then concluded by reporting and interpreting the themes. Interpreting the data "may be considered as the craft of giving your own meaning to your reassembled data and data arrays" (Yin, 2011:207). The objective was to create a complete interpretation, entailing specific data, which forms the foundation to make meaning of the research study (Yin, 2011). The attitudes, beliefs and practices of two Grade 4 Natural Sciences and Technology teachers regarding the explicit teaching of academic vocabulary in the Natural Sciences domain were described, using the identified themes in step three (cf. Section 4.3).

3.3 Conclusion

This chapter explained the collection and analysis of the data that helped the researcher to address the questions of this study. Ethical issues and the trustworthiness of this study were accounted for, as well as clear guidelines on the sampling and population. In the following chapter the researcher offers a qualitative report and interpretation of the research data.

CHAPTER 4

QUALITATIVE RESEARCH REPORT AND INTERPRETATION

4.1 Introduction

This chapter reports and interprets collected data related to the research problem as discussed in Section 1.2. The findings are also related to literature as reviewed in Chapter 2. In order to answer the main research question: *To what extent are two Grade 4 Natural Sciences and Technology teachers in two schools in the North West Province using effective practices to explicitly teach academic vocabulary in the Natural Sciences domain?* The following sub-questions were formulated and investigated:

1. What does the field of literature suggest regarding the teaching of vocabulary in the content-area classroom in terms of the teacher's responsibilities and the use of effective teaching and learning strategies? (This question was addressed in Chapter 2).
2. What are the national goals and guidelines regarding vocabulary teaching in content-area classrooms?
3. What academic words do Grade 4 learners need in order to learn academic content in the Natural Sciences domain?
4. What kind of support do the Grade 4 Natural Sciences and Technology teachers receive in how to select and teach academic vocabulary?
5. How do teachers prepare for teaching vocabulary in the Natural Sciences and Technology classroom?
6. What do teachers believe about the teaching of academic vocabulary in the Natural Sciences and Technology classroom?
7. What teaching practices do the teachers follow or apply?

4.2 Qualitative research report and interpretation of the data

4.2.1 Analysis and interpretation of the policy documents

An analysis of the Natural Sciences and Technology Curriculum and Assessment Policy Statement (CAPS) Grades 4-6 (SA. DoBE, 2011b), the Learner's Book (Adatia *et al*., 2013a), Teacher's Guide (Adatia *et al*., 2013b) and lists of vocabulary provided by the subject advisor (Selogiloe, 2013) for the Natural Sciences and Technology Intermediate Phase of the North West Province was done to establish:

a) what the national goals and guidelines are regarding vocabulary teaching in content-area classrooms;
b) which academic vocabulary Grade 4 learners need in order to learn academic content in the Natural Sciences domain;
c) what kind of support teachers receive in order to select and teach academic vocabulary.

In terms of the South African education curriculum's national goals and guidelines (SA. DoBE, 2011b:4-5), it is clear that the aim is to promote sociocultural and cognitivist learning in the classroom. The Natural Sciences and Technology CAPS Grades 4-6 document (SA. DoBE, 2011b) views learning as an active and social process that is crucial for meaning making. Learning is also seen as contextual and that information in the classroom should be relevant to the learners' lives. The importance of developing the learners' cognitive skills is also highlighted and teachers are required to "produce learners that can identify and solve problems; make decisions using critical and creative thinking; are able to collect, analyse, organise and critically evaluate information" (SA. DoBE, 2011b:5). This in line with this study's theoretical underpinnings (cf. Section 2.2.4) regarding the components that are involved in learning vocabulary (i.e. input, social interaction, output and feedback).

The CAPS document (SA. DoBE, 2011b:19) explicitly reminds teachers that they should teach language across the curriculum and of the importance of "developing language skills" (i.e. reading, writing and speaking) in the Natural Sciences domain. Yet, a survey of the CAPS document (SA. DoBE, 2011b) delivered no reference to vocabulary and there was no evidence of explicit instructions on how to teach vocabulary in the Natural Sciences domain.

Although a list (SA. DoBE, 2011b:67) is provided of academic vocabulary that learners will need across the Intermediate Phase (Grades 4-6) to guide teachers in the selection of vocabulary, this list does not acknowledge the different types of academic vocabulary (cf. Section 2.2.2.1), which require different teaching strategies (cf. Section 2.2.6), but focuses on Bloom's levels of cognitive development.

The CAPS document (SA. DoBE, 2011b:19) strongly focuses on the teaching of content and although it acknowledges the teaching of language in content-area classes, it is clearly not intended as an instructional manual. It may be assumed that the Natural Sciences and Technology teacher will have the necessary knowledge of *which* academic words to teach and *how* to select and teach them.

Subsequent lists provided by the subject advisor (Selogiloe, 2013) added no further insight (cf. Tables 4.1 & 4.2 in Appendix B). In line with the CAPS document (SA. DoBE, 2013b), the first list (cf. Table 4.1 in Appendix B) provided by Selogiloe (2013) is also classified according to the low, middle and high order cognitive levels of Bloom's taxonomy. No other classification of words was provided and it is clear from research (cf. Section 2.2.2.1) that academic vocabulary is classified according to the different types and not cognitive levels. Neither the CAPS document (SA. DoBE, 2013b) nor Selogiloe's (2013) lists provide any indication of this type of academic word classification. The synthesised model in Section 2.2.2.2 focuses attention on different types of academic vocabulary (i.e. general academic vocabulary, domain-specific and technical academic vocabulary and symbols).

In Selogiloe's (2013) first list, as in the CAPS document (SA. DoBE, 2011b), there is also little reference to general academic vocabulary that includes school-task vocabulary and meta-language words. However, the following school-task vocabulary and meta-language words occur (Adatia *et al*., 2013a): find out [5]; talk about [3], look for [4]; what do you think [3]; check [1]; complete [13]; copy [11]; decide [2]; draw [20]; fill in [1]; find [20]; follow the instructions [2]; give a reason(s) [2]; measure [13] and notice [4]) (cf. Table 2.1, Section 2.2.2.1).

The absence of these words from the CAPS document (SA.DoBE, 2011b) is significant, since this may be the Grade 4 EFAL learners first year of academic English, which they need to acquire in order to follow instructions, complete tasks and comprehend academic content.

Selogiloe's (2013) second list does contain what the synthesised model classifies as domain-specific and technical academic vocabulary, such as, *habitat, reproduce, germs, temperature, thermometer* etc. (cf. Table 4.2 in Appendix B), yet, there is no reference to word clusters, like, *germinate into; grow from; changes from; change of state*, technical vocabulary, such as, *Geranium(s); Impatien(s); Violet(s); Bunsen burner* or symbols, such as, ^{0}C and *cm(s)* that were identified in the first five topics in the Learner's Book (Adatia *et al*., 2013a).

This leaves the Grade 4 Natural Sciences and Technology teacher with the responsibility to identify both the appropriate academic words and the teaching strategies for how to teach the academic words. If teachers were to seek help from English Language (EL) teachers, they would find that a survey of the Grade 4 English First Additional Language (EFAL) CAPS document (SA. DoBE, 2011a:10; 51) shows that the teaching of vocabulary is mentioned fifty-one times, yet, the only strategy recommended to the EL teacher is "using the dictionary" or "keeping a personal journal". In Chapter 2, research has proven that both these strategies may be problematic for English Second Language Learners (ESLLs) (cf. Section 2.2.6.1).

The researcher applied the synthesised model (cf. Section 2.2.2.2) to identify academic words in the Learner's Book (Adatia *et al*., 2013a) Ninety-eight academic words were identified in the first five topics (i.e. Topic one - *Living and Non-living things;* Topic two- *Structures of plants and animals;* Topic three- *What plants need to grow;* Topic four- *Habitats of animals;* Topic five- *Materials around us*) and were classified in the three different spheres of the academic vocabulary field (cf. Table 4.3). It was also noted how many times a certain word would occur during the five topics.

A scrutiny of the first five topics revealed the following:

Table 4.3 Academic words identified from the first five topics in the Learner's Book (Adatia et al., 2013a)

Topics	General academic vocabulary	Domain-specific and Technical academic vocabulary	Symbols
Topic one- Living and non-living things	compare [1][4], complete [1], copy [2], decide [1], draw [1], fill in [1], find [4], identify [1], measure [1], notice [2], observe [5], sort [1]	*Living and non-living things* environment [3], germinate(s) [6], germs [3], mould [2], bacteria [2], organism [1], fungus [1] *Life processes of living things* reproducing [2]	
Topic two- Structures of plants and animals	communicate [2], compare [3], complete [2], copy [1],describe [5], draw [8], find [8], follow the instructions [1], identify [3], label [8], match [1], name [2], notice [2], observe [3], record [2], tabulate [2]	*Structure of plants* root(s) [5], seed(s) [3], stem(s) [7], structure [3] *Differences between plants* aloe [1], radishes [1] *Structure of animals* limbs [2], sense organs [3] *Differences between animals* gills [1], scales [1], fins [1]	

[4] The number in the brackets is an indication of how many times the word occurred across the topics. The researcher counted the words by using the word function on the electronic version of the Learner's Book (Adatia *et al*., 2013a).

		environment [1] *Word Phrases* parts of [2], structure of [2]	
Topic three- What plants need to grow	check [1], complete [3], copy [3], draw [4], explain [1], follow the instructions [1], identify [1], investigate [3], label [2], measure [3], name [2], observe [5], record [3]	*Different Plants* Geranium/s [3], Impatiens [1] Violet(s), [2], radicle [4], plumule [4] *Growth of plants* cutting(s) [13], germinate [3], root(s) [2], seedling(s) [12], seeds [12], shoots [2], soil [1], stem(s) [9], *Word Phrases* germinate into [2], grow from [4]	
Topic four- Habitats of animals	compare [8], complete [2], copy [1], describe [4], discuss [1], draw [6], examine [1], find [6], give reasons [1], identify [3], label [1], match [3], name [4], observe [2]	*Habitats* den [2], habitat [29], indigenous [2], predators [6], poachers [1] *Grassland, forest, river and sea habitats* grassland [14], forest [11], river [6], sea [8] *Comparing different habitats*	

		Venn-diagram [6]	
Topic five- Materials around us	complete [5],copy [4],decide[1], describe [2],draw [1],examine [1], explain [3],find [2], give an example [2], give a reason [1],identify [3], investigate [3],label [1], measure [9], name [1], observe [7], predict [2], record [2], sort [2]	*Materials around us* gas(es) [18], liquid(s) [19],material(s) [9], matter [6], solid(s) [19], substance(s) [5] *Change of state* condense(s) [10], evaporate(s) [11], gas(es) [20], energy [1], liquid [39], material(s) [9], properties [3], solid(s) [20], solidify [3], steam [1], substance [1], temperature [2], vapour [11] *Measure temperature* bar graph [2], degree [2], diagram [1], liquid [5],material(s) [13], solid(s) [2], substance [1], temperature [28], thermometer [17], Bunsen burner [2], Celsius [2] *Word Phrases* changes from [3], change of state [2], changes to [6], condenses to [3], freezes at [2]	^{o}C [4], cm(s) [3]

The Learner's Book (Adatia *et al*., 2013a) mainly provides wordlists with definitions, as well as labelled pictures. Both methods are more focused on conceptualisation than the acquisition of vocabulary. Conceptualisation is the creation of an idea and the first step in the acquisition of a word (Beck *et al*., 1982). Afterwards learners need to learn how to spell, pronounce and use the word in different contexts (cf. Section 2.2.3).

Mukoroli (2011) found that wordlists usually focus on the meanings of domain-specific and technical academic vocabulary and seldom include general academic vocabulary. This was also true for Adatia *et al*. (2011a:21; 37) as only three general academic words (i.e. *communicate*, *label* and *compare*) were clarified in a wordlist over five topics. Mukoroli (2011) argues that wordlists are often inadequate and they do not necessarily contain learner-friendly definitions.

Although the synonyms provided on page 27 (Adatia *et al*., 2013a) are learner friendly e.g. *plumule* (first shoot) and *radicle* (first root), they are inadequate in terms of the polysemous word *shoot* that has different meanings across the curriculum and will, therefore, need to be clarified within the Natural Sciences domain and other contexts. According to Carrier (2012) words with multiple meanings can be especially confusing and troublesome for English Language Learners (ELLs). On the other hand, no phonetic or other aid to assist in the pronunciation of academic words, is provided. The Learner's Book (Adatia *et al*., 2013a) also contains no evidence of learning strategies, such as, explanations of the origin of words or morphological analysis (i.e. prefixes and suffixes).

It seems that it is not the purpose of the Learner's Book (Adatia *et al*., 2011a) to include vocabulary teaching and learning strategies and it may be assumed by the authors that the Grade 4 Natural Sciences and Technology teachers know how to teach academic vocabulary. It is also evident that the Learner's Book (Adatia *et al*., 2013a) requires additional scaffolding and explanations from the teacher and is not meant as a self-study guide for the learners.

The Teacher's Guide (Adatia *et al*., 2013b) was analysed in order to determine whether the Grade 4 Natural Sciences and Technology teachers are provided with guidelines and methodological examples to support and enhance the learners' academic vocabulary knowledge. The first five topics in the Teacher's Guide (Adatia *et al*., 2013b) delivered no explicit guidelines on the use of effective vocabulary teaching strategies.

On page 20 of the Teacher's Guide (Topic four – *Habitats of animals*, Adatia *et al*., 2013b) the teachers are reminded to: "*tell learners what is meant by habitat*." *Tell* first of all implies an implicit oral teaching strategy and an aural learning strategy and secondly the explanation that the teachers are supposed to supply *"that habitats provide animals with shelter, protection from enemies, a safe place to reproduce and feed"* contains other unfamiliar vocabulary, like, *shelter, enemies* and *reproduce*. Blachowicz and Fisher (2015) state that this could cause more confusion as the meaning of the words are already a problem and the learners are confronted with more unknown academic vocabulary.

On page 33 of the Teacher's Guide (cf. Topic five - *Materials around us*; Adatia *et al*., 2013b) it is only stated that the teacher should "*reiterate that gases are substances that have no shape but they take up space*". This, once again, implies an implicit oral and aural teaching and learning strategy. Furthermore, the definition of *gases* is vague and includes a difficult word, namely, *substances,* which will not help the learners to come to a better understanding of the word. In terms of general academic vocabulary development, the Teacher's Guide (Adatia *et al*., 2013b) does not once explain how general academic vocabulary should be taught. The importance of *comparing* as a skill is emphasised (Adatia *et al*., 2013b:19) where the learners have to *compare* two different kinds of habitats, but it may be assumed that the teacher will know that the general academic term, *compare,* needs to be taught first. It was, thus, found that the Teacher's Guide (Adatia *et al*., 2013b) is only a basic guide, which is not sufficient in providing guidelines for the selection and teaching of academic vocabulary.

4.2.2 Analysis and interpretation of the teachers' lesson plans

Sub-question five on how the teachers prepare for the explicit teaching of academic vocabulary was addressed by looking at the Grade 4 Natural Sciences and Technology teachers' lesson plans and their teaching resources.

Before the onset of the first interview the researcher asked both teachers if they would be willing to submit their lesson plans. Only Teacher A submitted his lesson plans. Teacher B responded that the learners' work is a reflection of her lesson plans and that she makes use of the previous year's workbooks to plan her lessons.

Teacher A's lesson plans were not analysed according to a specific lesson plan template as the main goal was to merely determine whether he pre-selected academic vocabulary for teaching, explained how he would teach those words and described what resources would be used for academic vocabulary development.

Teacher A's lesson plans provided no objectives or specific aims concerning the teaching of vocabulary. There was no reference to previous knowledge that could have provided him with the necessary information on which vocabulary to teach. When planning for vocabulary teaching, teachers firstly need to consider their learners' previous vocabulary knowledge and proficiency. This is especially important when working with ESLLs, as it is for most their first encounter with English as the medium of instruction and they possess limited or no academic vocabulary knowledge (cf. Section 2.2.4.2).

In terms of academic vocabulary input he only once referred to the teaching of domain-specific and technical academic terms: *plumule* and *radicle* (cf. Lesson plan four, Appendix B). His lesson plans, however, did not provide ideas for teaching or explaining these words.

In all the other lessons he merely mentioned: "*discuss keywords"; "reinforce keywords to the learners in the Learner's Book on page 16"; "explain and elaborate on the keywords and give examples".* The key words were not identified in the lesson plans and the teaching of general academic vocabulary and symbols were never mentioned. When planning for learning activities the teacher used academic words, such as, "*identify*", "*sort*" and "*compare* living and non-living things"; "*discuss* what a seed needs to start growing"; "*investigate* if seeds are living things"; "*observe* a plant sample"; "*label* own plant"; "*observe* and *make conclusions* after observing a cutting"; "*describe* and write about habitats of African wild animals". He never explained how he would teach these general academic words.

It was evident that Teacher A did not explicitly plan for the teaching of academic vocabulary. According to research "[t]houghtful planning creates great lessons" (Johnson, 2012:72) and holds implications for effective teaching practices, effective learning and teacher effectiveness. Lesson planning is very important as it allows for more explicit and structured instruction. Researchers (Milton & Donzelli, 2013:460) agree that the planning of explicit instruction of vocabulary is very important as vocabulary "cannot teach and learn itself."

Flanigan and Greenwood (2007:227-228) and Marzano (2009) concur that effective planning for vocabulary instruction involves the:

a) selection of words which require explicit teaching;

b) selection of appropriate teaching strategies to teach those words;

c) deciding when during the lesson should those words be taught (cf. Section 2.2.4.2).

4.2.3 Analysis and interpretation of the semi-structured interviews prior to the lesson observations

Semi-structured interviews were conducted prior to the lesson observations to answer sub-question six of what the teachers' beliefs are about vocabulary teaching. This interview data were to be compared to what was observed in the classrooms. The interviews were conducted on 5 February 2014 and the researcher came to a better understanding of the teachers' beliefs concerning:

- how learners learn in general;
- obstacles the learners face in the Natural Sciences and Technology classroom in terms of academic proficiency.;
- what academic vocabulary entails;
- the teaching of academic vocabulary in the Natural Sciences and Technology classroom;
- the effectiveness of the Natural Sciences and Technology CAPS Grades 4-6 document (SA. DoBE, 2011b) and Teacher's Guide (Adatia *et al*., 2013b) as a guideline for the teaching of academic vocabulary.

Both teachers maintained in Question A1 (cf. Appendix B) that they believed learners learn best when they are able to see or observe information. They did not elaborate on this. Teacher A explained that learners learn through active participation, discussions with their peers and receiving input from their peers. Teacher B held that learners learn through repetition and that learners also need to receive extensive input in order to make sense of the content and key words. It appeared from the above answers that both teachers believed in the sociocultural and cognitive theories of learning, which is in line with the national goals and guidelines of the CAPS document (SA. DoBE, 2011b).

In terms of the language obstacles faced by learners, both teachers seemed aware that the medium of instruction is one of the learning barriers that the Grade 4 learners face in the Natural Sciences and Technology classroom (cf. Questions A4 & A6, Appendix B). They could not, however, identify which aspect of English the learners mostly struggle with.

Teacher A indicated the language used in the textbooks as a barrier and argued that the learners struggle with difficult words as it is their first encounter with academic vocabulary (cf. Question A4, Appendix B). This answer was elaborated on in Question A10 (cf. Appendix B), when the teachers were asked whether they think academic vocabulary play a role in the learners' ability to comprehend Natural Sciences and Technology texts. Both teachers appeared to recognise the importance of vocabulary knowledge for comprehension, as well as reading fluency. Teacher A answered that: *"[y]es, regarding the comprehension, I think…there are several occasions that are these, the terminology, the textbook does explain some of these words, especially called the key words and still even if the explanations are given, they still struggle to digest what those words mean*". Teacher B explained that the learners' "*bad word knowledge influences their reading comprehension".* She also observed in previous lessons that they "*read very slowly and struggle to make sense of difficult words.*"

In Question A8 (cf. Appendix B), where they were asked to list examples of academic vocabulary that the learners need to know before they enter Grade 4, neither teacher could provide specific words. This is significant as neither teacher seemed informed about the Grade 3 curriculum and what academic vocabulary knowledge learners were expected to possess. Teacher A provided words, such as, "*Science"* and "*Technology*". Teacher B responded that the learners only need to know the *"basics"* and the "*difference between plants and animals, why these are and those things are important*". *These* and *those* were not qualified.

When asked to provide examples of Grade 4 curriculum academic vocabulary that learners might find difficult (cf. Question A9, Appendix B), only Teacher A was able to provide a few examples, such as, "*germinate", "process", "investigate"* and *"make"* (?).Teacher B responded that the CAPS document (SA. DoBE, 2013b) should be used to determine which words need to be taught. However, the CAPS document (SA. DoBE, 2013b) does not specifically identify all the different types of academic vocabulary (cf. Section 4.2.1). Despite the fact that both teachers have been teaching Grade 4's for a number of years (cf. Section 3.2.4), neither seemed to be able to identify the words learners might struggle with in Grade 4.

Regarding the teaching of academic vocabulary in the content-area classroom both teachers agreed that they believed in various strategies (cf. Question A14, Appendix B).

However, they favoured oral explanations and oral repetitions to teach academic vocabulary (cf. Question A11, Appendix B).

Carrier (2012) and Milton and Donzelli (2013:458) agree about the use of oral repetition, provided that it is meaningful, and different strategies are used to explain the word more than once. Teacher A added that he also used demonstrations, field work, peer teaching, flash cards and the blackboard (cf. Questions A12, A13, A15, A16 & A17, Appendix B). There was, however, little evidence of planning for the use of these resources and activities in his lesson plans. Teacher B said that apart from oral repetitions, she also used the blackboard or transparency, posters, experiments, pictures and personal vocabulary journals that the learners used to record academic vocabulary and their definitions (cf. Questions A12, A15, A16 & A17). Section 2.2.6.1 reported on the advantages and disadvantages of this strategy to teach academic vocabulary to ESLLs.

In Questions A18 (cf. Appendix B), where they were asked to comment on the guidance provided by the Teacher's Guide (Adatia *et al*., 2013b), both teachers said that they were satisfied with the guidelines included in the Teacher's Guide (Adatia *et al*., 2013b). Teacher B explained that she had, however, noticed that the Teacher's Guide (Adatia *et al*., 2013b) does not provide sufficient examples of what academic vocabulary to teach and as a result she used other aiding resources. The researcher found little evidence of guidelines during the analysis of the Teacher's Guide (Adatia *et al*., 2013b).

The fact that vocabulary may not be seen as a primary focus is emphasised by Teacher B's answer to Question A19 (cf. Appendix B) when she stated: *"The work load is too much…Time is not there to teach everything. It is really difficult to get to everything…the teachers at this school only teach what is necessary."* Teacher A never mentioned anything regarding work load during the interview.

4.2.3.1 Findings

The document analysis and pre-observation interviews revealed that:

- The national goal of the South African curriculum (SA. DoBE, 2011b) is to promote language teaching across the curriculum.
- Except for a wordlist, the CAPS document (SA. DoBE, 2013b), the Teacher's Guide (Adatia *et al*., 2013b) and Learner's Book (Adatia *et al*., 2013a) do not provide guidelines and methodological examples to support the teacher in the explicit teaching of academic vocabulary knowledge.

- There was little evidence of planning for the teaching of academic vocabulary from Teacher A. Teacher B did not submit lesson plans.
- The teachers had inadequate understanding and knowledge of what academic vocabulary entails in terms of the types of academic vocabulary, prior knowledge required and the different academic words in the Grade 4 curriculum.
- Both teachers claimed to understand the significance of vocabulary teaching and its significance for reading comprehension and reading fluency.
- They believed in using various teaching strategies to teach academic vocabulary and they favoured oral explanations and oral repetition.
- Both teachers believed in the use of different resources, such as, posters, flashcards and the blackboard to teach academic vocabulary.
- They believed that the guidance supplied by the Teacher's Guide (Adatia *et al*., 2013b) and CAPS document (SA. DoBE, 2011b) was sufficient for effective vocabulary teaching.

4.2.4 Report and interpretation of lesson observations

4.2.4.1 Classroom environment

In both classrooms the Grade 4 learners were predominantly English Second Language (ESL) speakers. The mother tongue taught at School A is Setswana, but English is the medium of instruction. School B is an English medium primary school. However, there were some IsiZulu and Sesotho speaking learners in each classroom setting, which meant that English was their second or third language. There were forty-five learners in Classroom A and twenty-six leaners in Classroom B.

4.2.4.2 Lesson observations

Lesson observations were conducted in two Grade 4 Natural Sciences and Technology classrooms over a period of four weeks. Recording of the lessons and observations were done according to a matrix (cf. Appendix B). Afterwards these recordings and observations were also compared with what had been said during the pre-observation interviews. A total of sixteen lessons were observed, nine lessons in Classroom A and seven lessons in Classroom B. The teachers did not pace their lessons correctly as Teacher B worked very slowly and did not finish Topic five- *Materials around us*. She was not willing to participate in the research longer than what was scheduled.

On the other hand, Teacher B, worked very fast and finished the prescribed work ahead of time. The researcher came to a better understanding of:

- what academic words were taught;
- how key academic words were selected and taught;
- the use of learning activities focused on the acquisition of vocabulary;
- the use of resources focused on the acquisition of vocabulary.

Since neither teacher provided detailed planning the researcher found it difficult at times to identify and record key academic vocabulary. This is, however, significant, because if words are only implicitly used or taught, learners may also fail to take note of these words. This is one of the reasons why researchers encourage the explicit teaching of vocabulary (cf. Section 2.2.3).

Both teachers seemed to focus on the teaching of the domain-specific sphere which includes technical academic vocabulary (cf. Table 4.4, Section 4.2.4.1). This sphere also includes word clusters and polysemous words, which neither teacher focused on. Only one incident of the explicit teaching of general academic vocabulary was recorded. This was during lesson nine when Teacher A demonstrated the meaning of the word, *measure*. He used a thermometer and ruler and showed the learners how to do instrument readings, but he never supplied them with a synonym, word analysis or made them use the word themselves. The teacher focused more on teaching the concept than the word. Research has proved that conceptualisation is only the first step in the acquisition of a word (Beck *et al*., 1982).

General academic vocabulary, which includes school-task vocabulary were used during the lessons when instructions were given. Most of these instructions came from the Learner's Book (Adatia *et al*., 2013a) e.g. lesson one- *copy* the diagram of the seven life-processes from the blackboard"; "lesson two- *"copy* the table in your workbook and compare living and non-living things*";* lesson three- *"identify, label* and *describe* the different parts of a plant"; lesson four- "*tabulate* the differences you see between the pictures of the plants"; lesson five- *notice* any differences you see between the animals in the pictures and *tabulate* the differences"; lesson six- "*copy* and *complete* the sentences about what plants need to grow"; lesson seven- "*make* a drawing of a habitat"; lesson eight- "*fill-in* the missing words" and lesson nine- "*predict* what will happen to the water temperature of the hot water". Neither teacher spent time on explaining nor defining what is meant by e.g. *copy*, *identify, label, describe, tabulate*, *notice, complete, make*, *fill-in* or *predict*.

It was probably assumed that the learners would implicitly derive the meanings of the words from the task or that they knew what the words meant.

From the possible ninety-eight academic words, the researcher was only able to identify eighteen academic words that the teachers focused on out of the sixteen lessons. Some of the words they focused on were not even academic words, such as, *warmth, breathe, move, feed, seem dead, leaves* and *flower*. Flanigan and Greenwood (2007); Gardner (2013) and Irwin (2008) argue that content-area teachers often avoid teaching general academic vocabulary as those types of words are very abstract and need to be taught using specific strategies. On the other hand, they might believe that it is the language teacher's responsibility.

Teacher A used translation in every lesson, despite the fact that he said he only used English (cf. Section 3.2.4). In lesson two, he translated questions and academic vocabulary as many as twelve times. When he attempted to explain the concept of *seem dead* (lesson two), the learners struggled to make meaning of the concept and they kept quiet when he asked questions. He then stated: "*They don't understand, eish, it's difficult for them"* and he immediately translated his explanation. Although code switching can be a very effective teaching practice to employ for the teaching of vocabulary (cf. Section 2.2.6.2.1), Teacher A's learners did not all share the same mother tongue and the teacher followed a practice of translating words without always returning to the learners' SL. His belief is contradictory to the curriculum (SA. DoBE, 2011b) and he may have used code switching due to a lack of planning and his own personal proficiency.

In lesson three, Teacher A added African prefixes to terms – "umleaf and umflower", which according to Setati *et al*. (2002) creates a barrier to fully acquiring the correct English scientific vocabulary. Probyn (2006:394) has shown that this is not conducive to learning and refers to it as "smuggling the vernacular into the classroom." Furthermore, Setati *et al*. (2002) emphasise that African languages do not always have lexis alternatives, for example: different scientific concepts, such as, *power, force, work,* and *energy* all translate to a single term in some African languages, yet, each has a different scientific meaning. The learners' poor grasp of English vocabulary was demonstrated in lesson one, two, six and seven when Teacher A asked them to explain the work to the person sitting next to them. The learners struggled to comply and merely murmured in their home language or remained quiet.

Both teachers professed a preference for using repetition when teaching academic vocabulary (cf. Section 4.2.3). This was quite evident as nine lessons contained incidents of choral repetition. In lesson one, both teachers expected the learners to repeat the words after them i.e. "*grow", "reproduce", "feed", "move", "breath", "excrete*" and *"sense."* They used repetition to help the learners memorise characteristics of living things. In an attempt to explain the words individually, Teacher A, made use of the examples: *"Reproduce is when an animal has a baby"*; "*Excrete means when you need to go to the loo."* Yet, she failed to provide the correct scientific synonyms for the words *reproduce* and *excrete.* This practice may reflect the teacher's own lack of proficiency and breadth of vocabulary knowledge.

In some instances, the learners were required to memorise the definitions of key academic vocabulary from the Learner's Book (Adatia *et al*., 2013a:4). In lesson one, Teacher B required them to repeat the definitions of the words (i.e. *germinate* and *organism*) from a wordlist:

***TB**: Germinate when a seed starts to grow.*
***Ls**: Germinate when a seed starts to grow.*
***TB**: Organism a living thing.*
***Ls**: Organism a living thing.*
***TB**: Kom, everyone has to say the words, all together.*
***Ls**: Germinate when a seed starts to grow… Organism a living thing.*

In lesson three i.e. *Structures of plants*, both teachers again made use of repetition. Teacher A chanted words i.e. *"roots", "stem", "leaves"* and *"flower*" and the learners followed using the same chanting intonation. The words were not explained and although he had drawn a sketch on the blackboard, he did not point at the different parts of the plant. Milton & Donzelli (2013:458) are among the many researchers that claim that mere repetition of words is ineffective as "simple repetition may not aid the learning of new vocabulary." Coral drilling is based on a behaviourist learning theory (Harmer, 2007:67). Afterwards the learners were required to draw a picture of a plant with the correct labels. Some learners did not understand the general academic term, *label*, and wrote full sentences instead.

In the same lesson, *Structures of plants*, Teacher B made use of a very effective teaching strategy, namely, syllabication (Agantien & Jonathan, 2014). Teacher B syllabicated the word (suc-cu-lents) and afterwards wrote it on the blackboard, but during the seven lessons that were observed, this was the only incidence of this specific teaching method.

Even though this is an effective teaching and learning strategy that helps leaners to effectively comprehend words by knowing their spelling and pronunciation (Agantien & Jonathan, 2014:120), she never focused on teaching the meaning or the origin of the word as well.

There was also never an opportunity to practise the word orally, in written form or in different contexts. Teacher B did, however, attempt to explicitly teach the word *succulents*, by providing a synonym *"cactus"*, which, strictly speaking, is not an exact synonym. *Cactus,* is an example of a *succulent, but* not a synonym for *succulent.* This could again be an indication of the teacher's own lack of vocabulary breadth, but more significantly it shows how a lack of planning affected the selection of correct synonyms. At the back of her classroom there was a poster depicting the structure of a plant (i.e. *seedling, roots, shoots, plumule* and *radicle*). Despite the fact that Teacher B said that she used posters regularly to teach academic vocabulary (cf. Section 4.2.3), she only once referred to this poster. She neglected to explicitly explain the academic vocabulary and instead she only pointed at this poster. She may have thought that the learners would acquire the academic vocabulary by reading them from this poster.

In lesson four, *Structures of animals,* Teacher A once again used repetition (i.e. *structure*, *limbs*, *sense organs*), but also closed-ended questions that prevented the learners from using vocabulary in full sentences, for example: *"Animals also have different parts right?"*

One of the learners struggled to make meaning of the word, *limbs*. As in lesson nine, Teacher A instructed the learners to use the wordlist in the Learner's Book (Adatia *et al*., 2013a:16) and this resulted in a scramble as not all learners had their own Learner's Book (Adatia *et al*., 2013a). It may be that the teacher was unable to think of an appropriate synonym or that he lacked the proficiency to explain the meaning of the word. On the other hand, it also showed that he believes learners may be able to grasp the meaning by reading a definition of the word.

In the same lesson Teacher B exemplified the word, *limbs,* by explaining that: *"You have legs and arms that you use to do activities and they are called limbs."* However, the learners were not given the opportunity to repeat the word, pronounce or spell the word. Drawing attention to the silent 'b' in the word may be of importance as correct spelling is also related to the acquisition of vocabulary (Nation, 2001; Thornbury, 2011).

On one occasion in lesson three, the learners had to copy information from the overhead projector, but the word, *leaves*, was spelled incorrectly [leafes] and all the learners copied this incorrectly spelled word into their workbooks. This prevented the learners from correctly learning the important concept and also indicated that the teacher did not properly plan for the purposeful teaching of vocabulary and concepts by first making sure how to spell this word. It became clear that spelling and pronunciation of words were neglected. Although the teacher instructed them to underline the words in their books she did not provide them with an opportunity to use the words in another context. She never assessed whether the learners understood the meanings of the academic words that they were supposed to underline. This could demonstrate the teacher's belief that learners learn vocabulary implicitly, although research has proved that implicit learning is not enough and that words need to be taught explicitly (Milton & Donzelli, 2013).

In lesson five, *Differences between different animals*, Teacher A asked the class what the shape of a pigeon was. Teacher A drew a triangle on the blackboard to illustrate the shape of a pigeon and asked the class: *"What is the shape of a pigeon?"* One little girl answered: "*Triangle, it has three feet."* The teacher simply responded "*incorrect*", supplied the word orally, "*triangular*", and continued with the lesson.

In the same lesson, Teacher A required the learners to repeat words, which he mispronounced. *Gills* was pronounced (dʒɪls) instead of (gɪlls) and *whiskers* was pronounced (wɪska:s) instead of (wɪs·kə[r]s) and *scale* [skeɪl] pronounced [skæl] as in cat. The learners dutifully repeated. In lesson seven this teacher again mispronounced predator [predətə(r)] as [prɪˈdeɪtə(r)]. Apart from the fact that this may reflect on the teacher's personal proficiency, it actually shows that the teacher did not prepare for the teaching of vocabulary by checking the pronunciation and meanings of the words he intended to teach. When he seemed uncertain to pronounce a word he would say: *"Eish, you need to learn how to say these words in the English class."*

Not only did this contradict his statements regarding the importance of teaching academic vocabulary in the Natural Sciences classroom (cf. Section 4.2.3), but it should also be remembered that this teacher's major subject is English (cf. Section 3.2.4). His excuse for not really wanting to teach the pronunciation of the word corresponds with Irwin's (2008:10) finding that content-area teachers very often "[s]lip into the traditional view that vocabulary instruction belongs only in the language arts portion of the curriculum."

In lesson five, Teacher B provided the sentence: *"Different animals have different body coverings that protect them from predators or weather conditions."* No synonyms or other explanations were provided. She then carried on by asking the learners if they could remember what the word *sense organs* meant. One learner answered: *"It is things you use to smell and hear."* She simply stated *yes* and continued with the lesson. She never attempted to extract the correct vocabulary for *things* or even checked whether the learners really understood what was meant by *sense organs*.

In lesson six, Teacher B briefly mentioned and enunciated the words: *chlorophyll* and *photosynthesis* during the oral explanation of what plants need to grow. These words are not in the Grade 4 curriculum. Teacher B did not explain the words' meanings and origin and merely reassured the learners that they would learn these words in Grade 5. Although she used synonyms to orally explain that plants need soil that contains *fertiliser* and that it is called *compost*, which will help plants to *germinate* or *grow*, she did not write these words on the blackboard and the learners did not use these words themselves. Afterwards, Teacher B did not test whether they fully grasped the meanings of these words or whether they could use them in meaningful sentences (cf. Section 2.2.4.2.2). This may demonstrate a lack of planning and more significantly the explicit teaching of academic vocabulary.

Lesson seven, revealed no new strategies. Teacher A again used repetition, he instructed the learners to explain the work to one another, he could not supply the learners with a learner-friendly definition of *habitat* and he mispronounced predator [predətə(r)] as [prɪˈdeɪtə(r)]. This teacher provided a list of academic vocabulary (i.e. amphibian, carnivores and herbivores), which is not part of the Grade 4 curriculum. He never explicitly taught the words by writing them on the blackboard, analysing the different parts of the words (i.e. prefixes and suffices) and explaining the origin of each word. Teacher B used an inexact synonym for habitat (i.e. home), which did not elucidate the difference between *home* and *house.* She mispronounced the word, *tentacle* [tentəkl] as [tenteɪckl], and simply instructed the learners to copy information on the topic, *Habitats of animals*, into their workbooks.

Lessons eight and nine were completed by Teacher A only. Once again this teacher used the same strategies. Other than using flashcards (i.e. liquid, evaporate, condensation) he simply glossed over words such *temperature* and *thermometer* in a wordlist on page 64 of the Learner's Book (Adatia *et al*., 2013a) and he used a thermometer as he attempted to explain the meaning of the word (*thermometer)*. However, no other strategies like teaching the word's spelling, pronunciation, history and origin and the different word parts (i.e. prefixes and suffixes) featured.

As far as engaging learners in interactive activities and learning, a practice that both teachers said they believed in (cf. Appendix B) is concerned, both classrooms were teacher-dominated. Learners were rarely given the opportunity to practise new academic vocabulary.

Activities in both classrooms were mostly restricted to filling in missing words (Adatia *et al*., 2013a:10; 25; 59 & 61), matching words with the correct definitions (Adatia *et al*., 2013a:22) and labelling sketches (Adatia *et al*., 2013a:12; 27). In Teacher B's classroom the learners had to copy down notes from the overhead projector. This is at the lowest cognitive level and it is just a matter of memorisation. The learners were not engaging with the meaning of what they were writing or copying. The use of words in oral and written activities, like, discussions, writing reports, conducting Science investigations or writing full sentences, were not encouraged. Instead, the learners were mostly passive, despite the fact that both teachers' statements in the pre-observation interview reflected a belief in a sociocultural and cognitive learning environment (cf. Section 4.2.3). Despite the fact that Teacher A proclaimed that he did fieldwork and experiments with the learners when teaching academic vocabulary and Teacher B professed that she used posters, experiments, pictures and personal journals (Section 4.2.3), there was little or no evidence of these strategies in their lessons.

4.2.4.3 Findings

The lesson observations revealed that:

- Neither teacher planned for the explicit teaching of academic vocabulary. One teacher did not pre-select words at all as she did not provide lesson plans. When the other teacher identified required academic vocabulary very little reference was made to specific teaching strategies. The lack of planning was also evident in the failure to link new academic vocabulary with the learners' previous vocabulary knowledge and the pacing of the teachers' lessons as one teacher did not finish in time, whereas, the other teacher finished ahead of time.
- There was no evidence during the lesson observations that either teacher referred to the wordlist in the CAPS document (SA. DoBE, 2011b) for the identification of required academic vocabulary.
- Out of a possible ninety-eight academic words that were identified from the Learner's Book (Adatia *et al*., 2013a), the teachers only focused on eighteen academic words. They mostly focused on teaching high frequency words, such as, *warmth, breath, move, feed, seem dead, leaves* and *flower.*
- The teachers' lack of personal proficiency affected their teaching of academic vocabulary. This was evident in:

a) the mispronunciation of words;
b) the supplying of inexact synonyms;
c) the frequent reference to wordlists only;
d) the inability to supply learner-friendly definitions.

- Although they claimed using various teaching strategies, both teachers favoured choral drilling as a vocabulary teaching strategy. The teacher did not have the technique and sufficient methodological knowledge when vocabulary strategies, like, flashcards and peer teaching were used for the teaching of vocabulary.
- Despite the fact that they initially stated that they believe in interactive lessons, their lessons were teacher dominated and little feedback and open-ended questions were asked.
- Both teachers confused the teaching of concepts with the teaching of vocabulary. They focused on the meaning only without focusing on the actual acquisition of vocabulary.
- Although the teachers said they taught in English one teacher used translations and did not understand the principles of effective code switching.

4.2.5 Analysis and interpretation of the second semi-structured interviews after the four weeks of lesson observations

On 5 and 10 March 2014 two sets of semi-structured interviews were conducted. The second interview served only as a reflective interview and allowed the teachers to summarise and reflect on their teaching experiences of the past four weeks. The reflective interviews shed light on the teachers' views regarding:

- the most successful topic(s) in terms of teaching academic vocabulary;
- the most successful teaching strategy used for teaching academic vocabulary;
- their beliefs on the teaching of academic vocabulary in the content-area classroom after the lesson observations;
- their approaches to dealing with the learning barriers the learners faced;
- the sufficient use of resources for the development of academic vocabulary knowledge;
- their plans and goals for the next term regarding the teaching academic vocabulary;
- assistance from language experts to teach academic vocabulary more successfully;
- an intervention programme to train in-service teachers on how to select and best teach academic vocabulary.

On reflection regarding the topics that were most successful (cf. Questions B1, Appendix B), both teachers maintained that the topics of *Living things and Non-living things* were the most successful ones as they were able to easily explain the concepts and refer to examples in and outside the classroom e.g. a *desk, pencil case*, *tree and plants*.

However, the learners were familiar with these concepts as they are part of the Grade 3 curriculum (SA. DoBE, 2013c:32). During the lesson observations it was noticed that no new academic words were introduced and activities were limited to the repetition of facts (i.e. characteristics of living things) only.

Teacher B reflected (cf. Question B2, Appendix B) that the use of higher-order questions was the most effective teaching strategy that she used for the teaching of academic vocabulary. However, she only used one higher-order question throughout the four weeks of observation. She further reflected that instructing the learners to underline important academic vocabulary worked best during her lessons. Teacher B professed that peer teaching was the most successful teaching strategy. Neither of these strategies was successfully applied (cf. Section 4.2.4.2).

Both teachers were asked to reflect on how they addressed barriers to learning throughout the four weeks (cf. Questions B4, B5 & B6). Teacher A responded that she helped the learners during break. During the lesson observations it was, however, noticed that the learners mostly copied worksheet questions, sketches and sentences displayed on the overhead projector. Her reflection revealed that she did not address this barrier during the four weeks and might have thought that it was not necessary or her responsibility. She mentioned that she helped learners immediately when they struggled. However, the researcher observed one instance in lesson five, *Differences between different animals*, where a learner was not sure what was meant by the concept, *body coverings*, and she did not assist him. She only advised him to reread the question. Teacher B was asked in Question B6 whether she addressed the learner's "*bad word knowledge*" that she identified as a barrier to reading fluency in the first interview (cf. Section 4.2.3) and she answered that she did a lot of repetition with the learners. However, the words were not always repeated in context or in meaningful ways (cf. Section 4.2.4.2).

In Teacher A's reflection on Question B4 (Appendix B) he reflected that: *"They are using their mother tongue where they get to understand. I then explain the words, I translate it to Setswana."*

The use of some of the learners' mother tongue was observed in all his lessons, however, the teacher only translated his explanations and never code-switched by explaining the words again in English. Learning activities still had to be completed in English, thus the language barrier was not dealt with at all. In his reflection he also changed his initial statement in terms of not using the learner's home language as the medium of instruction.

In answer to Question B5, this teacher explained that he used practical examples to help the learners to make meaning of Science vocabulary, which they found problematic. Yet, the lesson observations demonstrated that he focused more on the meanings of concepts and not on the acquisition of academic vocabulary.

Both teachers were asked (cf. Question B7, Appendix B) to reflect on their previous statements (cf. Question A14, Appendix B) concerning the frequent teaching of vocabulary and the use of multiple strategies. Teacher A was uncertain and said that there are too many academic words that needed to be taught and that it was an impossible task. Despite the work load, he finished the prescribed work ahead of time. This time could have been utilised for the teaching of academic vocabulary. In contrast to his previous answer (cf. Question A17, Appendix B) Teacher A now reflected: *"I must be honest, strategies to explain academic vocabulary to the learners are good on paper, but not good in terms of implementation.*" Teacher B reflected: "*You try to explain the words to them as much as you can and I like to link words with their previous knowledge and practical examples*." The lesson observations delivered limited evidence of the use of these strategies.

During the pre-observation interview Teacher B said she used posters to teach vocabulary. When asked (cf. Question B8, cf. Appendix B) to reflect on the use of posters during the observed lessons she answered that she regularly used posters in her lessons and also the pictures in the Learner's Book (Adatia *et al*., 2013a). It may be that she intended to use these resources more effectively, but the lesson observations showed otherwise. She only once referred to a poster at the back of her classroom (cf. Section 4.2.4.2) and she seldom referred to the pictures in the Learner's Book (Adatia *et al*., 2013a). This could also be due to a lack of planning.

In Question B8 (cf. Appendix B), Teacher B was asked to reflect on the effectiveness of peer teaching or learning and field work as strategies he said he would use during his lessons (cf. Questions A3, A12 & A17, Appendix B).

He answered that peer teaching or learning worked very well, but he never elucidated how he used field work as a strategy for teaching academic vocabulary. The lesson observations proved that the learners were not able to clarify the meanings of the newly learnt academic terms to one another (cf. Section 4.2.4.2) and field work never featured.

Regarding future plans and aims for the teaching of academic vocabulary (cf. Question B10, Appendix B), Teacher A said that he noticed shortcomings in his teaching and planned to improve on this. Teacher B seemed content with her teaching practices.

In answer to Questions B9 and B11 (cf. Appendix B), Teacher A was in favour of receiving help from a language expert to show him how to teach academic vocabulary, but both teachers rejected the attendance of a workshop. The fact that Teacher A indicated a need for help from a language expert is interesting since he majored in English in the FET Phase (cf. Section 3.2.4). It may be, however, that he required help with the methodology of vocabulary teaching in the Intermediate Phase.

4.2.5.1 Findings

The second semi-structured interviews revealed that:

- What the teachers said they would do regarding the teaching of academic vocabulary (e.g. the use of personal vocabulary journals, additional resources and strategies, like, fieldwork and experiments) did not materialise.
- Despite initially agreeing on the importance of teaching, both teachers, in reflection, were of the opinion that there is not enough time for the explicit teaching of vocabulary in an already full curriculum.
- In reflection it was clear that both teachers felt that they were using effective vocabulary teaching strategies (e.g. choral drilling, translation and underlining).
- Although there was some interest in an intervention programme, both were negative about attending a workshop.
- Methodology- both teachers are trained in the FET Phase methodology.

4.2.6 Conclusion

The researcher reported on and interpreted what was said during the interviews and what had been observed in each classroom. The findings helped to answer the main research question:

To what extent are two Grade 4 Natural Sciences and Technology teachers in two schools in the North West Province using effective practices to explicitly teach academic vocabulary in the Natural Sciences domain?

The study revealed that:

- The CAPS document (SA. DoBE, 2013b) and Teacher's Guide (Adatia *et al*., 2013b) are not sufficient and provide very limited guidance in terms of teaching academic vocabulary in the Natural Sciences domain.
  These documents may be used to great effect, provided the Natural Sciences and Technology teacher knows *which* words to select and *how* to teach them.
- The Learner's Book (Adatia *et al*., 2013a) does not sufficiently focus on the development of academic vocabulary.
- The teachers are not aware of the importance of lesson planning for explicit vocabulary teaching.
- Neither teacher is aware that the academic vocabulary field comprises three spheres (i.e. general academic vocabulary, domain-specific and technical academic vocabulary and symbols) and how to identify these academic words for their lessons.
- Their lack of proficiency and vocabulary breadth are barriers to vocabulary teaching and learning.
- Both teachers might be aware of the value of vocabulary teaching and strategies, but they lack the necessary Intermediate Phase methodological skills, knowledge and techniques to effectively teach academic vocabulary.
- The teachers lack an understanding of what effective and explicit vocabulary teaching practices entail.
- Both teachers' teaching practices are in line with the behaviourist learning theory and not the sociocultural and cognitive learning theory as outlined in the CAPS document (SA.DoBE, 2011b).
- The teachers are unaware that they need guidance and help in how to teach academic vocabulary effectively and explicitly. They view workshops in a negative light.

The next chapter will provide a summary of the literature review and empirical research. Chapter 5 will also present the limitations of this study; the answers to the research questions; contributions; general recommendations; suggestions for future research and the conclusions.

CHAPTER 5

SUMMARY, LIMITATIONS, CONTRIBUTIONS, RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

The purpose of this study was to gather theoretical information and empirical data on the teaching and learning of vocabulary in two Grade 4 Natural Science classes. Qualitative research was undertaken which involved an intrinsic case study methodology and which was imbedded in an interpretive research paradigm. The researcher collected relevant documents, observed lessons in two Grade 4 Natural Sciences and Technology classrooms and interviewed the teachers to obtain an in-depth understanding of their attitudes, beliefs and practices regarding academic vocabulary teaching in the Natural Sciences domain.

The research was driven by the following main research question and sub-questions:
To what extent are two Grade 4 Natural Sciences and Technology teachers in two schools in the North West Province explicitly teaching academic vocabulary in the Natural Sciences domain?

Sub questions:

1. What does the field of literature suggest regarding the teaching of vocabulary in the content-area classroom in terms of the teacher's responsibilities and the use of effective teaching and learning strategies?
2. What are the national goals and guidelines regarding vocabulary teaching in content-area classrooms?
3. What academic words do Grade 4 learners need in order to learn academic content in the Natural Sciences domain?
4. What kind of support do the Grade 4 Natural Sciences and Technology teachers receive in how to select and teach academic vocabulary?
5. How do teachers prepare for teaching vocabulary in the Natural Sciences and Technology classroom?
6. What do teachers believe about the teaching of academic vocabulary in the Natural Sciences and Technology classroom?
7. What teaching practices do the teachers follow or apply?

This final chapter will give attention to:

- a summary of the literature review and empirical findings of this study;
- the limitations of this study;
- answers to the research questions;
- the contributions of this study;
- the general recommendations;
- suggestions for future research;
- the conclusion.

5.2 A summary of the literature review and empirical findings of this study

Chapter 1 of this study focused on the background and research problem within the South African context. It became evident that South African Grade 4 learners who have to learn through the medium of a Second Language (SL) face many obstacles as they move from Grade 3 to Grade 4. One of these obstacles is to master the specific academic vocabulary of complex subject domains, such as, the Natural Sciences domain. The questions as outlined in section 1.3 were the driving force of this study and helped the researcher to gain an understanding of two Grade 4 Natural Sciences and Technology teachers' teaching practices in terms of teaching academic vocabulary in their classrooms. Specific concepts were also clarified.

Chapter 2 presented a review of the literature on academic vocabulary for learning purposes in the academic context. Chapter 2 also provided examples of various teaching strategies, methods and tools that the Grade 4 Natural Sciences and Technology teacher could employ in any lesson on any topic.

Chapter 3 described how the research design, methodology and methods were applied to address the research aims and questions of this study. The research study was embedded in an interpretivist paradigm and adopted a qualitative research approach and an intrinsic case study methodology. This research study also took certain ethical aspects into consideration.

Chapter 4 presented the findings and interpretations of the data in two Grade 4 Natural Sciences and Technology classrooms. During the empirical research it was found that:

- The CAPS documents (SA. DoBE, 2013b) and Teacher's Guide (Adatia *et al*. 2013b) do not provide sufficient guidelines for teaching academic vocabulary.
- The Learner's Book (Adatia *et al*. 2013a) does not focus on the development of academic vocabulary.
- The teachers do not plan for the teaching of academic vocabulary.
- There is a lack of explicit teaching of academic vocabulary.
- The teachers lack the motivation and responsibility to teach academic vocabulary.
- The teachers are unaware of the types of academic vocabulary and its importance for learning.
- The teachers believe that the explicit teaching of academic vocabulary is time consuming in an already full curriculum.
- The teachers are unaware of the national goals and guidelines as outlined in the CAPS document (SA. DoBE, 2013b).
- The teachers are not trained in Intermediate Phase teaching methodology.
- The teachers lack personal proficiency and struggle to effectively teach through the medium of English.

5.3 Limitations of research

This study presented several findings on vocabulary learning and teaching in the content-area classroom, yet there are some limitations as well:

- As the researcher attempted to start with the empirical research, one of the teachers no longer wanted to take part in the research study. The researcher was consequently forced to find another teacher that met the selection criteria and who was willing to participate.
- Due to time constraints and logistic reasons, only two Grade 4 Natural Sciences and Technology teachers from the Potchefstroom district took part in this study.
- The observation could have occurred over a longer time period, which could have provided the researcher with more insight into the teachers' attitudes, beliefs and teaching practices with regard to academic vocabulary teaching.
- The researcher was not able to observe the topic of *Materials around us* in Teacher B's classroom. The teacher worked at a slow pace and she did not provide consent to observe longer than was scheduled. It, therefore, would have been unethical to conduct observations for one extra week without the consent of the teachers, principals and the subject heads of Natural Sciences and Technology.

- Both teachers are trained in the FET Phase, but they are teaching in the Intermediate Phase, which is a limitation of this study as they might have approached the methodology differently.

5.4 Answers to the research questions

This study showed that:

- academic vocabulary should be taught explicitly by using effective and various teaching and learning strategies;
- Grade 4 learners need to know the three different spheres (i.e. general academic vocabulary, domain-specific and technical academic vocabulary and symbols) to learn academic content in the Natural Sciences domain;
- the CAPS policy document (SA. DoBE, 2011b) and Teacher Guide (Adatia *et al*., 2013b) do not provide sufficient support and guidelines of how to select and teach academic vocabulary;
- the teachers do not explicitly plan for the teaching of academic vocabulary;
- the teachers believe in a behaviourist teaching practice and that it is not their responsibility to teach vocabulary;
- their teaching practices are ineffective and they do not teach academic vocabulary explicitly.

5.5 Contributions of this study

This study contributes in various ways to this subject area.

- The literature review of this study contributes to the development and/or expansion of scientific knowledge. It provides significant information with practical examples and tools (cf. Section 2.2.6) that the Natural Sciences and Technology teacher may find beneficial to apply in his or her lessons.
- A framework or model like the synthesised model (cf. Section 2.2.2.2) emerged from research in Chapter 2. This framework or model may be used as a practical tool for the selection of academic vocabulary. It focuses the teacher's attention on which words to teach and it clarifies, for example, what the sphere of general academic vocabulary entails by providing examples. It also visually depicts the range of the academic vocabulary field from general academic vocabulary to symbols. This helps the teacher to become aware of how important it is to teach the more abstract sphere, namely, general academic vocabulary and then to focus on the other spheres that are more domain specific and concrete.

- Finally, the findings from the observation provide information that could inform an outline for an intervention programme to improve the learning, as well as teaching of academic vocabulary in content-area classrooms.

5.6 General recommendations

The findings that emanated from this research study could serve as recommendations with the intention to improve teaching practices.

- The CAPS document (SA. DoBE, 2011b), as well as the Teacher's Guide (Adatia *et al*., 2013b) proved to be curriculum documents and not instructional manuals of how academic vocabulary needs to be selected and taught. This could call for the amendment of these documents or the development of an instructional manual which precisely explains what 'teaching a language across the curriculum' entails (e.g. which words need to be taught and how).
- The South African Department of Basic Education (SA. DoBE) has an important role and obligation to ensure that every learner has his or her own textbook.
- Content-area teachers need an accessible electronic resource file that includes teacher resources, like, posters, graphic organisers, visual representations that are specific for the teaching of academic vocabulary and current research on vocabulary teaching practices.
- Content-area textbooks should be more focused on the development of vocabulary and should include vocabulary learning strategies.
- Language assistants are required to assist content-area teachers during their lessons.
- Intervention programmes are needed and not workshops that will make content-area teachers aware of their shared responsibility to teach academic vocabulary and to enable them to plan and prepare for effective vocabulary teaching. Booklets with appropriate academic vocabulary teaching strategies could be designed.
- Pre-service teachers should attend training programmes on language teaching methodology for the Intermediate Phase.
- Refresher courses for in-service teachers are required to sharpen their skills in teaching through the medium of English.

If all the recommendations outlined in this study are adhered to, an intervention programme could be designed to train Grade 4 Natural Sciences and Technology teachers to help their learners learn academic vocabulary successfully and to be equipped with effective academic vocabulary learning strategies that they can use across the curriculum. However, all content-area teachers, principals, the subject advisors and DoBE will need to view the learning and teaching of academic vocabulary as a priority in content-area classrooms and to provide the teachers with the necessary encouragement, support and training to achieve this important goal.

5.7 Suggestions for future research

Larger scale research could be conducted to give a broader perspective on the explicit teaching of academic vocabulary in content-area classrooms. A mixed method research study could be followed that involves the Intermediate, as well as Senior and Further Education Phases; different content-area teachers; the learners; principals and subject advisors. If more individuals participate, focus-group interviews could serve as a rich and meaningful data collection method.

5.8 Conclusion

Content-area teachers and especially the Grade 4 teachers need to understand the importance of the role that academic vocabulary knowledge plays in reading comprehension, academic success and success after school. It is important that content-area teachers start to realise that the learning and teaching of academic vocabulary in their classrooms do not require extra teaching time and that it can easily be integrated with content teaching. The focus on key academic vocabulary will in reality make the subject content more manageable for the learners and the workload will be less overwhelming. The empirical research indicated that content-area teachers may tend to neglect the teaching of academic vocabulary in their lessons due to various reasons and factors as explained in Chapter 4. Orientation and training could, therefore, make all content-area teachers aware of the importance of academic vocabulary learning and teaching. This could bring about motivation and responsibility to ensure learners' academic vocabulary knowledge development and academic success.

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APPENDICES

Appendix A: Ethical clearance and consent

NORTH-WEST UNIVERSITY
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Ethics Committee
Tel +27 18 299 4849
Email Ethics@nwu.ac.za

ETHICS APPROVAL OF PROJECT

The North-West University Research Ethics Regulatory Committee (NWU-RERC) hereby approves your project as indicated below. This implies that the NWU-RERC grants its permission that provided the special conditions specified below are met and pending any other authorisation that may be necessary, the project may be initiated, using the ethics number below.

Project title: Explicit academic vocabulary teaching of two Grade 4 Natural Science and Technology teachers in the North West Province.

Project Leader: Dr AHC Uys
Student: C Prinsloo

Ethics number:

N	W	U	-	0	0	1	2	4	-	1	5	-	A	1
Institution				Project Number						Year			Status	

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Approval date: 2013-06-06 **Expiry date**: 2018-06-05

Special conditions of the approval (if any): None

General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following:

- *The project leader (principle investigator) must report in the prescribed format to the NWU-RERC:*
  - *annually (or as otherwise requested) on the progress of the project,*
  - *without any delay in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.*
- *The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, the project leader must apply for approval of these changes at the NWU-RERC. Would there be deviated from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.*
- *The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date, a new application must be made to the NWU-RERC and new approval received before or on the expiry date.*
- *In the interest of ethical responsibility the NWU-RERC retains the right to:*
  - *request access to any information or data at any time during the course or after completion of the project;*
  - *withdraw or postpone approval if:*
    - *any unethical principles or practices of the project are revealed or suspected,*
    - *it becomes apparent that any relevant information was withheld from the NWU-RERC or that information has been false or misrepresented,*
    - *the required annual report and reporting of adverse events was not done timely and accurately,*
    - *new institutional rules, national legislation or international conventions deem it necessary.*

The Ethics Committee would like to remain at your service as scientist and researcher, and wishes you well with your project. Please do not hesitate to contact the Ethics Committee for any further enquiries or requests for assistance.

Yours sincerely

Linda du Plessis

Digitally signed by Linda du Plessis
DN: cn=Linda du Plessis, o=NWU, Vaal Triangle Campus, ou=Vice-Rector: Academic, email=linda.duplessis@nwu.ac.za, c=US
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Prof Linda du Plessis
Chair NWU Research Ethics Regulatory Committee (RERC)

education

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DR KENNETH KAUNDA DISTRICT

TLOKWE AREA OFFICE

OFFICE OF THE AREA MANAGER

TO: CHANTELLE PRINSLOO
NORTH WEST UNIVERSITY

FROM: MS S.S. YSSEL
AREA MANAGER
TLOKWE

DATE: 22 AUGUST 2013

SUBJECT: RESEARCH ON QUALITATIVE, CASE STUDY RESEARCH

The above matter refers.

Permission is herewith granted to you to conduct research at two primary schools in the Tlokwe Area Office under the following provisions:

- the activities you undertake at schools should not tamper with the normal process of learning and teaching.
- you inform the principal of your identified school of your impending visit and activity;
- you will obtain prior permission from parents;
- you provide my office with a report in respect of your visit;
- you will obtain prior permission from this office before availing your findings for public or media consumption.

Wishing you well in your endeavour.

MS S.S. YSSEL
AREA MANAGER
TLOKWE AREA OFFICE

AO131102/dp

Gerrit Dekker Street

POTCHEFSTROOM

2531

15 September 20145

Me. Chantelle Prinsloo

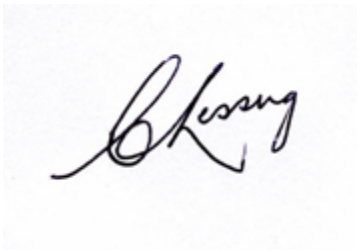
NWU (Potchefstroom Campus)

POTCHEFSTROOM

CHECKING OF BIBLIOGRAPHY

Hereby I declare that I have checked the technical correctness of the Bibliography of the MA-dissertation: Explicit academic vocabulary teaching of two Grade 4 Natural Sciences and Technology teachers in the North West Province of Me. Chantelle Prinsloo (8901260262085) according to the prescribed format of the Senate of the North-West University.

Yours sincerely



Prof CJH LESSING

Dominic Dirk Uys
Freelance writer and editor
uysdominic@gmail.com
Cell: 076 228 6504

TO WHOM IT MAY CONCERN

This is to attest that I have edited the language of a chapter of Chantelle Prinsloo's **MEd** dissertation. The title of this dissertation is: *Explicit academic vocabulary teaching of two Grade 4 Natural Sciences and Technology teachers in the North West Province.*

Dominic Uys
Freelance writer and editor

Date: 21 October 2015

Appendix B: Empirical research

Table 4.1 General academic vocabulary from the subject advisor's list (Selogiloe, 2013)

Low order general academic vocabulary	Middle general academic vocabulary	High order general academic vocabulary		
Label	Describe	Compare	Estimate	Sequence
List	Explain	Demonstrate	Evaluate	Sift
Name	Give an example	Design	Examine Formulate	Sketch
State	Plan	Discuss	Hypothesise	Sort
and others such as:	Rearrange	*and others such as:*	Illustrate	Study
Choose	*and others such as*:	Analyse	Improve	
Define	Convert	Apply	Interpret	
Give an example	Discuss	Appraise	Interview	
Identify	Give examples	Argue	Invent	
Match	Identify	Arrange	Investigate	
Recall	Observe	Calculate	Justify	
Select	Outline	Classify	Modify	
Underline	Report	Collect data	Organise	
	Review	Compile	Predict	
	Summarise	Conclude	Prepare	
	Translate	Construct	Prioritise	
		Contrast	Rank	
		Create	Rate	
		Debate	Record	
		Differentiate	Revise	
		Distinguish	Scrutinise	

Table 4.2 Domain-specific and Technical academic vocabulary from the subject advisor's list (Selogiloe, 2013)

Living things	Radicle	Temperature	Sphere
Non-living things	Habitat	Gas	Planet
Fungus	Indigenous	Substances	Sun
Life processes	Rainfall	Condensate	Moon
Reproduce	Grassland	Evaporate	Earth
Move	Savannah	Eardrum	Space
Breath	Predator	Continent	Rocket
Excrete	Poacher	Island	Orbit
Feed	Shelter	Atmosphere	
Grow	Den	Lake	
Sense	Escape	Ocean	
Limbs	Vapour	Coal Plastic	
Germs	Malleable	Fibre	
Germinate	Sand	Triangulation	
Hatch	Clay Absorb	Nutrients	
Radicle	Structure	Sinew	
Cutting	Vibrate	Thermometer	
Seedling	Solid	Audiologist	
Plumule	Liquid	Solar system	

NATURAL SCIENCES AND TECHNOLOGY GRADES 4

LESSON PLAN

TLOKWE AREA OFFICE

THEME 1

STRANDS :- NATURAL SCIENCES : Life and Living TECHNOLOGY:	DURATION: 3.5 hours	GRADE: 4	TERM: 1	YEAR: 2014

Specific Aims: 1; 2 and 3	Topic: Living things	Prior knowledge: Grass grows because we cut it when it gets too long

Content & Concepts to be learned	Teaching and Learning activities:		Equipment and Resources	Assessment
	Educator	Learner		
Life and living and Structures (Living things)	Ask learners to look at picture on page 1 of learners' book. Ask which things need food, water and air, and which can change and grow. Discuss seven life processes [LB – page 2]. Explain difficulties to see the signs of life in living things, especially plants. For example, we do not see plants walk around, but plants grow upwards towards the light. Plants show growth movements towards stimuli they sense. Clarity on the things that are alive but appear to be dead, difference between dead things and living things that seem dead but are not, such as hibernating tree in winter.	Do Activity 1 in pairs for 15 minutes. Describe an inanimate object such as the bicycle & its parts. Then describe a living thing, such as a dog & the things it does. Bring different pictures of living things from magazine Give examples of things that seem dead, but which can come alive given certain environmental changes. Discuss what a seed needs to start growing. Complete Activity 3 Investigate if seeds are living – practical garden activity - Observation	• Platinum Textbook • Examples of living things or pictures • Plants animals/bread mould • Pictures of living things • Bean seeds	Informal Assessment
Inclusivity:	Physical; Cognitive; Specific academic experiences/difficulties; psychological/emotional; involving the family or society and specific language issues			
Teacher reflection:				

THEME 1

STRANDS :- NATURAL SCIENCES : Life and Living TECHNOLOGY:			DURATION: 3.5 hours	GRADE: 4	TERM: 1	YEAR: 2014
Specific Aims: 1; 2 and 3	**Topic: Non-Living things**	**Prior knowledge:**				

Content & Concepts to be learned	Teaching and Learning activities:		Equipment and Resources	Assessment
	Educator	Learner		
Life and living and Structures (Non-living things)	Explain that non-living things cannot do the things living things can do. Non-living things do not show any of the seven life processes. Classify anything that is, or has ever been, alive and non-living: anything that is not, or has never been, alive. Point out that, although non-living things show signs of living things like fire growing bigger and moving, for this reason, growth cannot be used by itself to classify something as living. To classify something as living, something must display all of the signs of life	Identify, sort and compare living and non-living things [LB page 8] Activity 7. Bring different pictures of non-living things from magazine	• Platinum Textbook • Examples of living things or pictures • Plants animals/bread mould • Pictures of living things •	Informal Assessment • Activity 1 – Oral LB 1 • Activity 2 – Write LB 2 • Topic Revision – LB – page 10
Inclusivity:	Physical; Cognitive; Specific academic experiences/difficulties; psychological/emotional; involving the family or society and specific language issues			
Teacher reflection:				

NATURAL SCIENCES AND TECHNOLOGY GRADES 4

LESSON PLAN

TLOKWE AREA OFFICE

THEME 2

STRANDS :- NATURAL SCIENCES : TECHNOLOGY:			DURATION: 9hours	GRADE: 4	TERM: 1	YEAR: 2014
Specific Aims:	**Topic: Structures of Plants and Animals**	**Prior knowledge:**				

Content & Concepts to be learned	**Teaching and Learning activities:**		**Equipment and Resources**	**Assessment**
	Educator	Learner		
Structure of plant • Plant parts • Differences between plants	Discuss keywords Learners to bring a plant sample to class Describe the uses of each plant parts Compare plants	Observe a plant samples (page 14) Identify plant parts Describe colours of the leaves and flowers of the plant, their shape and size etc. Complete questions on page 13 – 2 a-c and give feedback Complete task 2 (3 a – c) Draw and label own plant Learners' book page 15 – make comparison	Examples of picture/ or live of plant parts Picture of animals Worksheet	Practical observation worksheet Activity 2 on LB page 13 – identify, label and describe Topic revision LB page 22
Structure of animals • Animal body parts • Differences between animals - Size and shape - Limbs - Body covering - Sense organs	•Reinforce keywords to learners LB page16 Show a picture of an animal – LB page11 Ask learners to name different parts	Identify, label and describe the parts of an animal Describe differences between animals LB page 20 Draw and label animal of choice		

NATURAL SCIENCES AND TECHNOLOGY GRADES 4

LESSON PLAN

TLOKWE AREA OFFICE

THEME 3

STRANDS :- NATURAL SCIENCES : TECHNOLOGY:			DURATION: 3.5 hours	GRADE: 4	TERM: 1	YEAR: 2014
Specific Aims:	**Topic: What plants need to grow**	**Prior knowledge:**				

Content & Concepts to be learned	Teaching and Learning activities:		Equipment and Resources	Assessment
	Educator	Learner		
Conditions for growth	Explain what plants need to grow – just like human beings, in order for us to grow and have energy – moreover to survive, we need food to eat and drink water, wear clothes to keep us warm Use seedlings from activity 3 in topic 1 Quiz learners what it was that helped the seeds to germinate. Use picture on page 27 of LB to explain what radical and plumule are. Tell that not all plants grow from cuttings Cover portion of grass from sunlight, air and rain	Observe learners book page 23 on how a plant can grow from cuttings or seedlings and state what it need in order for it to grow. Complete activity 1 LB page 23 Identify the things that a plant need to grow LB page 25 Grow a plant from a stem cutting LB page 26 Observe a cutting – draw and label own cutting Learners observe and make conclusions	Seeds; cuttings; ruler; measuring tape; empty jar; water; cotton wool or paper towel – per group Pot plants	Formal assessment Observe and record findings of growth of cutting over time
Inclusivity:				
Teacher reflection:				

NATURAL SCIENCES AND TECHNOLOGY GRADES 4

LESSON PLAN

TLOKWE AREA OFFICE

THEME 4

STRANDS :- NATURAL SCIENCES : TECHNOLOGY:			DURATION: 4.5 hours	GRADE: 4	TERM: 1	YEAR: 2014
Specific Aims:	**Topic: Habitats of animals and plants**		**Prior knowledge:**			
Content & Concepts to be learned	**Teaching and Learning activities:**		**Equipment and Resources**		**Assessment**	
	Educator	Learner	Pictures of plants and animals and their habitats			
Different habitats Need for a habitat	Explain and elaborate on the keywords Give examples of local environment pertaining to habitats of both domestic and wild animals – where animals live - Grassland - Forest - River - Sea Point out why different animals live where they live pertaining to the type and kind of food they eat For example, plants grow in the soil as opposed to concrete floor Human beings habitat for example is a house in the community for safety and protection from danger Habitat provide animals with shelter protection from enemies, a safe place to reproduce and food	Complete activity on LB page 31 Identify , draw and describe animals and their habitats – LB page 32 Match animals to their habitat and why they live there LB page 36 Draw two habitats on the school grounds and what is expected to live there and why. Describe and write about the habitats of African wild animals – LB – page 39			Topic revision Learners book page 40	
Inclusivity:						
Teacher reflection:						

School A

Verbatim:
Transcription of Interview 1

Setting: The teacher's classroom

Date: 5 February 2014

Time: 9:35 -10:30

Biographical information:

- What is your gender? Male
- What is your age? 44 years
- What is your home language? Setswana
- How many teaching experience do you have (in years) 4 years
- What are your qualification HED (four years diploma in English) in 1998 and BEd Honours degree in Education Law in 2014.
- Do you feel you are trained to teach the subject domain- Natural Science? No
- At which institution did you of study and received training? NWU
- Did you receive language training? Yes
- Do you teach Natural Science through the medium of English and did you receive training in how to teach other subjects through the medium of English? Yes

Teacher's approach to teaching and learning

A1 Interviewer: In your opinion and from your experience when do your learners learn best?

Teacher: *According to me…personally…like they learn by doing and how…that is the most important thing…okay some of them they learn by the visual and I suppose that is the two most important according to me… visual learning and by doing…action learning sort to speak.*

A2 Interviewer: What is your viewpoint or approach that forms the foundation of your teaching practices?

Teacher: *Okay, personally, my main approach is like involvement…that is my approach…I have to do less talk, or less work and then the learners*

have to do close to seventy percent of the things they need to learn…so I have to involve them…that is the approach that I am using.

A3 Interviewer: Do you perhaps apply specific methods or strategies that enhances their learning in the Natural Science and Technology classroom?

Teacher: *Everything should not always be through me…now one of the strategies or some of the strategies that I do apply is uhm…is where I…uhm get the peer learning…they have to actually assist other learners who is not excelling…ask others to explain to others…because maybe what I am saying is coming from another direction…it could be from their peers…it could be more understandable…and learners can learn better…get them more engaging with each other…*

A4 Interviewer: What do you think could be factors that influence successful learning?

Teacher: *Ai, it is a lot hey…very uhm disturbing barriers to learning…and I have seen some…they just…you know…their minds flows out or away from the lesson…and those give me difficult problems in terms of putting the point across…and social barriers or social situations and there is more…and some of the barriers I suppose, the language is the most important…language is a serious barrier and you know the grade 4's learners come from Grade 3 and most of the things they were doing in their mother tongue and then English… it is a foreign language that most of them actually do not understand, but they are trying though…but I even come to the point where some of the resources we use, the textbook, the wording there, the grammar in there is difficult, it is of high standard…I do not know I think their home language and first additional language, I think it is difficult when it comes to languages, because that it starts with understanding…some of the learners know the answers to the questions asked, but they struggle to express themselves in English, they need to express themselves in their mother tongue. And you know what, the teacher is also the barrier to learning.*

A5 Interviewer: Have you by any chance identified or detected certain factors that influence your learners' learning and how have you attempted to address those factors?

Teacher: *Early in the year, I have strategised to take them in an environment in which they feel comfortable. At the same time I will know this is my goal and this is what I have to attain. We have even requested in the subject phase meeting their needs, to be able to help learners, so it is coming to slow and in the end it is going to impacts my goal, to what I need to achieve with the learners, so I have to improvise.*

Teacher's knowledge of academic vocabulary teaching and learning

English required for specific purposes, for instance in Natural Science, is different from the English that is required for other classes and social purposes?

A6 Interviewer: What do you think is the major obstacle or problem that your learners face in the Science classroom?

Teacher: *Comprehension…It is the most difficult thing…Like I said English specifically in Natural Science, learners find it difficult to comprehend some of the words or things they come across with, because they are totally new to them…maybe more time is needed to help them to comprehend. They want to talk, but they struggle to express themselves in English.*

A7 Interviewer: What do you understand by academic vocabulary?

Teacher: *It is quite tricky. I am not sure.* (The teacher cannot answer the question and the researcher reformulated the question). The teacher then answers: *It's the textbook, it is difficult and the leaners struggle with it a lot.*

A8 Interviewer: What do you think are some of the academic vocabulary that grade 3 learners require to cope in the grade 4 Natural Science and Technology classroom?

Teacher: *Words like Science, Technology…they know things around them, they know descriptions, but they do not know the specific terminology for things. They just have to be introduced to things that they will be expected to learn in the next grade.* (The teacher hesitates to answer the question.)

A9 Interviewer: Have you found that there are some words in Natural Science that the learners might not know or understand when they enter grade 4 and in what ways have you tried to narrow that academic vocabulary gap?

Teacher: *Honestly, words like germinate, process, investigate, make…*

A10 Interviewer: What have you noticed or identified is the effect of academic vocabulary on the learners' ability to comprehend Natural Science texts, their academic performance and reading fluency?

Teacher: *Yes, regarding the comprehension, I think…there are several occasions that are these, the terminology, the textbook does explain some of these words, especially called the key words and still even if the explanations are given, they still struggle and struggle to digest what those words mean. I think it is too foreign for them, not the language per say, but the terminology in Natural Science…you can*

understand in terms of the terminology in English the term is different from Natural Science and even from Geography, like the word climatology…it is difficult to them. They preform academically well so far, they are getting there. In terms of reading fluency, their academic knowledge influences it a lot. I have identify it a lot, and I felt that I should engage them in terms of if they come across a word and they do not understand or pronounce it, some can assist them in class in the language they are familiar with.

Teacher's planning and teaching strategies for academic vocabulary development

A11 Interviewer: What do you think are some of the various strategies that content teachers could use to help learners understand academic vocabulary?

Teacher: *Well trying to look at the visual, putting things on the wall, but we do not actually have room, where you can put only Science things…classrooms are short…if we had I would have had an English class, a Natural Science class for the grade 4's, when it is Natural Science they move to Natural Science class, when they get there they see everything around them is about Science, they see the term germinate…I think seeing things all the time can assist, but we don't have space.*

A12 Interviewer: What is your teaching strategy that you apply for teaching academic vocabulary to your learners?

Teacher: *Well…I suppose explaining, standing there explaining to them, demonstrating some things to them so that they understand the important academic vocabulary…it is inclined practically…using them as well, helping them to get knowledge by the other one teaching the other one.*

A13 Interviewer: Based on your experience, do you think learners need to have a breadth or depth of academic vocabulary or both, in Natural Science learning?

Teacher: *I little bit of both, can do. The learners need a wide range of vocabulary, but also need to understand the words on a deeper level.*

A14 Interviewer: How many times do you think learners need to be exposed to a specific academic word before they really know and can apply the word?

Teacher: *Actually all the time. Uhm, I don't know, because we have different learning areas, especially in Natural Science and Technology, being exposed to those words that has to be, uhm, I think the more you are expose to the words the more you become familiar with it, so I think they should always be expose to those kind of words.*

You can expose them to the words by using different strategies, uhm, like the flash cards, I call them zop cards and I paste it on the board with prestick and when I talk of a word a basically send them to that word that is on the board.

A15 Interviewer: When your learners encounter general or domain-specific academic vocabulary in their workbooks for the first time, and they do not understand the meaning of the word, what do you prefer to do to help them understand the meaning of the word?

Teacher: *What I do first, I don't answer for them, I only help them through the process of learning. I facilitate of the sort, like I said action learning. In most cases I don't take notice that they don't know, I just ask them what is the word there, it is me who don't know and then I am like who know, please tell us, because me myself I don't know, what do you think?, so one or two of them carry knowledge in the class I just guide them to the correct answer and then the others actually get to grasp the meaning of the word.*

A16 Interviewer: Besides teaching and learning strategies, what type of resources do you and the learners like to use to enhance the teaching and learning of academic vocabulary?

Teacher: *Flash cards, in the past I projected the words, but the learners look at the projector instead of the words, I use the black board a lot of times…And there are charts, but a lot of times they are looking at it, but most of the times they don't even know what they are looking at. I use their textbook…I like that platinum…it is straight to the point.*

A17 Interviewer: In your lessons, what first hand experiences in learning academic vocabulary, have you found to be effective?

Teacher: *Well you know I don't normally apply that in most cases, uhm…because they are very slow in terms of moving, it takes long time to move a huge group, to maneuver, do something there, when I look one group is fifty seven. The group will be there and another group will be there. I don't normally do experiments, but fieldwork exercises, I do fieldwork exercises, everyone doing his/her part, whatever, based on the content.*

Teacher's perceptions regarding the promotion of academic vocabulary instruction

A18 Interviewer: In what ways does the *teacher guide* help and show you to assist the learners in academic vocabulary learning?

Teacher: *I think the Natural Science and Technology teacher guide, the platinum book, whatever I say on the teacher guide, the learners do, the teacher guide actually puts the learners to action. It gives me the proper guidance to get messages through to the learners… but if I see it lacks some of the vocabulary that is where I resort to other*

resources. It gives me examples of strategies to use…it works…it gives practical examples to explain words to the learners.

A19 Interviewer: What does the CAPS for grade 4 Natural Science and Technology emphasises with respect to teaching academic vocabulary?

Teacher: *I have not received training in the CAPS. I have been to CAPS workshops..,a lot…and they speak about the importance of academic vocabulary. They stressed it and they would say do this…it was action learning based.*

A20 Interviewer: What kinds of professional development do you think would most help and prepare preservice and inservice teachers to work with learners that have to learn through the medium of English?

Teacher: *First of all they need to be qualified teachers, qualified to teach Natural Science and Technology. Need to be able to get messages across to the learners. The teachers need to be able to receive training in how to handle children who don't learn through the medium of their mother tongue. It is the how question. So receiving training in how to work with the English Second Language learners.*

School A

Verbatim:

Transcription of Interview 2

Setting: The teacher's classroom

Date: 5 March 2014

Time: 9:10 - 9:50

B1 Interviewer: Of the topics or themes completed this term, which do you think your learners understood best/was most successful?

Teacher: *Well living and non-living was one, I suppose they understood it perfectly well, because it was practical, they could see, hear and feel the things I was talking about. I instructed them to go outside and find living and non-living things for me, so that theme was a successful one, 70-80% of them understood the work.*

B2 Interviewer: What was the most successful teaching strategy for academic vocabulary you used in this term? On what do you base your answer on?

Teacher: *What do you call it…uhm…not a one way route, like feedback, you know feedback from the learners what they understood. It works best if they get feedback from them than from me.* (The teacher did not really understand what is meant by teaching strategy).

B3 Interviewer: What was the least successful strategy that you have found that is not really effective for teaching academic vocabulary? On what do you base your answer on?

Teacher: *I suppose it is a teacher orientated strategy, which is not learner orientated. What I mean is like I will be the one always coming up with this and that…initiating…completing and what not, not giving them a chance to sort of utter anything or explain to me what they know or think about that, that is actually teacher orientated, like everything goes through me, ends with them. I have to actually contribute small and they have to contribute big, it does not have to be the other way around. The teacher talks a lot. I based my answer on, they withdraw…withdrawal… they don't respond to some of the questions posed, in terms of do you understand the meaning of this, what does this mean…they just go cold… it shows they do not actually understand anything at all.*

B4 Interviewer: In our first interview you mentioned a few factors (e.g. social barriers, language barriers and even teaching barriers) that could influence their learning, have you by any chance come across and address these factors during this term and how?

Teacher: *Well, supposed to barriers, the only learning barrier that I have identified so far is the language as a barrier, because they do not actually learn by saying words, but by doing. In term of addressing this barrier, there are actually those learners, three learners or close to five learners, so*

some of those three learners that carry knowledge of what I am trying to explain, you know I am trying to be learner orientated, so I give those learners a chance to explain to their colleagues and they are using their mother tongue where they get to understand. I then explain the words, I translate it to Setswana and then explain it in English again.

B5 Interviewer: You mentioned in the previous interview that the major obstacle in Natural Science is comprehension and the use of English in Natural Science, that learners find it difficult to comprehend some of the words or things they come across. So have you addressed these obstacles in your lessons during the first term? Give examples of how you addressed them.

Teacher: *Explain to them, to make it practical to them. I remember in the living and non-living theme I used my lighter to explain to them that fire is a non-living thing, it can't move, it can't discrete. So I think using the practical things to explain the difficult subject terminology works best, because with those lessons I never had problems.*

B6 Interviewer: Thinking back on you lessons, what language teaching strategies from the Language classroom could you have used, since you are a qualified English teacher? If so, what types of teaching and learning strategies?

Teacher: *I am not sure. In the language classroom it is different and I must say we are limited to use certain strategies, due to the lack of resources.* (*The teacher could not really answer this questions*).

B7 Interviewer: You mentioned in the previous interview that learners need to be exposed to important academic vocabulary all the time, has this worked well in the first term? And you said that they can be exposed to the words through multiple ways. Have you done that? If so, give examples of how you applied different strategies in your lessons to teach important academic vocabulary.

Teacher: *You know, I don't know, I am not sure, there are too much for them to do. They get easily confused, they are really confused, because they are introduced to a lot of new terminology that they were not introduced to before. I must be honest, strategies to explain academic vocabulary to the learners are good on paper, but not good in terms of implementation. Let me say in terms of resources as I previously said, in our school there are classrooms, my classroom is the English classroom that are only pasted with English posters, so somewhere there needs to be a Natural Science classroom. So I am moving up and down with the charts and what not and I try to prepare those things. So the word like predator can be drilled into the learners, one way is not enough, they can say it, I can say it and they can look at pictures. So the resources that are needed to teach academic vocabulary limits the strategies, it is controlled by the resources.* (The teacher did not really know what to answer and hesitated).

B8 Interviewer: You mentioned in the previous interview, that you prefer to use peers to help each other (peer teaching) and fieldwork (action learning) with respect to academic vocabulary teaching and learning. Have you applied these teaching strategies to teach academic vocabulary these past weeks? Based on what evidence was the use of this strategy successful?

Teacher: *In terms of action learning, it was effective, but not effective enough, the learners are getting there. I must say peer learning worked well.*

B9 Interviewer After these four weeks, if you could ask 'language experts' up to three questions, what would it be?

Teacher: *That is a killer question. I suppose to try and limit the vocabulary in grade 4, because it is too much or to use other simple terminology or is there? Are there any other vocabulary that a teacher can use before getting to words such as predator and carnivore?*

B10 Interviewer: What are the goals that you have set, in terms of your academic vocabulary teaching practices, for the second term?

Teacher: *I have things in mind what I will do differently. I am going to take it upon myself to go out and network with other grade 4 Natural Science and Technology teachers to exchange ideas of what worked and what did not work. I noticed now these few weeks that the learners need visual support. The textbooks have pictures in, but when I teach and refer to pictures on page 12, they do not even know that I am on page 12.* So for the second term I am going to make my own charts to teach the important academic vocabulary, I will put it on the board and then I won't lose my learners. I will also alter my teaching and budgeting my time so that there are enough time for them to do and me to look at their work. (The teacher have not really put much thought into what his goals are for the next term, so he struggled to answer the question).

B11 Interviewer: Do you think a workshop or intervention programme could be effective and helpful to assist inservice subject domain teachers in academic vocabulary teaching and what do you think should this intervention programme entail?

Teacher: *Yes it can, but there is a big problem in terms of…like I said… what works here cannot or necessarily work there. A lot of things should be included in this programme, explaining methodologies and different techniques of how to teach academic vocabulary. They can use experienced teachers…there is a lot of experienced teachers sitting on pension with the best practices. But the thing is where is the time going to be for this intervention programme? They will have to find the time. But it is the only thing that is going to assist us in the long run.*

School B

Verbatim:
Transcription of Interview 1

Setting: The teacher's classroom

Date: 5 February 2014

Time: 13:00-13:48

Biographical information:

- What is your gender? Female
- What is your age? 55 years
- What is your home language? Afrikaans
- How many teaching experience do you have (in years)? 32 years
- What are your qualifications? HED (four years diploma in English) in 1980 and BEd Honours degree in Education Management in1998/1999
- Do you feel you are trained to teach the subject domain- Natural Science? Yes
- At which institution did you of study and received training? Oudtshoorn College and NWU
- Did you receive language training? Yes
- Do you teach Natural Science through the medium of English and did you receive training in how to teach other subjects through the medium of English? Yes

Teacher's approach to teaching and learning

A1 Interviewer: In your opinion and from your experience when do your learners learn best?

Teacher: *I think the most important thing of learning is repetition…repetition…we do worksheets…write things on the board for them. What really works well is to underline and to describe and define the key words for them. Jy weet as hulle die key words verstaan dan weet hulle darem hoe en wat.*

A2 Interviewer: What is your viewpoint or approach that forms the foundation of your teaching practices?

Teacher: *You know I am an old teacher…The way that we work here in our school is…you know we have a lot of textbooks…but what I and most of the teachers do is we reduce the work and to actually make summaries for them and then we teach that specific work to them in exactly that way by explaining things…and making use of posters and so forth and umh again repeating…allowing them to answer questions, put the work on the transparency…do worksheets with them…let them answer the worksheets…and then put the correct answers on the transparency…ken hulle dit en dan leer hulle dit…*

A3 Interviewer: Do you perhaps apply specific methods or strategies that enhances their learning in the Natural Science and Technology classroom?

Teacher: *I like to use repetition and to make use of the transparency to provide the reduced information to the learners and so that they can copy the worksheets from the transparency.*

A4 Interviewer: What do you think could be factors that influence successful learning?

Teacher: *Well for our learners the big, big, big barrier to learning is the fact that they most of them do not have help at home…especially with the older people…usually most of them do not have books. They do not have these extra things to help them... as I said books…yes some of them have and some here and there go to the library but ag I can really say most of them don't really go there...And they don't got these have extra things to make things easy for them…You see they..If you are busy with the life cycle of the plant, what they know is what they learn in class. I mean especially the older people at home don't have the experience and knowledge to help them with that…And if there are parents that could help many of them are not at home…you know they are working in other places…so they stay with the elderly…But the biggest problem is as I said most of the teaching and learning takes place in the class and not much at home.*

A5 Interviewer: Have you by any chance identified or detected certain factors that influence your learners' learning and how have you attempted to address those factors?

Teacher: *Ja…you know at our school we really have an open door policy…we involve the parents…we have a very good intervention uhm that we do at school year, but we also have a parents meeting every term and then we by means of a letter we invite parents that we want to see. Like a said intervention is very important to us…ja we are really working hard on that. The parents also have to recall what they are going to do to help their learners to learn.*

Teacher's knowledge of academic vocabulary teaching and learning

English required for specific purposes, for instance in Natural Science, is different from the English that is required for other classes and social purposes?

A6 Interviewer: What do you think is the major obstacle or problem that your learners face in the Science classroom?

Teacher: *You know at school in the classes, our medium of instruction from Grade 3 is English…the problem that we have is, it is not extended to the home…not even during break…most of our children are speaking different languages…during break…at home we have a few that have English as their home language…you see that is another problem if there is a parent that might be able to help the learner they do not really understand the language, especially many of the work…it is foreign to them…they might be able to express themselves in their home language but if you come with these words…they do not really understand that…Uhm the other problem that I have noticed is that we get learners that can actually read quite well, but the most difficult for them is the comprehension of what they are reading…that is the difficult thing…the understanding of English.*

A7 Interviewer: What do you understand by academic vocabulary?

Teacher: *Well actually each subject has its own vocabulary, each teacher actually has to teach the subject language to the learners. And I just said repeating, repeating, repeating, you have to repeat I mean no one remembers a difficult word if they don't…you know it is quite scary, sometimes we use a simple word then they haven't got a clue.*

A8 Interviewer: What do you think are some of the academic vocabulary that Grade 3 learners require to cope in the grade 4 Natural Science and Technology classroom?

Teacher: *Just the basics. In Grade 3 they are doing their basics. They have to know certain terminology and you just build on it. Just teach according to the policy. If they do not know certain terminology then you take it on your own. But I would like a grade 4 child if they get here to darem know the difference between plants and animals, why these are and those things are important. Actually we work really well together as a staff. We have our subject staff meetings… up to where did you go with this?…Okay stop there I will go on from there.*

A9 Interviewer: Have you found that there are some words in Natural Science that the learners might not know or understand when they enter grade 4 and in what ways have you tried to narrow that academic vocabulary gap?

Teacher: *I think the most important strategy, because our children are struggling with comprehension, I think the most important thing is if*

you, as I said with the grade 4 learners we reduce the work and actually make summaries of the work that they should know, the most important thing for me that they should be able to get them in the mode of there is a sentence, but these words are important… getting out the key words. So I think it is a very important strategy to help the learners to be able to get the key words… and another thing that is important to me is to help the learners get the things that are important. Yes so I think it is really important for the learners to know that this is the skeleton of the work that I have to know. I have to be able to get out these key words.

A10 Interviewer: What have you noticed or identified is the effect of academic vocabulary on the learners' ability to comprehend Natural Science texts, their academic performance and reading fluency?

Teacher: *Well, I have said before, the learners can't read with understanding…you know…so their bad word knowledge influences their reading comprehension. I have also seen that the learners sometimes read very slowly and struggle to make sense of difficult words. Uhm, then I must help them and explain the difficult words. I can also see what the influence is on their academic work…I think if they their word knowledge improves their level of academic work will also improve.*

Teacher's planning and teaching strategies for academic vocabulary development

A11 Interviewer: What do you think are some of the various strategies that content teachers could use to help learners understand academic vocabulary?

Teacher: *Repetition is one. And what do you call it…Jy weet waar jy goed assosieer. For example what is herbivore, reminds you of herbs, herbs are plants, so herbivores eat plants. And repeating the words, especially for the little ones.* (The teacher is hesitant and does not really know what to answer).

A12 Interviewer What is your teaching strategy that you apply for teaching academic vocabulary to your learners?

Teacher: *What I said now and it is important to write the words on the blackboard or the transparency and explain it in that way to the learners and you teach it repeatedly, what you did today you teach tomorrow, because tomorrow it is prior knowledge, before you start with the new work you refer to the previous work.*

A13 Interviewer: Based on your experience, do you think learners need to have a breadth or depth of academic vocabulary or both, in Natural Science learning?

Teacher: *Both are important, but we must always remember with which Grade we are working with…you know…many times the people that are*

sitting in the offices expect things from the learners that are not really expect from them of that age…so I think you must really know with what age you are working with… in grade 4 if they know what a plant eater is, it is by far enough. So I really think know the age of the learners and what you are working at… That is why it is important for different Grades to sit together…you know when you are busy with your planning and stuff and you must know that this is actually what my learners need to know in grade 4 and set realistic goals…realistic goals…not just any goals…it must be realistic.

A14 Interviewer: How many times do you think learners need to be exposed to a specific academic word, before they really know and can apply the word?

Teacher: *As much as possible, they have to encounter the words more than three times. The teacher should also explain it more than once by using different methods, especially if she sees the learners struggle to understand a word.*

A15 Interviewer: When your learners encounter general or domain-specific academic vocabulary in their workbooks for the first time, and they do not understand the meaning of the word, what do you prefer to do to help them understand the meaning of the word?

Teacher: *No, in the beginning of the year we aren't really making use of the textbook…but the textbook, most of them are actually quite thick…because they do have explanations for many things…there is a glossary… but even that many of the learners do not know that… if there are words that they must know now you go to that that and explain that…again repeating and repeating… but words that does not actually have anything to do with the work that you are busy with now you will just in short explain, but if they need it you give posters to the learners…there are many things…describe means this…analyse means this…then you have to explain that. And you know what the work they do in their notebooks, you normally get them…help to write down the definitions and go back to that…can you remember what we did that time?…that is what we call that…repetition is quite important.*

A16 Interviewer: Besides teaching and learning strategies, what type of resources do you and the learners like to use to enhance the teaching and learning of academic vocabulary?

Teacher: *Well, I have posters in my class, I make use of them and I use pictures during my lessons.*

A17 Interviewer: In your lessons, what first hand experiences in learning academic vocabulary, have you found to be effective?

Teacher: *Ja…I make use of experiments and you know what I also make use of is the learners' experiences.*

Teacher's perceptions regarding the promotion of academic vocabulary instruction

A18 Interviewer: In what ways does the teacher guide help and show you to assist the learners in academic vocabulary learning?

Teacher: *It is actually good. It really guides you. It gives different examples how to explain the content to the learners.*

A19 Interviewer: What does the CAPS for grade 4 Natural Science and Technology emphasises with respect to teaching academic vocabulary?

Teacher: *The work load is too much. The NCS and CAPS expects too much from the learners. Time is not there to teach everything. It is really difficult to get to everything that is why, we, the teachers at this school reduce the work for the learners and only teach what is necessary.*

A20 Interviewer: What kinds of professional development do you think would most help and prepare preservice and inservice teachers to work with learners that have to learn through the medium of English?

Teacher: *They should have to have the subject knowledge, many students sitting in your classes, it is funny not many students have subject knowledge. I have realised that some of the students also struggle to teach through the medium of English and do not always know how to teach content to the learners. This is, I think, things that should be looked at on pre-service level.*

School B

Verbatim:

Transcription of Interview 2

Setting: The teacher's classroom

Date: 10 March 2014

Time: 07:50 - 08:30

B1 Interviewer: Of the topics or themes completed this term, which do you think your learners understood best/were most successful?

Teacher: *Living and non-living things. Because it is things that they can observe, when I refer to it. For example when I spoke about the chairs they are sitting on and explained it was alive, but not anymore, the trees with their green leaves you see outside, it is a living thing. So yes, I think that was the most successful theme.*

B2 Interviewer: What was the most successful teaching strategy for academic vocabulary you used in this term? On what do you base your answer on?

Teacher: *The most important teaching strategy that I like to use, ag is the one that comes from Jan van Riebeeck, is asking questions and answering questions. That is very important. When we do the work, when we explain the work, they underline the words that are actually the crux, you know, the words that are explaining what we are busy with, so that the learners pick up the key words and then then I ask questions, what is this, what happened here, what happened there etc. etc. This is all the questions, low order questions and high order questions. And it is very important to me that the learners understand that the learners understand concept things in-depth and in a very simple way we try to explain this to the learners so that they have a good foundation, because next year and the year we are going to do much more. But if they have the basics it is easier to work on more difficult stuff. I base my answer on what I have seen in their academic work. You can really see this in the type of questions they ask and the answers that they give you.*

B3 Interviewer: What was the least successful strategy that you have found that is not really effective for teaching academic vocabulary? On what do you base your answer on?

Teacher: *You know what I have experienced is that group work is a great strategy to use when all the learners are on the same academic level and have the same opportunities to gain the academic work. This did not work in my class, the classes are too big and some learners do all the work, while others do nothing. The one that is doing the work understands the work, but the others who do not do the work or are not on the same*

academic understand the work. That is why it is important for me to do the teaching and to help the learners with the words and that is what is working for me.

B4 Interviewer: In our first interview you mentioned a few factors (e.g. social barriers, language barriers) that could influence their learning, have you by any chance come across and address these factors during this term and how?

Teacher: *I helped my learners during breaks when they are behind with their work.* (The teacher did not completely answer the question.)

B5 Interviewer: You mentioned in the previous interview that the major obstacle in Natural Science is comprehension, that the learners can actually read well, but the most difficult for them is the comprehension of what they are reading, understanding of English. Have you during these weeks come across this problem? Have you addressed these obstacles in your lessons during these few weeks? Give examples of how you addressed them.

Teacher: *The moment that you see the learners struggle with a word you immediately help them. Comprehension is not a thing that will be solved right now.*

B6 Interviewer: You mentioned in the previous interview that you have identified in the past that the grade 4 learners read slowly, that their bad word knowledge influences their reading comprehension. You also identified that it influences their academic work and if their word knowledge improves their level of academic work will also improve. So have you by any chance had to address bad word knowledge situation these few weeks? Could you already see an improvement in their academic work and test results, due to the development of their academic word knowledge?

Teacher: *Yes, I did repetition with them, with words they struggled with. Yes, there is definitely progress. You know in Grade 2 and 3 they only touch on things that are important, in grade 4 we start with the different subjects. So you can really see from the words they knew up till the words they know now, there is definitely progress. We just don't have the time to go back and back.*

B7 Interviewer: You mentioned in the previous interview that learners need to be exposed to important academic vocabulary and that the teacher should also explain it more than once especially if she sees the learners struggle to understand a word. So did you by any chance had to explain the meaning of words to them more than once? If so how did you explain the meaning of the words to them? Has this worked well in the first term?

Teacher: *As I have said you try to explain the words to them as much as you can and I like to link words with their previous knowledge and practical examples. I really try to do that.*

B8 Interviewer: You mentioned in the previous interview, that you also like to use posters and pictures during your lessons to explain academic vocabulary and concepts. Have you used them during these few weeks? In which lessons have you applied those resources and explained how you used them?

	Teacher:	*Yes, I most definitely used posters that is on the board and for the next term I am going to take the posters off that is on the board and I am going to put up other posters for the next terms work. And in the textbook, what we have here, there are very excellent pictures in it. I like to use the pictures and for them to relate pictures with each other. I used the posters at the back for lesson- the growth of new plants. They used there textbooks to draw the germination of plants. They remember a word more easily when they see it and not just hear it.*
B9	Interviewer	After these four weeks, if you could ask 'language experts' up to three questions, what would it be?
	Teacher:	*How can one reduce work to the learners and only focus on what is important? (Not really sure what to answer).*
B10	Interviewer:	What are the goals that you have set, in terms of your academic vocabulary teaching practices, for the second term?
	Teacher:	*For the second term, I will need to put in much more effort. The words are going to be more abstract, like the word, evaporation. So for the second term I am going to do more practical work with the learners. Where the learners can see what is going on.*
B11	Interviewer:	Do you think a workshop or intervention programme could be effective and helpful to assist inservice subject domain teachers in academic vocabulary teaching and what do you think should this intervention programme entail?
	Teacher:	*I think something like that will be actually good. You know what, but it will never work. I think the only way it could work is when experience teachers manage the intervention programme and work with inexperience teachers and it needs to be for a few months, not for a day not for a period. They need to be in the classes and show the teachers how…not pointing fingers…not saying you are stupid…but showing them how and try things and looking at what works better. This intervention programme should show the teachers how to teach academic vocabulary, so you know, that is showing teachers different methods and strategies. They have to practically demonstrate them and this programme should also be subject and phase specific.*

Lesson 1: Living things		
Criteria	**Teacher A**	**Teacher B**
Introduces the theme and explains unknown domain-specific and technical academic vocabulary.	Both teachers orally explain the lesson theme and the concepts i.e. *living things* and *non-living things* with the related academic vocabulary i.e. *dead, alive, reproduce, excrete, sense, grow, move, breath, feed.*	
Uses examples to explain the new domain-specific and technical academic vocabulary.	No.	The concepts are contextualised by referring to examples of living and non-living things in and outside the classroom i.e. *the tree is a living thing….the plants outside are living things…* When she explains the characteristics of living things, she uses the sentences: "*excrete means when you need to go to the loo you excrete or reproduce is "when an animal has a baby."*
Applies scaffolding strategies to develop the learners' domain-specific and technical academic vocabulary.	No. Both teachers move on quickly to the learning activity before scaffolding the teaching/learning events.	
Explicitly explains the domain-specific and technical academic vocabulary by using different strategies.	Both teachers do not make use of different strategies to explicitly explain the domain-specific and technical academic words to the learners. Both teachers do not teach the domain-specific words and concepts- *germs, bacteria, fungus, organism* and *environment.*	
Teaches the academic vocabulary in an integrated way and in different contexts.	No. The vocabulary are merely mentioned and explained as a list of words.	
Teaches metacognitive skills or learning strategies that they can use to learn academic vocabulary more effectively.	No, in both classes the learners are not required to think through the meanings of the newly learnt words or to reflect on them. No learning strategies are taught.	
Repetition of words.	Teacher A makes them aware of the domain-specific and technical academic vocabulary by referring them to the wordlist in the learner's book. The learners are only required to read the meanings of the academic vocabulary chorally as a class. In both classrooms they have to choral the 7 life processes.	
Uses strategic questions to help the learners to reason through academic vocabulary and answer questions about the learnt academic vocabulary.	No, both teachers provide the explanations and do not pose questions to the learners.	
Uses a wordlist.	He only refers to the wordlist.	No. The teacher does not use the learner's book.
Uses posters, magazines, graphic organisers or pictures to explain academic vocabulary.	No.	Yes, the learners are required to study a picture with living and non-living things and

		draw a column to compare the two concepts. However, the teacher has posters at the back of her class, but she did not use them.
Uses the learner's book (Adatia *et al*., 2013a) and teacher guide (Adatia *et al*., 2013b) to teach the academic vocabulary.	He strongly relies on the learner's book to teach the content and to explain the words i.e. *reproduce, excrete, sense, grow, move, breath, feed*. The learners have to listen to the teacher with their books closed in front of them.	No.
Allows the learners to create their own sentence of the academic vocabulary or by doing something with definitional information like, finding an antonym or giving oral responses.	No.	
The class work/homework is in line with the academic vocabulary taught in the classroom.	Fill-in activity on page 10.	The teacher requires the learners to copy the diagram of the seven life processes from the projector.
Other observations. **(Notes after the lesson).**	He became frustrated and at times translated the questions. There was only one real opportunity for output (i.e. homework activity). Not much time was provided for learners to respond to his questions. The learners only had to read the definitions of the academic vocabulary and repeat the descriptions twice. In classroom A the learners had to repeat the word, *reproduce* after the teacher, but when the teacher required them to use the word form, *reproduction*, they	She went through the summarised work on the transparency with them and the learners had to highlight all the important words (i.e. germs, organism, reproduce and environment) and information, but she did not explain their meanings. She orally explained the words to the learners once and then they had to write down the explanations of the concepts from the transparency.

	were not able to and they also just meaninglessly repeated the word, reproduction after the teacher. The learners seemed to struggle with the concepts: "*seems alive but are dead and seems dead but are alive"* (Adatia *et al*., 2013a:10). He became frustrated and skipped the activity. The learners were instructed to complete the activity for homework.	
	Both teachers did not explain the general academic vocabulary in this lesson - *observe, identify, sort, compare, fill in, copy* and *complete*.	
Lesson 2: Non-living things		
Criteria	**Teacher A**	**Teacher B**
Introduces the theme and explains unknown domain-specific and technical academic vocabulary.	Yes both teachers introduces the theme, but they do not explain unknown academic vocabulary.	
Uses examples to explain the new domain-specific and technical academic vocabulary.	No.	She uses examples that were known to them: *the desk is a non-living thing…your pencil case is a non-living thing*.
Applies scaffolding strategies to develop the learners' academic vocabulary knowledge.	No.	
Explicitly explains the domain-specific and technical academic vocabulary by using different strategies.	No new academic vocabulary are taught. Teacher A only orally explains the concept of *non-living* by orally explaining that it is things that are dead.	
Teaches the academic vocabulary in an integrated way and in different contexts.	No.	
Teaches metacognitive skills and learning strategies that they can use to learn academic vocabulary more effectively.	No	

Repetition of words.	No.	
Uses strategic questions to help the learners to reason through academic vocabulary and answer questions about the learnt academic vocabulary.	He only asks yes and no response questions - *do you understand…do you know what a bean seed is…have you ever seen a bean seed?*. He does not really cognitively challenge them.	The teacher does not ask questions.
Uses a wordlist.	Yes. The teacher reads the definition on page 9 of the learner's book, which the learners have to read as a class.	No.
Uses posters, magazines, graphic organisers or pictures to explain academic vocabulary.	He makes use of real life artefacts like the tables in the classroom and rocks from outside the classrooms to explain what non-livings things are.	No.
Uses the learner's book (Adatia *et al*., 2013a) and teacher guide (Adatia *et al*., 2013b) to teach the academic vocabulary.	The teacher uses the learner's book to read the description of the concept of non-living things.	No.
Allows the learners to create their own sentence of the academic vocabulary or by doing something with definitional information like, finding an antonym or giving oral responses.	No.	
The class work/homework is in line with the academic vocabulary taught in the classroom.	The learners have to identify, sort and compare living and non-living things by investigating pictures in the learner's book (Adatia *et al*., 2013a:8).	The learners have to copy a list of examples about living and non-living things displayed on the projector.
Other observations. **(Notes after the lesson).**	He tried to explain the concepts of *seem alive but is dead, seem dead but is alive*. He struggled as the learners	The learners had to copy lists displayed on the transparency, which does not leave enough room for creativity, in-depth academic vocabulary development and independent work.

	could not respond that they understand which led to the translation to SeTswana.	
	Both teachers did not give attention to the general academic vocabulary. Teacher A did not explain the words – *identify, sort* and *compare* to the learners that they came across in the question they had to answer for homework.	
Lesson 3: Structures of plants		
Criteria	**Teacher A**	**Teacher B**
Introduces the theme and explained unknown domain-specific and technical academic vocabulary.	He introduces the theme to the learners by writing the topic on the board. The learners then have to read the topic from the board as a class**.** He also asks them what the word, *structure,* means and explains further that it is the different parts of something. He draws a picture of a plant on the board and labels the plant to introduce the relevant academic vocabulary for the lesson. The drawing and word labels are not very clear. The learners have to copy the sketch in their books with the labels.	She does revision of the previous work. She revises the important domain-specific and technical academic vocabulary (*reproducing, excreting, sensing* etc.) She then introduces the new theme to the learners and writes it on the board. The learners need to copy it from the board. She orally asks the learners what the word, *structure*, means and then immediately answers her own question - *structures are the parts of a plant,* before the learners can answer.
Uses examples to explain new domain-specific and technical academic vocabulary.	No.	
Applies scaffolding strategies to develop the learners' domain-specific and technical academic vocabulary knowledge.	He provides them with opportunities where they have to complete a few activities in the class so that	No, she does the explaining and draws a sketch with all the different vocabulary labels.

	he can see whether the learners know what the different parts of the plant are called. However, he jumps too quickly from one activity to another.	
Explicitly explains the domain-specific and technical academic vocabulary by using different strategies.	No. Oral explanations are used to teach domain-specific and technical academic vocabulary i.e. *structure, roots, stem, leaves, flower.*	
Teaches the academic vocabulary in an integrated way and in different contexts.	No.	
Teaches metacognitive skills and learning strategies that they can use to learn academic vocabulary more effectively.	No the learners are never required to reflect on the words they have just learnt during the lesson. A word's spelling and pronunciation i.e. succulents is taught through syllabication, but the teacher does not teach the learners how to use this strategy for future purposes.	
Repetition of words.	In both classrooms the learners have to orally repeat words after the teacher, but they are not required to copy the definitions of the words in their workbooks. In Classroom B the learners have to copy information displayed on the transparency with the questions and answers. The words *pod* and *cob* are not explained.	
Uses strategic questions to help the learners to reason through the words and answer questions about the learnt academic vocabulary.	No.	
Uses a wordlist.	No.	
Uses posters, magazines, graphic organisers or pictures to explain academic vocabulary.	Yes, he makes use of a real life example (artefact), a plant to explain the different parts of the plant. He makes use of his own drawing.	Yes, she makes use of her own drawing on the board to explain the structures of a plant. She also just refers to the poster at the back of her class about the different parts of a plant and does not use it to explicitly teach the words.
Uses the learner's book (Adatia *et al*., 2013a) and teacher guide (Adatia *et al*., 2013b) to teach the domain-specific and technical academic vocabulary.	Yes, he uses the learner's book and draws a picture of a plant with the appropriate academic word structure of a plant, *roots, stem, leaves, flower.*	No.

The teacher allows the learners create their own sentence of the academic words or by doing something with definitional information like, finding an antonym or giving oral responses.	No.	
The class work or homework is in line with the academic vocabulary explored in the classroom.	The learners have to complete an activity where they have to look at different pictures and complete a column of the different characteristics of different plants.	The learners have to first copy information that is displayed on the transparency and then they have to label a sketch of a plant.
Other observations. **(Notes after the lesson).**	He translated twelve times in this lesson. He continued to translate until he was convinced that they fully understood the meanings of the academic vocabulary. The learners were also allowed to answer in SeTswana, the teacher accepted it. He never provided a learner with negative feedback when she drew a picture of the structures of an animal and not a plant.	She explicitly explained, *succulents,* by pronouncing the word to the learners then braking the word down in syllables and then she wrote the word on the board. The learners were able to hear the word's pronunciation and see the word's spelling. Finally she instructed them to say the word out loud with her. She used a synonym for the word stem that was not clear and did not clarify the word, stem (stalk).
	No, the teachers did not explicitly taught the general academic vocabulary - *identify, label, describe, name, make a drawing, look for differences, tabulate, observe, draw observations, record , match, copy, complete, compare.*	
Lesson 4: Structures of animals		
Criteria:	**Teacher A**	**Teacher B**
Introduces the theme and explained unknown domain-specific and technical academic vocabulary.	He does revision of the previous content and domain-specific and	The teacher orally introduces the theme and writes it on the board. She also does revision of the previous content and domain-specific and technical academic vocabulary i.e. *Just*

	technical academic vocabulary i.e. *structure*. He then orally informs them what the topic is and writes it on the board and explains what the concept, *animal*, means and refers to a *dog*.	*like plants have different parts, animals also have different parts or as in the previous lesson we said structures.*
Uses examples to explain the domain-specific and technical academic vocabulary.	Yes, he makes use of familiar examples like *legs, arms a dog is an animal.*	Yes, she uses familiar words such as *legs, arms, body parts.* She makes it personal and uses the learners as examples when she explains what *limbs* are. *You have legs and arms that you use to do activities and they are called limbs.*
Applies scaffolding strategies to develop the learners' domain-specific and technical academic vocabulary knowledge.	No, they usually provide the meanings of the academic vocabulary (input) and answer their own questions (output) when they want to test the learners' comprehension of the words.	
Explicitly explains the domain-specific and technical academic vocabulary by using different strategies.	No.	
Teaches the academic vocabulary in an integrated way and in different contexts.	No.	
Teaches metacognitive skills and learning strategies that they can use to learn academic vocabulary more effectively.	No.	
Repetition of words.	The learners are required to repeat *structure, limbs* and *sense organs* after him. The learners do this in a mechanical way and do not produce or create their own written and oral sentences.	They repeat the words *sense organs* and *limbs* after the teacher.
Uses strategic questions to help the learners to reason through the words and answer questions about the learnt academic vocabulary.	The teacher asks yes and no questions - *Are you sure?...You remember that, right…Animals also have different parts, right?*	He asks- *Do humans have limbs?...Do animals have smelling organs?* This could have confused the learners.
Uses a wordlist.	Yes, he just mentions to them if they struggle with a certain word that they have to make use of the wordlist in the learner's book. He	No.

	glosses over the words i.e. *limbs and sense organs* in the wordlist.		
Uses posters, magazines, graphic organisers or pictures to explain academic vocabulary.	No.		
Uses the learner's book (Adatia *et al*., 2013a) and teacher guide (Adatia *et al*., 2013b) to teach the domain-specific and technical academic vocabulary.	Yes he uses the wordlist and the sketch.	No.	
Allows the learners to create their own sentence of the academic words or by doing something with definitional information like, finding an antonym or giving oral responses.	No		
The class work/homework is in line with the academic vocabulary taught in the classroom.	Yes, the learners need to answer questions on the structure of a mouse on page 17.	Yes, the learners only have to underline the words in paragraphs on a worksheet in their books and label two pictures.	
Other observations.	He translated to SeTswana seven times during the lesson. When he wanted to test the learners' knowledge of the academic vocabulary he usually asked the same learners in the class. He at times lacked the necessary knowledge of domain-specific academic- *do dogs have hands?...the snake runs away.* He did not give the learners enough time to respond to questions and answered his own questions - *Limbs are?...Legs we use to move from one place to another.* He did not clearly pronounce the		

	word *dog* and the learners' consequently confused it with the word *door*.	
	In both classrooms the words: *identify, describe, name, make a drawing, look for differences, tabulate, observe, draw observations, record label, match, copy, complete* and *compare* were never taught. The learners in Classroom A came across the word – *label*, however the teacher did not explain its meaning. like, The learners were required to label a picture of an animal, however the word, label was never taught first.	
Lesson 5: Differences between different animals		
Criteria:	**Teacher A**	**Teacher B**
Introduces the theme and explained unknown domain-specific and technical academic vocabulary.	Yes, they both orally introduce the theme. No link is made between new and unknown academic vocabulary.	
Uses examples to explain the domain-specific and technical academic vocabulary.	No, he does not try to establish what their previous knowledge is and to contextualise the new academic vocabulary. He assumes they know what the concepts, *giraffe* and *hippopotamus* are - *Do you know what a giraffe is? Oh, my goodness you must watch Natural Geographic.*	Yes, she also introduces them to other concepts and words that do not appear in the learner's book (*sniffer dogs* and *tentacles*), she explains to them through linking it with the concepts and words they are already familiar with i.e. *limbs* and *sense organs.*
Applies scaffolding strategies to develop the learners' domain-specific and technical academic vocabulary knowledge.	No, there are no while activities that guide the learners to acquire the vocabulary and before completing the activity on page 22.	No, the learners are required to write down the questions of a worksheet that are displayed on the projector.
Explicitly explains the domain-specific and technical academic vocabulary by using different strategies.	For example the new words, *gills* and *scales* are only written on the board. The teacher then orally explains them and never explains the words again by using another strategy.	No.

Teaches the academic vocabulary in an integrated way and in different contexts.	No.	Yes, she uses an example of sniffer dogs and that they use sense organs like their noses to sniff out things.
Teaches metacognitive skills and learning strategies that they can use to learn academic vocabulary more effectively.	No.	
Repetition of words.	No.	
Uses strategic questions to help the learners to reason through the words and answer questions about the learnt academic vocabulary.	Does not ask questions.	No. *Are animals different, do they have different sizes?" "Do animals have different body covering?"* The questions are not open-ended.
Uses a wordlist.	No. There is no wordlist.	
Uses posters, magazines, graphic organisers or pictures to explain academic vocabulary.	No.	
Uses the learner's book (Adatia *et al*., 2013a) and teacher guide (Adatia *et al*., 2013b) to teach the domain-specific and technical academic vocabulary.	Yes. He reads information on page 19 about the different body coverings of animals i.e. scales.	No.
Allows the learners to create their own sentence of the academic words or by doing something with definitional information like, finding an antonym or giving oral responses.	No.	
The class work/homework is in line with the academic vocabulary taught in the classroom.	The learners have to look at different pictures in their workbooks and write down the animals' shape and sizes. Activity 5 on page 20.	The learners have to complete the answers of the worksheet on the differences of animals as displayed on the projector and complete an activity on page 22 where they have to match the words with their correct defintions.
Other observations.	He translated his explanations ten times in SeTswana. On one occasion in the lesson the teacher asked the class what the shape of a pigeon is. One of the learners responded that	The worksheet questions comprised basic questions, like name, why and what questions, which did not really cognitively challenge the learners and developed their academic vocabulary knowledge on a higher level. She instructed a learner to just reread the sentence after he complained that he does not know what the concept, *body coverings*, means. She mispronounced the word- *tentacles*. She tried to visually

	the shape of a pigeon is a triangular shape, because it has three limbs. The teacher just responded that she was incorrect but never helped her to understand that the shape of a pigeon is triangular, but that a pigeon has four limbs (2 wings and 2 legs). He mispronounced the words i.e. *scales*, *gills*, whiskers and predator. The learners struggled to pronounce the word - scale. He tried to use the pronunciation of word - *cat* to explain the pronunciation of the word scale. He, however, feels that learners need to learn how to pronounce words in the English language classroom - *eish, you need to learn how to say these words in English.*	explain what is meant by the concept - scorpion, but it was not successful as she had no picture.
	No. The general academic vocabulary, *notice, tabulate, observe, communicate, label, match, and identify* were never explained.	
Lesson 6: Conditions of growth		
Criteria:	**Teacher A**	**Teacher B**
Introduces the theme and explains unknown domain-specific and technical academic vocabulary.	They only orally tell them what the topic is and write it on the board.	
Uses examples to explain the domain-specific and technical academic vocabulary.	He explains the academic words for the learners and	He uses familiar examples - *We need food to survive, we need clothes to keep us warm in the winter and not to freeze to*

	links it with real life events. He explains that plants need certain things to stay alive and to grow and that it is called, *conditions*. He then provides practical examples that the learners are familiar with- *If I cover this piece of grass in front of the class with a dustbin, it will not get sunlight and it will die and turn brown and yellow. So plants need sunlight to grow and to stay alive.*	*death, we need water to survive. Just as we need certain things to keep us alive, plants also need certain things to keep them alive. They need sunlight, water, air, soil and warmth.* She tries to integrate the academic words in her explanations and link it with examples they are familiar with.
Applies scaffolding strategies to develop the learners' domain-specific and technical academic vocabulary knowledge.	No.	
Explicitly explains the domain-specific and technical academic vocabulary by using different strategies.	He uses the linear array strategy to explain the word, warmth – *"warmth is not hot and not cold."*	No.
	Both teachers neglects to explain the terms, *seeds, seedlings, cuttings, plumule* and *radicle*.	
Teaches the academic vocabulary in an integrated way and in different contexts.	No.	
Teaches metacognitive skills and learning strategies that they can use to learn academic vocabulary more effectively.	No.	
Repetition of words.	No.	
Uses strategic questions to help the learners to reason through the words and answer questions about the learnt academic vocabulary.	Both teachers asks closed questions. Teacher A mostly asks yes and no questions - *Do you know what warmth is?...If you put a plant in the fridge, the plant will grow in the fridge, right?* Teacher B asks - *Is water important for plants?*	
Uses a wordlist.	No.	

Uses posters, magazines, graphic organisers or pictures to explain academic vocabulary.	No.	She uses her own sketch e.g. a drawing of how a plant needs sunlight to grow with the relevant academic word labels.
Uses the learner's book (Adatia *et al*., 2013a) and teacher guide (Adatia *et al*., 2013b) to teach the domain-specific and technical academic vocabulary.	Yes, he refers to the two pictures on page 23 when explained the academic words that are linked with the topic of what plants need in order to grow.	No.
Allows the learners to create their own sentence of the academic words or by doing something with definitional information like, finding an antonym or giving oral responses.	No.	
The class work/homework is in line with the academic vocabulary taught in the classroom.	The learners have to complete a fill-in activity of the four conditions for growth. They have to fill in the correct words.	The learners are instructed to copy two pictures from the workbook. They have to draw the germination process of a plant. The learners also need to label the two pictures. The words such as *radicle, plumule, seedling, shoots* are not explained.
Other observations.	He translated again i.e. eight times during the lesson. He required the learners to explain the meaning of the concept, *conditions* and *warmth*, to each other, but they could not. He wanted the learners to peer-assess each other's work, but they could not and did not know what to do.	She was about ten minutes busy with the learners and explained the academic words, thereafter the learners were provided twenty minutes to just copy the worksheet questions and the pictures and the academic words from the learner's book. She also merely mentioned the words e.g. *chlorophyll* and *photosynthesis* in passing and did not explicitly explain the words. She told them that they were going to learn these words in Grade 5. She used another term for *fertiliser* like, *compos*t and explained - *seeds need compost to help them grow… germinate means grow*
	The teachers neglected to focus on the investigation of the growth of plants on page 28. This prevented the acquisition of domain-specific as well as general academic vocabulary.	

	Both teachers neglected to explain the general academic vocabulary - *explain, identify, copy, complete, investigate, observe, measure, record, label* and *make a drawing* to the learners	
Lesson 7: Habitats of animals		
Criteria:	**Teacher A**	**Teacher B**
Introduces the theme and explains unknown domain-specific and technical academic vocabulary.	He instructs the learners to chorally read the theme as a class from the learner's book. He writes the topic on the board, but does not immediately explain the meaning of *habitat*.	She orally introduces the theme to the learners and orally explains domain-specific and technical academic vocabulary - *habitat, grassland, ocean, river, forest* and *predator*.
Uses examples to explain the domain-specific and technical academic vocabulary.	Both teachers contextualise the domain-specific and technical academic word, *habitat*, to the learners. They both contextualise the word by linking it with their lived experiences or circumstances e.g. *A habitat is a home and animals live outdoors. You have a house that you live in, hear in Ikageng, and your pets live in the house with you or outside in the little dog house (Teacher A).* They explain to the learners that animals as well as humans have a home and it is called their habitat. He emphasised during his lesson and said that - *if you don't say the word then you will not know the word*. Teacher B explains: *Andile, you live in a brick house and animals also have a place where they stay and eat and we call it a habitat.*	
Applies scaffolding strategies to develop the learners' domain-specific and technical academic vocabulary knowledge.	No.	
Explicitly explains the domain-specific and technical academic vocabulary by using different strategies.	No. He only explains the words and expects the learners to repeat it after him i.e. *habitats, predators, dessert, amphibians, carnivores* and *herbivores.* He never provides them with the opportunity to use/practise the words.	No. She only orally explains the words and also refers to a picture in the learner's book to show them an example of a *habitat.*
Teaches the academic vocabulary in an integrated way and in different contexts.	Yes, they use a personal example that habitat is also known as home.	
	He merely orally listed words.	
Teaches metacognitive skills and learning strategies that they could use to learn academic vocabulary more effectively.	No.	

Repetition of words.	Yes, a lot of repetition takes place and choral reading. He for example introduces them to new words namely *predators, dessert, amphibians, carnivores* and *herbivores* by only orally explaining and listing the words and then he requires the learners to choral the words.	No.
Uses strategic questions to help the learners to reason through the words and answer questions about the learnt academic vocabulary.	Both teachers ask closed-ended questions. They ask yes and no questions. They ask *what?* and *where?* questions, but seldom *why* questions- *Where do lions stay?...Where can we find snakes?* Some of his questions was very vague and made no sense – *"Habitat is what?" Animals that go after another, we say it is?" Look at the picture", the place where the camel is, how is it?*" Teacher B asked *What types of animals do we find in the ocean habitat? and she once asked a higher cognitive order question: Do you think we will find a shark in a grassland habitat? Why not?*	
Uses a wordlist.	Yes, after looking at some of the pictures of habitats he instructs the learners to go and look for the definition of *habitats* in the wordlist. They choral read the meaning of habitat.	No.
Uses posters, magazines, graphic organisers or pictures to explain academic vocabulary.	No.	
Uses the learner's book (Adatia *et al*., 2013a) and teacher guide (Adatia *et al*., 2013b) to teach the domain-specific and technical academic vocabulary.	Yes, the wordlist.	No.
Allows the learners to create their own sentence of the academic vocabulary or by doing something with definitional information like, finding an antonym or giving oral responses.	No.	
The class work/homework is in line with the academic vocabulary taught in the classroom.	The learners are instructed to draw a column and list all the types of habitats and the animals that live in the different habitats.	The learners are instructed to draw the picture of a habitat that is in the learner's book on page 40.

Other observations. **(Notes after lesson).**	He translated to SeTswana four times during the lesson. He assumed that the learners know the meaning of the concept, *dessert* and realised in the middle of the lesson that he needs to explain it. He bombarded them with words that are not part of the grade 4 curriculum i.e. *herbivore, carnivore,* and *amphibians.*	
	In both classes the general academic vocabulary- *discuss, identify, make a drawing, match, draw, compare, communicate, give reasons, look for similarities and differences, name, copy, complete* were not taught.	
Lesson 8: Different states of matter		
Criteria:	**Teacher A**	
Introduces the theme and explained unknown domain-specific and technical academic vocabulary.	He introduces the theme on flashcards on the board with the domain-specific and technical academic vocabulary on each card and as he explains the process of how matter changes into different states.	
Uses examples to explain the domain-specific and technical academic vocabulary.	No.	
Applies scaffolding strategies to develop the learners' domain-specific and technical academic vocabulary knowledge.	No, the learners just repeats the domain-specific and technical academic vocabulary after him - *come on, repeat it after me.*	
Explicitly explains the domain-specific and technical academic vocabulary by using different strategies.	No. He only orally explains the meaning of domain-specific and technical academic vocabulary and concepts i.e. *evaporates, condenses, condensation, solidify*, *liquid* and *melts.* The learners also have to repeat the words after him.	
Teaches the academic vocabulary in an integrated way and in different contexts.	No.	
Teaches metacognitive skills and learning strategies that they can use to learn academic vocabulary more effectively.	No.	
Repetition of words.	The learners choral the words from the wordlist.	

Uses strategic questions to help the learners to reason through the words and answer questions about the learnt academic vocabulary.	He asks yes and no questions and some of the questions are vague and confuse the learners - "*What happened to the water?" What happened to the gas when it went up?*
Uses a wordlist.	Yes on page 56 i.e. words like *state of matter, substance, solid, liquid, flow* and *gas.*
Uses posters, magazines, graphic organisers or pictures to explain academic vocabulary.	He uses flashcards.
Uses the learner's book (Adatia *et al*., 2013a) and teacher guide (Adatia *et al*., 2013b) to teach the domain-specific and technical academic vocabulary.	Yes, only uses the wordlist in the learner's book.
Allows the learners to create their own sentence of the academic words or by doing something with definitional information like, finding an antonym or giving oral responses.	No.
The class work/homework is in line with the academic vocabulary taught in the classroom.	The learners have to complete a fill in activities (pgs. 59, 61) where they have to fill in the missing domain-specific and technical academic vocabulary.
Other observations. **(Notes after the lesson).**	He translated to SeTswana four times during the lesson. He made use of a kettle to show what gas is and how water vapour can condense. He demonstrated to them how a solid changes into a liquid with an ice cube. He used the incorrect vocabulary - *when ice loses its cold it becomes liquid.* To conclude his lesson he instructed: *"Can someone explain to others what words we know today?"* The learners could not answer him. The general academic vocabulary i.e. *sort, describe, observe, examine, copy* and *complete* were never taught.
Lesson 9: Measure temperature	
Criteria:	**Teacher A**
Introduces the theme and explained unknown domain-specific and technical academic vocabulary.	He introduces the theme and asks the learners to read the theme from the learner's book.
Uses examples to explain the domain-specific and technical academic vocabulary.	He explains the general academic word, *measure*, to the learners by using a ruler. He refers to Mathematics and asks the learners whether they use their ruler in this subject to measure objects. He then informs them that a specific instrument is used to measure temperature and that it is called a *thermometer*. He explains that it is used to tell you how warm or cold something is.
Applies scaffolding strategies to develop the learners' domain-specific and technical academic vocabulary knowledge.	No.

Explicitly explains the domain-specific and technical academic vocabulary using different strategies.	No, he only orally explains the meanings of the domain-specific and technical vocabulary i.e. *measure* and *thermometer.*
Teaches the academic vocabulary in an integrated way and in different contexts.	Yes, the word measure is explained in a different context.
Repetition of words.	He expects the learners to repeat the words and their meanings after him i.e. *measure, thermometer, temperature.*
Uses strategic questions to help the learners to reason through the words and answer questions about the learnt academic vocabulary.	He asks yes and no questions and some of the questions are vague and confuse the learners – *What is temperature?...How do we know what the temperature of this is?*
Uses a wordlist.	After discussing the academic vocabulary - *measure* and *thermometer*, the learners have to read the meanings of the words in the wordlist in the learner's book on pages 64 and 65. They chorally read it as a class.
Uses posters, magazines, graphic organisers or pictures to explain academic vocabulary.	He orally explains the academic vocabulary, *thermometer* and shows the learners the instrument.
Uses the learner's book (Adatia *et al*., 2013a) and teacher guide (Adatia *et al*., 2013b) to teach the domain-specific and technical academic vocabulary.	Yes, when he explains the meanings of the words –*measure*, *thermometer* and *temperature.*
Allows the learners to create their own sentence of the academic vocabulary or by doing something with definitional information like, finding an antonym or giving oral responses.	No.
The class work/homework is in line with the academic vocabulary taught in the classroom.	The learners have to complete questions on pages 63, 64 and 65.
Other observations. **(Notes after the lesson).**	He translated to SeTswana three times during the lesson. The general academic vocabulary i.e. *investigate, explain, measure, record, draw, label, name* and *predict* were never taught.