

## Contextualising textbook knowledge in Technology Education classroom: synthesising content and context

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**Abstract:** The use of textbooks is one of the important methods of teaching and learning in mathematics, science and technology subjects. Looking at the background of South Africa it makes us inquisitive to understand teachers' use of textbook in their classroom practice. The purpose of this study was to explore how technology teachers' contextualise textbooks in their classroom practice. The study investigated how four South African Grade 9 Technology teachers contextualised textbooks in their classroom context. The data was collected through semi-structured interviews and classroom observation. The results were analysed according to the conceptual framework of "Didactical transposition". The findings revealed that technology teachers regard situations of learner's context and local materials as vital to be used in the teaching and learning of technology. Teachers rely completely on the content of the textbook but prefer to develop activities that are learner's context orientated. While teachers were focusing on contextualising activities they end up compromising the expected knowledge required in that particular grade. This indicates teacher's insufficient knowledge of didactically transposing the textbook. Therefore, there is a need for teachers to be trained to adapt textbook information and to develop relevant activities without compromising the expected performance.

**Key words:** Textbook as pedagogical text, adapting materials, view of textbook, Curriculum.

### 1. Introduction

Learning support material, especially commercially prepared textbooks, has a central role in the implementation of new curriculum in South Africa since 1994 (Potenza & Monyokolo, 1999). The new curriculum named Curriculum 2005 (C2005) was introduced in 1998 to transform curriculum into single core syllabus (Department of Education (DoE), 1997). This was done to eradicate the racist curriculum that was established by the apartheid education (Ndimande, 2006). The Curriculum 2005 (C2005) caused a lot of debates and research inquiry (DoE, 2004) based on the challenges that teachers were experiencing (Gumbo, 2003). Some challenges identified in the literature include lack of qualified teachers, lack of resources, lack of clear content about the outcomes, the conflicting understandings of OBE's new pedagogy and lack of assistance to teachers as a curriculum implementer (Jansen, 2001 and Potenza & Monyokolo, 1998). This led to Curriculum 2005 (C2005) to be reviewed and adapted as the National Curriculum Statement (NCS) (DoE, 2000; Howie, 2001).

National Curriculum Statement (NCS) brought other challenges where there was a lot of production of new textbooks purporting to be aligned to the demands of the new curriculum stipulations. Ensor, Dunne, Gumedze, Tawodzera, Gatant, Jaffer & Reeves (2002) for example, claims that the textbooks as a classroom resource material has a definite impact on teachers' pedagogical practices. According to McKinney (2004) this is partly because textbooks tend to be the most cost-effective and accessible vehicles for supporting the curriculum. Lebrun, Lenoir, Laforesr, Larose, Roy, Spallanzani and Pearson (2002) suggested that the didactic materials can have the impact on teachers' classroom practices, describing textbooks as pedagogical tools. Indeed, the use of textbooks in science teaching is said to have a powerful influence on teachers' classroom practice (Peacock, 2001). Ewing (2006) states that a textbook has remained a central resource for

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teaching and learning in many schools, however its effectiveness is questionable. He added that in many contexts, students are restricted to solving routine problems from the textbook that are broken into discrete steps and are isolated from their real world experience. This form of learning has continued to dominate in many classrooms today as they are seen to be the best way of transmitting content that can be tested effectively, whereas this creates a gap for a particular group of learners (Boaler, 2002). Similarly, Wenger (1998) argued that experiencing mathematics in this way predisposes the formation of learner's identity of marginality and non-participation. Moreover, Sutherland, Winter and Harries (2001) said that textbooks is a routine approach to teaching and learning that relinquish teachers from their responsibility of planning lessons which help them to engage student. This review then forms the intellectual base for my broader research interest of understanding how technology teachers utilise textbook in the classroom practice.

## **2. Use of textbook**

### **2.1. Textbook as pedagogic texts for teachers and learners**

Curriculum materials have been suggested as one tool to aid the implementation of the education reforms (Powell & Anderson, 2002). Goodlad (1984) in Ben-Peretz (1990) also stated that the dominating form of curricula at all school levels is textbooks and is a source of insight for many teachers. Therefore, Lebrun et al. (2002) suggested that textbooks supply not only the content subject matter, but also teaching strategies and procedure in the form of an elaborately worked out approach to the presentation of the subject and a detailed lesson plan. Hinchman (1987) and Zahorik (1991), identified three ways of using textbooks namely: (1) systematic use, which expose knowledge in an orderly way; (2) source of information, which is an extension of knowledge and (3) reference in discussion, which is a thinking knowledge. Luke et al. (1989) make the point that the learner does not engage with the textbook in his or her own way in a classroom, but experiences the textbook as a support to their learning as mediated by the teacher. Olson (1989) claims that the intention of a textbook is to report meaning that are highly crystallised and singularly interpretable. In difference, Stray (1994) emphasizes the additional socio-economic values conveyed by textbooks, and sees them as market commodities.

### **2.2. Adapting materials**

Textbooks play a key role in the transmission of teaching and learning of content knowledge i.e. what should be learned and how the content knowledge should be taught and learned. Fullan and Pomfret (1977) identified two orientations frameworks; (1) "fidelity" orientation that tends to look for deviations from the original intent of curriculum developers, as reflected in the way the materials are used by teachers and (2) "adaptation" orientation that tends to look for modification of curriculum materials according to specific classroom situations. Roehrig, Kruse and Kern(2005) state that during adaptation of activities teachers also break the link between activities, decoupling activities that are supposed to be linked together or one builds on the other. Ben-Peretz (1990) also explains that teachers who introduce too many changes into these materials may cause distortions rather than accommodate them to the needs of their learners. Jaffer (2001) places teachers into two broad categories: (1) those who associate with the textbooks attempting to mirror the practices privileged there and (2) those who acted selectively upon the textbooks. It therefore suggests that teachers would respond in different ways to the textbooks and draw from it in different ways to shape their classroom practice (Ensor et al, 2002).

The study was guided by the conceptual framework of "didactical transposition" (Candela, 1997:500). Originally the notion of didactic transposition has been introduced by Chevallard (1980), in Candela (1997:500) as the "process by which existing form of knowledge is modified into an instructional instrument in the classroom". The conceptual framework of "didactic transposition" of curriculum texts is referred to as the transformation of an object of knowledge, such as the textbooks into an object of teaching in the classroom (Candela, 1997:500). In the context of this study the concept of "didactic transposition" was used as a process in which the content knowledge covered by the textbook is transformed to produce school knowledge.

## **3. Methodology**

The study sought to analyse how technology teachers contextualize textbooks knowledge for their classroom use. A qualitative-interpretive method(Creswell, 2003) was employed to answer research question. The research question that this study aimed to answer was how Technology teachersadapt Technology

textbook to suit their context. The participants for this study comprise of four Grade 9 Technology teachers which was conveniently selected within Gauteng province. The data were collected through semi-structured interviews and classroom observation with the teachers. This entailed field notes based on observation of the classroom practices/lessons and transcription scripts of interview of the respondent teachers.

## 4. Findings and discussion

The following data were collected through interview and classroom observation. Teachers' understanding of textbooks; teaching experience and environment has a determinant influence on their practice. Teachers tended to perceive the textbooks differently and they intimately explain it as a guide and others as a source of information.

### 4.1 Randy's classroom

Randy was a middle age male teacher between the ages of 40-50. The classroom was having 40-50 learners. During interview Randy said that *"when sometimes you talk about something he is able to see practical that they can grasp information more effectively than when they just see it only, because as you see that technology is practical"*. This was confirmed during class observation where Randy explains the content in the textbook by relating it with real-life examples. He gave examples about how chairs, tables and other structure can be made rigid. During the activity Randy develops activities that require learners to build a stadium that can withstand a weight of 2kg sachet of sugar. Learners used boxes and other materials to make the stadium. This activity was very good but Randy didn't comply with the requirement for grade 9 learner according to the policy document. He reduces the standard of the cognitive level required at that particular grade. Surprisingly, when I assess Randy's activities against policy document it was equivalent to the cognitive level of grade 6 learner. It seems like Randy didn't know the learning outcomes of grade 9 and didn't bother to develop assessment rubric that will help him to assess the project. When I ask him about the learners' cognitive level during the discussion, he said that the *"textbook that I am using doesn't have enough information"* which seems to be an excuse. Some of the response from Randy didn't correspond with what he was doing as he said that *"when I create formal discussions, opinions, sometimes learners can see points that I never thought about but when they say it because of life experience, we can take it maybe to the higher form"*. Randy seems to be more comfortable with the content suggested in the textbook than the activities. My findings agree with Lubinski and Jaberg (1997) who found that, teachers were extremely framed by the content knowledge suggested in the textbook by strictly sticking to topic. Randy's practice can be associated with Fullan and Pomfret (1977) frameworks of "fidelity" as he deviated from the curriculum expectation of grade 9 cognitive level.

### 4.2 Naki's classroom

Naki was a middle age female teacher between the ages of 35-40 with the class of 25-30 learners. During class observation Naki didn't read any textbook or ask learners to read the textbook but use it for activities. This was confirming what Naki said that she use the textbook if *"the activity is relevant a little bit to what so ever is around and strategy that they are using in the textbook is ok"*. During the activity she asked learners to build a tower using spaghetti and assess the strength of the tower using a bottle of 2 litres full of water. Naki prefers to use textbook activities and change material to the ones that are available. Naki seems to be more comfortable with textbook activities and prefer not to change or add anything from the textbook. Naki's practice match Jaffer's category of teachers who associate with the textbooks attempting to mirror the practices privileged there (Jaffer, 2001). However Naki was also aware of what Ensor et al. (2002) claims that material can have an impact on teachers' pedagogical practices as he changed some of the materials suggested in the textbook. During the next activity Naki used textbook more responsibly as she omitted some of the unwanted words in the activity that she was using. For example Naki found a case study in the textbook that was taken from magazine as an article about initiating girls in Ndebele culture. She said that *"they sing vulgar song to her and other traditional songs but they do dancing that is have got explicit sex and use of it, and I thought I must take that out because some parents are going to complain because we have a whole variety of cultures, we have Muslim pupil, Hindus and other religions that might take exception to that, so that type of thing I took it out so that they wouldn't be exposed"*. This findings was in line with Fullan and Pomfret (1977) "adaptation" orientation framework where Naki modified and Ben-Peretz (1990) remove some of the words in the textbook to suit her classroom situations.

### 4.3 Mary's Classroom

Mary was a middle age female teacher between the ages of 40-50, having 40-50 learners in the classroom. During interview Mary indicated that “*basically I look at, practical information if they are relevant to what they know*”. She further said that “*class activities are straightforward out from the text book*”. During class observation Mary used one of the textbook to pull out some ideas to develop the activities that learners did.

She further said that “*--- every book I look at, I grab something out of each book and I say this is integrating with the history of it, this is integrating with the future of it moving towards how it's done and that kind of stuff, so I take something out of each textbook to do*”. This was confirmed during class observation where Mary develop her own activities that where Home Economics related. Mary said that she was previously Home Economics teacher before the new curriculum transformation. Mary preferred to develop her own activities that are related to her experience than to expose herself to new ideas and new knowledge.

She didn't wish to deviate from her previous experience of “Home economics”. Mary preferred to lower the level of activities by giving them activities that they can be able to get more materials at home. For example Mary gave learners a project to make a hat that they will use during the athletics and the other learners where expected to make a school bag for their books, believing that learners they will be able to find materials. Mary changed the activity that was in the textbook completely. During our discussion the teacher explained that he changed the activity because he wanted to use the home economics textbook information. She made a crucial statement during interview that “*I was teaching home economics previously therefore I am good in economics but with other content I don't know much*”. Mary was looking for the easy things that she knows and can be able to do. My finding concur with Roehrig et al. (2005) findings as Mary adapted activity by breaking the link and its intention and develop the other activities.

#### **4.4 John's classroom**

John was an old male teacher between the ages of 60-65 with the class of 30-40 learners. During teachers activity John didn't contextualise any content knowledge presented in the textbook but prefer to read the information in the textbook and explain how things are manufactured. John's explanation was not relevant to what was presented in the textbook. This practice of John was contradicting his response during the interview that “*subject must be area based*”. During my observation with John, he didn't contextualise any teaching and learning that he was talking about. In addition John said that “*You got to explain and you set your task according to what you want, what is the need in the community, because we have to explain and put your activity clear what is the need in Soshanguve may not be the need in Geretz Marits*”.

John was more contradicting what he said during the interview. What was also surprising in this class was that during the first lesson the teachers seems like starting the content of processing materials towards the end of the term while we are expecting learners to be in the designing process, this was reflected when he start to explain what is processing. During the activity, John tried to change the activities by changing the whole activities that were suggested in the textbook and make no meaning to the purpose of the activities that was inside the textbook. John's practice was found by Roehrig et al. (2005) that teachers during adaptation of activities teachers also break the link between activities, decoupling activities that are supposed to be linked together or one builds on the other. John changed all activities to name, fill-in the missing words and state questioning. During interview John said that “*I draft my own activity, Ja you have to, because that very book is very mechanical minded, very nice book but it does not cover this they see at school, do not cover things in less topic but not it depth*”. To contextualise teaching and learning, teachers appear to resort to the least preferred lower standard issues which are having situational, minimal, and transitional or zero technologic potential (Cyril, 2006:53).

### **5. Conclusion and recommendation**

In conclusion, I found that technology teachers regard situations of learner's context vital to be used in the teaching and learning of technology. All teachers used textbook differently i.e. others used it as a source of information whereas others use it as a guide. For example, Randy and John used the textbook to get content knowledge and Mary used it to get some ideas to develop her own activities. Most of the teachers prefer to develop their own activities that are context based. However, they were not aware that they are lowering the standard of the knowledge needed in that particular grade. Some teachers like Naki preferred to change materials proposed in the textbook to the materials that they think learners can access easily. The data also showed that the difficulty from the teachers was experienced when they have to balance the actual

content knowledge to be delivered and relevance of the activity. Part of the issue may be that teachers often see content knowledge in the textbook as not relevant to their everyday life or uncertain of how they can adapt the content knowledge from the textbook and make it relevant to learners' life. This uncertainty was showed by William during the interview that “--- maybe I'm too technical minded, maybe because I come from technical school, and in my days we didn't do those stuff, we did stuff that was job related, more practical than theory, more technical things that just talking stadiums”.

The notion of “contextualising textbook knowledge” was the main issue to the teacher as they believe that learning must be context based. Most of the teachers showed that they have limited knowledge about the content of technology which hinder them from balancing between the levels of content expected and contextualising the content knowledge. In view of this, opportunity for learner to grow and learn from known to unknown was often ignored. Teachers run-away with this concept of contextualising teaching and learning which finally make teachers to compromise the quality of education and decreasing learners' ability to explore beyond what they know. The Contexts given were non-technological in nature and perceived as not complying with acceptable technology that will build learner's cognitive thinking skills. In conclusion teacher's didactical transposition of textbook is insufficient. Therefore, there is a need for teachers to be trained to adapt textbook information and to develop relevant activities without compromising expected performance.

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