

**A comparative study of how Technology teachers evaluate, select  
and use commercially prepared Technology textbooks**

**by**

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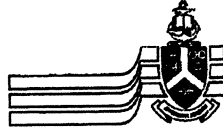
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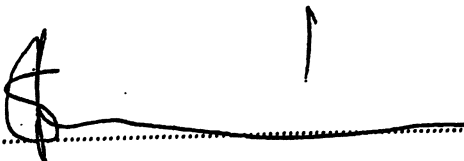
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M.S. Ramaligela

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Date

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## **DEDICATIONS**

I specially dedicate this work to my mother, Mrs. Ramaligela T. Maria for the foundation she laid in my life and the emphasis that she placed on my educational achievement.

I also dedicate this work to my husband Rakgalakane and my sons, Mulalo and Rendani for their undying love, support and patience throughout my years of study.

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## LIST OF ABBREVIATIONS USED IN THIS DISSERTATION

|       |   |
|-------|---|
| AAAS  | American Association for the Advancement of Science |
| CPT   | Commercially Prepared Textbook                      |
| C2005 | Curriculum 2005                                     |
| DoE   | Department of Education                             |
| EAL   | English as Additional Language                      |
| LO    | Learning Outcomes                                   |
| NCS   | National Curriculum Statement                       |
| NRC   | National Research Council                           |
| NSTA  | National Science Teacher Association                |
| OBE   | Outcomes Based Education                            |
| RAU   | Rand Afrikaans University                           |
| RNCS  | Revised National Curriculum Statement               |
| SO    | Specific Outcomes                                   |
| SPCT  | Study of the Palestinian Curriculum and Textbook    |



## ABSTRACT

This study explores how technology teachers evaluate, select and use commercially prepared textbooks, comparing practices in well-resourced and medium-resourced schools in South Africa. The study is led by two research questions, firstly how technology teachers evaluate and select textbooks and secondly how technology teachers use textbooks in their classrooms. This is a comparative case study, involving nine schools, sampled for convenience. Data were collected through semi-structured interviews and classroom observation.

Two conceptual frameworks were used to interpret data. Evaluation and selection of textbooks were explored in terms of 'textbook register', while the use of textbooks was explored in terms of 'didactical transposition'. From the literature, I extracted seven categories on textbook evaluation. These were content, connections, language, format, activities, context, and teaching strategies. I merged these categories with the two conceptual frameworks to design instruments and analyze data.

Results showed that teachers in both contexts regarded the requirements of the curriculum as crucial in textbook selecting. They also regarded suitable activities as very important, and preferred that textbooks clearly present the technological steps. In well-resourced schools, teachers also preferred support in the form of teachers' guides. There was a clear difference in the ways teachers from the two contexts used textbooks in the classroom. In medium-resourced schools, the relevant section from the textbook was read to class while in well-resourced schools, teachers compiled additional notes, indicating that they set a higher standard for their learners. However, in both contexts teachers explained difficult concepts and used discussions to involve

learners in making connections and to reduce the language level used in textbooks. In medium-resourced schools, teachers also allowed learners to code-switch to their mother-tongue language.

In terms of activities, teachers in both contexts used textbook activities without adaption but also developed additional activities. In terms of contextualising, teachers discussed or explained content information by relating it with real-life experiences, but didn't attempt to contextualise textbook activities. Regarding teaching strategies, they mostly used their own preferred strategies instead of that proposed by the textbook. In particular, teachers in well-resourced schools preferred that learners do activities individually, indicating that they valued traditional teaching methods.

In this study, the teachers in medium-resourced schools did not question the authority of the textbook. In well-resourced schools, the teachers set a higher standard than the textbook, but at the same time required support in the form of teacher's guides. This suggests that teachers in both contexts were unsure about what exactly is required by the curriculum in terms of content and pedagogy, and that they did not know how to adapt activities offered in textbooks to suit their context. It is recommended that teachers be assisted by specialists to align textbook evaluation, selection and use with curriculum expectations.

Key words: Technology Education, textbook evaluation, textbook selection, textbook use.

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# CHAPTER ONE

## ORIENTATION AND BACKGROUND

### 1.1 INTRODUCTION

Technology Education was introduced for the first time in 1998 in South Africa as a separate learning area in a new curriculum (Department of Education (DoE), 1997). Named Curriculum 2005 (C2005), it introduced Outcomes Based Education (OBE) to South Africa as a replacement for the previous content-heavy curriculum established during the apartheid era (Ndimande, 2006). C2005 was accompanied by serious challenges that were identified in the literature, including different understandings of the OBE pedagogy, unspecified content to support the outcomes, inadequate training for teachers to implement the new curriculum, and inadequate resources (Jansen, 2001; Potenza & Monyokolo, 1999). Jansen (1999) argued that these problems surrounding C2005 were worse in disadvantaged schools.

Technology teachers experienced additional problems because Technology was a new learning area (Potgieter, 2004) which the teachers were neither trained to teach nor sure of what the curriculum expected of them (Ankiewicz, 1995; 2003; Engelbrecht, Ankiewicz & De Swardt, 2007). Although there were many new textbooks available, their approach and content presented varied considerably, complicating their selection as well as the teaching of Technology.

The challenges surrounding C2005 led to its revision and the introduction of the Revised National Curriculum Statement (RNCS) in 2002 (DoE, 2000; Howie, 2001). The lack of adequate resources such as textbooks was not resolved as the introduction of the RNCS was

followed by the development of even more textbooks (Stoffels, 2004). For technology teachers the RNCS clarified the uncertainty about appropriate content to be taught. However, the problems regarding inadequate professional development and poor understanding of the OBE approach were not resolved (Engelbrecht et al., 2007). The situation raises questions about how technology teachers deal with the availability of many textbooks in order to teach the latest curriculum, in particular, how teachers from different contexts manage the challenges. This study aims to provide answers, particularly on how technology teachers from medium- and well-resourced schools evaluate and select textbooks, and how they use them in their classrooms.

## **1.2 BACKGROUND**

Since South Africa's first post-apartheid elections in April 1994, the DoE has introduced C2005 to replace the previous content heavy curriculum, established by the apartheid government. This educational transformation introduced a new Outcomes-based Education (OBE) approach, which intended to guide policies for education (Rogan, 2004). C2005 and OBE provided an open broad framework of non-prescriptive content that relied on teachers developing their own learning programmes and using a variety of learning support materials (DoE, 1997). The curriculum transformation caused many debates and research inquiry based on the challenges that teachers were experiencing (Gumbo, 2003; Jansen, 2001; Potenza & Monyokolo, 1999). The challenges included the lack of qualified teachers in the new learning areas, lack of professional development for teachers as curriculum implementers, lack of adequate resources, lack of clear content about the outcomes, and differing understanding of the OBE pedagogy (Jansen, 2001; Potenza & Monyokolo, 1999).

Responding to various challenges, the Minister of Education appointed a committee to review C2005 and make recommendations (Chisholm, 2000), which led to the introduction of the RNCS in 2002. One of the recommendations by the Review Committee was to discontinue Technology Education as a separate learning area and merge the Specific Outcomes (SOs) with Learning Outcomes (LOs) to clarify content in all learning areas (Chisholm, 2000). In reaction, the proposed discontinuation of Technology Education caused many debates, ending in an agreement to retain it in the RNCS. However, the issue of qualified technology teachers and professional development was not resolved by the implementation of the revised curriculum (Potgieter, 2004). Amongst the questions raised in the debates was how technology teachers evaluate, select and use the variety of commercially prepared textbooks to shape their classroom practice after the introduction of the RNCS.

Technology Education started as a pilot project, called the *Technology 2005 Project*, in three provinces in South Africa in 1997 (Potgieter, 2004). Technology Education is a compilation of previously existing technical subjects, namely technical drawing, manufacturing, science and some aspects of home economics (Gumbo, 2003). Makgato (2003) and Ginestie (2006) pointed out that Technology Education took the place of technical subjects, with technology defined as a diverse form of creative activity in which people interact with their environment to improve the quality of life (Doherty & Canavan, 2006). Ferrari, Berlatzky, Cwi, Perez, Kipperman, Gorinskiy and Dagan (2006) argued that *technical* education develops practically orientated skills whereas *technology* education involves knowledge of content and the designing process. Most of the technology teachers previously taught technical subjects that focused on only one discipline, while Technology



Education required an educator to be well versed in various disciplines (Engelbrecht et al., 2007). However, the teachers' lack of knowledge in all these disciplines may have an effect on how they evaluate, select and use technology textbooks.

The aim of introducing Technology Education into the South African curriculum was to develop learners who will contribute towards a technological environment by developing their skills and knowledge in interaction with society and environment (DoE, 2002a). The value of Technology Education has been emphasized by various authors. According to Ankiewicz (1995), Makgato (2003) and Potgieter (2004), Technology Education empowers learners to function effectively in a technological environment, to the benefit of individuals, society and the natural environment. Therefore, the development of technology has the potential to improve the quality of life in most societies (Doherty & Canavan 2006; Kananoja, 2006). Furthermore, Höpken (2006), Draghi (1993) and Cronin-Jones (1991) have pointed out that technology can help to prepare students for living and develop the potential to address the problems that young people are facing when they leave school, by equipping them for innovation and productivity. Therefore, Technology Education should be relevant to the economic needs of the nation and prepare students for work and life in society (Barnett, 1992; Ferrari et al., 2006; Pavlova, 2006). However, Starko (1995) suggested that to establish and maintain innovation and productivity among learners, the approach of activity-based learning, design and problem-solving in Technology Education should be integrated. In light of this, it is important that technology teachers utilize textbooks in ways that can empower learners to be effective in a technological environment.

When C2005 was revised, the SOs were merged with content related LOs. This was done for all learning areas, including Technology Education, where the original seven SOs were reduced and merged in the RNCS as three LOs (Potgieter, 2004). The curriculum for this learning area now included a clearer indication of the specific content to cover, as well as the progression expected through the different phases. The DoE (1997) presented the original seven SOs that had been proposed in C2005 as:

- SO1 Understanding and applying the technological process to solve problems and satisfy needs and wants
- SO2 Apply a range of technological knowledge and skills ethically and responsibly
- SO3 Access, process and use data for technological purposes
- SO4 Select and evaluate products and systems
- SO5 Demonstrate an understanding of how different societies create technological solutions and adapt them to particular problems
- SO6 Demonstrate the impact of technology
- SO7 Demonstrate an understanding of how technology might reflect different biases and create responsible and ethical strategies to address them.

In terms of the RNCS, the new LOs indicate which content should be used to achieve the outcomes (DoE, 2002a). These new outcomes of the learning area are: LO1- Technological process and skills; LO2- Technological knowledge and understanding; and LO3- Technology, society and the environment. The content knowledge of Technology Education was clear in RNCS and was articulated in LO2 as Structures, Processing (Textiles and Food) and System and Control (Electrical and

Mechanical) (DoE, 2002a). Learning outcome 2, the content knowledge, is taught through learning outcome 1, which is the technological process, integrating it with the social context, which is learning outcome 3. Technology Education is a unique subject compared as all learning outcomes must be integrated when teaching (DoE, 2002b).

Although the challenge of content was solved by the RNCS, Jansen and Middlewood (2003) argued that a lack of understanding of OBE pedagogy still held sway. Another problem that persisted in Technology Education was the lack of adequately trained technology educators (Engelbrecht et al., 2007). Consequently, Technology Education was often the responsibility of teachers who had taught technical subjects or science in the previous dispensation and who were not adequately trained with regard to content and/or teaching in the new learning area. The introduction of Technology Education caused much confusion amongst many teachers on how to approach it and what to teach learners in class (Ankiewicz, 2003). Under C2005, the lack of prescribed content allowed teachers to make use of their previous specialist teaching subject while compromising other aspects of Technology Education (Engelbrecht et al., 2007).

Under the RNCS, the LOs specified content which combined all technical subjects (Engelbrecht et al., 2007; Gumbo, 2003), making Technology Education even more difficult to teach as teachers needed knowledge of different subjects. In an attempt to solve this problem they adapted the expected OBE approach in the manipulation of their traditional subjects (Engelbrecht et al. 2007), but inadvertently they were neglecting the technological process as an essential aspect of Technology Education, instead teaching content and skills related to the technical subjects in which they were trained (Ankiewicz, 2003). Some

schools addressed this problem by following a rotation programme, with Technology Education being taught by means of a team approach. Each educator was responsible for one theme and the learners rotated amongst educators, however this method did not do justice to the new approach proposed by the DoE (Ankiewicz, 2003).

### **1.3 RATIONALE**

The implementation of C2005 led to the abandonment of the traditional content-heavy textbook (Land, 2003; Stoffels, 2004), one reason being that teachers were expected to be creative and innovative curriculum developers who are able to adapt and develop learning materials according to the needs of their schools (DoE, 1997). Yet, according to Rogan (2004), there were very few teachers who were actually creative in developing their own teaching materials. Coincidentally, the introduction of Technology Education created new problems in South African schools (Ankiewicz, 2003), such as a lack of qualified Technology Education teachers, appropriate resources and quality Technology Education textbooks (Makgato, 2003). Banks (1994) also claims that many people who have an interest in teaching Technology did not study Technology Education as a subject in their training. Consequently, the structural and philosophical framework of the outcomes-based curriculum in South Africa lent itself to different understandings and interpretations by some authors, as well as the teachers who eventually choose the textbooks (Stoffels, 2004). As Fullan (1991) argued, it is important to consider teachers' understanding of the curriculum and the production of published textbooks during curriculum changes. The lack not only of qualified Technology Education teachers but also of quality Technology Education textbooks and uniformity in understanding OBE by both teachers and developers of materials had implications for the

implementation of the RNCS and Technology Education. It is expected that these implications could be reflected in the way teachers evaluate, select and use textbooks.

Personal experience throughout my career as an educator, cluster leader and a facilitator in teacher development programmes in Technology Education indicated that textbooks are essential resources, extensively used by teachers. From discussions with other educators at curriculum workshops and cluster meetings, it was evident that there was great uncertainty on how to choose suitable textbooks and use them in teaching. During the training sessions, little time was allocated to the evaluation and selection of textbooks or how they could be used in the classroom. Interestingly, Potenza and Monyokolo (1999) suggested that provincial governments needed to develop criteria for evaluating materials and empower teachers through training to select appropriate materials. Therefore, these conversations and experiences led me to question how Technology Education teachers evaluate, select and use the textbooks to shape their classroom practices.

I undertook an extensive literature search that showed insufficient research in Technology Education, especially on the use of Technology Education textbooks in teachers' classroom practice. There were a few studies that focus on the implementation of Technology Education (Khumalo, 2004; Potgieter, 2004), evaluation studies in Technology Education (Mouton, Tapp, Luthuli & Rogan, 1999), and on Design and Technology (Higgins, 2002), but there was a lack of research on how Technology Education educators use learning and teaching support materials such as textbooks. There were studies conducted in South Africa on the use of textbooks as a classroom resource in mathematics (Peacock & Gates, 1998) and science (Stoffels, 2005; Peacock & Gates,

1998), but not in Technology Education. In general, many studies in science and mathematics focus on content of textbooks (Fauvel, 1991; Olson, 1989 ) and how teachers use textbooks (Ensor, Dunne, Galant, Gumedze, Jaffer, Reeves, & Tawodzera, 2002; Langhan, 1993; Sosniak & Perlman, 1990; Taylor & Vinjevold, 1999), but few that focused on the Technology Education classroom, especially in the South African context.

#### **1.4 RESEARCH QUESTIONS**

This study aimed to establish how Technology Education teachers evaluate, select and use commercially prepared textbooks to shape their classroom practice in South African schools. Two different contexts, namely well-resourced and medium-resourced schools, were investigated to shed light on the effect of persisting inequalities on teachers' practice. The following questions were formulated to guide the investigation:

- How do Technology Education teachers evaluate and select commercially prepared textbooks?
- How do Technology Education teachers use commercially prepared textbooks in their classrooms?

#### **1.5 THE LIMITATIONS OF THE STUDY**

The conclusions of my study will not be generalized, based on the fact that this is a case study. Although similar practices may arise in many situations, my analysis can be seen as specific to the Technology Education classroom practice at a specific time in South Africa. The conclusions should also be considered against the fact that the OBE

approach to Technology Education as a learning area is unfamiliar territory for most teachers in South Africa, and therefore the situation may be very different in countries where teachers were adequately trained to teach technology using an OBE approach.

## 1.6 STRUCTURE OF THE DISSERTATION

This thesis is divided into six chapters, with the structure as follows: **Chapter one** provides a framework and sets a foundation for the entire study. It gives a brief and general overview on the implementation of Technology Education. This chapter discusses the background of the study, research questions, limitations and the structure of the dissertation. **Chapter two** is a synthesis of the literature, indicating global trends and South African studies regarding textbooks as pedagogical tools for teaching and learning, the evaluation and selection of textbooks, as well as the use of textbooks. **Chapter three** presents the conceptual framework used in this study to understand the engagement of the teachers with textbooks. In this chapter I provide a thorough explanation of the frameworks of didactical transposition and textbook register as lenses to understand and explain how teachers engage with textbooks. **Chapter four** presents the research methodology used for investigation. It provides a motivation for the choice of a qualitative research design and explains the research design, the sampling procedures, the data collection techniques and how data was analysed. **Chapter five** presents the results obtained through engagement with teachers during interviews and observations. This includes a narrative-analytic account of interviews in four well-resourced schools and five middle-resourced schools that participated in this study. In **chapter six** I relate my results to the research questions, discussed in terms of the conceptual framework, namely didactical

transposition and textbook register, to explain the participants' decisions on how they engage with the textbooks. Conclusions are then drawn.

## **1.7 CHAPTER SUMMARY**

This chapter has discussed the background and the rationale of this research study. The main purpose of this study is an exploration of how teachers evaluate, select and use commercially prepared textbooks in Technology Education. The next chapter reviews and evaluates the existing literature relevant to this study.



## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

This chapter critically assesses the global trends regarding the evaluation, selection and use of commercially prepared textbooks across different subjects. The purpose of the survey is to learn from the experiences of others in order to understand the situations encountered in the current research on technology textbooks. The survey is organised into two separate sections in accordance with the two research questions.

#### **2.2 EVALUATION AND SELECTION OF TEXTBOOKS**

Although textbooks play a vital role in education, the task of choosing the best is a complicated undertaking, with many to select from (Nugrahenny, 2005; Venezky, 1992). The wealth of commercially available materials on the market today makes the selection of the most suitable book a challenging task, requiring teachers to make informed and appropriate choices when selecting textbooks (Rubdy, 2003). Teachers do not always have the required subject knowledge to make appropriate choices (Lam & Lidstone, 2007).

Content knowledge presented in textbooks has been identified as one of the crucial criteria for textbook evaluation. For example, Tarr, Reys, Barker and Billstein (2006) identified content as one of the dimensions that should guide teachers to select mathematics textbooks, and emphasized alignment with the curriculum, in-depth presentation, progression across the grades, and a balance between knowledge,

understanding and skills. Similarly, Lemmer and Edwards (2007) and the *Study of the Palestinian Curriculum and Textbook* (SPCT) (2006) indicated that science textbooks should focus on content knowledge and progression. In addition, Dreckmeyr, Maarschalk and McFarlane (1994) emphasise that content must be scientifically correct and show concept progression across the levels. For language teaching, Byrd (2001) argued that content should be relevant to the curriculum and discussions interesting. From these studies across different subjects it is expected that content knowledge should be similarly important in the evaluation and selection of technology textbooks.

Various authors have pointed out that content should be presented in an organized, comprehensive way, with well connected ideas. For example, Lemmer and Edwards (2007) indicated that science textbooks should focus on the coherence of knowledge and activities, while Byrd (2001) argued that content and illustrations in language textbooks should be connected. Moreover, the American Association for the Advancement of Science (AAAS) (2006) and Rubdy (2003) developed criteria to analyse textbooks, requiring that they build on learners' prior knowledge, and show learners how they are expected to do so. Kinder, Bursuck and Epstein (1992) found that the readability of history textbooks was of poor quality, and in response to such criticism on the readability level, publishers began reviewing them and constructing short sentences with simplified vocabulary (Harniss, Dickson, Kinder & Hollenbeck, 2001; Chambliss, 1994). However, this practice resulted in disconnected ideas. Similarly, textbooks have also been criticised for not presenting coherent chains of events, with a lack of coherence that prevents learners from connecting events and ideas (Beck & McKeown, 1994; Kesidou & Roseman, 2002). These studies highlight the importance of

connections in textbooks to enable learners to link ideas, activities, illustrations and prior knowledge.

Peacock (2001) argued that the language and structure of science textbooks contribute to the cognitive demands on learners, and that diagrams often “carry meaning and information” (p. 26). The importance of visual elements is indeed reflected in criteria for evaluation of textbooks. For example, Holliday (2003) and Dreckmeyr et al. (1994) developed criteria for science textbooks, focusing on format which included pictures, diagrams, illustrations, tables, sketches and graphs. For mathematics textbooks, Haggarty and Pepin (2002) reported that teachers in Germany, France and England prefer well formatted textbooks that address particular skills or techniques. For language teaching, Byrd (2001) argued that textbooks should be well formatted with good visibility, illustrations, graphics and design elements, while Rubdy (2003) warned that the discursive format of texts often makes it difficult to distinguish between description, guidance and criticism. These studies across different subjects indicate that textbooks should use clear but adequate language, supported by a format that includes graphics and design elements, with clearly visible printed text.

Activities are another important aspect of textbooks, and according to Lemmer and Edwards (2007) and Byrd (2001), science and language textbooks should offer a variety of exercises and assessment tasks that can be useful in the lessons, as well as examples that are related to the concepts. For mathematics, Haggarty and Pepin (2002) found that teachers prefer straightforward questions for low-ability learners and challenging, interesting questions for high-ability learners. In addition, Lemmer and Edwards (2007) and Byrd (2001) indicated that textbooks should cater for different learning abilities and styles. The AAAS (2006)

indicated that textbooks should use examples that encourage creativity, while Tarr et al. (2006) argued that they should present activities that encourage discussions and working together and that cultivate a spirit of learning. According to Rubdy (2003), activities in language textbooks should develop learners' skills. These studies across various subjects recommend that textbooks should present enough activities and assessment task for different abilities and learning styles, including challenging and interesting questions. Furthermore, activities should encourage learning and teamwork, thus developing life skills.

Contextualising new information is an integral part of constructivist learning. (Vygotsky, 1986). Textbooks should use relevant examples to make content realistic so as to facilitate meaningful learning (AAAS 2006; Dreckmeyr et al., 1994; Haggarty & Pepin, 2002; Tarr et al., 2006). However, the importance of context is sometimes overlooked, as discussed by Ewing (2004), who pointed out that teacher's selection of mathematics textbooks is often restricted by the sequencing of topics, without considering contextualizing it around learners' knowledge. Therefore, textbooks should provide real-life examples of the content information and activities. Similarly it can be argued that technology textbooks should be contextualised so as to be meaningful to learners.

Holliday (2003) and Byrd (2001) indicated that textbooks should reflect pedagogic guidance on how learners should learn in programmes. Such support to teachers is often presented in the form of teachers' guides (Sutherland, Winter & Harries, 2001). Different authors argued that textbooks should provide teachers' guides to support educators by clarifying teaching and learning methods (Kesidou & Roseman, 2002; Tarr et al., 2006). Poorly trained or inexperienced teachers could benefit from textbooks that have teacher's guides, particularly in a new learning

area in a new curriculum, as is the case with Technology Education in South Africa.

From the literature discussed above, seven criteria for textbook evaluation and selection have been identified: content, connectedness, language, format, context, activities and teaching strategies. The seven criteria do not act in isolation, as each reflects an aspect of the ways in which the learner comes to an understanding of the content. These criteria encompass the social constructivist principle, which views individual learning as a personalized activity of adding new learning experiences to existing knowledge, within a familiar social context (Meacham, 2001; Vygotsky, 1986). In South Africa, the social constructivist principle is central to the learner centred basis of OBE, as expressed in C2005 and the RNCS. Clearly, content is only one of seven interrelated criteria which provide opportunity for the learner to acquire new knowledge. Therefore, the seven criteria for textbook evaluation extracted from the literature are indeed relevant to the educational ideals of OBE in South Africa.

Because these criteria have been extracted from different studies and different subjects, it is argued that they are also applicable to the new learning area of Technology Education. In fact, the three learning outcomes for Technology Education, are visible amongst the seven categories. LO1, process and skills, represent the engagement with activities by which the content knowledge, LO2, is acquired, while LO3 is acquiring and applying the knowledge in a familiar social context. It is therefore. These categories will therefore be used in the interpretation of data collected in this study.

### **2.3 THE USE OF TEXTBOOKS**

According to Ball and Cohen (1995), learners do not engage with textbooks on their own in a classroom, but rather experience the textbook as a support to their learning as mediated by the teacher (Luke, De Castell & Luke, 1989). Even in the OBE era, learners are not expected to be independent textbook users as teachers play a crucial role in facilitating (Blachowicz, 2008). In fact, teachers may selectively use sections, change sequencing, decide how learners should make use of the text, choose teaching strategies and control the way in which text is made accessible to learners (Haggarty & Pepin, 2002). It is also possible that the author's intentions may be lost in teachers' interpretations or adaptations (Ensor et al., 2002).

Teachers' use of textbooks has been discussed widely in the literature, bringing with it different classification systems. Hinchman (1987) and Zahorik (1991) identified three categories of using textbooks. Firstly, *systematically*, that is the presentation of knowledge following the textbook without deviation. Secondly, a textbook can be used as a *source of information*, while varying strategies and activities. Lastly, as *reference in discussion*, the teacher facilitates discussion largely independent from the textbook. However, more often, researchers simply classify textbook users in two groups. Johnson (1993, as cited in Haggarty & Pepin, 2002), referred to those who follow without deviating from the sequence, and those who break away by supplying additional content, examples and activities. For mathematics, Jaffer (2001) grouped teachers into two broad categories: those who attempt to mirror textbook practices and those who work selectively from the textbooks. Although 'teaching by the book' has been regarded as poor practice (Doyle, 1992, as cited in Haggarty & Pepin, 2002), teachers in England, for example, were seen as having become more textbook-dependent

because of insufficient time for lesson preparations (Haggarty & Pepin, 2002).

Content adaptations serve to facilitate student learning of important contents (Harniss et al., 2001), one important adaption being the selection of only the most important information from a text and arrangement of it within one's own organizational structure or context (Kameenui & Carnine, 1998). Different sources may also be consulted to enrich existing content, for example, Haggarty and Pepin (2002) and Lambert (1999) found that some teachers also used additional textbooks to develop their own course materials and to prepare lessons. Also, teachers may wish to add personal aspects to enhance their practice (Julie, 2006).

However, some teachers may lack the expertise required to actually improve on existing textbooks. Ben-Peretz (1990) argued that teachers' attempts to introduce changes to existing texts raises the problem of adherence to curricular guidelines or to curriculum materials. Adapting curriculum materials is not a simple task (Harniss et al., 2001), especially when, as Lam and Lidstone (2007) claimed, teachers lack the content knowledge required to confidently criticise and adapt materials. When teachers adapt textbooks it may actually disadvantage the learners. During adaptation of activities, teachers may break the link between activities, decoupling similar ones and interrupting progression (Roehrig, Kruse & Kern, 2005). Similarly, Jaffer (2001), Ensor et al. (2002) and Ben-Peretz (1990) argued that teachers who introduce many changes disconnect the narrative, the link of activities and coherence of content, and in so doing may destroy the purpose rather than accommodate it to suit the needs of their learners.

In contrast to the ideal for teachers to adapt textbooks according to their classrooms, it is well known that teachers frequently teach the textbook (Fullan, 1982). For example, Stoffels (2004) in South Africa and Lubben, Campbell, Kasanda, Kapenda, Gaoseb, & Kandjeo-Marenga (2003) in Namibia found that science teachers depend heavily on the textbooks, making learners copy and complete activities from them. Similarly, Haggarty and Pepin (2002) found that mathematics teachers in France, Germany and England use textbooks regularly in class for learners to do exercises following the teacher's presentation and for reference purposes to guide their thinking and planning. These studies indicate that activities or exercises for learners are taken mostly unchanged from textbooks in developed and developing countries, regardless of context. From experience, it is expected that a similar trend exists for using technology textbooks in South Africa.

There may be various reasons for teachers' decisions to remain faithful to the textbooks. Lam and Lidstone (2007) argued that teachers are reluctant to adapt them because they lack content knowledge and confidence in their learning areas, thus relying on the textbook schemes to inform their classroom practice with teaching activities or topics, with little or no grasp of conceptual framework of the subject (Sutherland et al., 2001). In a similar vein, Islam and Mares (2003) found that most of the teachers using published materials in the classroom are not involved in creating materials and thus have little knowledge of how to adapt materials for their classrooms. Harniss et al. (2001) argued that teachers do not have adequate time to modify materials as they are often immersed in burdensome paperwork, while Haggerty and Pepin (2002) found that teachers in England reported that they do not have adequate time for lesson planning. Moreover, many teachers are not prepared to engage themselves in curriculum modifications as it means spending



excessive amounts of time (Hall, 2005). Nevertheless, it may also be true that teachers prefer to remain faithful to the suggestions included in the guide because they believe that curriculum developers or authors of commercial textbooks possess valid knowledge and expertise which is reflected in their choice of the topics, theme, and principles included in the materials (Ben-Peretz, 1990).

Apart from adapting textbooks, teachers play an important role in making language levels simpler for learners. For example, Beck and McKeown (1994) found that many teachers reported that learners had difficulties with textbook vocabulary and so provided some assistance to these learners. From interviews with English, German and French teachers, Haggarty and Pepin (2002) discovered that learners found textbook language difficult, irrespective of their ability. These teachers mediated the exercises to reduce the level of language used. For most learners in South Africa, the language problem is intensified by the use of English as a second language in education. Probyn (2001) interviewed South African mathematics and science teachers about their perceptions of teaching through the medium of English as additional language (EAL) and found teachers and students experience difficulties. In addition, teachers indicated that they are not able to communicate freely but some meet students' cognitive and affective needs by code-switching between English and the mother tongue they have in common (Setati & Barwell, 2006). It seems that language is a particular concern in South Africa, over which teachers have little control, thus having to mediate the exercises or reduce the language level of exercises.

It may sometimes be necessary to adapt the context of textbook information in order to make the new knowledge accessible to learners. In particular, the availability of internationally published materials

increased the need for modification to suit learner's contexts (Nugrahenny, 2005). Fullan and Pomfret (1977) referred to the adaption of materials according to specific classroom situations. It is important to allow teachers as implementers of materials the choice to adhere to the given text or to introduce changes and modifications (Ben-Peretz, 1990). Ultimately, teachers are the ones who are familiar with learners' and classroom situation, so they are in a position to discover gaps and bring about change or improvement. Therefore, it is to be expected that teachers would use textbooks in different ways in their different classroom situations (Ensor et al., 2002).

In the United States (US), it is recommended that science textbooks should be grounded in practical contexts (Taylor, 2001). In addition, the National Research Council (NRC) and AAAS recommend that science educators must design curriculum materials that are relevant to the learners' everyday experiences. These views rest on the theory of social constructivism, meaning that learning develops during social interactions or day-to-day experiences with others in a particular cultural context (Meacham, 2001; Vygotsky, 1986). In South Africa, Technology Education is intended to prepare learners to interact with society and environment (DoE, 2002). However, Stears, Malcolm and Kowlas (2003) argued that not only learners, but also teachers find it difficult to relate everyday knowledge with science knowledge, suggesting that using everyday examples is challenging to many teachers.

Many teachers do not concern themselves with deciding how the material they are teaching should be presented to their students (Jackson, 1986, as cited in Ben-Peretz, 1990). Instead, they rely upon commercially prepared instructional materials, such as textbooks, to make those decisions for them. Similarly, Lubben et al. (2003) reported

that science teachers in Namibia used a drill, practice and rote learning approach and depended heavily on the text, but did not exploit it to highlight the main points of learning. In contrast, Haggarty and Pepin (2002) found that some German, French and English mathematics teachers preferred to use their own teaching style while others followed textbook approaches. It seemed that more experienced teachers were inclined to use their own preferred strategies, as they had a 'bank of ideas' (Haggarty & Pepin, 2002, p. 584) to support their lesson plans. In South Africa, Ensor et al. (2002) also found that some teachers use the teaching strategies presented in the textbook whereas some use their own preferred methods for teaching and learning. These varying findings indicate that teaching strategies may be a personal preference, sometimes related to experience.

The introduction of C2005 questioned many traditional practices in teaching and learning, including the use of textbooks (Ensor et al., 2002). Leite (1999, as cited in Lemmer, Edwards & Rapule, 2008) argued that textbooks should give educators an opportunity to increase their own content knowledge through exercises and projects. However, this did not become a reality for many South African teachers as they were generally unprepared for the new curriculum (Rogan, 2004). Rather, they simply reproduced what they saw in training sessions as they did not have a real understanding of the philosophical and pedagogical underpinnings of OBE (Stoffels, 2004). Textbooks and learning support materials were mostly used to copy and complete activities instead of being utilized in knowledge construction (Milne, Gough, & Loving, 2002; Stoffels, 2004). Teachers following texts conservatively is not a new phenomenon in the world, Ben-Peretz (1990) having pointed out that they may lack adequate training and practice, and be unable to include additional themes and principles

which may be found in the curriculum. He further argued that these teachers may be lacking the professional skill to experiment with the material. In South Africa, the DoE (1997) expects teachers to be creative and innovative curriculum developers, able to redesign and develop their own learning materials according to the contexts.

For Technology Education, the challenge may be even greater, as it is a new learning area in which teachers have not accumulated experience of the subject specific content knowledge and use of the technological process that would enable them to adapt textbooks confidently. The technological process is regarded as the backbone of the learning area (DoE, 2002a) and central to the ability to design solutions to problems (Davis & Hancock, 2001). Clearly, using the technological process presents a further challenge to teachers. However, this study does not aim specifically to explore the use of the technological process, but has a broader focus namely how teachers use the textbooks.

In conclusion, the literature shows teachers' use of textbooks can be broadly grouped into two practices, namely adaption or non-adaption. The adherence to textbooks holds for content, context, activities and teaching strategies. The reasons for not adapting are not clear, although lack of confidence, inadequate training, insufficient content knowledge and insufficient time may be contributory factors. In South Africa, Technology Education is a new learning area operating within a new OBE pedagogy, with poorly trained teachers, suggesting intensified challenges around textbook adaption.

## 2. 4 CHAPTER SUMMARY

This chapter critically analysed literature on textbook evaluation, selection and classroom use across a variety of countries and subjects. Research articles, books and dissertations were consulted. Regarding evaluation and selection of textbooks, the following seven categories were identified from the literature: content, connections, context, language, format, activities and teaching strategies. In terms of the use of textbooks, the literature showed two typical practices, namely to adapt textbooks or to use them unchanged. Although teachers are expected to adapt textbooks to suit their classroom situations, various reasons for adhering to given textbooks have been found, including a lack of content knowledge, experience and time, as well as trust in the decisions of those who produced them. The following chapter outlines the theoretical framework used to interpret the data collected in this study.

## **CHAPTER 3**

### **CONCEPTUAL FRAMEWORK**

#### **3.1 INTRODUCTION**

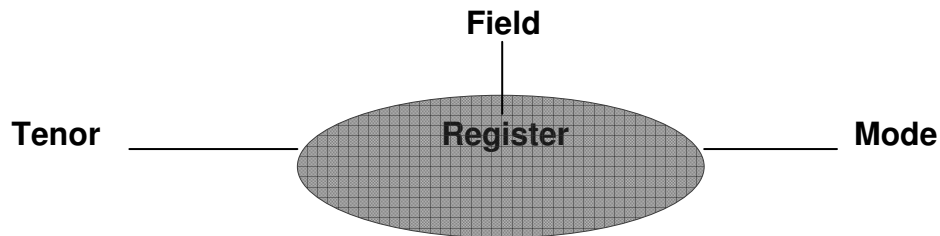
The research proposal outlined a comprehensive analysis of a framework that was to interpret the results on how technology teachers engage with textbooks. The study was to be guided by the framework of didactical transposition (Candela, 1997). However, during my interaction with respondents I realised that this framework restricted me to discussing only the last research question, namely how teachers use textbooks in the classroom. In order to discuss the first question, I needed to extend the conceptual framework. Similar situations were experienced by Stoffels (2004) and Hatch (2002), where midway through qualitative studies they adapted their theoretical lenses to better explain their emergent findings.

Therefore, I also introduced the framework of textbook register (Halliday & Hasan, 1976) to discuss the first research question, namely how technology teachers evaluate and select textbooks. The two frameworks, textbook register and didactical transposition, were combined to discuss both research questions, hence I will give a comprehensive analysis of both.

#### **3.2 TEXTBOOK REGISTER**

The well established concept of textbook register, formulated by Halliday and Hasan (1976), was borrowed from linguistic science, to extend the conceptual framework. This conceptual framework is still applicable today in linguistic science (see for example Dalton-Puffer

(2009), O'Halloran (2007), Eggins (2004)), and also in science education (Lubben et al., 2003)..Register is described in terms of three dimensions, namely field, mode and tenor, as represented in figure 3.1.



**Figure 3.1:** The dimensions of textbook register.

Halliday and Hasan (1976, p.22) described these dimensions as follows:

The field is the total event in which the text is functioning, together with the purposive activity of the speaker or writer; it thus includes the subject matter as one element in it. The mode is the function of the text in the event, including therefore both the channel taken by the language - and its genre, or rhetorical mode, as narrative, didactic, persuasive, phatic communion. The tenor refers to the type of role interaction, the set of relevant social relations, permanent and temporary, among the participants involved.

The concept of textbook register was also used by Eggins (2004, p.90) and was explained in terms of three dimensions as follows:

Field is what the language is being used to talk about. The mode is the role that the language is playing in the interaction. The tenor is the relationship between the interactants.

In this study the three dimensions of textbook register are interpreted as follows: *Field* is translated as content knowledge and its management; *mode* as communication; and *tenor* as actions as required by the textbook. These three dimensions give rise to the questions: *What is to be learnt? How is the learning material communicated to the reader? What are the teachers and learners supposed to do in the learning process?* The distinction between textbook genre and register is not always clear (Swales, 1990). Register is the older concept involving the management of the ideas (field), the discourse (mode) and personal relations (tenor). On the other hand genre focuses on the textbook language itself, which is a research field in its own right (Peacock, 2001).

The concept of textbook register has been interpreted in different ways in the literature. For example, textbook register was adapted by Lubben et al. (2003, p.113) in their study of teachers' use of textbooks in Namibian science classrooms as a "set of meaning that is appropriate to a particular function i.e. a set of meanings and configurations of semantic patterns that are typically drawn upon in the understanding of these meaning". Lubben et al. (2003) translated *field* as the pedagogic purpose of the teacher's reference to the textbook in class, *mode* as the genre of the section of the text being referred to, and *tenor* as the reference to the textbook in class. Although they also interpreted the mode as a characteristic of the textbook, both field and tenor were not interpreted as characteristics of the textbook, but rather as features of textbook usage.

There is some overlap of the three dimensions namely field, mode and tenor. The communication (mode) of knowledge involves the knowledge (field) itself, and the learning actions (tenor) have to be communicated to



the reader, and it is aimed at specific knowledge. It is therefore to be expected that data interpretation will reflect this interrelated nature of the three dimensions.

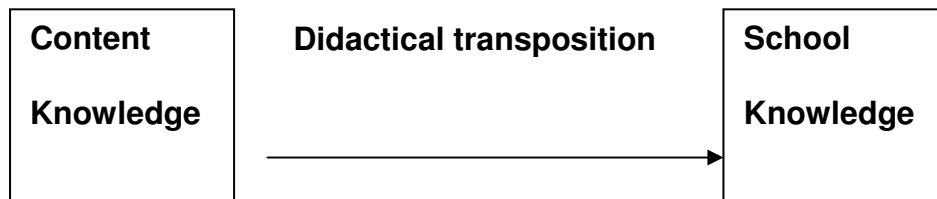
In this study, the framework of textbook register can be refined to contain the seven categories for textbook evaluation and selection identified in the literature in the following ways: *field* includes content and connections; *mode* includes language, format and context while *tenor* includes teaching strategies and activities

### **3.3 DIDACTICAL TRANSPOSITION**

Didactical transposition of curriculum materials refers to the transformation of an object of knowledge, such as a textbook, into an object of teaching in the classroom (Candela, 1997). Originally the notion of didactical transposition was introduced by Chevallard (1980, cited in Candela, 1997), and later interpreted by Candela (1997) in a study in Mexican schools. This conceptual framework is still useful today. For example Izquierdo-Aymerich & Adúriz-Bravo (2003) used the theoretical framework of didactical transposition to help to provide foundations for school science and to understand the relative independence of school science and scientists' science. In addition, Stoffels (2005) used the same theoretical framework to understand why science teachers still continue to use traditional approaches which are teacher-centred approaches in performing practical work. According to Lee and Roth (2003), scientific knowledge contains facts, theories, processes and instruments which have become part of practical understanding of how the world works. Candela (1997, p.500) argued that didactical transposition "entails a vision of science and how scientific knowledge is constructed, taught and learned", and that

“scientific knowledge is the result of a selection of particular ordering of science contents that the authors of the curricula establish and decide should be transmitted by the school”. However, the vision of what real science is, and how it is captured in syllabi and textbooks lies beyond the scope of this study.

In this study, content knowledge is regarded as the point of departure in understanding the didactical transposition as an input-output process, as shown in Figure 3.2, where school knowledge is the output. The content of Technology Education is Structure, Processing of Materials and Systems and Control, which include electrical and mechanical systems (DoE, 2003). Didactical transposition is understood to be a process in which the content knowledge covered by the textbook is transformed to produce school knowledge. Candela (1997, p.499) described school knowledge as the “product of a collective construct process expressed through everyday school practices in the classroom”. Candela further explained that this construction of school knowledge occurs when learners assimilate content knowledge with individual knowledge through discourse and classroom interaction, as in the socio-constructivist view of learning (Vygotsky, 1986). Similarly, Izquierdo-Aymerich & Adúriz-Bravo (2003) describe school knowledge as connecting learners idea with scientific knowledge or content knowledge presented in the classroom. Effective teachers should therefore have different kinds of knowledge, which include knowledge of the subject matter to be taught (content knowledge) as well as of specific strategies to teach that specific content (pedagogical content knowledge) (Van der Sandt & Nieuwoudt, 2005). Teachers are therefore “considered as active participants that contribute with their capacity, experience, knowledge, affectivity and psychological, social and cultural history to the construction of school knowledge” (Candela, 1997, p.499).



**Figure 3.2:** Didactical transposition as an input-output process.

The focus of the second research question is the teachers' use of the textbook in this process of constructing school knowledge.

Ben-Perez's (1990) notion of curriculum potential can be associated with didactical transposition. The curriculum potential refers to the intrinsic potential of curricula to be interpreted by teachers, and includes the possibility that texts be modified beyond or below the intentions of their developers, depending on the practical knowledge and professional creativity of the teacher. Candela (1997) found that transformations made by the teachers often change a textbook's intended teaching strategies. In a study in Mexican classrooms, he found that most science teachers did not replicate the learner-centred or problem-solving approach suggested in the textbooks for practical work but transposed it into teacher demonstration in order to avoid disruptions to the class order. He also found that learners may change teachers' intended strategies by unpredictable questions and remarks, thereby participating actively in the construction of school knowledge.

Six of the seven categories extracted from the literature on textbook evaluation and selection also feature strongly in the didactical transposition. For example, it was reported that content may be supplemented by using additional textbooks (Haggarty & Pepin, 2002), and that connections may be altered by reorganizing content according

to personal schedules (Kameenui & Carnine, 1998), although this may disrupt logic (Ben-Perez, 1990; Jaffer, 2001; Roehig et al., 2005). Language mediation was reported widely for first language users (Haggarty & Pepin, 2002) and more so for second language users (Setati & Barwell, 2006). The need that teachers adapt textbooks to suit specific contexts has been discussed exhaustively in the literature (Nugrahenny, 2005; Stears et al., 2003). It was reported that teachers often use activities unchanged (Milne et al., 2002; Stoffels, 2004) while some variation would be desirable. Regarding teaching strategies, it was found that teachers sometimes change proposed strategies to such an extent that it denatures the pedagogic intentions (Candela, 1997; Ensor, 2002). Within the framework of didactical transposition, this study will explore how each of these textbook categories are involved using the textbook in technology classrooms.

### **3.4 CHAPTER SUMMARY**

In this chapter I provided a description of two frameworks used in this study to describe teacher's engagement with textbooks. The framework of textbook register was employed to better understand the way teachers evaluate and select textbooks, while the framework of didactical transposition was used to understand how teachers use textbooks in their classroom practice. In the next chapter I provide a comprehensive description of the research design, including the collection and interpretation of data.

## CHAPTER 4

### RESEARCH METHODOLOGY

#### 4.1 INTRODUCTION

This chapter describes and explains my choice of research design, outlining the way that respondents were sampled and providing a comprehensive account of how instruments were designed, and the data collected and analysed. I also discuss issues of research credibility and confirmability, as well as how ethical guidelines were adhered to.

The nature of my research questions required a qualitative research design, as I aimed to describe and understand the way teachers engage with textbooks. According to Denzin and Lincoln (2000), qualitative research provides deeper understanding of a complex phenomenon through rich descriptions and explanations from the perspective of the participants. Although the researcher has to rely on the views of the participants (Creswell, 2008), the detail and openness in qualitative research allows understanding of the emerging results (Durrheim, 2006).

Within this design I explored the research questions through a comparative case study approach, to understand teachers' practices in two different contexts in South Africa. Altbach (1999) explained that a comparative study looks in many directions at the same time, while McMillan and Schumacher (2001) defined a case study as an evaluation of one situation in order to have in-depth understanding of participants and sites regardless of the number used in the study. My study therefore falls within this category of comparative case studies as it seeks to compare and understand how technology teachers engage with

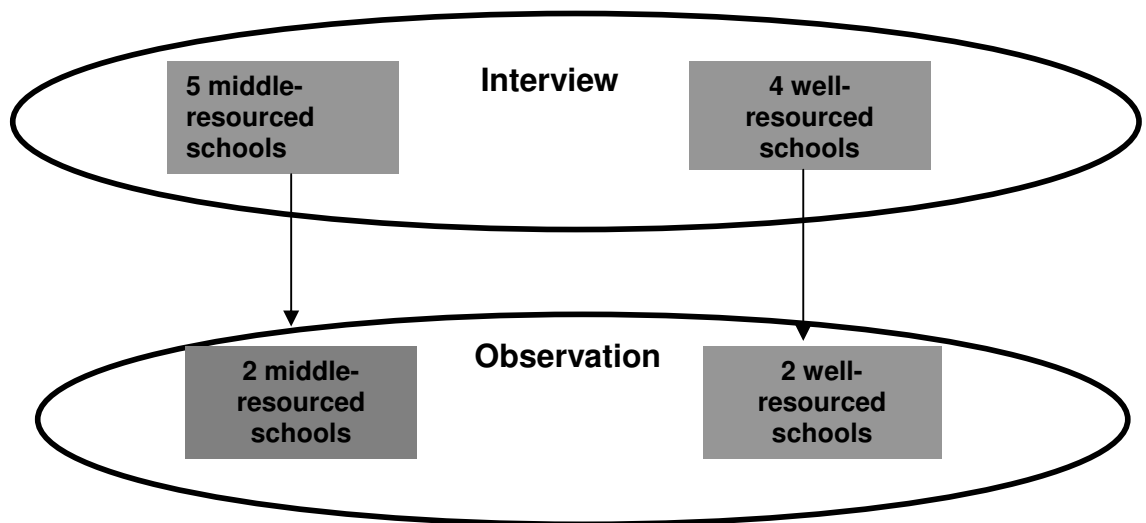
commercially prepared textbooks in two different contexts, namely well-resourced and medium-resourced schools in South Africa.

## **4.2 SAMPLE**

In qualitative research, a few individual or cases are sampled to provide rich data to enable the researcher to understand the complexity of the case (Creswell, 2008). In this study, ten schools were identified in and around one of the large cities in South Africa, all from the same educational district. Schools were chosen from suburban as well as township areas through purposive sampling, described by De Vos (2002) as a selection based on clearly stated criteria. It is important that the qualitative researcher selects participants that fit the question to be investigated (Creswell, 2008). When selecting participants it is vital that the researcher thinks critically about the limitations of the sample, the rationale of the decision and the aim of the study. In the current study, schools were selected on account of their socioeconomic status and accessibility to the researcher. The study was limited to compare the two most common socioeconomic contexts found in cities and townships, as these were easily accessible to the researcher. Schools charging fees of about R5000 per year were chosen to represent well-resourced schools, while schools charging fees of about R500 per year were chosen to represent medium resourced schools. Five schools from each context were chosen, but during the study, one of the well-resourced schools withdrew, leaving a total of nine schools.

The sample included one grade 9 technology teacher from each of the nine schools. These teachers were interviewed on how they evaluate, select and use the textbooks. From those nine schools, two schools from each context were selected for classroom observation on their usage of the technology textbooks. The selection of the four schools that

were observed was based on teachers' willingness to be observed in the classroom. Teachers who indicated that they would be uncomfortable with an observer in their classroom while presenting a lesson were not chosen for observation. Figure 4.1 (below) represents the composition of the sample for interviews and classroom observations.



**Figure 4.1:** Sampled schools for interviews and observations.

### 4.3 DATA

In a qualitative study, it is important that the instruments do not restrict the views of the participants (Creswell, 2008). Therefore interviews and observations are suitable data collection strategies. Data analysis involves organising data into categories and finding patterns between them (McMillan & Schumacher, 2001). Using an inductive process, one has to identify categories from the reviewed literature, and during data analysis, initial categories can be revised or reorganised to help in understanding the emerging results.

### 4.3.1 Instruments

Two instruments, interviews and observation, were used to collect data. The interview schedule is given in appendix D and the observation schedule in appendix E. The first research question, on how technology teachers evaluate and select textbooks, was addressed by the interviews, while the second research question, on how technology teachers use textbooks was addressed by the interviews as well as by the lesson observations, as summarized in Table 4.1.

**Table 4.1:** Instruments applied to explore the two research questions.

| Research Question  | Instrument                |
|--|---------------------------|
| 1. How do technology teachers evaluate and select textbooks? | Interview                 |
| 2. How do technology teachers use textbooks?                 | Interview and observation |

The instruments are based on the conceptual framework of textbook register and didactical transposition. The relevance of the field, mode and tenor of textbooks is probed through interview questions on teacher's evaluation and selection of textbooks. Furthermore, the framework of didactical transposition underpins the remaining interview questions on textbook use as well as the observation schedule. The seven categories extracted from the literature form common threads weaving together the interview questions and observation schedule. The research instruments were therefore designed specifically for this study, focusing on the research questions, grounded in the theoretical framework and weaved together by categories extracted from the literature.



### **4.3.2 Data Collection**

The process of data collection took two months, including time for obtaining consent and making practical arrangements. I conducted semi-structured interviews with the nine teachers, privately in classrooms after school hours. Interviews were audio-recorded with the consent of the teachers so that the sessions could be replayed for detailed and accurate transcription. Each of the nine teachers was interviewed on how they evaluated, selected, and used textbooks, addressing both research questions. Open and specific questions were used to enhance the credibility of the data. For lesson observations, four teachers were selected, as noted above. The dates and times for lesson observations were agreed on in advance, so teachers would be prepared and at ease. I visited each of these teachers four times to observe how they used the textbooks during lessons. I wrote field notes during the observations and completed the observation schedules immediately afterwards. Apart from supplying additional information to answer the second research question, the observations were also useful to confirm some of the remarks made by teachers during interviews.

### **4.3.3 Data Analysis**

Data analysis began with transcribing the recorded interviews and writing narratives of the lesson observations as required for interviews and observations (Creswell, 2008; McMillan & Schumacher, 2001). I then read through the data to make general sense of it, followed by a process of coding interviews according to the seven categories identified in the literature. According to Terre Blanche, Durrheim and Kelly (2006) coding entails grouping different phrases, lines, sentences, or paragraphs of data that are relevant to one or more of the themes. Therefore, in this study coding of data entailed grouping of lines and

sentences with a common theme, including some quotations to present the perspectives of the participants.

For the lesson observations, I first wrote narratives of all lessons, followed by coding according to the seven categories. I interpreted the narratives into a report based on the seven categories. I included some quotes to support my interpretations where applicable. In the final chapter I discuss corroboration of data from interviews and observations and interpreted the findings in terms of the conceptual framework, reflecting on the key issues that emerged from the data.

#### **4.4 CREDIBILITY AND CONFIRMABILITY**

Credible research produces findings that are convincing and believable. (Kelly, 2006). In qualitative research, credibility of results depends on rich data and skilful analysis of the data rather than a large sample (Libarkin & Kurdziel, 2002) and (Patton, 1990). Credibility also requires accurate description of the way research was conducted (De Vos, 2002). This study used qualitative methods which helped the researcher to find in-depth information on how technology teachers evaluate, select and use textbooks. This was explored using interview and observation so that the researcher can get rich data that can be analysed in order to support each other. Credibility was founded in my prolonged engagement of two months in the research field. Use of the time included meeting the principal and obtaining consent, which helped me to build a relationship of trust with the teachers so that they were at ease during interviews and with my presence in their classrooms. The period of engagement also enabled me to obtain a holistic picture of the contextual conditions in which the teachers operated, thereby enabling

me to provide rich descriptions of the context. In addition, the fact that I am not their senior or departmental official earned the teachers' trust.

Confirmability means confirming findings or data with other people (De Vos, 2002). Therefore, in this study the interpretation of the interview and observation was checked by the participants as well as by a colleague. Confirmability helps to remove evaluation from some inherent characteristics of the researcher (Libarkin and Kurdziel (2002). This refers to the degree to which the researcher can demonstrate the neutrality of the research interpretations. Therefore, the sampling of participants and selection of data was not based on any discrimination of gender or any other issues that reflect bias. The researcher was focusing on the accessibility of the schools and the willingness of the teachers to participate. However, results cannot be generalised.

Credibility and confirmability was further supported by continuous communication between myself and the teachers to clarify issues that had not been clear during the classroom observation. In addition, the findings were also communicated with teachers for further improvement. Hoepfl (1997) and Libarkin and Kurdziel (2002) added that credibility can also be addressed by making segments of the raw data available for others to corroborate findings. Accordingly, the transcription of the interviews is attached as an appendix. Finally, the credibility of this study was supported by my emphasis on triangulating the data from observations and interviews. By triangulation, the qualitative researcher checks for corroborating evidence from different individuals, different data types or methods of data collection. According to Creswell (2008, p.553), "the three points to the triangle are the two data sources and the phenomenon".

#### **4.5 ETHICAL CONSIDERATIONS**

Bogdan and Biklen (1992, p.49) argue that “Nothing is more serious to a researcher than to be charged with unethical practices”. More recently, Wassenaar (2006, p. 61) explained that “the purpose of research ethics is to protect the welfare of research participants”. In addition, research ethics protect the public and research community against scientific misconduct and plagiarism. For this study, an application for ethical clearance was submitted to the Faculty Ethics Committee and approved prior to data collection. Permission to conduct research in schools was obtained from the Provincial Department of Education as well as school principals. Letters of informed consent to participants, as well as parents, were signed prior to the scheduling of dates and times for the data collection. Furthermore, all names of participants and schools were replaced by pseudonyms to ensure anonymity and confidentiality.

#### **4.6 CHAPTER SUMMARY**

This chapter has outlined the design of the study, the selection of the sample, the design of instruments, and collection and analysis of data, while observing issues of credibility and ethical research practices. In the next chapter I present and discuss the results of the data collection process.

## **CHAPTER 5**

### **RESULTS**

#### **5.1 INTRODUCTION**

This chapter presents the data collected from nine case studies, to explore and understand how technology teachers evaluate, select and use commercially prepared textbooks. The chapter begins with a description of the sample, using biographical sketches of the participating teachers and descriptions of their schools. Next, data obtained from interviews is discussed in terms the dimensions of textbook register. Finally, the results from the lesson observations are discussed in terms of didactical transposition.

#### **5.2 SAMPLE**

All names for teachers are pseudonymous, reflecting the school contexts. For well-resourced schools, names are prefixed by 'W' and for middle-resourced schools by 'M'.

##### **5.2.1 Well-resourced schools**

Winnie is a black teacher in a class that has black, white and coloured learners, the majority of whom come from wealthy homes. The school is a secondary school for grades 8-12. School fees are between R5,500 and R8,000 per year, and many parents are professionals or government workers. The school is situated in a suburb and the classroom is well set-up with enough chairs and desks for all learners to sit individually. The desks can easily be arranged for group work. Winnie is a post level one teacher with 7 years experience of teaching Technology and at this particular school. The basic textbooks she uses

are *Spot-On Technology grade 9* (Bell, Marchant, Pretorius & Smith, 2007), *Technology Today grade 9* (Johnstone, Nkosi, Schreuder, Sherwood & Ter-Morshuizen, 2006) and *Shuters Technology grade 9* (Franken, Kellerman, Lehlakane, Ngetu, Sadeck & Truter, 2003). Each learner has a copy of *Spot-On Technology grade 9* (Bell et al., 2007) as well as a technology workbook developed by the former Rand Afrikaans University (RAU) (Engelbrecht, Ankiewicz & de Swardt, 2004). Winnie explained that this workbook is arranged according to the themes, i.e. structure, processing and systems. This workbook is convenient as learners can do their portfolio work individually. The workbook activities are structured in terms of questions and it provides spaces for learners to write their answers. The learners use the textbook as a reference, but the workbooks also explain some of the information before activities.

Wilma is a white teacher in a class with white and black learners, the majority of whom come from wealthy homes. The school is a secondary school for grade 8-12 and is situated in a suburban area. The school fees are between R5,000 and R8,000 per year. Each learner has a table and chair. The teacher has a laptop, projector and a chalkboard for class presentation. Wilma is a post level one teacher, having 5 years experience in teaching Technology. She is using *Spot-On Technology grade 9* (Bell et al., 2007), *Technology Today grade 9* (Johnstone et al., 2006) and *Shuters Technology grade 9* (Franken et al., 2003) to help her with preparations. Wilma mentioned that she is also getting some of the information from the Internet. Learners have copies of *Technology Today grade* (Johnstone et al., 2006).

Wendy is a white teacher in a class that has white and black learners, the majority of whom come from wealthy homes. The school is a secondary school for grade 8-12 and is situated in a suburban area. The

school fees are between R5,000 and R8,000 per year. Wendy is a post level one teacher, having 3 years experience in teaching Technology. She said that she is using a textbook to teach called *Design and Technology* (Garratt, 1996), from England. Learners do not have textbooks as she compiles notes for the learners to use. Wendy mentioned that she also gets some of the information from the Internet.

William is a white teacher in a class that has white, coloured and black learners, the majority of whom come from wealthy homes. The school is a secondary school for grade 8-12 and is situated in a suburban area. The school fees are between R10,000 and R15,000 per year. William is a post level two teacher, a head of department (HOD), with 10 years experience in teaching Technology. He is using *Dynamic Technology grade 9* (Clitheroe, Dilley & van der Westhuizen, 2006); *Spot-On Technology grade 9* (Bell et al., 2007), *Technology Today grade 9* (Johnstone et al., 2006) and *Shuters Technology grade 9* (Franken et al., 2003) to help him with preparations. William said that learners are only using technology workbooks, prepared by RAU (Engelbrecht et al., 2004), the same as the one used by Winnie.

### **5.2.2 Middle-resourced schools**

Mike is a black teacher in a class that has only black learners, the majority of whom come from very poor homes. The school is a secondary school for grade 8-12, situated in a township area. Learners pay fees of R350 per year. During my discussion with Mike it was revealed that most of the parents are unemployed. With this condition Mike said that some learners cannot pay school fees and usually do not eat during break. The classroom is moderately set up and has broken chairs and old desks with a chalkboard. Some windows are broken and the paint is flaking off. Mike is a post level one teacher with twenty years

experience of teaching, seven of teaching Technology. The teacher and learners are using *Spot-on Technology grade 9* (Bell et al., 2007) textbooks. During the interview Mike explained that he takes the textbooks from one class to another because the school does not have enough for all the classes.

Moses is a black teacher with a class of only black learners, the majority of whom come from disadvantaged backgrounds. The school is situated in a township area. The school fees are R300 per year. The school is a secondary school for grade 8-12. Most parents are unskilled workers and others are unemployed. Many learners do not eat during break. The classroom is small with many learners, few desks and a chalkboard. Moses is a post level one teacher with ten years experience in teaching Technology. He is using *Spot-On Technology grade 9* (Bell et al., 2007), *Shuters Technology grade 9* (Franken et al., 2003) and *Technology Today grade 9* (Johnstone et al., 2006). Learners are only using *Spot-On Technology grade 9* (Bell et al., 2007).

Michael is a black teacher in a class only comprising black learners, the majority of whom come from disadvantaged backgrounds. The school is a secondary school for grade 8-12, situated in a township area. The school fees are R250 per year. Michael is a post level one teacher with ten years experience in teaching Technology. He is using *Spot-On Technology grade 9* (Bell et al., 2007) and *Technology Today grade 9* (Johnstone et al., 2006), while learners are only using *Spot-On Technology grade 9* (Bell et al., 2007).

Morris is a black teacher in a class which has only black learners, the majority of whom come from disadvantaged backgrounds. The school is a high school from grade 8-12, situated in a township area, but learners



are coming from an informal settlement. Morris explained that learners are transported from the informal settlement to the school by buses that are subsidised by the government. Based on the learners' backgrounds, they do not pay school fees. Morris reported that most of the parents are unskilled workers and many are unemployed. He further commented that these results in poor performance and many learners do not eat during break. Morris is a post level one teacher with nine years experience teaching Technology. He is using *Spot-On Technology grade 9* (Bell et al., 2007), *Shuters Technology grade 9* (Franken et al., 2003) and *Technology Today grade 9* (Johnstone et al., 2006), while learners are only using *Technology Today grade 9* (Johnstone et al., 2006).

Mavis is a black teacher in a class which has only black learners. The school is situated in a township area and the school fees are R350 per year. Mavis is a post level one teacher with one year experience in teaching Technology. She indicated that the school is a middle school for grade 7-9 and opened during 2008. She is using *Spot-On Technology grade 9* (Bell et al., 2007) and *Technology Today grade 9* (Johnstone et al., 2006), while learners are only using *Spot-On Technology grade 9* (Bell et al., 2007).

### **5.3 INTERVIEWS**

Interviews were conducted in English, the language of learning in the schools sampled. The interview questions were formulated to find answers to both research questions, namely evaluation and selection, and use of textbooks. There were specific questions based on the seven categories as well as open ended questions. The open ended questions

were useful to confirm responses to specific questions, adding credibility to data.

### 5.3.1 Evaluation and Selection of textbooks

#### Content

During interviews, all teachers in both contexts indicated that they check that textbook content information matches the curriculum, as evidenced by the following extracts: In the well-resourced schools, William responded that he checks if textbooks have '*... enough content ... in line with the Gauteng Department of Education guideline*'. Wilma said that '*when I look at the textbook, I make sure it goes with the curriculum that we are given,...assessment guideline.... Content that goes with curriculum*', and that there must be '*... enough information ...*'. In addition, Wilma said that '*... the book that I am using is not best in terms of comprehension ... there are still lot of information that I have to add in*'. In one of the middle resourced schools, Moses responded that he checked if the textbook '*...covers the curriculum that we are doing*'. He further commented that '*... when you teach Technology there are ASs [assessment standards] and LOs [learning outcomes], we look at them*'. It was clear that the teachers in both contexts required that textbooks meet the curriculum specifications.

#### Connections

The connections in the textbook include the links between the content information and activities. In terms of the criteria used to evaluate and select the textbook for their classroom use, most of the teachers said that they checked the connections of information in the textbook. Eight of the nine the teachers preferred textbook information to be connected. In the well-resourced school Wilma said that '*they have to be a flow ... if*

*there is no flow learners get stuck and they don't understand what is coming next*'. In the middle resourced school Michael said that 'Yes, they must have connection because you will be in trouble. Because you will do things today and you will do it next week or next month then you will forget. If there is a link there is a progress'. Clearly, in both contexts, teachers generally agreed that links were essential to ensure meaningful learning.

### **Language**

English was a second language for most of the learners in middle-resourced schools and for some in the well-resourced schools, yet most teachers regarded the language used in their textbooks as suitable, despite them often needing to help to interpret the language to make it clearer for learners. In the well-resourced school Winnie was the only exception as she said that the language used '*... is very adequate for learners, because their medium of instruction is English*''. In the middle resourced schools, Mavis said that even if the language is suitable ' *... firstly you have to explain to learners, after that is when you can say go and do this because .... You must explain how things work ...*'. In summary, it seems that the teachers accepted the language as it was and were prepared to assist the learners when necessary.

### **Format**

All teachers in both contexts indicated that they looked at the way information was presented. Teachers said that well-formatted textbooks must show the technological process, give explanation of terms, explain everything in detail and supply content information in the form of a guide. In the well-resourced school William said that he checked if the textbooks would '*... have a proper format you can see, if they have a problem statement, words described and design brief ...*' Winnie said

that *'I check explanation of words ... a clear description of words and notes of the content'*. In the middle-resourced schools Morris looked to see if the textbooks *'...explain everything in detail, show technological steps that you must follow when making project'*. He further elaborated that textbook must *'... clearly explain design brief, how to go about making your project step by step until to the last step'*. Mavis said that to help learners to understand one must *'find ... pictures and you have to explain those pictures and what do they used for... so that when I talk about something learners they see, most of the learners learn more if they see, they remember fast ...'* Moses also regarded diagrams as important: *'the weak point that I saw in the textbook is that it does not have many illustrations, where grade 9 learners can just follow without you being present.'* Mike preferred a convenient format for activities *'... so that I can photocopy for them and they can just write'*. Most teachers, in both contexts, indicated that they needed textbooks that were well formatted. For example, they should explain terminology, give steps of the technological process, diagrams, and activities in a format suitable for photocopying.

### **Activities**

During interviews, eight of the nine teachers indicated that they looked for suitable activities to give to the learners. For example, in the well-resourced school Wilma responded that, based on the good activities presented in the textbook: *'I don't add or take anything out, they do activity as it is in the textbook'*. William said that textbook must *'give you all questions and the facilitators guide provide you with answers ...'*. In the middle-resourced school Moses said that he needed *'... activities that can guide me'*. He further commented that *'it [the textbook] helps a lot, because it has got many activities that you can give learners to do'*. Mike added *'I use them [activities] sometimes as an informal*

*assessment... You just have to change and look at LO2, it will tell you what to do and you find suitable questions that you can use*'. The data therefore clearly showed that teachers regarded activities as an important aspect of textbooks.

### **Context**

There were different opinions about the importance of contextualising information in the textbook. Five of the teachers, across both contexts, indicated that information and activities should be relevant to learner's daily situation. Wendy said that when she evaluated textbooks, she looked '*...in terms of information and real life situation*'. In the middle-resourced school Moses said that he needed a textbook '*...that guide the child how technology is being compared with the real life situation*'. Mike had a different situation, finding that the rural settings portrayed in textbooks were unsuitable for urban learners: '*The textbook doesn't matter because most of the questions are coming from the rural area and learners here they don't know anything about rural area things. Then I design questions that suit the learners who are in urban area*'. It appears that teachers required information that was practical to the learners, reflecting situations they could see at home.

### **Teaching strategy**

The data revealed that the textbooks used various teaching strategies. In both contexts, some teachers replied that they did not use the textbook strategy, whereas others did follow it. Three teachers indicated that they preferred strategies that were proposed in the textbook while others did not consider it as important and preferred to use their own strategies. For example, in well-resourced schools, Wilma said that the textbook used various strategies, but '*I prefer individual work, because it*

*makes learners to do things themselves, others make them not to think themselves*'. William said that the textbook used a '*... combination of all*'. He further said that he was '*not always using those approaches because I don't believe in group work, that is my perception, I don't believe in the OBE practices because it is superficial*'. He said that learners '*don't work like that, they have to contribute by firstly working individually and then discuss as a team, I believe in four or five brains coming with different ideas brainstorming*'. Differently, Winnie said that she preferred the strategy used in the textbook because '*they use simple approach .... They start from design and they finish by making ...*'. In the middle resourced schools, Michael said the textbook '*... mostly use OBE, basically, they use RNCS. They use group work, individual work and pair work.*' Differently, Moses said that textbooks used many strategies but he preferred '*question and answer*'. It therefore seems that most of the teachers did not check the teaching strategy used in the textbook as they had their own preferred methods they used for their teaching.

Teachers in well-resourced schools also indicated that they needed support and guidance in the textbook and/or teachers' guide. William remarked that '*... in the facilitators guide book it must show what you are supposed to do in all of those activities*'. In addition, Winnie replied that the textbook must '*give clear guideline of marking rubric and year plan and term plan*'. It seems that the requirements about guidance for teachers were not simply aimed at teaching strategies, but also for the convenience of the teacher, as teachers indicated that they needed guidance in the form of planning, rubrics and teacher's guides.

### 5.3.2 Utilisation of textbooks

Some of the interview questions probed the use of textbooks. Here use reflects didactic transposition, i.e. how teachers use the textbooks during lessons. This will include the adaptation of content knowledge, connections, language, format, context, activities, and teaching strategies used in the textbook.

#### Content

Six of the teachers indicated that they consulted other textbooks and/or the Internet to add content, with three actually saying that they compiled notes to provide additional information. These three were from well-resourced schools. Wilma said the *'The book I am using is not the best in terms of comprehension. There are still a lot of information that I have to add in'*. William said *'You can find information and supplement it, and put it on the projector ... look at my portfolio there are a lot of supplementary ...[content] ... You can make your content notes widely and more interesting, we do that'*. It was not clear how Morris presented the additional information, as he responded *'... because we are using different textbooks, so normally we go through them and find if they have similar topics to add to make concrete'*. Mike also used different textbooks, saying *'Sometimes you need to use what the learners see, that's why I'm using different textbooks'*. Differently, Michael suggested that he does not consult other textbooks or sources, saying *'when I go to class I have to use my own knowledge ... so I don't say I am going to use the textbook only'*.

From the interviews, it therefore transpired that teachers in well-resourced schools were more inclined to add content by compiling notes which they gave to learners, while it was not clear how those from the medium-resourced schools actually presented the added content.

## Connections

Most of the teachers indicated that they were satisfied with connections in the textbooks. The additional content from other sources and teachers' explanations probably served the purpose of providing additional connections. Mavis and Morris involved learners by asking them to find information at home and bring to class, while Mike said '*I do the things that suit the learners. I get the topics from them and I look at the things that are happening*'. It seems as though teachers from the middle-resourced schools used creative ways, involving the learners and their contexts, to clarify connections.

## Language

There were three teachers who indicated that language was no problem, one from a medium-resourced school and two from well-resourced schools. In both contexts some teachers indicated that they helped learners to understand by explaining the difficult words and also discussing information. For example, Wendy said '*With some of them [learners] it's difficult but I try to explain in low level*'. In the middle-resourced schools Moses said '*... there are those who do not understand, we go down to them and have extra time and explain...*'. In some of the medium-resourced schools teachers did not always indicate whether or not they actually assist learners with language, for example Morris saying that he did not really adapt the language, but '*... we encourage learners to use English so that they can learn*', while Michael said '*when they come to grade seven they are in trouble because they can't read and write, ... ..but then in grade nine they are good*'. There seem to be different perceptions amongst the teachers in both contexts about learners' language problems, and that learner's problems in



understanding were sometimes not addressed, particularly in medium-resourced schools,

### **Format**

In both contexts, most teachers indicated that they did not adapt the format of activities but preferred to copy them. For example Michael said *'they use OBE basically, the RNCS. They use group work, individual work and pair work'*. Wilma said *'I don't add or take anything; they do activities as it is in the textbook'*. Mike added that he would actually *'...photocopy for them and they can just write'*. It seems that most of the teachers were satisfied with the way activities were structured in the textbooks.

### **Activities**

Some teachers from both contexts indicated that it was important for them to adapt activities in their teaching and learning. For example Winnie indicated *'It is very simple, you know the school that you are teaching, also you know if they are having resources or not. If you don't have time and resources rather remove some of the things that are there'*. In the middle-resourced schools, for example, Morris said that there were actually enough activities, but he sometimes adapted activities using the Internet, adding *'... we develop our own [activities] so that they (learners) can collaborate and make sense'*. Moses said that there were enough activities and that they were mostly clear, but if not, *'then I try to change them to be clear'*. Differently, William and Wilma said that they use the activities as they are in the textbook. William added that his school had all the resources required by the textbook activities. It seems that that teachers adapted activities when they did not have the resources required by the activities presented in the

textbooks. This indicates that textbooks had enough activities but these were adapted where schools lacked resources.

### **Context**

In terms of contextualising learning, in well-resourced schools teachers were not clear about how they did this. It seems most of the teachers in well-resourced schools did not contextualise information presented in the textbook but rather copied the information or activities. In middle-resourced schools, some of the teachers indicated that they developed their own activities to contextualise teaching and learning. For example, Mike said *'...we design questions that suit learners who are in urban area. The textbook doesn't matter because most of the questions are coming from the rural area and learners here they don't know anything about rural area things. .*

### **Teaching strategy**

Most of the teachers responded that the textbooks used various strategies, depending on the activity. For example, *Michael said 'They use group work, individual work and pair work', while William said 'It's a combination of all of them, it depends. Others they try to do research in it, others they will give you questions ....'* Most teachers indicated that they seldom used the strategy proposed in the textbooks. Two teachers indicating that they preferred learners to work individually. For example, *Wilma said 'I prefer individual work, because it makes learners to do things themselves, others make them not to think themselves'. Differently, Morris said that he uses 'individual and group work but more of group work, because learners learn more with their peers'. Michael said that '... the approach that I prefer is pair and individual work if they are doing it in class or write test but if you are doing resource task or project you must use group because they [learners] are many'. Moses*

said he used many methods, while Wendy was the exception, saying that she used the approach proposed in the textbook.

Regarding teaching and learning strategies, most teachers indicated that textbooks use many approaches, depending on the activity. However, most of the teachers indicated that they used their own preferred strategies which they think is best. The reasons for their decisions vary: Wilma believes that students should learn to think for themselves while Morris believes that more learning takes place when working with others. On the other hand, the availability of resources is the main consideration for Michael. In conclusion, the majority seems to have enough confidence/experience to decide for themselves on a suitable strategy.

## **5.4 OBSERVATIONS**

This section is divided into two parts, the first narrating stories of four technology teachers in their classroom presentation, presented in terms of cases, the second presenting the observations in terms of the categories found in the literature.

### **5.4.1 Narrative stories**

#### **Case 1**

On day one, Winnie was waiting for me to arrive as she was not having a class at the time. When the learners came to class, she firstly greeted them and then introduced me to the learners, telling them the purpose of my visit. Winnie distributed notes that she had prepared for learners, about different components used in electrical circuits. She started by explaining various components and their functions in different electrical

circuits. After explaining she asked them where these components, such as connector, bulb, switch, resistor, potentiometer, transistor, triode vacuum tube, thermostat, capacitor, LED and LDR can be used in electric circuits. Learners were able to identify only components that they had previously used in a parallel and series circuits, and they also knew the purposes of these components. I asked Winnie how they knew parallel and series circuits, assuming that she had taught them before this presentation. She told me that they had learnt these in grade 8 Technology and also in Natural Science, which according to the policy document would be true. The current lesson was about designing an electric circuit for different purposes, e.g. alarm, bell. For homework, she asked learners to use the Internet to find circuit diagrams of different devices and to identify their components.

On the second day, all learners brought the information because they all have access to the Internet. Only those who were absent on the previous day did not do the homework. The teacher asked learners to discuss their results in small groups and prepare feedback to present to the class. The presentations were interesting and in some cases the learners also gave the functions of components, even though the teacher did not ask for that. It seems that the accessibility of the Internet enabled them to learn beyond the teacher's expectations. After that the teacher asked them to complete an activity in their workbook, which required them to design a series and a parallel circuit. The teacher requested learners to do the activity individually in their workbooks and then brainstorm in a group of 6 learners to decide on the final design. During the observation, learners were also using their Technology textbooks and Natural Science textbooks as references. While they were busy working individually, the period came to an end and the

teacher asked them to finish their work at home so that they could continue the brainstorming the next day.

On the third day, learners discussed their individual drawings in groups and later submitted their final work to the teacher before the period was over. During the last day, Winnie distributed their scripts and started to do corrections with them on series and parallel circuits. She asked learners to look at the feedback as she was going to discuss it without selecting a specific group. She explained and corrected their mistakes while they were also asking questions to get clarity on their mistakes. After completing the corrections she asked them to discuss and do the next activity with their groups and prepare one design that they would use to assemble their product. The activity was to design a circuit that would supply a low DC voltage to control a circuit that would activate an output as soon as it became dark. They started discussions, but the period was over before they could finish, so Winnie asked them to complete the activity during their own time using their workbooks.

## **Case 2**

I arrived during break and found Wilma waiting for me in the staffroom. In class, She began a lesson on the topic '*electronic components used today*'. All the learners took out their textbooks. Wilma used *PowerPoint* to present the lesson while learners listened, having been promised time to copy after explaining. She then allowed them to copy the notes and reminded them to read their textbooks as well as notes at home so that they could understand better. The information she presented was related to the information in the textbook but in more detail. During the second day learners did an activity taken from the textbook in their exercise books. Learners were asked to write the activity individually but were first allowed to discuss it with their classmates. The textbook

proposed pair work whereas Wilma wanted them to do the activity individually. The activity was about identifying different electronic components and to indicate the input-process-output for each one. The learners were not able to finish the activity as the time allocated for the lesson was very short because of other school activities.

During day three Wilma asked them to take out their exercise books so that they could mark the previous work. She asked them questions based on the previous activity which they answered without the teacher writing on the chalkboard. She corrected them wherever they made mistakes so that they could have correct solutions. After the corrections she asked them to take out their textbooks and notebooks so that they could start with the next topic, which was about resistors. They learnt about different types of resistors and how to calculate the resistance using the colour code. The teacher used a *PowerPoint* presentation to explain the content information, after which she gave them a small task to calculate resistance then discuss the answers. This activity was not from the textbook but developed by the teacher. According to my observation the activity was not pre-planned but the teacher thought about it after the presentation. Like the previous day, the teacher asked them to do this individually.

During the last day, Wilma again used a *PowerPoint* presentation but she also used the chalkboard to further explain the calculation. The lesson was about 'Ohms Law'. Surprisingly, the learners' responses showed that they knew this work. When I ask the teacher about it she told me that they also did this work in Natural Science. When I asked how she knew this, she said that she also checked Natural Science textbooks for integration purposes. After the presentation, and allowing them to copy the notes, she gave them homework to submit the

following period. The learners had to do an activity from the textbook, individually, though the textbook proposed group work.

### **Case 3**

When I arrived, Moses was waiting for me in the staffroom. We went to class and found learners waiting for us. Moses greeted the learners and then introduced me to them and they welcomed me politely. Moses distributed textbooks to the learners so that they could start with the lesson, which was about systems and control (mechanical systems). He introduced the lesson to the learners by telling them that they were going to learn about 'different components used in mechanical systems'. Then Moses asked one learner to read the information presented in the textbook. While the learner was busy reading, Moses frequently stopped the learner and asked the class questions so that they could further understand by discussing it and relating it to real-life examples. For example, he explained concepts such as electrical systems, mechanical mechanisms, input, process and output. During the discussion Moses allowed learners to use their first language to express themselves. After discussing Moses wrote on the chalkboard an activity which required learners to define some concepts. It was not in the textbook, but had been developed by the teacher. Moses asked them to discuss it with their class mates and write individually in their exercise books. At the end of the period the learners submitted their exercise books together with the textbooks.

On the second day of my observation, I arrived at school as before and found Moses waiting for me, so we went to class. Moses greeted the learners as usual and opened his textbook. He asked one learner to fetch the learners' exercise books from his desk so that they could do the corrections for the activity that they had submitted in the previous

lesson. The learner who fetched the exercise books had to distribute them randomly so as to ensure that learners did not correct their own work. During corrections Moses asked questions based on the written activity and the learners answered him while he was writing on the chalkboard. He then went to the desks, signing their exercise books, after which he asked one learner to distribute the textbooks so that they could continue with the next activity. The activity required them to copy the table from the textbook and complete it in their workbooks. They had to identify the objects shown in the textbook and identify the input-process-output. Learners were asked to do that activity in groups of four, whereas the textbook suggested pair work. In the activity Moses did not change any question from the textbook. When the period was over he asked them to finish and submit the activity as they would do corrections. The teacher asked one learner to collect the textbooks and take them to his office before we left the class.

On day three of my observation, Moses used the same approach as on day two for doing the corrections for the previous activity. After the corrections he continued with the next topic, namely 'different types of systems'. The approach to deal with this topic was similar to that used during day one: Moses asked one learner to read the from the textbook while he explained some difficult words by relating it with real-life context, e.g., gear, level, pulley, hydraulic and pneumatic systems. The teacher also asked learners to show where these systems worked. Next the teacher referred them to an activity which they had to complete and submit. He asked them to work in groups whereas the textbook proposed pair work. The activity required learners to identify different components of each system shown in the textbook, to write input-process-output, to explain how each system benefited the people who used it and also to state whether the system was mechanical, electrical



or a combination. Moses did not change any question from this activity. While the learners were still busy doing the activity, the period was over and Moses asked them to copy the textbook questions and complete it at home, after which he asked two learners to collect the textbooks and we left.

During the last day of my observation, the class began by doing corrections as on other days. After the corrections he distributed the textbooks so that they could start with the next topic of 'the impact of technology on peoples and the environment'. Moses discussed carbon dioxide production, acid rain and the energy crisis with the learners, giving real-life examples. The approach used was the same as on day two. He then gave learners an activity from the textbook and did not change anything from the textbook, asking them to do it individually as the textbook suggested. That was the end of the period and Moses said that they had to copy the questions and do the activity at home.

#### **Case 4**

During the first day, Mike introduced me to the learners after greeting them. He asked them to take out their class workbooks to do corrections. While they were busy doing corrections I realised that the questions were very similar to the ones in the textbook, since I had the textbook in front of me. This was more surprising because during the interview session Mike had told me that he was not a 'textbook fan' but that he 'uses it only as a resource book or as a guideline'. When I checked learner's class workbooks in passing, I found that learners were marking an activity from the textbook. When I asked him why he was using the textbook, since during the interview he had told me that he used the textbook only as a guideline, he told me that he used three different exercise books. The first exercise book was for informal

assessment tasks, those tasks that come from the textbook. The second exercise book was for formal assessment, those were tasks coming from real-life scenarios and doubled as a portfolio of evidence. The third exercise book was a resources book for notes. During this period only the corrections were made.

During the second day, Mike started by distributing the textbooks amongst the learners, there were not being enough for each learner to have one, as he had explained during our conversation. He was busy with a chapter on systems and control, and during this period he was doing the topic of 'Energy crisis in Africa'. He read the information given in the case study and explained to the learners while asking them some real-life questions so that they could better understand by participating in a discussion. During the discussion Mike allowed learners to use their first language to respond. He asked them to identify any crisis that they had experienced during the past month and explained how this had affected their lives. After learning about their experiences of the energy crisis, Mike gave them an activity. He preferred that they worked in groups of four, though the textbook proposed they read the case study on their own and then worked on their own to answer the questions.

On the third day learners had to make corrections again, as they had on the first day. There were many questions and it took them the whole period to finish the corrections as the teacher was also elaborating on their answers.

During day four we went to class as usual. Mike distributed the textbooks and asked the learners to open their textbooks at the topic on levers. Mike read the information about levers and their different classes as presented in the textbook. He also asked learners to look at the

pictures and related his explanations with real-life situations. The textbook did not propose anything in terms of how to deal with the content information but indicated that they should work individually to answer the activity. Mike suggested that learners work in pairs to do the activity. The activity required them to identify different types of levers based on the pictures provided. There was not much time left, so Mike told the learners to copy the questions from the textbook and do the activity at home in their own time.

#### **5.4.2 Observation schedule**

The seven categories identified in the literature were also reflected in the items of the observation schedule. There were specific and open-ended items that could relate to any category, depending on teachers' practices. The open-ended items were useful in enhancing the trustworthiness of the observations.

#### **Content**

In terms of the content knowledge, the data showed that there was a difference in how teachers from the two contexts presented content information. In well-resourced schools, both Winnie and Wilma compiled additional notes, and they also explained to learners. In middle-resourced schools, Moses and Mike used only the information presented in the textbook and discussed it with the learners. Moses asked one learner to read the content information from the textbook. While the learner was busy reading, Moses often stopped her and asked questions to the whole class to stimulate discussion. Mike read the information himself and then discussed with the learners. In well-resourced schools both teachers being observed added more information to that of the textbook by developing notes. In medium-resourced schools, both teachers being observed read only the

information presented in the textbook, without adding any. In both contexts, teachers explained the relevant content and involved learners in discussions.

### **Connections**

In terms of the content information both teachers observed in well-resourced schools connected content information by developing notes and explaining to learners. In the middle-resourced schools both teachers being observed connected information by discussing content with learners. For example, Mike asked learners to look at the diagrams while he explained the levers, and he connected the information with real-life situations. It seems that in both contexts teachers verbally linked information to enhance learner's understanding but only well-resourced schools added notes to enhance connections.

### **Language**

In the well-resourced schools, neither teachers nor learners changed the language during the lessons. These classes had black and white learners, so switching to African languages would not be helpful for all learners. In the middle-resourced schools both teachers were using English but also code switched to learners' first language, e.g., Xitsonga or Sepedi. During the discussion and answering of the questions learners were also using English but sometimes switched to their first language. In both contexts, all teachers used discussions and explanations, which also helped learners to understand the technical or academic language in textbooks.

### **Format**

In one of the well-resourced schools, Wilma made use of *PowerPoint* presentations. She also allowed learners to copy the presentation, which

provided not only additional content but also a new format of content. Mike directed learners to look at the diagrams in the textbook while he was explaining levers; this emphasis could support learners who learn better through visual representations. The practice of reading from the textbook in the medium-resourced schools meant information was being presented in an audio format, which could enhance learning for those who learn better through hearing than reading. Regarding activities, during the lesson observations none of the teachers changed the format of activities presented in the textbooks.

### **Activities**

In both contexts it was observed that all teachers used activities provided in the textbook unchanged and that some developed additional activities. For example, Wilma asked learners to copy activities from the textbook without modifying them on days one and three, but she also developed other activities for days two and four. Moses also used textbook activities as well as an activity that he had developed himself. Differently, Winnie and Mike only used activities from the textbooks, without any change or modification. It appears that all the teachers made use of textbook activities without changing them, and some developed additional activities.

### **Context**

In both contexts it was observed that teachers used real-life examples when explaining or discussing the content knowledge. Wilma was the only one who did not relate any content with real-life contexts during the lessons observed.

### **Teaching strategy**

The data showed a difference between the two contexts in terms of how teachers presented content. Both teachers in well-resourced schools prepared additional notes for their learners and explained the content. In middle-resourced schools, both teachers had the content read from the textbook to the learners. Both teachers also discussed the content by asking questions so that learners could participate.

For activities, most teachers changed the strategy presented in the textbook and used their own preferred strategies. Moses was the only one observed to use the strategy proposed in the textbook, and that happened only once. The strategies used for activities differed within and across the two contexts. In the well-resourced schools, both teachers preferred learners to do and submit their work individually, but they were encouraged to discuss the activities in groups or pairs. In the middle-resourced schools, Mike required individual work for only one of the four activities, while Moses used individual work in two of the four cases.

## **5.5 CHAPTER SUMMARY**

This chapter reported on the data collected from nine Technology teachers from two different contexts. It firstly presented data collected from interviews with nine teachers on how they selected, evaluated and used the textbooks. I then reported on lesson observation for four of these teachers. In the next chapter, I discuss my findings of this study in terms of the conceptual framework, substantiated by the literature.

## CHAPTER 6

### UNDERSTANDING TEACHERS' PRACTICES

#### 6.1 INTRODUCTION

In exploring how technology teachers engage with commercially prepared textbooks in the South African context, I was led by two research questions, firstly how technology teachers evaluate and select textbooks and secondly how technology teachers use textbooks. These questions were analysed using two conceptual frameworks, i.e. 'textbook register' and 'didactical transposition'. Data was collected using two instruments, namely interviews and lesson observations. Table 6.1 reflects the way the research questions were explored in terms of the instruments and discussed in terms of the conceptual framework.

**Table 6.1:** Research questions explored in terms of the conceptual frameworks and instruments.

| RESEARCH QUESTION   | CONCEPTUAL FRAMEWORK     | INSTRUMENT                |
|---|--------------------------|---------------------------|
| How do technology teachers evaluate and select commercially prepared textbooks?     | Textbook register        | Interview                 |
| How do Technology teachers use commercially prepared textbooks in their classrooms? | Didactical transposition | Interview and observation |

This chapter firstly reflects on how the two instruments were used to corroborate the data to check its credibility. Next, the two research questions were discussed in terms of the conceptual frameworks, reflecting the seven categories found in the literature. For each research

question, the similarities and differences across the two contexts were discussed.

## 6.2 TRIANGULATION

Two instruments were used to collect data. This enhanced credibility as I could check whether a teacher's classroom practice was in agreement with his/her remarks during the interview. Triangulation of results for interviews and observation is discussed below, separately for each of the four teachers observed. Except for Mike, there was good agreement between claims made during interviews and practice during lesson observation.

### Winnie

Winnie's classroom practice was found to be in agreement with her remarks during the interviews. She indicated that the main reason for selecting the textbook was that '*they have more information and they could give clear guideline of marking rubric and year plan and term plan*'. This was in agreement with my observation of her using a technology activity workbook from RAU (Engelbrecht et al., 2004), which contained information related to activities and planning as well as marking rubrics for all activities at the end of each module.

Regarding content, Winnie said that she '*... look if it [the textbook] has notes of the content and explanation*'. However, the selected textbook did not meet her requirements of comprehensiveness and explanation so she developed additional notes for learners, as she mentioned during the interview. This was confirmed during my observation when Winnie gave additional notes to learners.



In terms of the activities, Winnie said that the textbook she was using had suitable activities which learners could do independently. This was confirmed during my observation when she asked learners to do all activities from the workbook without adding or omitting any information. In view of the abovementioned agreements between the interview and the observations, data collected from Winnie was regarded as credible.

### **Wilma**

Wilma said the most important reason for selecting the textbook was that it followed the curriculum and assessment guidelines, and that it should have the '*majority of those things*'. In spite of this, she was not completely satisfied with the content. In terms of the content knowledge Wilma said during the interview '*I often find that textbook is not comprehensive, there is not enough information and all the work that we need to cover in a year*'. She further commented that '*the book that I am using is not best in terms of comprehension. There are still lots of information that I have to add in*'. Her dissatisfaction with the textbook's content was confirmed during the observations when she supplied notes, adding more detail to the textbook content.

Regarding activities, Wilma said that while some were of a very low standard others were suitable. Wilma adapted her use of textbook activities accordingly, as she selected activities that have a better standard and used them unchanged. She also supplied additional activities, as observed during the third day. She also said that when she used textbook activities, '*I don't add or take anything out; they do activity as it is in the textbook*'. This was also confirmed during days two and four of my observation, when she asked learners to do activities from the textbook.

In terms of teaching approach, Wilma said that '*I prefer individual work, because it makes learners to do things themselves, others makes them not to think themselves*'. This was confirmed during my observation when she instructed learners to work individually whereas the textbook had proposed group work and pairs. Based on the agreement between Wilma's interview and classroom practice, data collected from her was regarded as credible.

### **Moses**

During the interview, Moses indicated that the alignment of the textbook's content information with the curriculum was the most important reason for selecting it. During days one and three of my observation, Moses demonstrated that he truly valued the textbook's content, as when he asked one of the learners to actually read the section to the class. While the learner was reading, Moses sometimes stopped her and asked questions to the class to discuss and explain the content. This was in agreement with his remark '*...in most cases there are some of the words that learners do not understand, then you explain them to the learners*.' Also, when I asked Moses if he sometimes added content his response indicated that he would explain difficult words rather than add content. This was in line with my observation of him presenting content by having the textbook read to the class. He indeed 'taught by the book'.

When asked if the textbook played an important role in his classroom presentation, Moses referred to activities, saying '*it [the textbook] helps a lot, because it has got activities that you can give learners to do*'. Later in the interview he added that there were many activities. During the lesson observations, Moses used three activities from the textbook, without changing them, supporting the remarks he had made during the

interviews. When I asked Moses if he used the approaches proposed in the textbooks he said '*No, I use many*'. This was confirmed during observations when I noticed that he changed the teaching approach proposed for specific activities in the textbook.

It seemed that Moses was satisfied with what the textbook offered in terms of content and activities, but that he deviated from the textbook's proposed teaching strategies. The data obtained from Moses was regarded as credible since his behaviour during my observation was in agreement with his interview responses.

### **Mike**

Some of the statements Mike made during the interview were contradicted during my observation. He actually used the textbook as it was, without making any changes as claimed during the interview. For example, Mike said that '*I summarise the textbook all of them and I give them questions and they respond*'. Throughout my observation he did not attempt to summarise the textbook but rather read it to the class and discussed it with them. Surprisingly, during the interview session Mike said that he was '*not a textbook-fan*' and that he used the textbook as a reference, which contradicted his practice of reading the information directly from the textbook.

When I asked him about the content of the textbook he responded '*... textbook doesn't matter because most of the questions are coming from the rural area and learners here they don't know anything about rural area things. I develop questions that suit the learners who are in urban area*'. This was also contrary to his practice as he did not attempt to develop any activity during my observation, but rather asked learners to copy the activities without changing them. These contradictions between

Mike's responses during the interview and what he actually did during my class observation suggested that his interview responses were not credible.

### 6.3 RESEARCH QUESTION 1

The first research question probed how technology teachers evaluated and selected textbooks. The data was analysed with the aid of the conceptual framework of textbook register. The discussions of the findings were arranged in terms of the dimensions of textbook register, namely *field*, *mode* and *tenor*. Table 6.2 illustrates how the dimensions of textbook register relates to the categories extracted from the literature, as discussed in chapters two and three of this study.

**Table 6.2:** Relationship between dimensions of textbook register and categories.

| Dimensions of Textbook Register | Categories from the Literature    |
|---------------------------------|-----------------------------------|
| Field                           | Content<br>Connections            |
| Mode                            | Language<br>Format<br>Context     |
| Tenor                           | Activities<br>Teaching strategies |

#### Field

As discussed in chapter three, the field of the textbook referred to the management of content knowledge presented in the textbook. This was analysed in terms of two categories, namely content information and connections. In terms of the content, all teachers in both contexts

required content information that covered the curriculum. This result was in agreement with that of Lemmer et al. (2008) and Byrd (2001), who identified content alignment with the curriculum as the most crucial aspect to be considered when evaluating and selecting textbooks.

In terms of the connections, most of the teachers in both contexts believed that information in textbooks should be linked to enable meaningful learning to take place. Only one of the teachers in middle-resourced schools did not perceive linkage with the textbook as essential, as she argued that she could explain connections to limit misunderstanding. My results are therefore in agreement with existing literature on the importance of connectedness of information in textbooks (Beck and McKeown, 1994; Byrd, 2001; Kesidou & Roseman, 2002).

The teachers in both contexts considered content and connections as important criteria in choosing the textbook. However, there was also an interesting difference between teachers from the two contexts. Most of the teachers in well-resourced schools also compiled additional notes for learners as they believed that the textbooks did not supply sufficient content knowledge. This may be an indication that teachers in well-resourced schools were more knowledgeable or confident regarding appropriate content. However, the reason for this difference was not probed as it lay beyond the scope of the study. It could be explored in further research.

### **Mode**

The mode of the textbook refers to how the content is communicated to the user. This was analysed in terms of three categories, namely *language*, *format* and *context*. Regarding textbook language, it seemed

that teachers accepted the language used in textbooks as a given fact which they did not criticize, even though the majority of learners and some teachers used English as a second language. However, in both contexts teachers indicated that they explained in simpler language to improve understanding of textbook English. This finding coincided with that of Harniss et al. (2001) and Kinder et al. (1992), who found that teachers were not critical of the language used in the textbooks but regarded content knowledge and the activities presented in the textbook as more important. Furthermore, my results showed that teachers' lack of evaluating textbook language was observed in both contexts.. It is noteworthy that even teachers who themselves were second language users accepted teaching and learning in English as a reality of education in South Africa.

Teachers' requirements for well-formatted textbooks were in agreement with existing literature of Holliday (2003) and Dreckmeyr et al. (1994), whose criteria for textbook evaluation emphasized textbook format. Some teachers in medium-resourced schools indicated that they required more diagrams, while others emphasized that textbooks should have a list of terms. There were also preferences that activities be in a format suitable for photocopying, so that learners could easily complete them. In addition, teachers in both contexts preferred textbooks that emphasized the technological steps, which may be an indication that they were unsure about how to teach Technology Education.

In terms of the contexts, most of the teachers in this study preferred information and activities that was contextualised. They indicated that information and activities should be set in familiar situations so that learners could make sense of it, supporting researchers like Lemmer et al. (2008), Byrd (2001), Dreckmeyr et al. (1994) and Zahorik (1991) on

the importance of contextualising teaching and learning from a socio-constructivist perspective. Moreover, my results indicated that teachers from both contexts recognized the need to contextualise new information. Mike's comment on rural situations portrayed in textbooks reflected urbanisation in South Africa. Many children in metropolitan areas are no longer familiar with rural life, a factor which should be taken into account by textbook writers.

### **Tenor**

The tenor of the textbook referred to interactions between the textbook and its users, which include learners as well as teachers. This was analysed in terms of two categories, namely *activities* and *teaching strategies*. Activities included written exercises, designing and practical work that the learners should do themselves to enhance their learning. In both contexts, teachers regarded suitable activities which they could use without adapting as a very important requirement for textbooks. This result agreed with existing literature of Stoffels (2005), Haggarty and Pepin (2002) and Byrd (2001), who found that teachers prefer textbooks that have more activities for learners. It could mean that teachers were unsure about how to develop or adapt activities or that they simply wished to reduce their workload.

In terms of teaching strategies, the data showed that most of the teachers did not check the strategies proposed for activities as they used their own preferred methods. This differed from the argument that teaching strategies should be an important criterion to be considered when evaluating and selecting textbooks (Lemmer et al., 2008). My result of teacher's disregard of the proposed teaching strategy for activities was observed in both contexts.

Another aspect that I classified under teaching strategies was *guidance given to teachers*. Teachers in well-resourced schools indicated that they preferred a textbook to provide a year planning, marking rubrics, and facilitator guide. This result supported that of Lemmer et al. (2003) and Kesidou and Roseman (2002), who identified a teacher's guide as an important aspect to be considered when evaluating and selecting textbooks.

### Summary

Table 6.3 (below) summarises the findings on research question 1, indicating the criteria used to evaluate and select textbooks as reported by teachers from two different contexts.

**Table 6.3:** Summary of the criteria for evaluation and selection of textbooks as reported by teachers in medium- and well-resourced schools.

| Dimension of register | Categories   | Comparing contexts                 |
|-----------------------|--|------------------------------------|
| <b>Field</b>          | <b>Content</b><br>Covers curriculum<br>Comprehensive       | Both contexts<br>Well-resourced    |
|                       | <b>Connections</b><br>Linked information                   | Both contexts                      |
| <b>Mode</b>           | <b>Language</b><br>Not critical                            | Both contexts                      |
|                       | <b>Format</b><br>Require diagrams<br>Require list of terms | Medium- resourced<br>Both contexts |
|                       | <b>Context</b><br>Familiar situations                      | Both contexts                      |
| <b>Tenor</b>          | <b>Activities</b><br>Suitable to use as is                 | Both contexts                      |



|  |   |                                 |
|--|---|---------------------------------|
|  | <b>Teaching strategies</b><br>Not crucial for activities<br>Teacher's guide | Both contexts<br>Well-resourced |
|--|---|---------------------------------|

## 6.4 RESEARCH QUESTION 2

The second research question explored how technology teachers use textbooks in their classroom practice. The data analysis drew on the notion of didactical transposition (Candela, 1997) presented in Chapter 3. Didactical transposition is the process of transforming content knowledge to school knowledge. Candela (1997, p.499) described school knowledge as the 'product of a collective construct process expressed through everyday school practices in the classroom'. This transformation is mediated by the teachers, interacting with knowledge presented in the textbook. The discussions of the findings were arranged in terms of the categories for textbook selection, which also featured in the literature on textbook usage.

### Content and Connections

During interviews in well-resourced schools, teachers indicated that they adapted the content presented in the textbook by adding information from other sources. This practice was confirmed during my class observations in well-resourced schools. Similar practices were observed by Haggarty and Pepin (2002), who found that mathematics teachers in France preferred to develop additional notes and use textbooks mainly for activities. However, in middle-resourced schools in this study, teachers indicated that they were satisfied with the textbook content. They presented the content by actually reading from the textbook as it was, and just discussed it with the learners to make it clear. These teachers tended to be followers of the textbook, as described by Fullan (1982) and Milne et al. (2002), where teachers follow textbooks without

any adaption. The two divergent ways of textbook usage found in the literature were therefore also observed in the current study and, importantly, the phenomenon was related to school context. In well-resourced schools, didactical transposition involved adapting, while in medium-resourced schools it involved following.

In both contexts, connections were emphasized verbally by explanations and discussions. The added content in the well-resourced schools also served to strengthen connections.

### **Language, Format and Context**

In terms of the language, most of the teachers indicated that they explain in simpler language to adapt the level of language used in the textbook. In medium-resourced schools, code switching from English to learners' first language was observed. This did not happen in well-resourced schools, where most of the teachers were white, and probably unable to speak any African language sufficiently well to assist black learners. Not even the one black teacher used African languages because the classes in well-resourced schools included black and white learners. My results on code switching were therefore in agreement with the existing literature on the use of learner's first language (Lambert, 1999; Setati, 2005). Moreover; my results indicated that code switching of textbook language was observed only in middle-resourced schools, not in well-resourced schools.

Textbooks present content mainly in the format of written text, while the teachers' explanation and discussion of content in both contexts provided alternative representations. Another transformation of textbook format involved presenting textbook content (and additional content) visually, by using a data projector to present lessons in two of the well-

resourced schools. In the medium-resourced schools, the written content was read to the learners, which could support learners who find it difficult to learn from written text. However, it is not clear whether this mode of presenting content holds any advantages: reading may be better than a poor explanation, but poor reading may be worse.

As discussed earlier, the format of activities presented in the textbooks was not adapted, and teachers preferred textbooks with activities which they could use unchanged. During my observation of lessons, all teachers in both contexts related content knowledge with learners' experiences, but they did not contextualise any of the textbook activities.

### **Activities and teaching strategies**

Teachers in both contexts preferred to use the activities presented in the textbook but they also developed additional activities. This result agreed with Stoffels (2005), Lubben et al. (2003), Haggarty and Pepin, (2002) and Lambert (1999). Furthermore, my results on teachers' preference to use readymade textbook activities were observed in both contexts.

There was a remarkable difference between the cognitive levels of activities developed by teachers across the two contexts. In one of the activities in a well-resourced school, learners had to use the Internet at home to find circuit diagrams for various devices, and they had to identify components in these circuits. In contrast, an activity in the middle-resourced school only required learners to write down definitions of some concepts which they could simply copy from their textbooks.

Teachers in both contexts seldom used the approach suggested in the textbook for activities but preferred to use their own. My results were therefore in agreement with that of Haggarty and Pepin (2002), Lebrun,

Lenoir, Laforest, Larose, Roy, Spallanzani and Pearson (2002) and Jaffer (2001), who found that teachers preferred to use their own pedagogical approach to that presented in textbooks. The fact that this practice was observed in two different contexts is a new result. All teachers indicated that they did not prefer one specific method but rather used many, depending on the task that they were doing. However, in well-resourced schools teachers preferred that learners work individually, though they sometimes made use of group and pair work to ensure that learners engaged in social meaning-making.

### Summary

Table 6.4 (below) summarises the findings of my study on how technology teachers use textbooks in their classroom practice. The table shows textbook use for the seven categories, as observed in the two different school contexts.

**Table 6.4:** Summary of findings on textbook use by teachers in medium- and well-resourced schools.

| <b>Didactical transposition for the seven textbook categories</b>   | <b>Comparing contexts</b>                           |
|---|---|
| <b>Content and connections</b><br>Develop notes with additional content<br>Read the textbook to the class<br>Explain or discuss with learners | Well-resourced<br>Middle-resourced<br>Both contexts |
| <b>Language</b><br>Explain content in simple language<br>Code switching to learners' home language  | Both contexts<br>Middle-resourced                   |
| <b>Format</b><br>Unchanged for textbook activities  | Both contexts                                       |

|   |                                 |
|---|---------------------------------|
| <b>Context</b><br>Discuss content in real life context.   | Both contexts                   |
| <b>Activities</b><br>Textbook activities used unchanged<br>Develop new activities                             | Both contexts<br>Both contexts  |
| <b>Teaching strategies</b><br>Own preferred approaches used for textbook activities<br>Prefer individual work | Both contexts<br>Well-resourced |

## 6.5 CONCLUSION

This study explored how technology teachers engage with commercially prepared textbooks. Two contexts, namely well-resourced and middle-resourced schools in South Africa were compared. The study was led by two research questions, firstly how technology teachers evaluate and select textbooks and secondly how technology teachers use textbooks. I found similarities and differences across the two contexts regarding both research questions. Also, the teacher textbook requirements played a role in the way they used textbooks.

It is important to note that most of the teachers in this study began their teaching careers after or at the time when Technology Education as a learning area and OBE were introduced. Mike was the only one of the nine teachers who had been teaching under the old curriculum, with a total of twenty years teaching experience. The others all had ten years or less experience in teaching, therefore it is unlikely that their practices were influenced by own experiences of content-based teaching.

Teachers in both contexts regarded content alignment with the curriculum as an essential requirement for textbooks. However, their use of textbooks showed that teachers in well-resourced schools were not completely satisfied with what the textbooks offered, so they added content which they deemed necessary. They can therefore be regarded as independent textbook users, while teachers from middle-resourced schools can be described as typical textbook followers. Their classroom presentations consisted of having the relevant sections read to the class, indicating that they did not question the authority of the textbook. It is not clear what the reason for this difference is and further investigation is recommended.

Some questions are unanswered: Why were teachers in well-resourced schools not satisfied with textbook content, and what kind of content were they adding? It may be that teachers in well-resourced schools are better trained or perhaps more confident. It could also be that the well resourced schools maintained a traditional culture that valued content in spite of the focus on skills rather than content in OBE. Since all the teachers in the well-resourced schools began teaching after the introduction of Technology Education and OBE, it can be argued that their practices of adding content were not influenced by their own personal experiences of teaching the old curriculum. Ultimately it can be argued that the teachers in both contexts may be unsure of exactly what content is required by the curriculum. This could explain why teachers in well-resourced schools added content, seeing the textbook as insufficient, while teachers in medium-resourced schools followed the textbook rather than rely on their own judgement.

Although English is not a home language for most learners, particularly in medium-resourced schools, teachers in both contexts did not regard the language level of textbooks as an important criterion for evaluating and selecting textbooks. It appeared that they accepted the use of English as a language of learning as a reality in South Africa. In order to assist learners to understand, teachers explained and discussed the content, using simpler language. Code switching to African languages occurred, but only in medium-resourced schools. These practices helped not only with language, but also to connect information.

Regarding format, teachers in both contexts required that textbooks reflect the steps of the technological process to guide their teaching, suggesting that they were still unsure about how to teach Technology Education.

Suitable activities for learners were regarded as an essential requirement for textbooks by teachers in both contexts. They used these without adapting the format but varied the teaching approach. It is not clear why they placed so much emphasis on suitable activities but there may be different reasons. It is possible that these teachers understood the socially constructivist principles of learner involvement in learning, or they may simply have understood OBE to mean that the learners should be 'kept busy'. Also, they may have preferred to use textbook activities as a way to manage a heavy workload, or may have been unsure about how to develop activities.

In both contexts teachers also provided additional activities, though again it is not clear why. It may mean that they wanted to raise or lower the standard. The activity provided by Moses in a middle-resourced school only asked for definitions, while in a well-resourced school,

Winnie provided an Internet activity on circuit components. Together with Wilma's remark on low standards of textbook activities, this suggested that teachers in well-resourced schools expected more from learners.

In terms of context, teachers indicated that they required practical information and relevant activities. In both medium- and well-resourced schools they discussed or explained content, placing it in the context of real life. However in terms of the activities, teachers did not attempt to contextualise additional activities that they were developing, and they did not contextualise any of the textbook activities. So while they were aware of the importance of contextualizing, it was not clearly reflected in activities. This may indicate that they did not know how to contextualise activities, or that a heavy workload prevented them from spending more time on them.

In terms of teaching and learning strategies, in both contexts teachers seldom used strategies proposed in the textbook, while mostly they used their own preferred strategies. Group work and working in pairs were observed in both contexts, but teachers in well-resourced schools preferred that learners worked individually. This once again suggested that well-resourced schools value the traditional emphasis on individual effort as opposed to group work.

Interestingly, teachers from well-resourced schools also indicated that they required textbooks to provide teacher support given in the form of teacher guides, year planning and marking rubrics. The teachers from the medium-resourced schools did not mention similar requirements. Once again the reason for the difference was not clear. Were they still unsure about OBE pedagogy, or did they simply need it to cope with the



workload? It may be an indication that well-resourced schools set high academic standards. However, it may once again mean that they are unsure of what is expected by the curriculum in terms of pedagogy.

## **6.6 LIMITATIONS, IMPLICATIONS AND FURTHER RESEARCH**

The context of the study excluded generalization to other countries and other subjects. Firstly, Technology Education is a new learning area in South Africa. Secondly, it was introduced at the time when OBE was introduced, therefore results for a similar comparative study in a well established subject and/or curriculum in a developed country may be very different from what I found. Furthermore, this was a case study, so a different sample may also have produced different results. However, the value of this study does not lie in generalizations, but in understanding how these unique conditions contributed to teachers' engagement with textbooks.

The study showed that teachers in both contexts attempted to meet the requirements of the curriculum when selecting textbooks. There are indications that teachers in both contexts are unsure about content and pedagogy the curriculum expects of them and that teachers in well-resourced schools had higher expectations of learners. It is recommended that teachers be assisted by specialists to interpret the curriculum and to adapt activities according to their own context in order to improve their classroom practices.

This study opened up new questions on technology teachers' engagement with textbooks. Firstly, the content added by teachers in well-resourced schools and the activities added by them in both contexts need to be explored. Secondly, it would be interesting to explore why

teacher guides are required in well-resourced schools but not in medium-resourced schools. Finally, research should be conducted into why teachers in middle-resourced schools tend to follow textbooks without adaption. These issues need to be investigated further to understand teacher behaviour and to improve teacher's use and adaption of textbooks.

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## APPENDIX A: INFORMATION ON A RESEARCH PROJECT



Department of Science Mathematics and Technology Education  
Faculty of Education  
University of Pretoria  
3 June 2009

To: Grade 9 Technology teachers  
Selected GDE schools  
Tshwane district

### **Information on a research project**

I am a student at the University of Pretoria, registered for a Masters' degree in Technology Education. I am collecting data for my research project, entitled 'A comparative study of how Technology teachers evaluate, select and use commercially prepared textbooks'. Teachers from ten selected schools will participate in the project.

The Department of Education gave permission that data may be collected for this project in GDE schools. Also, the Ethical Committee of the University of Pretoria has certified that the research conforms to the required ethical standards. Your school's principal has signed permission that data may be collected in this school.

You are invited to participate in this research project. I wish to point out that your identity as well as your schools' name will not be revealed in the research and that your participation is completely voluntary. If you choose not to participate, another teacher will be approached. Should you decide to participate, you will be expected to participate in an interview and lesson observations.

The interview is expected to last less than 45 minutes. You will be asked questions about how you evaluate, select and use textbooks. A voice recorder



will be used as an accurate record of the interview, and you will have the opportunity to read the transcription of the interview to ensure that it accurately reflects your ideas. There will observation of four of your lessons to understand how you use textbooks in your teaching.

Should you be prepared to participate, please read and sign the document of informed consent attached to this letter.

I will appreciate your consent to assist me in my research. Thank you very much for your time.

Signed.....

Ms. M.S. Ramaligela.

Student nr. 25477499

Date:.....

Signed.....

Dr. E. Gaigher

Supervisor

Date:.....

## APPENDIX B: INFORMED CONSENT BY TEACHERS TO PARTICIPATE IN A RESEARCH PROJECT



Department of Science Mathematics and Technology Education  
Faculty of Education  
University of Pretoria  
3 June 2009

### **Informed consent by teachers to participate in a research project**

Having read the letter of information about a research project entitled ‘A comparative study of how Technology teachers evaluate, select and use commercially prepared textbooks’, please read the conditions below and sign if you agree to participate.

#### **I understand and agree that:**

- My identity as well as that of my school and learners will be held in the strictest confidence.
- Information will be used only for research purposes.
- A voice recording will be made of an interview conducted by the researcher.
- I will teach four lessons to be observed by the researcher. The researcher will focus on how I use the textbook and she will not observe the learners during these lessons.
- I am not waiving any human or legal rights by agreeing to participate in this study.
- Results of this study may be used in my dissertation, conferences and articles in research journals.
- My participation in this study is voluntary, and I can withdraw at any stage.
- My participation will contribute to understanding how textbooks are utilized.



- I verify, by signing below, that I have read and understood the conditions listed above.

**Name:** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Place:** \_\_\_\_\_

Signed.....

Signed.....

Ms. M.S. Ramaligela.  
Student nr. 25477499

Dr. E. Gaigher  
Supervisor

Date:.....

Date:.....



## APPENDIX C: INFORMATION ON A RESEARCH PROJECT



Department of Science Mathematics and Technology Education  
Faculty of Education  
University of Pretoria  
3 June 2009

To: Parents of grade 9 learners  
Selected GDE schools  
Tshwane district

### Information on a research project

I am a student at the University of Pretoria, registered for a Masters' degree in Technology Education. I am collecting data for my research project, entitled 'A comparative study of how Technology teachers evaluate, select and use commercially prepared textbooks'. Teachers from ten selected schools will participate in the project. The purpose of the project is to investigate how Technology teachers utilize textbooks.

The Department of Education gave permission that data may be collected for this project in GDE schools. Also, the Ethical Committee of the University of Pretoria has certified that the research conforms to the required ethical standards. Your school's principal has signed permission that data may be collected in this school, and the technology teacher has agreed to participate in the project.

The data collection will not disrupt the normal learning activities. Although your child will be present in the classroom when the researcher visits the Technology teacher, there will be no interaction between the researcher and your child. Your child will not be evaluated or observed in any way. The researcher will focus on the teacher in order to observe how the teacher makes use of the textbook. The researcher plans to visit the teacher 4 times. The teacher is expected to continue normal teaching, so your child's learning will not be disrupted. Consequently, your child will not be harmed in any way.

Signed: .....

Ms. M.S. Ramaligela.

Student nr. 25477499

Signed:.....

Dr. E. Gaigher

Supervisor

Date:.....

Date:.....

## APPENDIX D: INTERVIEW QUESTIONS



### **A comparative study on how Technology teachers evaluate, select and use commercially prepared textbooks.**

**M.S. Ramaligela**

#### **Interview Protocol: Grade 9 Technology Teacher**

School (pseudonym): .....

Interviewee (pseudonym): .....

Number of years at the school: .....

Position/ Responsibility: .....

Date: .....

Thank you for your willingness to be a participant in this qualitative research study. My special interest is on how teachers' evaluate, select and use commercially prepared textbooks.

1. Which textbook/s are you using for grade 9. Technology?
2. What are the strong points in the textbook/s?
3. What are the weak points in the textbook/s?
4. Were you involved in the selection of this textbook? In what way?
5. What was the main reason for selecting the textbook you mentioned?
6. If you were in the position to select a textbook, which criteria would you use?
7. Is the language level used in the textbook suitable for your learners? If not, how do you adapt the textbook language to suit the learners' level?
8. How do you use the textbook to plan your lesson? Why?
9. How do you use the textbook while teaching? Why?
10. Do you think the textbook plays an important role in your classroom presentation? Why?
11. Does the textbook give suitable content knowledge for gr 9 Technology?
12. Do you sometimes add /omit content for the learners to study? Why?
13. Does the textbook have suitable activities that learners can do?
14. How easy are the activities if learners are to use it independently?



15. What do you add or omit to make activities clear?
16. Do you sometimes adapt textbook activities? How?
17. Are the activities in the textbook interconnected?
18. Do you think it is important that activities be interconnected?
19. Do you add or omit from activities to increase/reduce interconnection?  
Why?
20. Which approach/es do the textbook use for activities (demonstration, design, investigate, experiment, discussion, problem solving, group work)?
21. Do you use the approach suggested in the textbook? If not, which approach do you use and why?
22. What is the match between your intentions and what the textbook demands?

## APPENDIX E: OBSERVATION SCHEDULE



### **A comparative study on how Technology teachers evaluate, select and use commercially prepared textbooks.**

**M.S. Ramaligela**

#### **Observation Schedule: Grade 9 Technology Teacher**

School (pseudonym): .....

Interviewee (pseudonym): .....

Number of years at the school: .....

Position/ Responsibility: .....

Date: .....

Thank you for your willingness to be a participant in this qualitative research study. My interest during this observation is on how teachers' use commercially prepared textbooks.

1. Does the teacher use content proposed in the textbook? If not how does he add/omit/change it?

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2. Does the teacher use activities proposed in the textbook? If not how did he/she design the activities?

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3. Does the teacher use the approach suggested in the textbook to mediate teaching and learning activities? If not, how does the approach differ?

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4. How did the teacher explain difficult concepts?

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5. Are the activities suitable so that learners can do it independently?

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6. Does the teacher link the content/ activities with real-life situations?

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7. Does the teacher change the language level used in the textbook to link with that of learners?

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8. Does the teacher allow the learners creativity?

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9. To what extent does the teacher's intentions match the textbook's demands?

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