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**PRIMARY SCHOOL TEXTBOOKS IN ZIMBABWE:  
AN ANALYSIS IN SOCIAL CONTEXT**

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in  
The Department  
of  
Education

Presented in Partial Fulfilment of the Requirements  
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## **ABSTRACT**

### **Primary School Textbooks in Zimbabwe: An Analysis in Social Context**

**Andrea Ryf**

This thesis is based on an examination of some of the variables that affect schooling in Zimbabwe, a Southern African country. The study consisted mainly of a content analysis of selected primary textbooks for language and gender related matters. It addressed the following questions:

- (1) Is the material presented as if the learners were first language speakers of English, the language of instruction?
- (2) How are girls and women portrayed verbally and pictorially?

The selected grade 1, 4 and 7 English and science textbooks were first examined broadly for overall features such as visual readability and order of content. Subsequently, all textbooks and the corresponding syllabi were examined for awareness of and directions regarding preparation for the language needs of the science curriculum. A focus on science vocabulary and the portrayal of males and females in the science texts concluded the content analysis.

Additional data on the actual use of texts and possible gender bias of teachers in the classroom were gathered through collaboration with graduate students at the University of Zimbabwe. Teachers' views on science education, the science texts, and boys and girls' abilities and performance were obtained.

The results point to the existence of a good potential for improved access to the curriculum by coordinating the language needs of English and other subjects. Furthermore, more work needs to be done in Zimbabwe, as elsewhere, to portray males and females in less stereotypical roles.

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## INTRODUCTION

The development of an equitable and effective system of education in most African countries is constrained by a number of factors, some imposed by former colonial powers and now perpetuated, others generated by the interaction of economic, political and socio-cultural factors. While these matters can be explored from a macro-societal level of analysis, another way is to take a mid-level look at various aspects of a selected country's curriculum and the manner in which it is implemented. In particular, the curriculum may be examined for evidence of external influence, internal consistency, for a variety of types of bias and for "fit" to the particular cultural, linguistic or other features of a social context.

This thesis is based on an examination of some of the variables that affect schooling in Zimbabwe, a Southern African country. Zimbabwe is of particular interest due to the extent to which a variety of political and economic factors have affected the educational system since independence in 1980. While the British influence remains, the introduction of an economic structural adjustment programme (ESAP) in 1991 negatively affected the progress that occurred during the first decade of independence. Therefore, the prospects for further developing an effective and equitable system of schooling remain precarious.

In order to try to obtain a clearer view of some of the issues at hand, I chose to examine two aspects of the curriculum as they relate to (a) the language of texts, and (b) issues of gender as reflected in textbooks.

In most African countries the language of instruction and of texts is the language of the former colonizing nation. While the school is often the only place where children have contact with what is, in effect, a target second language, the

need to master it is essential to pass examinations, to gain access to scarce spaces at the secondary level and beyond. Thus, language creates an obstacle to education in complex ways, which will be elaborated on in this thesis.

Similarly complex is the matter of gender. Throughout the world gender is frequently found to act as another barrier to full access to education. While gender issues may be manifested in a variety of ways (e.g., instructional process and parents' decisions to educate boys for longer than girls), gender bias may be subtle and found within the content of the curriculum, in textbooks, and in the process of instruction. The fact that gender issues are intimately tied to language use is acknowledged, but does not form the focal point of this work. The connection between language and gender here is that they are two of the important variables that impede equitable access to education. Other factors that lie outside the scope of this paper include socio-economic status, parents' education, and rural-urban residency.

Specifically, this thesis addresses the following general questions:

- (1) How does the language of a textbook present the material to be learned? In particular, are the vocabulary, sentence structure and sentence length appropriate for second language learners? Is the material presented as if the learners were L1 speakers of the language of instruction (English)?
- (2) How are girls and women portrayed linguistically and pictorially in the textbooks? For example, are the situations culturally true? Are girls and women depicted in traditional, stereotypical or modern roles? Are they under- or over-represented?
- (3) When the texts are used in the classroom, do teachers pay particular attention to language-related matters by, for example, checking that students understand the

meaning of every-day English words as well as technical terms? Do they refer to the illustrations in the texts and “read” these to the class? In doing so, how is gender dealt with?

In order to explore these matters, a content analysis of selected primary textbooks was carried out. A textbook analysis was chosen since textbooks are believed to “circumscribe a curriculum” (Kumar, 1981, 1986, as cited in Altbach, 1987, p. 93). In the context of schooling in Africa, textbooks are particularly important because they are the only tool in the classroom for implementing a rather set curriculum; and textbooks are known to reflect biases based on gender, ethnicity and social class, for instance (Scrase, 1992; Sleeter & Grant, 1991; Obura, 1991). In order to gain awareness of development over grades, yet to keep this analysis feasible, grade 1, 4 and 7 textbooks<sup>1</sup> were chosen. The focus was on the textbooks used for English and science in order to provide a comprehensive picture of both language and gender issues. By comparing, for example, the language of English and science texts one could obtain a sense of the extent to which language issues are considered when the curriculum is planned.

The selected grade 1, 4 and 7 English and science textbooks were first examined broadly for overall features such as visual readability and order of content (see 1. Overview). Three readability formulas were applied in order to obtain data on the level of difficulty of the language used by the texts and the progression thereof over grades (see 2. Language Correspondence). Then all textbooks, as well as the respective syllabi were examined for awareness of and directions regarding preparation for the language needs of the science curriculum (see 2. Language Correspondence). A focus on scientific vocabulary and the

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<sup>1</sup> Grade 7 represents the last year of primary schooling.

portrayal of males and females in the science texts concluded the content analysis (see 3. In-Depth Analysis of Science Content).

Since it was impossible for this researcher to carry out fieldwork in Zimbabwe to ground the study in classroom observations, a classroom based study was designed and carried out by Zimbabwean graduate students who were co-supervised by Concordia University and University of Zimbabwe faculty members. This small study was intended to throw light on the language used by teachers when science texts were actually used and interpreted to students by teachers in that setting; it has thereby provided contextual data for the textbook analysis. The results of this study-within-a-study are incorporated into the Results section (Chapter 3) of this paper.

This thesis is divided into four parts. The Context of the Study in Chapter 1 lays the foundation for understanding some of the processes related to education and development; in particular, it will examine the way in which aspects of Zimbabwe's educational system may obstruct an equitable distribution of educational opportunities. The Methodology used in this research is described in Chapter 2. The Results are presented in Chapter 3. Chapter 4 discusses the findings and concludes with some suggestions for further study.

## CHAPTER ONE

### CONTEXT OF THE STUDY

Despite important differences between schooling in the West and schooling in developing countries, there exists a common notion: education is a means to a better life, provided one does well and stays in school long enough. Educational success is believed to translate into better employment opportunities, and in turn into higher income and social status, or in other words social mobility.

The perception of this function of schooling is particularly strong in Africa (Datta, 1984, p. 145). On the one hand, "good" education may be associated with the kind of education that was often a privilege of the colonizers' children. In most of sub-Saharan Africa, separate schools existed for Whites, Asians and Blacks in a system of apartheid, or overt and official racism (Bray et al., 1986, p. 69; Datta, 1984, pp. 145-7; Parker, 1973, p. 235). Those systems differed greatly. Per capita spending on education, the number of schools per system (in proportion to the total population), funding to these schools, teacher-student ratios, curricula (e.g., academic versus non-academic courses) and sheer physical access tended to favour the white child over the Asian and black (in that order). Experiences with segregated school systems for Whites may therefore imply two things: first, education plays a role in achieving and maintaining status and power;<sup>2</sup> second, the overt, often superficial features of the education offered to Whites took on tremendous symbolic meaning: If those apparent rituals could be replicated for Blacks, then Blacks would have a chance to succeed. This belief is reinforced by the folk-wisdom that education will result in national development and in an escape from poverty. Indeed, there is ample evidence to promote this partial myth:

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<sup>2</sup> See for instance Dorsey (1989): "Education [in colonial Zimbabwe] was seen to be the only route to salaried employment in the modern sector of the economy, providing security, affluence, prestige, and a modern style of life" (p.40).

Mothers who are literate have fewer, but healthier children. Those who can read and write do stand a better chance of getting jobs in the formal sector. But the belief in the power of an academic education (not vocational) denies the impact of other societal processes: the influence of indigenous socialization patterns on boys and girls; the impact of economic structural adjustment programmes on girls' rates of drop-out at 'A' level (once examination fees are increased); on the doubling of the death-in-childbirth rate once fees for pre-natal care are re-introduced (Gordon, 1996). But yes, as Lockheed and Verspoor (1991) report, "completed primary education helps alleviate poverty and advance economic and social development" (p. 2).

[Education] improves the productive capacities of societies ... It also helps reduce poverty ... As economies worldwide are transformed by technological advances and new methods of production that depend on a well-trained and intellectually flexible labor force, education becomes even more significant. (Lockheed and Verspoor, 1991, p. 1)

Perceptions of the nature of development and underdevelopment, as well as the role of education have changed over time and are still not uniform. "During the 1950's and 1960's, underdevelopment was usually seen as a socio-economic situation in which a society simply lacked industry, capital, technology and *an educated workforce*" (Bray et al., 1986, p. 1; emphasis added). And in regard to the refusal of white Rhodesians in 1965 to handing over rule to the African majority unless they reach "a responsible stage of development," Parker (1973) concludes that "such a stage of development ... requires education" (p. 234).

According to Dudley Seers, "three essential parts to development are reductions in poverty, unemployment and inequality" (Bray et al., 1986, p. 2). Education can contribute to a reduction of all three aspects of development (Bray et al., 1986, p. 7). Ideally and from a simplistic point of view, someone who



successfully completes as much schooling as possible has a better chance to find employment in the formal sector and to earn enough to support a family. As a consequence, more people succeed at achieving a higher social status and quality of life thanks to their work and income. Thus, education results in a reduction of unemployment, poverty and inequality.

However, both in the West and in developing countries, it is also acknowledged that education does not necessarily contribute to a reduction in inequality; it may even further perpetuate inequalities. With regard to educational conflicts in America, Bowles and Gintis (1976) pointed out that schools are considered to be democratic,<sup>3</sup> to promote equality<sup>4</sup> and full human development, yet they are also supposed to integrate youth into adult society and the labour force, where democracy and equality are not necessarily the order (see also e.g., Apple & Weis, 1986; Apple & Taxel, 1982; Bourdieu & Passeron, 1977). The authors however do not hold schools responsible for educational and economic inequality; they see them as merely one part of a larger structure and process:

The educational system does not add to or subtract from the overall degree of inequality and repressive personal development. Rather, it is best

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<sup>3</sup> Bowles and Gintis (1976, pp. 20-26) make reference to the liberal notion of education as "panacea." They specifically discuss two strands: the "democratic school," represented by John Dewey and his followers, and the "technocratic-meritocratic school" (see next footnote). The "democratic school" believes that education must fulfill at least three functions: 1) "integrative" - integrating youth into various adult roles (e.g., family, work, politics); 2) "egalitarian" - giving each individual a chance to compete for economic and social privileges; 3) "developmental" - promoting psychic and moral development.

<sup>4</sup> While Dewey argues the association of the integrative, egalitarian, and developmental functions of education (see preceding footnote), the "technocratic-meritocratic school" (Bowles & Gintis, 1976, pp. 20-26), represented by functional sociology and neoclassical economics, argues only their compatibility. The technocratic-meritocratic view sees inequality of income, power, and status as merely a reflection of an unequal distribution of mental, physical and other skills. The more skillful and the more intelligent individuals are therefore the more successful individuals; success is not related to social class, etc. According to this view, schooling is *equitable* since it is based on meritocracy, and ability is fairly equally distributed across social class, both genders, and different ethnic groups.

understood as an institution which serves to perpetuate the social relationships of economic life through which these patterns are set, by facilitating a smooth integration of youth into the labor force. (Bowles & Gintis, 1976, p. 11)

Similarly, Bray et al. (1986) say that education in developing countries does not necessarily play a role in the reduction of poverty, unemployment and inequality. "Education is a vehicle for change rather than an independent force, and the direction which the vehicle takes depends very strongly on who is driving and where the driver wants to go" (p. 7). In other words, education is not an independent enterprise, it is limited in what it can achieve by government policies, which may also be very rigid about what education *must* achieve.

### **Education and Equity**

As stated, schooling does not necessarily contribute to a reduction in inequality, but may even further perpetuate inequality. Inequality in education can be defined in terms of differences in the quantity and quality of education received by different groups (Bray et al., 1986, p. 61). "It is evident that educational opportunities in Africa are neither equitably distributed between different regions and sections of the population, nor are they evenly utilized" (Datta, 1984, p. 145).

Differences in the quantity of education are apparent when looking at such matters as enrolment rates at a particular level (as a percentage of respective age group); drop-out rates; average number of years of schooling; and transition rates between levels, i.e., between primary and secondary school and between secondary school and tertiary education). The following examples will illustrate that there are regional, socio-economic and gender differences in the provision of educational opportunities. In particular, students in rural areas in Africa are

disadvantaged in comparison to their urban counterparts. (See also discussion in Lockheed & Verspoor, 1991, pp. 146-154.)

Enrolment can be seen as the first indicator of vast regional and other inequalities. Datta (1984, pp. 147-8) indicates that the percentage of school-age children (between 6 and 15 years) attending school in different regions of Ghana in 1962 varied between 11.7% and 49.8%, and similarly, for the primary school age population in Nigeria in 1973-4, it varied between 10%<sup>5</sup> and over 75%. Bray et al. (1986, p. 70) found that in 1979, a child born in Kenya's Central Province, where primary enrolment approached 100%, had a much greater chance of attending school than one born in North Eastern Province, where enrolment was closer to 20%. This is hardly surprising since the population of North Eastern Province is made up of semi-nomadic peoples whose land cannot be permanently settled due to environmental factors. In contrast, Central Province is a rich, agricultural region settled mainly by one of the country's two most numerous and politically powerful groups (Kikuyu). Thus we see that culture or ethnicity also influences access to schooling.

Drop-out rates are influenced by a number of factors. Government funding to schools may be insufficient to maintain the provision of material and human resources, i.e., classrooms, educational materials and teachers. In other words, there may be more places in lower primary grades than in higher ones. According to Datta (1984, p. 150), one quarter of the pupils enrolled in Grade 4 in Zambia in the mid-1970's could not find places in Grade 5. The author adds that these pupils were from rural areas. Another reason for school drop-out may be the withdrawal of students by their parents. Parents may believe their children have received

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<sup>5</sup> The 19 Nigerian states have been divided in four groups, with the fourth one being labelled "Between 10% and 24% enrolment." The author, however, does not indicate what the lowest enrolment in that group is, i.e., it may be *anywhere* in the 10% to 24% range.

sufficient schooling, or may no longer be able to afford to send them to school. Bray et al. (1986, pp. 61-2) conclude that drop-out rates tend to be particularly high for lower income groups and girls. Even if schools are free, parents usually still have to pay for uniforms and textbooks. In addition, poorer families may depend on their children's labour to support the family. "Girls are similarly disadvantaged because they are often required for domestic duties and because parents are often afraid that they will become pregnant at school" (Bray et al., 1986, p. 62). Generally, parents may consider the education of girls to be less important due to a perceived lower rate of return~~girls' education may be considered less important due to a perceived lower rate of return~~: a school certificate and further education appear to have a higher rate of return for boys, since girls are less likely to seek paid employment which would require a school certificate. Also, when girls marry, they normally move to their in-laws' homestead, thus the investment in their education is perceived to be lost.

Transition rates between levels are further evidence of educational inequality. "Even where basic education is universally received, differences still exist at post-primary levels. No African country is even approaching universal secondary education, and the recruiting and gate-keeping mechanisms clearly operate the transition point between primary and secondary education" (Bray et al., 1986, p. 61). The simple fact is that "efficient" ways need to be used to select a few and reject the majority. The following quote expresses well the tragedy of this situation.

*Philemon's results (A story from Zambia)*

The headmaster stood up behind his desk. Although he greeted them cheerily enough, they noticed that he was twisting a new piece of white chalk nervously between his fingers. The boys knew from long experience that this was a sign of trouble.

“Good afternoon, boys, I’ve now received the acceptance from the headmaster of the Secondary School. I am afraid that some of you are going to be disappointed, but you know that there are not places in the Secondary School for everyone who passes Standard Six. With only two exceptions you all did very well in your qualifying examinations and I am very proud of the school’s results, but, I am sorry, only twelve of you have been accepted for Form 1.”

.... The only one to remain quite still was Philemon. He sat like a man stunned by the sudden news of death. Slowly he rose from his seat and went over to the headmaster who stood twisting the piece of white chalk between his fingers.

“Mufundishi, you didn’t read my name. You know me, Mufundishi, I’m your boy Philemon Nalusanga. You always told me that if I worked hard, one day, I would go for Secondary. You know I am going to be a doctor, Mufundishi. You know my Standard Six certificate won’t get me any job at all. Mufundishi, what am I going to do now?”

The headmaster was an honest man, so he just didn’t say anything.

*Extract from Merfyn Temple’s “From Chipapa with love,” an open letter to president Kaunda, Zambia, January 1974.*

(Hawes, 1982, p. 112)

The quality of education is similarly variable. There are regional imbalances, as well as rural-urban and gender differences with regard to the quality of school equipment, staff and instruction. Certain regions and particularly cities have proportionally more and better funded schools. Students in those schools may therefore be more likely to have access to better and more educational materials and learning resources, attend smaller classes and be taught by a more qualified teacher. As Bray et al. (1986) explain, “high drop-out rates in rural areas are chiefly explained by their general neglect by education authorities. Rural areas tend to receive much poorer quality teachers,<sup>6</sup> so that pupils are more likely to get bored with schooling” (p. 62). The authors refer to data from western Nigeria that demonstrates how greatly drop-out rates vary from, for instance, small village schools to urban schools: 84.9% and 20.0%, respectively. It may be argued

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<sup>6</sup> See Hawes (1982, pp. 16-7) for examples of variations in the qualifications of primary school teachers in several African countries and variations between regions of the same country.

though that a teacher's educational background does not necessarily reflect her or his qualification to teach. Hawes (1982, p. 19) suggest that teacher training may not be as determining a factor as other factors such as personal maturity and the will and opportunity to keep up to date.

So far, this paper has emphasized the question who is affected by an inequitable distribution of educational opportunities and how these imbalances become evident (e.g., enrolment and drop-out rates). But there is also the issue of equality of treatment in the learning process. What are some of the processes or mechanisms that impact on a student's experience at school which may affect her or his self image and confidence, motivation to learn and stay in school and ultimately her or his performance in school? As the paper goes on to examine Zimbabwe's educational system and various related aspects in more detail, it will discuss textbook bias, second language as well as teacher bias and expectations, as some of the mechanisms which perpetuate inequality. First, two other factors will be touched on briefly: malnutrition and the relationship between the school and the home or the community, respectively.

Bray et al. (1986) point out that malnutrition is a factor that disadvantages children from poorer families even before they enter school. "Malnutrition ... in the early years can seriously damage a child's brain and subsequent intellectual development. Malnutrition hits poorest groups hardest, and is another reason why children from those groups are unable to perform well in school" (p. 64). Lockheed and Verspoor (1991, pp. 77-80) consider malnutrition to be pervasive in the developing world: chronic malnutrition as percentages of school-age children in Kenya, Zambia, Zaire and Zimbabwe, for instance, was found to be 25.0%, 28.1%, 55.0% and 14.6%, respectively. In addition to protein-energy malnutrition, the authors mention micronutrient deficiencies as a problem.

A lack of sufficient correspondence between the school and home cultures can also disadvantage a child. “What is provided by the home environment of most children in developing countries does not begin to match what is demanded by the primary school” (Lockheed & Verspoor, 1991, p. 77). In other words, children who are already familiar with the expected behaviour in a classroom setting, who have been exposed to books, maps, puzzles, crayons and developmentally appropriate toys at home, and who may even be familiar with “school-related or literacy-nurturing activities” are considered to be at an advantage upon starting school (Bray et al., 1986, p. 63; Lockheed & Verspoor, 1991, pp. 76-7). That such experiences are rare in Africa is an understatement. The fact is the culture of the school in most of Africa is not the culture of the home. Thus schools are places where children are assimilated into a foreign culture, foreign interaction patterns, foreign curriculum content, and a foreign language. Yet there is remarkable community support for what schools offer - an ultimate relief from poverty and sheer hard toil of subsistence agriculture (especially for men).

Hawes (1982) elaborates on the relationship between the school and the community: “To a great degree they are places apart and the separateness is often maintained by a sort of mutual consent between school and community” (p. 13). This is of particular importance, since in the case of communities that *do* get involved, their contributions can be extremely beneficial, as well as crucial in determining the kind of educational provisions the school can offer. While money plays a factor,<sup>7</sup> it is the community’s willingness to become involved that is essential:

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<sup>7</sup> See for instance Dorsey (1989): “Wealthier communities ... can afford a better standard of education for their children” (p. 52).

There are some schools on commercial farms and in communal lands endowed with such facilities as libraries, staff-rooms and in one case, even an open air theatre. This is usually as a result of local initiative where the headmaster has a good working relationship with either the parents in the case of communal lands or the farmer and parents in the case of commercial farms. In such well endowed schools, the majority of the teachers are trained and in one case on a commercial farm, near an urban centre, *all* the teachers are trained. (SIDA, 1990, p. 94)

Therefore, children in supportive communities, and particularly those in more affluent communities can benefit from more and/or better quality provisions such as the condition of school buildings, and the presence of furniture and educational materials.

The following discussion of Zimbabwe's educational system will illustrate some of the connections between government policies, expenditure on education, educational opportunities and educational outcomes.

### **Schooling in Zimbabwe**

Zimbabwe's educational system has been undergoing many developments in the last 30 years, particularly since independence from Great Britain in 1980. The stages of these developments include an elite system of education during colonialization, a school system affected by the liberation war, a massive expansion of the system and new constraints due to the introduction of an Economic Structural Adjustment Programme (ESAP).

Colonial domination in what was then called Southern Rhodesia<sup>8</sup> was responsible for inequalities that "encompassed all aspects of life: social, economic, political, and educational. The society was stratified mainly on racial criteria"

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<sup>8</sup> Southern Rhodesia was renamed Rhodesia in the mid-1960's (Sylvester, 1991, p. 29).



(Dorsey, 1989, p. 41). Whites, who constituted a minority,<sup>9</sup> held economic and political power, earned more<sup>10</sup> and received better “services,” such as educational provisions. Blacks, on the other hand, were dispossessed “of most of the more fertile land [which] undermined their economic self-sufficiency” (Dorsey, 1989, p. 41) and experienced occupational, residential and other forms of discrimination.

Education was one example of segregation by the white-dominated society and government. Two separate systems of education for white and black children<sup>11</sup> were in operation:

White children, for whom education was non-fee-paying and compulsory, had access to education facilities and tuition of the highest quality. Schooling for black children was neither free nor compulsory and educational provision was inadequate in terms of both access and quality. (Gordon, 1994, p. 132)

The disparity between white and black children’s education is apparent when looking at enrolment figures and government expenditure, for instance. Since education was compulsory for white children until the age of fifteen<sup>12</sup> (Dorsey, 1989, p. 42) and since they had universal access to good quality schools, “virtually all of the European children” attended primary and secondary education (World Bank, 1992, p. 3), whereas “by 1971 ... only 43.5% of black children of school-going age were in school” (Gordon, 1994, p. 132).<sup>13</sup>

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<sup>9</sup> In 1971, Whites constituted 4.5% (Parker, 1973, p. 235) and in 1980 3.5 % of Zimbabwe’s population (Dorsey, 1989, p. 41).

<sup>10</sup> Parker (1973) states that “while the annual income of working Europeans, Asians and Coloureds in 1970 was R \$3,108, the comparable figure for Africans working in the cash economy was R \$312” (p. 237). The disparity in income is also reflected by the fact that Europeans paid over 98% of the country’s income taxes (based on a 1966 government publication; Parker, 1973, p. 248).

<sup>11</sup> Parker (1973, p. 235) also refers to a third school system for “Asians and Coloureds.”

<sup>12</sup> According to Hitchens (1981, p. 14), schooling was compulsory until the age of sixteen.

<sup>13</sup> Sylvester’s (1991) reference to the 1962 census puts black enrolment at a different rate: “60% of black children aged seven to sixteen attend[ed] school” (p. 42).

Enrolment differed especially at the secondary level, where it reached “106 per thousand” for Whites and “6 per thousand” for Blacks.<sup>14</sup> These differences were not merely the result of separate systems, they were in fact regulated:

In the mid-1960's, the Government decided that only 12.5 percent of the African population should have access to “academic” secondary education and 37.5 percent to practically-oriented education, with the remaining 50 percent being left with no education beyond the possibility of the primary level. (World Bank, 1992, p. 3)

Dorsey (1989) compares the black school system to an “educational pyramid in which pupils in secondary schools represented only 4 percent of pupils in the system, while in the white system the corresponding figure was 43 percent” (p. 42). In addition to differential access to education, whether at the primary or secondary level, black students also dropped out in greater numbers (Hitchens, 1981, p. 14).<sup>15</sup> Therefore, an imbalance existed with regard to quantity of educational opportunities for white and black children in colonial Zimbabwe.

What is particularly illustrative with regard to imbalances in the education of white and black students, and what may also be considered a cause thereof, is the difference in government expenditure on the education of white and black students, respectively. Expenditure per pupil was always higher in the case of white students. Parker's (1973, p. 248) figures show that in 1965 expenditure per white child was ten times as much as that per black child, and a World Bank Report (1992, p. 3) even indicates a twenty-fold disparity. Similarly, Dorsey

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<sup>14</sup> Hitchens' (1981, p. 14) figures reflect enrolment “per head of the population” and not as a percentage of the primary age and secondary age population. The latter may (proportionally) differ for Whites and Africans, in which case the data should be interpreted accordingly. See, for instance, Parker (1973): “In Rhodesia ... half of the total African population is under age” (p. 247) and Sylvester (1991): “Forty-seven percent of the population is younger than fifteen years of age” (p. 123).

<sup>15</sup> “In 1975 only 54.5 percent of the [black] grade 1 cohort completed the 7-year primary school course” (Dorsey, 1989, p. 42).

(1989, p. 42) and Hitchens (1981, p. 14) pointed out that expenditure per white student was 12 and 15 times, respectively, bigger at the primary level, and nearly three and two and a half times, respectively, at the secondary level. Consequently, “the differences in the regulations and budgetary provisions for the two systems resulted in restricted provision and a lower quality of education for blacks relative to that provided for whites” (Dorsey, 1989, p. 41).

Eventual independence did not come without a price: an armed struggle began in 1966 and continued, in fits and starts, until 1979. It was “motivated largely by two key issues - access to land<sup>16</sup> and access to education opportunities” (Sylvester, 1991, p. 48). The liberation war caused great devastation. Thousands of men, women and children were killed, wounded and many of them crippled. Hundreds of thousands had their homes destroyed and their schools, hospitals and clinics closed. “They ... had to abandon fields and cattle and seek refuge in towns.... Nearly a quarter of a million people fled from the war and [found shelter] in refugee camps in Botswana, Zambia and Mozambique” (Hitchens, 1981, p. 3).

What this meant to the country’s educational system is that many of its schools were not only damaged but also closed during the liberation war (Bray et al., 1986, p. 164; Gordon, 1996, p. 16). 30,000 children of primary school age went to neighbouring countries during the war (Bray et al., 1986, p. 164). On the other hand, the schools that were in operation were no longer formally segregated in the 1970’s. However, the education system was still “highly stratified on racial and social lines which militate[d] against Africans, and provide[d] a classic case

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<sup>16</sup> The land in question was land that the European settlers had expropriated (World Bank, 1992, p. 3; Dorsey, 1989, p. 41).

of ‘socialism for the rich and free enterprise for the poor’” (Hitchens, 1981, p. 14).

In 1980, after nearly a century of colonialization and a devastating liberation war, Zimbabwe gained independence from Great Britain. “The new government, determined to reform society and to respond to popular aspirations,<sup>17</sup> embarked on a programme of massive educational expansion” (Bray et al., 1986, p. 164). Reforms in education had the purpose of eliminating inequalities through improvements of the following:

- 1) the national allocation of resources to education; 2) the allocation of resources within the existing educational system; 3) the percentage of students completing different levels of the educational system; 4) the percentage of pupils from different social and racial backgrounds that complete different levels of education; 5) the percentage of female students that complete different educational levels; and 6) changes in the aims of the curricula and their content. (Dorsey et al., 1991, p. 1)

The government policy shift from an elite system of education to one of mass education led to a dramatic quantitative expansion of educational provisions. Free universal primary education was introduced, and although universal secondary enrolment was the goal, fees were not abolished at the secondary level (Gordon, 1996, p. 16; Dorsey, 1989, p. 46). In the first decade of independence, primary school enrolment rose from 819,586 to 2,281,595 from 1979 to 1990 and became almost universal.<sup>18</sup> The number of primary schools also increased from 2,401 to 4,530 during the same period. “At the secondary level, the rate of expansion was faster than ever experienced anywhere else in the world” (World Bank, 1992, p. i): enrolment rose from 66,215 to 708,080 and the number of

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<sup>17</sup> Based on the belief in education as the key to success and a better life, the African population expected an improved provision of educational opportunities.

<sup>18</sup> Gordon’s (1996, p. 3) statement that enrolment has become nearly universal is not supported by any figures. According to Dorsey (1989, p. 46), enrolment was almost 97% by 1987.

secondary schools increased from 177 to 1,512 from 1979 to 1990. The fact that the increase in enrolment was higher at the secondary than at the primary level, signified higher transition rates from primary to secondary school: from 20% in 1979 to 66% in 1990 (Dorsey, 1989, pp. 46-8; Dorsey et al., 1991, pp. 7-10, 18-20; Gordon, 1995, p. 7; Unicef, 1990, pp. 66-70; World Bank, 1992, pp. 3-6).

The government's commitment to and prioritizing of education involved a massive increase in the expenditure on education. As a percentage of the total government expenditure, expenditure on education rose from 10.3% in 1979/80 (Gordon, 1996, p. 16) to 23% in 1989/90 (Sylvester, 1991, p. 124). According to Dorsey (1989, p. 51), between 1980/81 and at least 1986/87,<sup>19</sup> education received the largest budgetary allocations of any government ministry.

However, while the expansion of Zimbabwe's educational system was a remarkable achievement, it also has to be acknowledged that it gave rise to problems. One of them has been and still is a teacher shortage. A 277% increase in the number of primary and secondary teachers occurred from 1979 to 1989 (Unicef, 1990, p. 72).

One of the most difficult problems was to find enough staff to teach the children. It was necessary to recruit many people who were untrained, and their number increased from 6,000 in 1980 to 14,000 in 1981 and 27,000 in 1983. (Bray et al., 1986, p. 164)

By 1989, the percentage of untrained teachers at the primary and secondary level reached 49% and 48%, respectively (World Bank, 1992, p. 3 and 5).

Concerns with the quality of education that schools were providing also arose. Evidence for higher quality education is often based on quantitative aspects such as training and experience of teachers; student-teacher ratios; and academic

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<sup>19</sup> The author's statement is based on data up until the 1986/87 fiscal year.

achievements (e.g., examination results). Examining those aspects, we may find that concerns may be justified. A high percentage of untrained teachers persists (see above). In 1989, student-teacher ratios were 39:1 in primary schools and 28:1 in secondary schools. "In fact, with significant variation in this data between schools, the fairly low ratios do not adequately reflect the range in the data, with extremely high pupil teacher ratios in some schools, particularly those in urban, high-density areas" (Unicef, 1990, p. 73). Grade 7 examination results (i.e., the number of passes, high passes and excellent passes) for English and Mathematics in 1989 were lower than in 1984 (Dorsey et al., 1991, pp. 11-2) and a World Bank report (1992) mentions concerns "about low levels of learning achievements, especially in the recently-established secondary schools" (p. 1). Another point are drop-out rates, especially at the secondary level. "Compared to many developing countries, drop-out of children in the first seven years of primary school in Zimbabwe was not a major problem" (World Bank, 1992, p. 4). However, many parents may not be able to afford secondary schooling. "The *real* dropout is thus from Grade 7 to Form 1 [secondary school]" (Unicef, 1990, p. 71) and the number of school leavers remains a problem throughout secondary school (World Bank, 1992, p. 6). A SIDA report (1990, pp. 74-5) indicates that while the average drop-out rate has been 13.2% over successive four-year periods (Form 1 to Form 4) during the 1980's, it reached 23.7% and 26.5% for the same length periods ending in 1988 and 1989.

Even more concerning than issues of quality of education is the fact that some groups appear to be consistently harder hit than others. It is therefore important to address the issue of equity. Particularly, attention needs to be drawn to the great disparities between urban and rural schools and the education of boys and girls (Dorsey, 1989; Dorsey et al., 1991; SIDA, 1990; World Bank, 1992).

(The situation of girls will be discussed in more detail later on in this paper.) Dorsey (1989) argues that “what is emerging is an expanded replication of the preindependence educational structure, highly differentiated in quality and highly stratified in terms of life-chance benefits conferred” (pp. 55-6). The author believes that this is due to the fact that

in the development of mass education the system has created a de facto situation in which the recently established rural secondary schools are producing pupils with academic achievement considerably lower than the products from other types school. To a great extent they are thus disadvantaged in terms of competing equally for the rewards that society has to offer. (pp. 55-6)

Money was and is an important factor in the creation of disparities. The quality of education schools can provide depends to at least some degree on how well they are funded by the government or the communities. There was an inequitable distribution of government funds to different types of schools (Dorsey, 1989; Dorsey et al., 1991; SIDA, 1990). For instance, one third of the cost of building rural primary and secondary schools was provided by the government while the local communities had to come up with the remaining two thirds. The building of urban primary and secondary schools, on the other hand, was covered entirely by the government (Dorsey, 1989, pp. 51-2).<sup>20</sup> In addition, “urban schools and middle and high fee paying private schools receiv[e] more money per pupil than rural schools” (Dorsey et al., 1991, p. 15). Where local communities, for instance school management committees, are in charge of financing most or all of a school’s budget, disparities are due to economic differences between the areas in question. Some schools with more affluent parents may be able to charge school levies per student which may enable them, for instance, to hire additional or better

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<sup>20</sup> Dorsey (1989) indicates that “it has now been decided that new urban primary schools must be built and financed by urban councils. Presumably a similar policy with regard to urban secondary school expansion will follow” (p. 52).

trained teachers. Yet other schools in poorer communities may depend completely on the involvement of local villagers since the “responsible authorities especially District and Rural Councils contribute nothing more than ‘moral support’ ... It has also been alleged that the District and Rural Councils sometimes misappropriate the grants” (SIDA, 1990, p. 100).

Disparities in the funding of schools are linked to the quality of education they can provide which is often seen in terms of their resources, quality of teaching staff, completion rates, and, ultimately, student achievements. In other words, a well funded school is more likely to be able to afford resources and better teachers, and is therefore expected to achieve better results with regard to student completion and transition rates, as well as student achievements. A study by Riddell and Nyagura (1991) found textbooks, trained teachers and the continuity of employment to be three key variables in academic performance. However, variables do not act on their own, they are interdependent. Examining, for example, the variable of qualified teacher, this is to say a teacher with a degree and teaching experience, it is hypothesized that he or she will probably achieve different results (i.e., student achievements) and be motivated to different degrees in (a) a school attended by motivated students who may have done well academically in the past; than in (b) a school that pays teachers less, does not have adequate facilities for its staff, and which is attended by students whose academic performance has been average in the past. Therefore, employing qualified teachers alone is no guarantee for effectiveness or achieving good results. In fact, Riddell and Nyagura (1991) suggest that (1) students’ prior academic achievement has to be taken into account in order to examine the effectiveness of schools, and (2) the more experienced teachers are not necessarily the more effective teachers, since “newly trained recruits have much to offer and ... longer experience may erode



teacher effectiveness” (p. 51). However, this is not to say that funding is not important in providing quality education or that funding should not be distributed more equitably.

After 1982, an increasing budget deficit, i.e., tax revenues were no longer sufficient to fund public expenditure, led to a large foreign debt, resulting in pressure towards reduced social expenditures (Unicef, 1990, p. 17; see also Stoneman, 1989, and Sylvester, 1991). Consequently, a macro-economic structural adjustment programme was imposed which had all the characteristics of other adjustment programmes prescribed by the World Bank and the International Monetary Fund, such as cuts in state funding of social programmes (education and health), removal of price controls and state subsidies of basic commodities (staple foods, fuel), devaluation of the Zimbabwe dollar, and emphasis on export oriented production (Gordon, 1996, p. 1; Gordon, 1994, p. 137; Gordon, 1993, p. 15).

Thus, after a decade of expansion, the introduction of an Economic Structural Adjustment Programme (ESAP) in 1991 led to major cuts of the state expenditure on education and health, thereby eroding the gains that were made in these areas, particularly by girls and women. However, the effects of ESAP in Zimbabwe extend beyond cuts to the two areas. “Its effects have both been dramatic and catastrophic for the majority of Zimbabweans” (Gordon, 1996, pp. 1-2).

There is a combined effect of the devaluation of the dollar, price increases, redundancies and increased unemployment on family income ... Cost recovery has meant an increase in the fees for [education and health], or the introduction of fees where there were none, at a time when people are also struggling to cope with the soaring prices of basic commodities required to sustain life. (Gordon, 1996, p. 1)

The effects of Zimbabwe's ESAP are complex and an examination thereof is beyond the scope of this paper. The following examples are therefore merely intended to give an idea of the extent of the effects. Changes to the health care system resulted in, for instance, higher maternal and newborn mortality rates. By the end of the second year of ESAP, the number of women who died in childbirth had doubled, and with regard to the mortality rate of newborns, there was a 22% increase in the number of babies who were born before arrival at Harare Central Hospital and who died after admission (Gordon, 1996, p. 14).

Focusing again on the education system, the effects of ESAP were manifold. Per capita spending on education dropped from 1991/92 to 1994 by 32%, which particularly affected primary education where per pupil spending dropped by 29% from 1991 to 1994 (Gordon, 1994). What this means in practical terms is that "fees at primary level in the urban areas have been reintroduced, and secondary school fees, O and A level examination fees have been substantially increased" (Gordon, 1994, p. 138). Other costs such as school uniforms, books and general purpose fees also increased annually. Many families, therefore, found it difficult to raise the fees and in addition, especially in rural families, found it difficult to afford the loss of child labour (Gordon, 1993, p. 13). As a consequence, some families withdrew their children from school. The effects on the schooling of girls who have been particularly affected by ESAP will be discussed below.

### **Education and Gender**

Throughout Zimbabwe's past, female students have always been and still are worse off than their male counterparts. Black females suffered the effects of both racism and sexism during colonialization, and as Gordon (1993) emphasizes

“whilst institutionalised racism in education was done away with, institutionalised sexism was never seriously addressed” (p. 12). Thus, gender inequities persist in education, as well as in other parts of society, and need to be redressed (Dorsey et al., 1991; Gordon, 1994; Gordon, 1993; SIDA, 1990; Unicef, 1990; World Bank, 1992).

Girls benefitted from the increased access to facilities, for instance through the introduction of free primary education, as a consequence of the educational expansion during the 1980's. Their number increased at all levels and boys and girls now enrol in almost equal proportions at the primary level where female enrolment in 1991 was 49.1% (Gordon, 1995b, p. 7). However, on the whole, girls benefitted less than boys due in part to inequitable instructional treatment that they received while in school. “Girls begin to drop out in greater numbers as early as primary school, fewer proceed to secondary school<sup>21</sup> and again drop out in greater numbers than boys” (Dorsey et al., 1991, p. 22). The enrolment of females is not only lower than that of males, in fact, while the overall proportion of girls remained relatively constant at the secondary level, i.e., 40% to 43%, their proportion at the senior secondary level has actually declined since independence.<sup>22</sup> As a consequence of these trends, a serious gender imbalance continues in tertiary education. Female students at the University of Zimbabwe, for instance, comprised approximately 24% of all enrolments throughout the 1990's (Dorsey et al., 1991, p. 38). In addition to quantitative disparities, girls are also reported to under-achieve when compared with boys, which will be discussed

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<sup>21</sup> For instance, in 1989, 62% of girls versus 70% of boys went on to secondary school (Dorsey et al., 1991, p. 10).

<sup>22</sup> From 1979 to 1989, the enrolment of girls decreased from 43% to 38.8% at Form 4, and from 35% to 29% at Form 6.

in more detail below (Dorsey et al., 1991; Gordon, 1993; Gordon, 1995b; Gordon, 1996; SIDA, 1990; Swainson, 1996; Unicef, 1990; World Bank, 1992).

While the progress made by girls in education was not without limitations, the introduction of an Economic Structural Adjustment Programme (ESAP) and the resulting budget cuts eroded these gains. The increased financial burden on parents through the reintroduction of primary fees, increases in secondary and examination fees, as well as increases in other costs, and the growing dependence on child labour to support a family during recession, made schooling less affordable and maybe a lesser priority.

As a consequence, the withdrawal of children from school became more prominent. For instance, by the end of 1992, the number of 'O' and 'A' level examination candidates had dropped by 17%, and in particular, the percentage of female 'A' level candidates decreased by 30.3%, namely from 29% in 1991 to 20.2% (Gordon, 1993, p. 16). This example evidences that girls are withdrawn at a higher rate than boys, which may be for two reasons. On the one hand, parents may hold different beliefs about the value of education for girls and boys due to/based on the perceived roles of males and females - i.e., women's employment in the informal sector and domestic work and childrearing do not require education - and even in the absence of overt gender biases like the above, "parents may be more inclined to send their boys to school in the first place and keep them there longer, mainly because of the better labour market prospects for boys compared with girls" (Davidson and Kanyuka, 1992, as cited in Swainson, 1996, p. 19). On the other hand, girls contribute more to domestic work and peasant agriculture than boys and their labour is thus more valuable to families (Gordon, 1993; Gordon, 1996; Swainson, 1996).

In Zimbabwe as elsewhere, in addition to barriers to access to education, girls also experience discrimination within education, i.e., in schools. Their academic performance, as well as self-identity and aspirations are affected by their educational experiences which differ greatly from those of boys. Some of the main factors responsible for the contrasting experiences of girls are parents' and teachers' expectations and attitudes, the curriculum, as well as the way female characters are portrayed in textbooks (for a discussion of these and other factors, see Swainson, 1996).

Girls' educational performance is considerably lower than that of boys, especially at the secondary level. According to Gordon (1995b), comparisons of achievement are based on data on students' performance in public examinations. The author emphasizes that up until form four (i.e., in the Grade 7, Zimbabwe Junior Certificate and General Certificate in Education 'O' level examinations), girls perform more poorly than boys. For instance in 1987, 15% of boys but only 7.4% of girls passed five or more ['O' level] subjects and thereby earned a Cambridge School Certificate (Dorsey et al., 1991, pp. 29-30). Looking at performance and passes by subject, it appears that girls almost consistently underachieve, especially in mathematics and science subjects. Exceptions cannot be generalized, but include the vernacular languages, Shona and Ndebele, English and bible knowledge (Dorsey et al., 1991, pp. 29-30; Gordon, 1993, p. 14; Gordon, 1995a, p. 4; Gordon, 1995b, p. 19; SIDA, 1990, pp. 31-2; Swainson, 1996, pp. 12-3).

Academic performance is important since it determines future educational success, for instance admission to a school or a particular programme, but it also influences employment opportunities. On the other hand, it can also be argued that academic performance affects individuals on a more psychological level.

Grades, for instance, can contribute to a student's self-esteem, and particularly academic self-concept. It is important to recognize grades as outcome as well as cause since they are in part the product or reflection of a student's belief in him- or herself, as well as a factor in the student's achievement in future performance.

Girls' self-concepts in relation to education and learning (their academic self-concepts) may strongly influence their educational aspirations, motivation and performance.... A belief in one's ability or inability to be successful in studying a subject is an important factor in achievement. (Gordon, 1995b, p. 25)

Academic performance is not the only factor that affects a girl's self-esteem or academic self-concept, teachers' and parents' attitudes, the curriculum and to some degree textbooks are others.

Parents and teachers alike believe in gender differentiated roles and occupational aspirations for girls and boys. In her studies, Gordon (1995a; 1995b) found that teachers and parents of girls considered the primary role of women to be domestic, and that of men to be the provider and head of the family. Although parents did not expect their daughters to work as "housewives only," they had higher occupational aspirations for their sons. When asked what jobs they would like their daughters and sons to have, their most frequent answers were nurse, teacher and clerk/secretary for the daughters, and engineer, tradesman, manager, driver and miner for the sons. These answers do not only reflect parents' gender differentiated beliefs and aspirations, but also the gender-typing of occupations, which is linked to the gender-typing of subjects.<sup>23</sup> Teachers responded similarly. However, the author appears to treat teachers as a sub-group, i.e., teachers that are also parents or parents that happen to be teachers, rather than a separate category

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<sup>23</sup> Science and mathematics are examples of a subject gender-typed as male, while a language subject is gender-typed as female.

of respondents. It is therefore not clear if and how childless teachers answered to these questions.

Gender differentiated roles and occupational aspirations are a result of the perceived overall characteristics of males and females, all of which are products of socialization. Some of these gender differentiated perceptions, along with primary socialization itself, are cited by teachers in one of Gordon's (1995b) studies as reasons for the poor academic performance of girls: "(1) Feminine emotional characteristics [i.e., their interest in love, romance and sex], (2) Female physical inabilities, (3) Female mental inabilities and female aptitudes, (4) Cultural norms and primary socialisation" (p. 19). With regard to mental abilities or intelligence, all parents and a significant number of teachers, as well as girls and boys believed that boys are more intelligent than girls (Gordon, 1995a, p. 13).

Again, it is very important to emphasize how complex and linked these issues are. The beliefs and attitudes of parents and teachers determine how they treat boys and girls and what they expect from them. Experiences with the way they are treated and what is expected of them, along with already formed gender differentiated self-identities impact on girls' self-esteem, academic self concept, motivation (or lack thereof) and occupational aspirations to name only a few characteristics. Gordon (1995b), for instance, found that there is "a high degree of correspondence between the occupational aspirations of parents and their daughters" (p. 30). Hyde (1994, as cited in Swainson, 1996) agrees: "girls' concepts of gender roles and related natures, abilities and aptitudes ... tend to mirror those of their parents and teachers" (p. 31). As a consequence, girls' educational, occupational and personal destinies are influenced by their parents and teachers. The role of parents and teachers should thus not be underestimated in any discussion of educational outcomes in Zimbabwe, and probably elsewhere.

The formal and hidden curriculum may also reflect gender differentiated objectives and expectations, i.e., requirements. As part of the movement towards gender equity in school, Zimbabwe's formal curriculum was modified to offer subjects such as fashion and fabrics and building to both genders. Although steps have been taken to offer the same subjects to boys and girls - an important achievement - they are not always available in sufficient numbers (Gordon, 1995b, p. 44). However, the issue whether boys and girls are able to attend the same classes, may be equally if not less important than the question if and how their learning experience in those classes differs.

It is the hidden curriculum that can be more powerful and pervasive since it is not as visible and overt, and thus does not get questioned or modified as easily as the formal curriculum. In the context of Zimbabwe, part of the hidden curriculum may involve strong perceptions of gender roles and abilities: women are nurturers, and are physically and academically weak, men on the other hand are leaders, and are strong and intelligent. These beliefs are reflected in the gender-typing of subjects and result in instilled beliefs that females are good at some subjects and males at others (Gordon, 1993; Gordon, 1995a; Gordon, 1995b). Thus while students may all be offered the same curriculum, they will still end up with different learning outcomes: different beliefs about what subjects are important with regard to their educational and occupational future, different beliefs about what subjects they are good at, and ultimately different experiences of success and failure. As discussed earlier, important agents in these processes are parents and teachers, but textbooks can be considered equally able to transmit and inculcate biases such as gender bias: "One important aspect of the hidden curriculum concerns the implicit role which textbooks assign to women and girls" (Bray et al., 1986, p. 150).



## **Textbooks**

Despite the increasing presence and importance of computers in western schools, the textbook remains the single most important instructional medium. It represents the instructional aid most likely present in a classroom anywhere in the world, thus the most accessible and familiar medium. In other words, “the textbook remains the basic element of education - the essential companion to the teacher” (Altbach, 1987, p. 93). In fact, it becomes more than a companion in the case of teachers with access to fewer other instructional aids, or less trained, experienced or confident teachers since they will tend to rely more heavily on textbooks. Therefore, the textbook is and remains as Altbach (1987) maintains “the most powerful and pervasive educational technology” (p. 93).

The status and situation of textbooks in developing countries are of particular interest. On the one hand, texts may not be present in sufficient quantities, but they are, on the other hand, especially important to effective schooling in the Third World, where according to Altbach (1987, p. 93) many teachers are poorly trained and do not have access to additional resources and information, such as educational materials or guidelines on teaching methods. Therefore, the textbook - maybe even more so than the teacher - is a major resource in the classroom.

An analysis of textbooks can provide insight into a particular curriculum, formal and hidden, since according to Kumar (1981, 1986, cited in Altbach, 1987, p. 93), one of the functions of textbooks is to circumscribe the curriculum. Texts therefore reflect the assumptions and objectives of those who developed the curriculum and textbooks in question, as well as those who are using them in their classrooms - especially in a context where teachers for a variety of reasons may tend to rely on a text heavily. In addition, with regard to the hidden curriculum, an

analysis may tell if a text is biased against a particular social class, religious or ethnic group, or if it is biased against females.

### **Textbooks and Gender**

Gender discrimination in western school textbooks became an issue particularly in the 1970's, when a number of studies examined the portrayal of females in texts (e.g., Britton, 1974; Scardina, 1972; Scott, 1978). Subsequently, improvements took place. However, most of them were of quantitative nature (e.g., more females were depicted in illustrations, or as Hitchcock and Tompkins, 1987, concluded, a preponderance of neutral characters has been created), and only limited progress was made with regard to the qualitative aspect (e.g., roles and characteristics attributed to females). Even in the 1990's, an equal portrayal of males and females in textbooks is not achieved.

Studies on “sexism” in textbooks found that gender bias was manifest in a variety of aspects: (1) Girls and women are underrepresented in textbooks, in both text and illustrations; (2) The roles and functions attributed to girls and women contrast significantly from those attributed to males; i.e., there is a tendency to portray girls and women as sisters and mothers (relatives and caregivers), and boys and men as farmers or shopkeepers (contributors in material and financial ways); (3) Girls and women are assumed to be less capable than boys and men. They are portrayed as passive, weak, homely and dependent; (4) The involvement of female characters in a story line, through dialogue or actions, is inferior to that of males. Male characters are assigned more speech and active participation in the story line. (5) There is sexism inherent in the language that textbooks use. Male pronouns are used more frequently, if not routinely, to refer to an individual whose gender is not specified, except in the case of female gender-stereotyped professions or

activities, such as nurse or looking after small children. Also, vocabulary is often sexist, for instance *postman* and *chairman* (Bray et al., 1986; Britton, 1974; Britton & Lumpkin, 1976; Decroux-Masson, 1979; Gappa & Pearce, 1982; Hitchcock & Tompkins, 1987; Michel, 1986; Scardina, 1972; Scott, 1978; Vaughn-Roberson et al., 1989; Walford, 1981).

The effect of discriminatory portrayal of females and males in school texts is central to the role that the school plays in the socialization process of young people, equal perhaps to the cumulative effect of teachers' differential treatment of boys and girls in the classroom. Thus, as long as sex roles are portrayed in an outmoded and stereotypical manner, efforts to bring about change in those roles are thwarted.

While some progress has been made in alerting authors and publishers to the insidious effects of thoughtless images, the case of texts and their use in developing countries presents an even greater concern. Here, societies are changing rapidly, sometimes accomplishing in 50 years what took 300 in the West; a phenomenon which was evidenced during Zimbabwe's educational expansion in the 1980's.

It appears that little research has yet focused on the issue of gender portrayal in textbooks in developing countries and in Africa, in particular; a point noted by Bray et al. (1986, p. 150). Thus there is a need for study in this area. Available research on gender bias in developing countries essentially yielded data comparable to that from the West. Obura's (1991) study on gender portrayal in Kenyan textbooks produced two main findings: fewer females than males appear in text and illustrations, and the portrayal of females is negative in relation to that of males (e.g., females are often described as of secondary importance to males, and there is a lack of centrality of female characters). Similarly, Oyedeji (1996)

counted more references to males and found that males and females were assigned gender-stereotyped roles or activities in his analysis of Nigerian textbooks: Most males are presented “in engineering, big businesses, architecture, navigation, surveying, and piloting, while most ... [females were presented as] women in the market or supermarkets or interacting with children at home” (p.50). Research in Singapore (Gupta & Yin, 1990) also indicated imbalances in the male-female ratio and role representation, as well as an imbalance in the amount of speech given to characters. Scrase’s (1992) comprehensive analysis of Indian textbooks yielded evidence of gender discrimination through the use of “stereotypes ranging from caring and compassionate ... to those in low-value employment and labour. Overall, women are pictured as subservient and external to the majority of plots, scenes and overall narrative in the textbooks” (p.317).

Marira’s (1991) content analysis of two series of English language textbooks used in Zimbabwean primary schools examined the gender ratios in professional occupations, domestic chores, leading characters in stories and sexist language. The study found a consistent male gender bias throughout the textbooks. For instance, the female gender is poorly represented in the professional occupations,<sup>24</sup> and nurse was the only occupation where the female representation at 100% was higher than the male. The author emphasizes that “the texts do not reflect a single female as a farmer yet the rural women in Zimbabwe are in the forefront in food production” (p. 119). According to Mulders (1986, as cited in Marira, 1991, p. 119), 74% of Zimbabwean females are involved in agricultural production. Another finding concerns the gender of leading

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<sup>24</sup> Professional occupations included headteacher, classteacher, police officer, nurse, doctor, shop-keeper, builder, carpenter, and farmer.

characters: males were found to be leading characters in 51.2% of stories, whereas females are leading characters in only 18.5%.<sup>25</sup>

Marira (1991) suggests that Zimbabwean society “has been silent or has developed a non-action approach to examining the nature of the curriculum in relation to gender issues” (p.118). Because of the crucial role of textbooks as a “source of messages about society’s expectations on gender roles” (p.109), Zimbabwe should more actively and effectively use legislation on gender equality to influence and encourage publishers to review and revise their texts. Publishers should not be allowed to reprint “unauthentic content,” since “the one sided presentation of society to our pupils is harmful to both the educational system and social development” (Bryne, as cited in Marira, 1991, p. 120).

## **Second Language Context**

Upon attainment of independence, African countries had to recognize that the colonialism or evidence thereof did not vanish completely; there remains a strong and dominant legacy. In schools in sub-Saharan Africa, the examination system modelled after the British system and the language of instruction, English, used in much of formal education, as well as the government, commerce and law, bear witness to this phenomenon; namely, the contradiction between long wanted sovereignty and an apparently unquestioned integration of British practice into local society. A partial explanation of this is offered by Bray et al. (1986, p. 12) who indicate that ties with a former colonial power remain strong throughout the African continent. While there are people who want to relate education more closely to local needs and lifestyles, there are also those who wish to maintain

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<sup>25</sup> The remaining 30.3% involve stories where both sexes have leading roles.

'standards' - "which usually means close adherence<sup>26</sup> to the formal system bequeathed to African countries by the colonial powers" (p.12).

Language is the "colonial legacy" this paper is mainly concerned with, since language plays an important role in issues of equity in education, such as access to post-primary education, achievement in and completion of education, as well as gender bias reflected in the language used by textbooks and teachers.

First, it is essential to understand why a colonial language *can* maintain or in fact, according to some views, even *has to* maintain the status of national language and medium of instruction, based on perceived socio-political and economic advantages. Most African countries are multilingual, and some of their linguistic groups may be very small or very scattered. Bamgose (1976, p. 15) refers to Ghana to illustrate this point: a country with 34 indigenous languages, of which three are spoken by only approximately 2,000 people each. Thus, it may be argued that in the absence of linguistic homogeneity, a national language, which would also serve as the medium of instruction, is imperative. Garvin (1974, as cited in Richmond, 1983) describes national languages as those which "serve the entire territory of a nation rather than some regional or ethnic subdivision," as well as "function as a national symbol" (p.2). Thus, national unity, as well as the facilitation of administration and the lower cost of producing educational materials in one language only are among the reasons cited by governments for choosing a national language for education and other enterprises (Ampene, 1978; Bamgose, 1976; Bray et al., 1986; Fawcett, 1970; Poth, 1988; Thompson, 1987).

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<sup>26</sup> "One way in which these 'standards' and international ties are maintained is through the examination system. In 1981 the main secondary school examinations of seven Anglophone countries were still set by Cambridge University in Britain" (Bray et al., 1986, p.12). Zimbabwe remains among these countries.

The selection of a national language is a choice between two options: a majority local language, or an international language, i.e., the language introduced by the former colonial nation. Choosing a European language over an indigenous one may be motivated by two main reasons. First, as Ampene (1978) points out,

there seems to be no hope of having a local language chosen as a national language in many countries ... since to legislate in favour of one of the languages is to ask for protests or even war from the ethnic groups whose languages will be dropped. (p. 13)

Second, the European language, English in sub-Saharan Africa, enjoys a status very different from that of the local languages. It is associated with prestige and success, since it is the language of commerce and many governments, as well as an essential tool in communicating with members of other linguistic groups, on the national and international level. Ampene (1978, p. 15) talks of a very strong desire to hold on to the international languages, and Thompson (1987) even refers to the “African refusal to be ‘imprisoned in their own vernaculars’” (p. 309).

With regard to education, two related issues or questions are common to a majority of writings on the medium of instruction in Africa. First, should and can a foreign language, such as English in sub-Saharan Africa, be the medium of instruction, and why? Second, if English can be the language of instruction, in what grade and how should it be introduced (i.e., gradually or by complete immersion)?

An examination of the first issue produces arguments for and against English as the language of instruction. On the one hand, English is seen as the key to social mobility, since it is associated with the language used in secondary schools and higher education, as well as white-collar employment (Mugore, 1993). In order to ensure their children’s success in school and the labour market, parents may demand that they receive more exposure to English (Hawes, 1982).

Unfortunately, one of the possible consequences of the status of English as a tool to success are negative attitudes towards the use of first languages in schools (Cleghorn et al., 1996).

Another argument for the use of English as the medium of instruction relates to the perception of local languages being unable to express Western concepts and thought patterns particularly in mathematics and science: “There is a risk that translation may lead to fundamental misunderstandings” (Hawes, 1982, p. 77); “Teachers find the vocabulary of indigenous languages inadequate to describe modern technologies ... Many teachers even go so far as to doubt whether African languages are capable of adaptation to the scientific needs ... of the modern world” (Poth, 1988, p. 22). However, this view is contradicted by Poth (1988) who maintains that African languages are capable of being scientific languages. He attributes advancements to speakers of these languages, in particular scientists, who are willing to use local languages as their medium of expression in the fields of science and technology.

Trappes-Lomax’s (1990, p. 95) reflections on the question whether a foreign language can be the medium of instruction, indicate three subjective characteristics required of the language of instruction: (1) it should be accepted by all concerned (parents, teachers, pupils and society), (2) it should be teachable (for instance, there are enough competent and proficient teachers to teach it), and (3) it should be experienced in use (a general familiarity with the spoken language, not merely based on exposure to the use of the language as a medium).

Advocates of the mother tongue as the medium of instruction, on the other hand, maintain that a child learns better and faster through her or his mother tongue (L1), that L1 literacy skills can be transferred to other languages, and that a second language (L2) will be learned more successfully the sounder the L1



foundation (Bagunywa, 1970; Bamgbose, 1976; Bray et al., 1986; Hawes, 1982; Lockheed & Verspoor, 1991; Mugore, 1993; Poth, 1988; Trappes-Lomax, 1990). In particular, it is pointed out that it is advisable not to teach literacy in two languages at the same time (Bagunywa, 1970; Hawes, 1982), and to introduce L2 reading only once L2 oral competence is mastered, since

mastery of the code of reading is intimately bound up with oral competence in a language. Once the code is mastered it is relatively easy to transfer the skill to another language; but to learn to read in a language where the spoken word is not well understood is to invite pseudo-literacy of the kind so painfully apparent in many countries. (Hawes, 1982, pp. 71-81)

Another important reason why a first language as the medium of instruction is preferable at least in initial schooling has to do with the fact that language is basic to one's cultural identity and the retention of cultural values, as well as the belief that teaching in the local language can create a link between the school and the community (Ampene, 1978; Bray et al., 1986; Hawes, 1982; Mugore, 1993; Poth, 1988; Thompson, 1987). Young African children leave the familiar and secure family environment and enter the new, if not alien world of school. They are thus, according to Poth (1988), "in a situation of emotional imbalance" (p. 12). A foreign language represents an additional cause of "emotional frustration and intellectual uncertainty" (p. 12).

Trying to answer the second question, when and how English should be introduced provided it is capable of being the language of instruction in an African country, proves more difficult than collecting arguments for and against English as a medium. It appears that authors, or their sources, are usually quite clear about the benefits of L1 or L2 instruction, but do not answer or even address the following questions about how L2 is to be introduced as a subject or the language of instruction: If it is recommended to first establish L1 language skills, by what

age or grade are they believed to be established? What exactly are sound L1 skills? Also, once L2 is supposed to be introduced, should this be gradually, or by complete immersion?

On the one hand, a Commonwealth Conference in 1961 recommended that English should be introduced as early as possible in a child's school life. A view shared by some governments and many educationists, who even suggest that in order to master English, children should learn the language from their first day of school (Bamgbose, 1976, Bray et al., 1986; Mugore, 1993). On the other hand, Bamgbose (1976) refers to meetings of experts, commissions or national bodies who advocate instruction in L1, and recommend that children should be educated in their mother tongue for as long as possible. Then there those who recommend or at least do not object to L2 at the primary level. Lanham (1973) believes that early primary years, approximately grades one to three, represent "the age of high receptivity for language learning" (p. 265). Similarly, Cleghorn et al. (1996) indicate that it is at the primary "level that the basic foundations of second language development for later learning are best established" (p. 3). However, except in the case of proponents of L2 as the medium from as early as possible, references are not specific enough to allow for any conclusions on when and how L2 should be introduced as the medium of instruction.

The fact that there are no recommendations when it comes to the practical aspects of introducing a second language as the medium in African schools, is reflected in Lockheed and Verspoor (1991) who indicate the complexity of the issue, but cannot offer any universal answers or plans of action, either:

Determining a sound language policy is of necessity heavily influenced by the unique economic, cultural, and linguistic factors of each country. In some situations, early primary education should be conducted in the first

language.... In other situations, early immersion ... is more appropriate - for example, when students do not share a common language. (p. 167)

The status of English in Zimbabwe is comparable to the situation in other African countries. At independence, Shona and Ndebele, Zimbabwe's indigenous languages, became official, and no immediate change occurred in the status of English, the language of the government. Opinions that Shona and Ndebele are not sufficiently developed to be used in a modern and technologically advanced state, while English is, are held by many Zimbabweans. In addition, English is considered capable of helping the nation realize its "nationalist" and "nationist" goals (Mugore, 1993).

In education, the official policy is to use the mother tongue as the medium of instruction in grades 1 to 3. English becomes the medium starting in grade 4. However, in urban schools, English is usually used from grade 1. This suggests that not all children have equivalent exposure to the language that plays a crucial role in determining students' achievements, access to post-primary education and completion of 'O' and 'A' levels, for instance.

In Zimbabwe, as elsewhere, any discussion of equity in education needs to include the issue of language. As Lockheed and Verspoor (1991) emphasize, "one of the most prevalent forms of discrimination in the classroom is teaching in a language that children do not understand or with which they are uncomfortable" (p. 166). Also, concerns are even more acute in light of reports that talk of students' problems with English, and even indicate English as a factor in students' overall low performance in school (Cleghorn et al., 1996; Mugore, 1993). As Mugore (1993) emphasizes, it is important to know if the way English is learned and taught in Zimbabwean schools is effective - culturally and socially - and also, "whether the English syllabus and other English programs ... are relevant to the

learner's social, political and economic environment, and reflect the cultural ideologies and philosophies of the learner's community" (p.12).

### **Science and Language**

It is recognized that science development is crucial to a country's overall development (Opare, 1996; Unicef, 1990). This is of particular importance in Africa, a continent that is considered to lag behind the rest of the world in science development (Ajeyalemi, 1990). In Ajeyalemi's (1990) view, this is an indication of the relative failure of science education in Africa. The belief that science education plays the main, if not the only role in determining a country's science development is shared by the Committee on the Teaching of Science of the International Council of Scientific Unions (1979, as cited in Ajeyalemi, 1990):

It is our opinion that the healthy growth of science and technology in any country depends critically on the availability of technically and scientifically trained manpower and that it is the responsibility of indigenous educational systems to provide such manpower. (pp. 173-4)

Since Africa compares favourably with other parts of the world when it comes to allocation of school time spent on science and mathematics in grades 1 to 9 (Unesco, 1986, as cited in Ajeyalemi, 1990, pp. 1-2), the "failure of education" can be assumed to be one of quality, not quantity. According to Ajeyalemi (1990), "perhaps the greatest problem of current science and technology education programmes in Africa is that of inadequacy of resources - human and material" (p. 172).

Another explanation for the perceived failure of science education relates to the fact that the African science curricula is tied to Western culture, beliefs and experience. Consequently, since science cannot be taught in a cultural vacuum, conflict arises between the indigenous culture and science culture (for further

discussion and illustrations of this issue see Shumba, 1995). It is therefore possible that people accept “the products and procedures of the technological aspects of science while remaining perplexed with the inner spirit of science itself” (Odhiambo, 1968, as cited in Shumba, 1995, p. 260). As Shumba (1995) emphasizes, “in traditional cultures, a commitment to science, and the spontaneous application of scientific approaches to problem situations may be absent sometimes even among science teachers” (p. 260).

The importance of science is also recognized in Zimbabwe, which is reflected, for instance, in the country’s curriculum. Since independence, the government has made efforts to revise the curriculum in order to align it to national development goals.

Curricula would deliberately move towards science and technology in order to discourage persistence of underdevelopment trends.... The drive towards science and technology and making the curriculum development oriented was seen as a necessary strategy for integrating education into rural development. (Unicef, 1990, p. 73)

Regardless of the country or ministry of education, it is evident that the language demands of the science curriculum are distinct from demands in subjects like English and history. Therefore, mastery of the respective language of instruction is not sufficient, students need to know the “language of science” in order to communicate in science (White & Welford, 1988).

This poses an additional obstacle to second language speakers of the medium of instruction. In order for them to master the “language of science,” they must undertake a double effort or a “dual translation.” A foreign language as the medium of instruction requires “a double effort from children who have just started school. They must interpret a message imparted in a language they do not yet know and at the same time master the content of that message” (Poth, 1988, p.

23). This is particularly relevant to the science curriculum, since “when culturally foreign concepts are taught, ... a process of ‘dual translation’ (cultural and linguistic) is required in order to connect the unfamiliar content of the lesson to the familiar world of the child” (Cleghorn et al., 1996, p. 6). Thus while even native speakers can experience problems due to an inability to make sense of or express science content adequately, L2 speakers are at an even greater disadvantage.

The “language of science” consists of the appropriate language structures and vocabulary (abstract scientific vocabulary and everyday science related vocabulary). Both are essential to successful communication in the field of science. The language structures in science discourse are distinct from those in English, for instance in essay writing or story telling. While an English essay can be and often is written in first person or in the voice of a constructed persona, science discourse characteristically omits all references to individuals since it intends to be objective or universal. In addition, science discourse will be limited to the essential facts or data; no emotions, moods or other descriptions of the scientists or the environment in question are included.

The importance of knowledge of the correct vocabulary is emphasized in the report *Science at Age 15*<sup>27</sup> which states that “the incidence of use of specialist terms and structures has been low, and to a certain although unquantified extent, must have limited pupils’ capacity to describe or record their observations.” Cassels and Johnstone (1985) studied the vocabulary of 30,000 secondary school children in Great Britain, and in particular tested the students’ understanding of the meaning of 100 words such as ‘contract’ and ‘devices.’ Their report indicates that “only 70% of pupils at the upper levels were found to have an understanding

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<sup>27</sup> Cited in White & Welford (1988), p.2. *Science at age 15*. Report prepared for The Assessment of Performance Unit. Science reports for teachers: 5. London: Department of Education and Science.

which matched the experts' view of all the words tested" (as cited in White & Welford, 1988, pp. 3-4). Cassels and Johnstone (1985, p. 14) further observed two kinds of "misunderstandings." In a surprising number of cases, students' answers were either the exact opposite of the actual meaning of a term or there was a lack of precision: "random" was confused with "well ordered" and "probability" with "possibility."

In regard to science vocabulary, the Grade 4 Teachers' Resource Book (Longman Zimbabwe, 1985) distinguishes between two categories: (1) basic concepts of the physical environment, e.g., growth and habitat, and (2) more abstract concepts relating to the environment as a whole, e.g., energy and system. The guide points out that concepts in the second category are more difficult to understand, and that perhaps "grasp of these will only begin to come in later years of the [elementary science] programme" (p. ii).

Many of the issues or factors discussed previously are found to intersect and come into play during science instruction: teacher expectations and attitudes, gender, textbooks, second language, and the language of science. It is therefore important to examine the interplay of these variables in the classroom itself. As noted earlier, this thesis has attempted to examine the content and use of science textbooks in the broader context of these interacting variables. As a result, some specificity may have been sacrificed in order to insure that sight was not lost of the context. This orientation to the thesis will also be seen in the following section on methodology.

## **CHAPTER TWO**

### **METHODOLOGY**

The data gathered for this thesis were directed to the following questions:

- (1) How does the language of a textbook present the material to be learned? In particular, are the vocabulary, sentence structure and sentence length appropriate for second language learners? Is the material presented as if the learners were L1 speakers of the language of instruction (English)?
- (2) How are girls and women portrayed linguistically and pictorially in the textbooks? For example, are the situations culturally true? Are girls and women depicted in traditional, stereotypical or modern roles? Are they under- or over-represented?
- (3) When the texts are used in the classroom, do teachers pay particular attention to language-related matters by, for example, checking that students understand the meaning of every-day English words as well as technical terms? Do they refer to the illustrations in the texts and “read” these to the class? In doing so, how is gender dealt with?

The primary method of data collection was a content analysis of English and science<sup>28</sup> textbooks used in grades 1, 4 and 7 in Zimbabwe. As Obura (1991) found in her content analysis, the available literature on textbook analyses is limited. “The literature that was available was surprisingly brief about analysing a range of textbooks. The available reviews tended to concentrate on children’s literature, or language and humanities textbooks” (p. 22). Therefore, the methods used in this analysis come from two sources: published textbook analyses and methods specifically adapted or designed for this study.

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<sup>28</sup> The science textbooks are called “Environmental and agricultural science.”



Having reviewed a number of other content analyses (e.g., Britton, 1974; Chimombo, 1989; Hitchcock & Tompkins, 1987; Obura, 1991; Scardina, 1972; Vaughn-Roberson et al., 1989; Walford, 1981), it was decided to proceed as others have done - from the broad, qualitative overview to the small scale, more quantitative type of analysis.

Nine<sup>29</sup> English and science textbooks,<sup>30</sup> currently used in Zimbabwean grades 1, 4 and 7, were subjected to a quantitative and a qualitative analysis of content. First, all textbooks were scanned on a broad scale. Aspects such as visual appeal and order of content were described (see 1. Overview). Subsequently, the English and science texts were compared with each other in order to examine the correspondence of language and whether any preparation for the language needs of the science curriculum takes place, either in English or in science itself. Readability; teaching and evidence of applications of the appropriate language structures in science discourse; and introduction of science specific vocabulary in the English curriculum were the main issues addressed in this section (see 2. Language Correspondence). Third, the grade 1, 4 and 7 science textbooks were subjected to an in-depth analysis. The focus was on science and language, particularly the use of science specific vocabulary in a second language context, on the one hand, and the portrayal of gender as an example of cultural content of a curriculum, on the other hand (see 3. In-Depth Analysis of Science Content).

A second source of data collection was a classroom based study, which was carried out by a local research team in Zimbabwe. This small study was intended to provide contextual data, throwing light on the ways teachers use textbooks, as

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<sup>29</sup> The analysis involved one textbook per grade and subject. However, the grade 1 English text is divided into four volumes: Pre-reader, Book 1, Book 2, and Book 3.

<sup>30</sup> See Appendix A for a list of analyzed textbooks.

well as on other factors that impact upon classroom processes (see 4. A Classroom Based Study: Teachers, Gender and the Use of Textbooks).

## **1. Overview**

The overview involved a broad scale assessment of the selected nine textbooks, focusing on aspects such as visual readability and appeal, order of content and progression over grades. This process entailed four steps, within which each textbook was evaluated based on the criteria discussed below.

Some elements of this evaluation, such as visual readability and appeal, were intended to be descriptive, rather than analytical, and as such were susceptible to reflect subjective judgement.

### **1.1. Visual Readability and Appeal**

Presentation of pictorial and textual information was at the core of this evaluation of visual readability and appeal of the textbooks which was carried out through an examination of covers, illustrations, and headings, as well as the quality of the paper the texts are printed on.

The criteria concerning the covers were attractiveness and meaning. The cover of a textbook and the illustrations therein are believed to influence a student's first impression of that text. Consequently, the interpretation of attractiveness in this study stems from the author's considerable experience with the use of textbooks in an elementary educational setting. Therefore, a cover that is printed in colour tends to be more appealing than a black-and-white or monochrome cover, and a picture - a photograph or a drawing - is more attractive than print or graphics alone.

The meaning of a particular cover was evaluated as to whether the pictures or graphics reflected the subject matter of the respective textbook. In other words, does the cover transmit a clear message or image, and is this message appropriate for the respective textbook? Thus, a science textbook cover that depicts a farm or an issue related to health care would be considered meaningful, whereas a cover depicting children listening to the radio would not be.

The illustrations were also assessed with respect to attractiveness and meaning, and it was indicated whether they are in colour or black-and-white. The above definitions of attractiveness and meaning of textbook covers also apply to the evaluation of illustrations. Colour, size and clarity of an illustration influence how a student reacts to it. An adequately sized, easily interpretable and colour picture may be more interesting than a small, ambiguous, black-and-white image. Also, in order for an illustration to be meaningful, the reader has to be able to comprehend it, and the image must reflect the subject matter.

The headings were examined with two issues in mind: consistency and systematic order. First, it was determined whether there was a consistent format to the headings and subheadings. For example, do main headings have the same style with respect to size, boldness of lettering, and the use of capitals? Is the use of headings consistent throughout? Second, are the existing headings helpful to the reader with respect to the comprehension of the content and the structure of the text?

The last variable is the quality of the paper the textbooks are printed on. It was indicated whether a text is printed on "regular" paper, meaning white paper of regular thickness, or on newsprint, inexpensive, thin, greyish paper. The assumption is that newsprint is less attractive than "regular" paper.

## **1.2. Proportion of Text to Illustrations**

The number of pages of both text and illustrations, respectively, were counted as quarter, half, three-quarter or whole pages in order to obtain the proportion of text to illustrations. In addition, each subtotal, i.e., the number of pages of text or illustrations in a particular textbook, was recorded as a percentage of the total number of pages of the respective text.

## **1.3. Order of Content**

The order of content was studied, focusing on the relation and the coherence between chapters or units. The focus was on a description and on the effectiveness of the order of content. Three questions were asked: (1) Is there an apparent order? (2) What kind of order is it? An order could be thematic, chronological (e.g., in a history text, or in relation to seasons) or it could be related to the demands or the “difficulty” of the content (e.g., a mathematics text for the first primary grades starts with additions, it will not introduce multiplications or divisions until the students are sufficiently familiar with additions, subtractions and a particular range of numbers, such as 1 to 100). (3) How “efficient” or successful is the order? A “good” order should help the reader understand the content and find what he or she is looking for. This is particularly important in the case of teachers who rely only or mostly on the textbook, rather than on additional sources, as well as in the case of students who use the textbook for independent study, i.e., not only when reading in class or doing an assignment on a particular chapter.

## **1.4. Progression over Grades**

The progression over the selected grades (1, 4 and 7) was examined. Is there a gradual increase in the level of vocabulary, and the difficulty and complexity of the content? Samples were used to examine the level of vocabulary. An analysis of the difficulty and complexity involved an examination of the unit headings, as well as a general assessment of the difficulty or complexity of content, using samples in the case of the English textbooks.

## **2. Language Correspondence**

At the core of this section was a comparison of language and vocabulary levels of the respective English and science textbooks, as well as an examination of the language needs of the science curriculum and how they are responded to. The comparison was intended to produce evidence regarding the correspondence or non-correspondence of levels of language and vocabulary in, for instance, the grade 1 English and science textbooks.

### **2.1. Readability**

In order to substantiate the preliminary findings regarding the level of language and vocabulary (see 1.4.2. above), readability formulas were applied to samples of all textbooks. Lix, the Fry Readability Formula and the SMOG Readability Formula<sup>31</sup> were selected from among over 30 readability formulas. Lix was selected because it was considered a more recent, promising formula worth applying and comparing to the established Fry and SMOG formulas.

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<sup>31</sup> Any further reference to the SMOG formula is to the Adapted SMOG Readability Formula, by Lawrence L. Smith (Brock, 1979, p. 111). The adapted SMOG formula was chosen, since the original formula has been found to grade about two levels higher than other formulas (Wheeler, 1983, p. 40).

The steps for computing Lix scores were as follows: (1) count the total number of words, the number of long words (i.e., words of more than six letters), and the number of sentences in the text; (2) compute the percentage of long words in the text; (3) compute the average words per sentence; and (4) add the two values for 2 and 3 and round to the nearest whole number (Anderson, 1981, p. 11). Anderson does not indicate if the formula is to be applied to the whole text or samples. However, since computing Lix scores using *all* pages of the nine textbooks was not considered feasible, and since Anderson (1981, p. 8) mentioned the use of samples in a test of Lix, it was decided to use random samples of five consecutive pages per text (only one sample from the grade 1 English texts). Scores were obtained per page, and the mean was computed. The mean Lix scores were used to determine the text difficulty. Generally, a score of 20 can be interpreted as “very easy,” while 60 means “very difficult” (see Table 2, Anderson, 1981, p. 13).

The Fry Readability Formula was applied next. For each text, three random samples of 100 words each were selected. The number of sentences and the number of syllables were counted in the respective 100-word samples. The average number of sentences and the average number of syllables per 100 words were entered on the Fry Readability Graph (Brock, 1979, p. 109), indicating the approximate grade level of the respective textbooks.

A textbook’s grade level can also be determined by the SMOG Readability Formula. Three ten-sentence samples were randomly selected in each textbook. In the 30 sentences, words of three or more syllables were counted. The square root of the number of polysyllabic words was estimated after rounding that number to the nearest perfect square. If the perfect square was 9 or less, the square root

gave the adapted SMOG grade. If the nearest perfect square was 16 or greater, one was added to the square root to determine the adapted SMOG grade.

## **2.2. The Language Needs of Science**

The investigation of the language correspondence in English and science textbooks centered around the issue of language needs of the science curriculum. It had two foci: (1) the language structures of science, for instance in the context of reporting, hypothesizing or interpreting, and (2) the vocabulary (abstract scientific vocabulary and everyday science related vocabulary). The analysis involved the science and English curricula for Zimbabwean grades 1, 4 and 7, as well as the respective science and English textbooks.

### **2.2.1. Language Structures of Science**

The language of science involves language structures that are different from those required in writing an essay or poem, for instance. These language structures are apparent in the context of reporting, hypothesizing or interpreting “science content.” They have to be learned and mastered independently, i.e., they are distinct from general mastery of a language. The Zimbabwean science and English curricula for grades 1, 4 and 7 were analyzed looking for any awareness of or directions regarding these language needs. Then, the English and science textbooks were examined to see if and how they respond to the syllabi or contain evidence of additional independent preparation for the requirements of the science curriculum, as well as in the case of the science texts, demonstrate a need or application for these skills.

### **2.2.2. Science Vocabulary**

The English syllabi for grades 1, 4 and 7 were examined for awareness of or directions regarding science vocabulary, particularly everyday science related vocabulary. Subsequently, the English texts were analyzed looking for introduction and use of science vocabulary. (See below for an examination regarding science vocabulary in the science syllabi and textbooks.)

## **3. In-Depth Analysis of Science Content**

### **3.1. Vocabulary**

The grade 1, 4 and 7 science syllabi were submitted to the same analysis as the English syllabi (see 2.2.2.). The main issue was whether the syllabi demonstrated any awareness of the curriculum's demands on students regarding the required science vocabulary. The corresponding science texts were examined in order to study whether and how vocabulary is introduced or reinforced.

### **3.2. Gender**

A statistical and comparative evaluation of the representation and portrayal of male and female characters featuring in the texts and illustrations of the selected science textbooks was carried out. First, the number of males and females in the body of text, as well as in the illustrations, including the covers, was compiled and recorded separately. Whenever the same person was mentioned or depicted more than once, the reference was counted only once.

Next, the body of text was examined for references to professions or roles, such as teacher and father; activities; and adjectives assigned to males and females, respectively. In addition, the language was examined for gender bias, for instance



in the vocabulary (e.g., *postman*, *chairman*), or any instances of use of a male pronoun in reference to a person whose gender is unknown or simply in reference to *any* individual, disregarding the fact that half of the population is female.

#### **4. A Classroom Based Study: Teachers, Gender and Use of Textbooks**

A classroom based study was designed and carried out by Zimbabwean graduate students who were co-supervised by Concordia University and University of Zimbabwe faculty members. This small study was intended to throw light on teachers' beliefs and opinions regarding science education, girls' and boys' abilities and the suitability of the science texts they use, on the one hand, and on how teachers treat boys and girls and use the texts in science class, on the other hand.

The study comprised classroom observations, as well as teacher interviews and questionnaires (see Appendices C, D and E). The local research team visited four teachers in two schools (two teachers per school) and observed their grade 7 science classes. Each classroom was visited three times. First, a pre-observation took place to allow the students and their teachers to get used to the researchers. The two lessons observed during subsequent visits dealt with Health and Landforms, respectively. The units were selected to throw light on whether there are any differences between a "neutral" topic (i.e., Landforms) and a topic (i.e., Health) that may favour one gender over the other, in this case females over males.

Two issues were at the core of this classroom study. First, the classroom observations and teacher interviews were designed to provide data on teachers' views on science instruction and the science textbooks, as well as on how teachers use the texts in the classroom. Of particular importance with regard to the last point is the teachers' use of language in interpreting the science texts to the

students. Second, the study was intended to contribute information regarding teachers' expectations or beliefs about the abilities of boys and girls in science class, and whether teachers tend to treat boys and girls differently.

## **CHAPTER THREE**

### **RESULTS**

This chapter presents the results of the content analysis of selected Zimbabwean primary textbooks, and a classroom based study carried out in Zimbabwe. The content analysis comprised a broadscale assessment of the textbooks, an examination of the language correspondence between English and science texts, as well as an in-depth analysis of science content that focused on scientific vocabulary and the portrayal of males and females in the science texts. A classroom based study was intended, among other objectives, to observe how textbooks are actually used.

#### **1. Overview**

The overview involved a broad scale assessment of the selected English and science textbooks currently used in Zimbabwean grades 1, 4 and 7, focusing on aspects such as visual readability and appeal, order of content and progression over grades. Some elements of this evaluation, such as visual readability and appeal, were intended to be descriptive, rather than analytical, and as such were susceptible to reflect subjective judgement.

#### **1.1. Visual Readability and Appeal**

The results of the assessment are recorded in Table 1. This table displays how each textbook “performed” with regard to each of the eight variables.<sup>32</sup> The

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<sup>32</sup> The eight criteria (see vertical columns) applied to evaluate the textbooks are: 1) attractiveness; 2) meaning; 3) attractiveness; 4) meaning; 5) colour; 6) consistent format; 7) helpfulness; and 8) quality of paper.

data were quantified in numbers, using a scale of 0 to 2.<sup>33</sup> Since most of the assessment was susceptible to subjective judgement, a broader scale was not considered to be more valid. The maximum score possible was 12.

Table 1 - Visual Appeal

	Cover		Illustrations			Headings		Paper	Total
	1	2	3	4	5	6	7	8	
Engl. - Grade 1									
Pre-reader	2	1	2	2	1	1	0	1	10
Book 1	2	1	2	2	1	1	2	1	12
Book 2	2	1	2	2	1	1	1	1	11
Book 3	2	1	2	2	1	1	1	1	11
Engl. - Grade 4	2	1	1	2	0	1	2	0	9
Engl. - Grade 7	1	0	2	2	0	1	2	0	8
Sci. - Grade 1	1	2	2	2	1	0	0	0	8
Sci. - Grade 4	2	2	1	1	0	0	0	0	6
Sci. - Grade 7	2	0	2	2	0	1	2	1	10

<sup>33</sup> This process involved a scale of 0 to 2 where 0 is negative and 2 positive. In the case of criteria number 5 and 8 (see footnote 32), the scale was 0 to 1, 0 meaning "No" and 1 "Yes."

The main findings or comments on the assessment of visual appeal and readability are reported in more detail below.

The covers of all nine textbooks are in colour. Photographs were used for the English textbooks, and drawings for the science texts. One picture is found on each cover, with the exception of the grade 7 English and the grade 1 science text that use four pictures each. This may at least partially explain why the latter two textbook covers were not considered as attractive as the others. They convey too many themes, whereas the other covers transmit just one clear message, such as children interacting with each other, or a farmer standing on a field.

While the covers of the English textbooks for grade 1 and 4 were judged to be very attractive, they were not considered very meaningful. They depict children interacting with each other, which is part of any language instruction. However, if some of these covers were put on a Mathematics or Science textbook, they would be equally meaningful, if not more. For instance, the cover of the pre-reader showing children playing with different coloured shapes would be just as suitable as the cover of a mathematics text.

Both grade 7 texts failed to meet the criteria of a meaningful cover. The English text looks more like a book used for vocational counselling or training. Adolescents are portrayed gardening, cooking, typing and doing carpentry. The science textbook cover, on the other hand, contains features such as antennae and a radio that *may* be relevant to a science text. But it is unclear what the cover is supposed to represent.

The only two textbooks that were assigned lower scores with respect to attractiveness of illustrations are the two grade 4 texts. Colour was not a factor here, since there was a separate score for the colour of illustrations. A comparison

of the grade 4 and 7 English textbooks, which are in many ways very similar, did not show crucial differences between their illustrations. However, the illustrations in the grade 4 text were considered less attractive since they tend to be somewhat less clear and less realistic. For instance, facial features tend to be blurry or uniform, and proportions are incorrect (see for instance p. 52, bottom, and p. 95).

The illustrations in the grade 4 science textbook were also found to be less attractive, as well as less meaningful, i.e., it was more difficult to understand or interpret the illustrations in this text compared to all the others. They were considered less attractive for reasons similar to those mentioned in the assessment of the grade 4 English text. In addition, the illustrations may contain too much information, and/or the way this information is transmitted may be unclear. This lack of clarity may affect the overall visual appeal. The main exception are photographs of wildlife that are very appealing.

It is often difficult to extract meaning of the grade 4 science illustrations. There may be too much information in a picture (e.g., see pp. 30-31; e.g., one relatively small black-and-white picture depicts a msasa tree, as well as its leaves, flowers, pods and seeds, all out of proportion, and placed close together to avoid unused space) or the parts of a picture do not seem to be connected (pp. 70-71; e.g., a picture depicting animal habitats tends to be perceived as various unconnected elements, such as groups of trees and a river). In addition, the relevancy of some pictures may be questionable. On page 36, we find a picture of the outside of a cement factory. The picture does not have any relevance; it neither illustrates what the text says, nor transmits any information. Another example are the flowers depicted on page 29. The black-and-white image is supposed to illustrate the effect of water coloured by various dyes and absorbed by

white flowers. Naturally, the illustration is not very enlightening in the absence of colour.

The use of headings in the grade 1 and 4 science textbooks is inconsistent. The grade 1 text only uses headings for two re-occurring sections: “Things to do” and “Things to find out.” Therefore, since most pages or sections do not have a heading, the use of headings was considered inconsistent. In the case of the grade 4 science textbook, one example that illustrates inconsistent use of headings is the use of two different “formats” to indicate main sections. Unit 1 (p.11), and Unit 3 (p.21), for instance, both use different main headings: **regular size bold print** and **REGULAR PRINT CAPITALS**. The regular size bold headings are also found in Unit 3, which uses them as subheadings. In addition to an inconsistency in “format,” not every “section” has a heading. Another example is the title of Unit 10 in **large size bold print**: **National Parks and wildlife**. It serves at the same time as the title of the unit and (at least with regard to the first part, National Parks) as the heading of a main section, preceding headings such as **Recreational Parks and Sanctuaries**. These inconsistencies make apparent how helpful a consistent system of headings is or would be to the reader to help him or her understand the content or at least the structure of the content.

While the headings in the grade 1 English texts (Books 1-3) structure the content, it is not always obvious what a particular unit, or section of a unit is about. For instance, Unit 20 in Book 2 (pp. 23-25) is titled “Teachers and farmers.” However, the unit is mainly about the location of objects and people, e.g., the ball is in the tree; the teacher is near the door. Only one of three pages is actually concerned with content relating to the topic of this unit. Page 24 has the heading “A farmer” and introduces some vocabulary stemming from a picture of one or more farmers and a cart pulled by two oxen. Another example is Unit 28 in

Book 3 (pp. 12-15): the title “Two stories” is misleading since there is only one story (“Story 2,” pp. 14-15; “Story 1” can be found on pp. 6-7). The reader does not know why the unit is titled “*Two stories*” and how that title relates to pages 12 and 13.

For the last criteria, the quality of the paper each textbook is printed on was determined. While this criteria may not appear to be very significant, it is still important. The appearance and feel of the paper will influence the student’s first impression and interest in a book. Paper of a “regular” thickness and attractive colour, such as white or, for instance, pale blue, will appeal more than greyish, thin paper.

According to the totals presented in Table 1, scores assigned to the textbooks can be grouped in three ranks. All grade 1 English texts, as well as the grade 7 science text ranked best. The other two English texts and the grade 1 science textbook represent the second group, followed by the grade 4 science text. While these totals were calculated using eight different criteria, they closely reflect the author’s initial overall impression. The textbooks in the first group ranked well thanks to their attractive covers and illustrations, and with the exception of the black-and-white grade 7 science text, they are all printed on “regular” paper and have colour illustrations. The lower totals for the second group were mainly due to the quality of paper the books are printed on, and the fact that their illustrations are in black-and-white, with the exception of the grade 1 science text that has colour illustrations. The grade 4 science textbook, on the other hand, proved to have a number of “weaknesses.” The use of headings and subheadings was found to be inconsistent, as well as confusing. Also, the illustrations were somewhat less attractive and less easily readable compared to the other texts.



## **1.2. Proportion of Text to Illustrations**

In order to obtain the proportion of text to illustrations, the number of pages of text and illustrations, respectively, were counted. Pages were recorded as quarter, half, three-quarter or whole pages, and the subtotals were computed as a percentage of a textbook's total number of pages (see Table 2).

As expected, the proportion of text to illustrations changed from grade to grade, and even from book to book in grade 1, due to an increase in the number of pages of text as a percentage of the total number of pages. In grade 1, the percentage of text is 30.5% and 35.11% for English and science respectively. With regard to the English textbooks, this percentage increases to 79.83% for grade 4 and 89.99% for grade 7. The percentages for the science texts are 42.48% for grade 4 and 55.65% for grade 7.

It was noted that the increase was more pronounced in the case of the English textbooks: 30.56%, 79.83% and 89.99%. The percentages for the science texts are 35.11%, 42.48% and 55.65%. This may suggest that in the case of the English texts, illustrations were gradually replaced by text as the students' language skills advanced. On the other hand, illustrations remained essential in the science texts. It may be hypothesized that the respective science textbook designers considered illustrations to be an essential learning tool, or to carry information that words cannot, or cannot transmit equally well.

**Table 2 - Proportion Text to Illustrations**

Textbook <sup>34</sup>	Pages of Text (Percentage of Total)	Pages of Illustrations (Per- centage of Total)	Total Number of Pages <sup>35</sup>
English 1 - grade 1	5.75 (17.97%)	26.25 (82.03%)	32
English 2 - grade 1	6 (18.75)	26 (81.25)	32
English 3 - grade 1	15.25 (38.125)	24.75 (61.875)	40
English 4 - grade 1	17 (42.5)	23 (57.5)	40
Total grade 1	44 (30.56)	100 (69.44)	144
English - grade 4	239.5 (79.83)	60.5 (20.17)	300 (311-11)
English - grade 7	242.75 (89.99)	27 (10.01)	269.75 (270-6.25)
Science - grade 1	24.75 (35.11)	45.75 (64.89)	70.5
Science - grade 4	43.75 (42.48)	59.25 (57.52)	103 (112-9)
Science - grade 7	78.75 (55.65)	62.75 (44.35)	141.5 (151-9.5)

<sup>34</sup> See Appendix A for complete references. English 1 (grade 1) refers to the Pre-reader, while English 2, 3 and 4 represent Books 1, 2 and 3 for grade 1.

<sup>35</sup> The total number of pages does not include blank pages or pages such as the title page or the table of contents.

### 1.3. Order of Content

The order of content was studied, focusing on the relation and the coherence between chapters or units. The main objectives of this examination were to describe the order of content and to rate its effectiveness.

A preliminary analysis led to the following conclusion. There is an important distinction between science and English textbooks regarding their content. In the case of the science textbooks, the topic or subject matter is essential and is closely related to the objectives of the syllabus, while the emphasis in the English texts is on the syllabus objectives, and not on the subject matter of a particular chapter. In other words, in the case of the English texts, the subject matter is not the objective, it is a means of achieving an objective such as improving L2 understanding and vocabulary, reading comprehension, or grammar. In addition, an objective cannot be achieved in merely one chapter, as may be the case in the science texts. Therefore, two important questions arose with regard to the English texts: Can there be a systematic order of content, and would such an order be efficient?

The first part of this examination was concerned with the order of content in the English textbooks. As mentioned above, the English texts were not found to be based on content per se. Content can be seen as a means of achieving objectives. However, there is a distinction between the textbooks used in grade 1 and those used in grades 4 and 7. The emphasis in grade 1 is on vocabulary and basic L2 skills, such as greeting someone in English and asking a question. Therefore, the content appears to be somewhat more connected to the objectives, when compared to the texts for grades 4 and 7.

No consistent systematic relation or coherence between chapters could be detected in the English texts. In the case of the grade 1 texts,<sup>36</sup> some units may be part of the same theme, such as “Names” and “Greetings,” and “Colours” and “Colour and Size,” respectively. Those units are however an exception, and overall, no consistent thematic order was apparent.

The content of the grade 1 English texts was found to closely relate to the syllabus. In the latter, functional objectives were grouped into eight blocks of four to seven units each (pp. 1.9-1.27), which closely, though not perfectly, parallel the content, and order of content of the textbooks. No such influence was found with regard to the grade 4 and grade 7 textbooks.

While it was impossible to detect a relation and coherence between chapters, an order or structure was apparent within the chapters of the grade 4 and 7 English textbooks. Each chapter consists of several steps - such as “Language preparation,” “Reading,” and “Understanding the passage” - that reflect a common theme or topic such as prepositions. The steps (headings, number, and order) may vary from chapter to chapter, but the overall impression is that of structure and continuity. It is also possible that there can be continuity with regard to the content of a particular step from chapter to chapter. A thorough examination of the content or objective of each step was impossible due to time restraints. However, one example for continuity of content was apparent: a newspaper project in grade 7. Step 7, Writing, in Unit 17 starts with instructions for a group assignment on writing a class newspaper. The steps titled Writing continue to deal with this project in Units 18 to 20.

The analysis of the science textbooks did not produce any significantly different findings. The order of content seems random; units that could be

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<sup>36</sup> The pre-reader is not divided into units. It can be used, or is to be used with Book 1.

grouped together are placed in an apparently random order. Units 5 and 16 in the grade 4 text, for instance, are titled “Let’s investigate trees” and “Growing tree seedlings.” It is not evident why the two topics are ten units apart. A similar example can be found in the grade 7 textbook. Units 7, 8 and 10 deal with the human body. Unit 9, however, is concerned with “the science of burning.”

The grade 7 text divides its units into three sections, labelled Term I, II and III, indicating that the units are meant to be taught during a particular term. It is unclear what the reason for that rigid order is, whether it has anything to do with seasons, such as crop period or seeding period.

The syllabus is influential in determining the subject matter, albeit to different degrees depending on the textbook. The subject matter of the grade 1 text,<sup>37</sup> as well as its order are particularly closely linked to the syllabus. Except for the reversed order of syllabus topics 8 and 9, the topic of each textbook unit, as well as the order of each unit correspond to the nine syllabus topics and their order (see Primary School Environmental Science Syllabus for Grade 1 to 3, 1994, pp. viii-xxii). However, in the case of each of the three textbooks, it was observed that: 1) not all objectives of the syllabi were covered, and 2) some subject matter, and even chapters are not part of the respective syllabus. For instance, syllabus topic 2 (Soil, Grass and Grazing) for grade 1 is soil. The textbook, on the other hand, mainly talks about rocks and grass - topics the grade 1 syllabus does not mention at all.

#### **1.4. Progression**

The progression over the selected grades (from grade 1 to grade 4, and from grade 4 to grade 7, respectively) was examined. Is there a gradual increase in the

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<sup>37</sup> The grade 1 science textbook is not divided into units.

difficulty and complexity of the content, as well as in the level of language and vocabulary?

#### **1.4.1. Content**

With regard to an increase in the difficulty and complexity of the content over grades, it was noted that the content of both, the science and the English texts becomes more difficult and complex particularly from grade 1 to grade 4. The increase is however far less obvious from grade 4 to grade 7.

In science, the grade 1 text starts with basic concepts, such as properties of water. Aside from the fact that the textbook is written in English - a second language for the majority of students in Zimbabwe, which officially only becomes the language of instruction in grade 4 - the content of the grade 1 science text seems appropriate for grade 1. The topics in grade 4 and 7 are more complex, and not always clearly identifiable as grade 4 or 7 content, respectively. On the whole, it is not the topic per se, but rather the way the topic is dealt with that indicates what grade level it is intended for. The grade 7 text may deal with topics in a more in-depth manner than the grade 4 text.

Similar observations were made regarding the English textbooks. Exercises in the grade 7 text may be more demanding than those in grade 4. Yet, the contrast between grade 4 and grade 7 is not striking.

#### **1.4.2. Vocabulary**

It is self-evident that the vocabulary in the grade 1 textbooks is very basic. With regard to the English textbooks, sentences, particularly in the pre-reader and books 1 and 2, consist of only a few words, e.g. My hat is blue; That is my father's house. The vocabulary is still rudimentary: objects in the students'

environment, adjectives to describe physical features of people and objects, elementary verbs, and so on. However, the language in the grade 1 science textbook is somewhat more complex. Sentences may be longer, the vocabulary is more specific, and the grammar is more “advanced” than in the English texts, e.g., use of “tallest” and “shortest.” Also, with regard to reasoning or knowledge, the science textbook appears to be somewhat more demanding. For instance, the students are asked to find out why rocks in a river are smooth (p. 9), and which months are cold and dry (p. 49). In comparison, the grade 1 English text deals with the days of the week, but not the names of the months (pp. 4-5).

An examination of the level of vocabulary in the grade 4 English and science textbooks, compared to the grade 1 texts, showed a distinct progression. The vocabulary is more “advanced” or developed. The fact that most students using these texts are learners of English as a second language is less evident than in the grade 1 textbooks, even though there are vocabulary and grammar exercises in the English text that may not be found in textbooks written for native English speakers. This is of particular importance in light of the fact that grade 4 officially represents the first year of use of English as the medium of instruction.

Again, although maybe less distinctly than in the grade 1 texts, the grade 4 science textbook shows less evidence of the students’ ESL background than the English text, and there may even be much resemblance to a textbook used by native English speakers.

In grade 7, an increase in the level of vocabulary, compared to the grade 4 texts, is far less noticeable than the increase from grade 1 to grade 4. However, the vocabulary has increased and the sentences are somewhat more complex, for instance, they may contain more clauses.

## 2. Language Correspondence

### 2.1. Readability

Scores produced by the Lix readability formula (see Table 3) supported preliminary findings (see 1.4.2.). The text difficulty, or the readability level, is comparable for the respective grade 4 and grade 7 English and science textbooks. The higher Lix score for the science textbooks is not considered significant. However, a comparison of the two grade 1 texts showed a higher text difficulty for the science text. It was also noted that text difficulty was very low overall, i.e., between 11 and 26 (with a score of 20 representing “very easy” and 60 “very difficult”).

Table 3 - Lix Scores

Textbook	Percentage long words	Average sentence length	Lix score
English - Grade 1 (Book 2, pp. 20-4)	6.09%	4.66	11
Science - Grade 1 (pp. 33-7)	11.18%	5.06	16
English - Grade 4 (pp. 156-160)	12.44%	10.89	23
Science - Grade 4 (pp. 56-60)	15.7%	9.87	26
English - Grade 7 (p.138-143)	12.6%	10.97	24
Science - Grade 7 (pp. 76-80)	13.23%	12.13	25



Application of the Fry and SMOG Readability Formula produced identical results regarding the grade level of the texts (see Tables 4 and 5), and there was also a high correlation between the Lix scores and the average number of syllables per sentence computed by the Fry Readability Formula (correlation = 0.926). The data from the Fry and SMOG formulas led to two sorts of conclusions. First, both formulas indicated the approximate grade level of each textbook which only corresponded with the two grade 1 texts. The grade 4 English textbook rated as grade 3, and the three remaining texts as grade 5. Therefore, a comparison of the

Table 4 - Fry Readability Formula

Textbook <sup>38</sup>	Average Number of Sentences	Average Number of Syllables	Average Number of Syllables per Sentence	Fry Readability Graph
English - 1	20.2	125.67	6.22	grade 1
Science - 1	18.5	110.67	5.98	grade 1
English - 4	10.6	124.33	11.73	grade 3
Science - 4	9.07	136.33	15.03	grade 7
English - 7	8.67	132	15.22	grade 7
Science - 7	7.7	130	16.88	grade 7

<sup>38</sup> The English samples were taken from Book 1, pp. 18-24, Book 2, pp. 14-17, and Book 3, pp. 14-15 for grade 1; p. 88, p. 177 and p. 252 for grade 4; and p. 57, p. 158 and p. 236 for grade 7. The science samples are from pp. 10-15, pp. 28-31 and pp. 48-50 for grade 1; p. 12, p. 59 and p. 103 for grade 4; and p. 24, p. 91 and p. 134 for grade 7.

respective grade 4 and grade 7 textbooks showed that the readability level of the grade 4 science text is higher than that of the respective English text, while the grade 7 texts have approximately the same readability level. In addition, the readability level of three texts is below the grade level at which they are used, while one text, the grade 4 science textbook, is above that level.

Table 5 - SMOG Readability Formula

Textbook <sup>39</sup>	Total number of polysyllabic words	Nearest perfect square	Square root	SMOG Grade
English - Gr. 1	0	1	1	1
Science - Gr. 1	2	1	1	1
English - Gr. 4	9	9	3	3
Science - Gr. 4	15	16	4	5
English - Gr. 7	15	16	4	5
Science - Gr. 7	18	16	4	5

The second conclusion based on the Fry and SMOG formulas centres around the issue of progression of level of content previously addressed (see 1.4.1.). While readability level does not equal content level, there is an

<sup>39</sup> The English samples were taken from Book 1, pp. 16-18, Book 2, pp. 21-22, and Book 3, p. 12 for grade 1; pp. 87-88, p. 170 and p. 255 for grade 4; and pp. 51-52, p. 144 and p. 214 for grade 7. The science samples are from pp. 14-16, pp. 41-42 and pp. 56-58 for grade 1; pp. 18-19, p. 67 and pp. 92-93 for grade 4; and pp. 40-41, p. 82 and p. 125 for grade 7.

assumption that the two are related. Therefore, the grade levels obtained from the two reading formulas support the earlier observation that an increase in the level of content is most apparent between grade 1 and grade 4, but less noticeable between grade 4 and grade 7. As the two formulas showed, there is a decrease in curriculum content over grades, and in the case of the science texts, a flattening of curriculum content around grade 4.

## **2.2. The Language of Science**

### **2.2.1. Language Structures of Science**

The science syllabi for grades 1, 4 and 7 do not contain any directions regarding the language structures of science. However, objectives and activities *do* require students to discuss, describe, report, interpret and so on (see Objectives; Suggested Learning Activities; and Assessment). Thus, the syllabi do not demonstrate awareness of the fact that these skills need to be acquired, and it is unclear whether there is an assumption that they are taught elsewhere, in particular in English class.

An examination of the English curriculum yielded some evidence of consideration for the language needs of the science curriculum in grades 4 and 7, while the grade 1 syllabus does not contain any such reference. However, these references are very general, i.e., not to science in particular, and do not sufficiently address the issue of preparation for the language needs of the science curriculum.

Under “Core Skill Objectives,” the grade 4 syllabus lists these two writing objectives:

W.3.: To write notes, labels and captions in connection with diagrams, maps, etc. and out-door observations similar to what is provided for in Subject Syllabuses. (p. 4.9)

W.5.: To write other short pieces, such as an episode from their own experience, or e.g. recording weather conditions [...]; methods of preparing food [...], within the same limits as in W.2. The writing of sentences should emphasise connected meaning. (p. 4.9)

The grade 7 syllabus refers to the following objectives under the “List of Combined Skills and Functions:”

Listening - L.2.: To understand the main points of the teacher’s explanation of syllabus content in other subjects as defined by their respective syllabuses, and to ask questions to clarify whatever is not at first clear. (p. 9)

Speaking - S.5.: To outline the steps in any particular process or reference of events relevant to syllabus content of other subjects of the curriculum up to the Grade 7 level. (p. 10)

Writing - W.2.: To write notes, make records etc. in relation to diagrams, table or scientific observation similar to what is provided for in subject syllabuses. (p. 11)

Writing - W.3.: To produce other pieces of prose writing of varying length, such as reports of experience of their own feelings, or the written tasks, specified in other subject syllabuses. As a maximum these need not be more than 12 sentences in length at Core Level in Grade 7. (p. 11)

The English textbooks were not considered to teach or reinforce the language structures of science/linguistic science skills to a relevant degree. No

instance was found in the grade 1 texts and only a few in grade 4 and 7 which were not sufficient in number or quality to contribute to students' preparation for the language needs of the science curriculum. One example in the grade 4 text relates to objective W.3. (see above): rather than writing notes in connection with maps, though, the students are asked to answer questions or complete sentences that are based on maps (p. 9 and p. 16). In grade 7, an exercise on writing cooking instructions (p. 61, Step 6: the first topic suggested) was found to relate to objective S.5., except that it is to be done in writing, not orally. The exercise differs from other writing exercises in that it does not expect students to write a story, but to write instructions implying that they will list only the necessary steps, in a logic order, leaving out redundant details or references to personal experience. This exercise can be compared to listing the steps involved in a scientific experiment. Exercises like this are an exception; a vast majority of exercises that involve writing or speech consist of very brief segments - not requiring the student to decide on a logic order or to focus on the essential pieces of information, for instance - and they very often entail describing and talking about personal experiences or opinions (e.g. "Write your favourite folk story," Step 6, p. 146), or fictitious ideas.

Generally, the objectives of the English grade 4 and grade 7 syllabi quoted above were not found to be addressed by the textbooks. The two examples above, as well as some exercises involving tables (grade 7, p. 65 and p. 190) are insufficient, and even show variation from the stated objectives, such as being a written exercise instead of an oral, which clearly indicates a lack of sufficient efforts to reach the respective syllabus objectives.

The science textbooks do not demonstrate to a significant degree a need for or application of science specific language skills on the part of students, nor do they point to any attempts to teach or reinforce such skills.

The grade 1 science text does not explicitly ask students to write. There are some exercises that ask students to finish a sentence or to answer a question, not specifying whether this is to be done orally or in writing. Aside from the fact that the textbook is written in English - a second language for the majority of students in Zimbabwe, which officially only becomes the language of instruction in grade 4 - the readings and exercises are not difficult, i.e., demands for science specific language structures - for instance required in reporting an observation - as opposed to general language skills, are either moderate or absent.

With regard to science specific language structures, the demands on students in the grade 4 and 7 textbooks are mainly in form of answers. The students are asked to produce answers of varying length or complexity (e.g., to the questions “Which planet is closest to the sun?” and “How can I compare the amount of rust in each container?” Grade 7, p. 94 and p. 105), but mainly they are one-sentence answers. No exercise was found to involve a more complex and “longer” language task, such as planning an experiment (step by step) or describing and explaining scientific observations in a paragraph or so, rather than just one sentence.

As a consequence of the above findings, an observation was made regarding the genre of language used in the grade 4 and 7 science texts and thus possibly reinforced in the students. This genre of language and the format of the exercises do not appear much different from those found in other textbooks, for instance English or mathematics texts. There are even exercises that involve mathematics problems and that seem to belong in a mathematics text rather than a science text

(e.g., pp. 118-9, grade 7), as well as stories and tasks that remind of an English textbook (e.g., p. 29, grade 4 and pp. 25-6, grade 7).

### **2.2.2. Science Specific Vocabulary**

The English curriculum for grades 4 and 7 does not mention the issue of science vocabulary. The grade 1 syllabus, on the other hand, contains four references to vocabulary relevant to science. However, only three of them are core objectives, the fourth is mentioned under “Enrichment Material” which means that not all students will come in contact with it. Also, a core objective in the English syllabus that deals with the names of parts of the body and face is not an objective that is included in the science curriculum for grade 1. This leaves two objectives: “The pupils can identify familiar animals, both domestic and wild” (p. 1.4, Core Objective 1.10) and “The pupils can make statements about the weather” (p. 1.4, Core Objective 2.1).

In all three English textbooks, some content was found that relates to science content. Therefore, there may be a possibility that relevant vocabulary, abstract or everyday science related vocabulary, is introduced or reinforced. The grade 1 English texts were found to contain a few references to domestic and wild animals - for instance in Book 2 (pp. 2-3) and Book 3 (pp. 14-5) - thereby relating to the Core Objective that pupils can identify familiar animals (C.O. 1.10, p. 1.4, see reference to English syllabi above). There is, however, no designated section or chapter that deals with this topic and the respective vocabulary.

There are some instances of science subject matter in the grade 4 and 7 English textbooks. It was apparent that any such subject matter does not necessarily correspond to the respective syllabus or science textbook. For instance in the grade 4 English text, two instances were found where the subject matter is

not grade 4 curriculum content, but grade 5 and grade 7 content, respectively (p. 240 on crop rotation and pp. 121-3 on lightning), while another example *does* relate to grade 4 content (pp. 198-202 on cattle dipping and ticks). While the subject matter of further references in both the grade 4 and grade 7 texts relates to science content, it does not closely correspond to curricular content, or only in a very general way, such as in a section on the human body where some of the information may come from syllabus content from various grades, and other information is considered new (grade 7, pp. 11-4). Generally, references to science subject matter were not considered to play a significant factor in the acquisition of science specific vocabulary.

### **3. In-Depth Analysis of Science Content**

#### **3.1. Vocabulary**

No explicit mention of vocabulary - abstract scientific vocabulary or everyday science related vocabulary - was found in any science syllabus. Sometimes, what is listed under 'Key Concepts' at the beginning of the sections on each of the nine syllabus topics may indicate new vocabulary. However, there is no indication whether terms are new and need to be introduced, or should be "reinforced." Examples of such vocabulary are: "Trees are made up of *roots, trunk, branches, and leaves*" (Grade 1, Topic 3, p. 5); "Some small animals are harmful to plants and animals (*pests*)" (Grade 4, Topic 4, p. 8); and "*Vegetation* consists mainly of grass, bushes and trees" (Grade 7, Topic 2, p. 24) (italics added, indicating what may be new vocabulary).

This absence of directions or recommendations regarding science vocabulary is particularly surprising for two reasons. First, the syllabi are otherwise extremely specific and rather rigid. They contain instructions on



everything from what teachers and students should or must do and know, to learning resources and how to assess pupils.

Second, the absence of references to new science related vocabulary in the science syllabi is surprising in light of the glossary that can be found at the back of each syllabus. The 14.5 page glossary<sup>40</sup> is intended “to help teachers understand” (Environmental Science Syllabus, Grades 1 to 3, 1994, p. 48). The question arises how students are helped to understand. If there is an assumption that (some) teachers (may) need to look up these terms, it must also be assumed that pupils do not know some, if not most of the vocabulary relevant to their grade. In other words, the students cannot be expected to have a better mastery of that vocabulary than the teachers. Yet, it is not apparent from the syllabi what terms the students should know, and how they are to learn them.

In order to get additional data on how teachers may deal with the issue of science vocabulary, i.e., whether there are any other sources of information that draw teachers’ attention to these issues, teacher’s guides for grade 1, 4 and 7 (published by Longman Zimbabwe; i.e., not the same publisher as analyzed science textbooks) were examined. The grade 1 Teacher’s Resource Book does not mention any language issues, at all. It does address the issue of language of instruction, nor the “conflict” regarding L1 instruction and L2 textbook. The grade 4 Teacher’s Resource Book (pp. i-ii), on the other hand, contains a number of references to language, such as lists of relevant science vocabulary in each unit; a mention of two categories within which concepts and skills are developed, i.e., the category of basic physical concepts including solution and habitat, and another

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<sup>40</sup> The glossary is intended for teachers. There is no indication whether all of the vocabulary will be used in class, either by the teacher or in the textbook, and whether the students are expected to know these terms. Also, since the glossary is the same in each of the three science syllabi, it is implied that particularly pupils in grades 1 to 6 are not expected to know all terms.

category for more abstract concepts such as cycle and energy (which, according to the Resource Book, might only be grasped “in later years of the programme,” i.e., in later grades); and a reminder that “concepts and skills cut across subject boundaries,” i.e., the responsibility to teach and reinforce these concepts and skills does not solely belong to the syllabi and instructors of science. However, with regard to this last point, while the responsibility may be shared, it is not apparent from the Teacher’s Resource Book how science classes will at all contribute to the learning and understanding of science concepts. The Resource Book is very specific when it comes to many aspects of science classes, but not regarding the issue of language.

In the grade 1 textbook, there is nothing to suggest what words, if any, are not known or may not be known. The text assumes that learners are all L1 speakers. It is common practice that the teacher translates the book (from English to respective L1), and the students do not have a copy of their own. While the official policy in Zimbabwe is to teach in the students’ respective mother tongue throughout grades 1 to 3, in cities, English is usually the language of instruction from grade 1.

An examination of the grade 4 and grade 7 science texts was intended to focus on scientific vocabulary, and whether and how it is introduced or reinforced. This examination proved to be somewhat difficult in the absence of data on what the science vocabulary is that the curriculum requires for a given grade (i.e., the vocabulary the textbook uses), what they learn in other subjects, particularly in regard to everyday science vocabulary, as well as data on what students actually do know (they may not learn as much as the curriculum suggests, or they may know more). In other words, it is difficult to determine what constitutes new

vocabulary or vocabulary in need of reinforcement. The following findings are therefore only approximate.

The science related vocabulary in the grade 4 and 7 science texts was analyzed for whether and when it is explained (i.e., introduced for the first time or reinforced as a reminder). Less than half of the total number of units (20 and 22, respectively) were found *not* to contain any vocabulary that requires a definition or explanation: 9 units in the grade 4 text, and 8 units in the grade 7 text.

The number of units that almost immediately explain new vocabulary was 5 (grade 4) and 12 (grade 7). In the grade 7 text, a tendency to delay explanations of new terms was observed. Instead of explaining the term sufficiently when it is first used, a full explanation occasionally only comes as the text progresses.

The texts were also analyzed for vocabulary that does not get (sufficiently) explained or defined. Approximately, 9 units were found in the grade 4 text and 7 in the grade 7 text.

An example of a term that is insufficiently defined and that may only be grasped at the end of the unit, is the term “space” in the grade 7 text: “WHAT IS SPACE? Beyond Earth’s atmosphere there is no air, no water, just space. Anyone who ventures into space must take everything he needs with him” (p. 91). The text then goes on to talk about the night sky (stars) and the solar system (planets, moons, space exploration). In this author’s view, that initial definition should have been either “briefer” (e.g., space refers to what is beyond the earth’s atmosphere) or more precise (e.g., same brief definition, mention stars and planets etc., and that space is infinite, we do therefore not know for sure that there is no air, water or other beings out there).

These approximate data suggest that textbook designers are not sufficiently aware of learners' needs with regard to understanding science vocabulary in a second language context. For instance, if terms are not defined or explained, or only once the text progresses, the learner who is unfamiliar with these terms, must experience frustration. Vocabulary plays an important role in understanding science content. It is therefore important to insure, or at least facilitate, that students understand the vocabulary on a linguistic level (maybe include L1 terms), as well as on a level of science "mastery," not science "approximation" (see earlier reference to Cassels and Johnstone's, 1985, study).

### **3.2. Gender**

Gender has to be recognized as one of the constraints to equitable and high quality schooling for all. Textbooks represent an important element of the overt curriculum, as well as the hidden curriculum, for instance through the gender differentiated portrayal of females and males.

The statistical and comparative evaluation of male and female characters featuring in the text and illustrations of the selected science textbooks involved two aspects: (1) the male - female ratio, and (2) references to professions or roles, as well as adjectives assigned to males and females in the body of text. With one exception (grade 1, body of text, see below), the count of males and females yielded consistent evidence of an overrepresentation of males (see Table 6). There are 284 pictures or mentions of males in all three textbooks combined, versus 135 females; thus, 67.78% of gendered references are to males, and 32.22% to females. The imbalance increases over the grades, and is most pronounced in grade 7; males represent 54.55%, 57.83% and 85.38% in grades 1, 4 and 7, respectively.

The female count is always lower, despite the exception mentioned above which is an absence of references to gender all together in the grade 1 text. There are no pronouns and the only nouns the book uses to refer to humans are “people” and “person.” The reason for this absence of references to males and females is unknown. If it is a deliberate attempt to avoid gender stereotyping, it must be noted that the illustrations failed to do the same. Not only is there an imbalance in the male - female ratio, but activities tend to be gender stereotyped, females cook and sew, and males build and play soccer.

Table 6 - Gender Representation in Science Textbooks

	Ratio female : male		
	text	illustrations <sup>41</sup>	Total
Grade 1	0 : 0	75 : 90	75 : 90
Grade 4	11 : 12	24 : 36	35 : 48
Grade 7	4 : 28	21 : 118	25 : 146
Total	15 : 40	120 : 244	135 : 284

In addition, the body of text was examined for references to occupations or roles, activities, and adjectives assigned to males and females, respectively. Findings are summarized in Table 7. Due to the absence of gendered mentions in

<sup>41</sup> With regard to illustrations, the totals include the counts of males and females only. The figures that could not be identified as either male or female, e.g., a baby on a mother’s back, or figures in a crowd of people, are not included in Table 3. Their numbers are: 8 (grade 1), 13 (grade 4) and 35+ (grade 7).

the grade 1 text, as well as insufficient data on adjectives, the table does not contain any results on these two categories, i.e., grade 1 text and adjectives.

The professions assigned to males and females appear gender stereotyped. Ten different occupations are used in connection with males, and only three with

Table 7 - Textual References to Males and Females

	Science Grade 4	Science Grade 7
<u>Professions</u>		
Males	Farmer, florist, miller, teacher	Agricultural advisor, astronaut, factory worker, farmer, headmaster, health worker, manager
Females	Receptionist, teacher, typist	-----
<u>Roles/Functions</u>		
Males	Employer	Father, foreign visitor
Females	Mother	Mother, wife
<u>Activities</u>		
Males	Riding bike, carrying weight	Banging wood, fishing, observing lightning etc., playing, smoking
Females	Picking flowers, gardening	-----

females who are not assigned any profession at all in the grade 7 textbook. The male occupations include farmer, florist, astronaut and headmaster, while females are portrayed as a receptionist and a typist. Teacher is the only profession assigned to both a male and a female.

The roles or functions assigned to males and females are similarly stereotyped. There are two mothers and a wife, on the one hand, and a father, an employer, and a “foreign visitor” on the other. Even though both males and females are seen as parents, father and mother respectively, the females are portrayed in domestic ways only, while the males are also seen as someone dominant/powerful - an employer one depends on for work and income - and someone interesting and maybe enviable - a foreign visitor who may have travelled and seen a lot.

Activities of females and males are again stereotyped. Females are rather domestic, they pick flowers and do gardening, while males are portrayed doing outdoors activities like riding a bike or fishing. In western eyes, some of their activities are traditionally considered masculine, like fishing and smoking.

During the course of this statistical and comparative analysis of the representation and portrayal of males and females, an observation was made regarding the use of male pronouns. In various instances in Unit 16,<sup>42</sup> the grade 7 science textbook gives examples of fictitious individuals, and consistently uses male pronouns to refer to them. For instance, “Anyone who ventures into space must take everything he needs with him” (p. 91). The unit also uses the term “man” (or “men”) and it is unclear whether it embraces mankind or male humans only.

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<sup>42</sup> See p. 92, p. 93, p. 95, and p. 97 in the grade 7 science textbook.

#### **4. A Classroom Based Study: Teachers, Gender and Use of Textbooks**

The local study comprises classroom observations in Zimbabwe (a number of science classes at the grade 7 level). The data were collected in January/February 1996 with the help of three graduate students under the supervision of Rosemary Gordon at the University of Zimbabwe.

A classroom based study was carried out to throw light on teachers' beliefs and opinions regarding science education, girls' and boys' abilities and the suitability of the science texts they use, on the one hand, and on how teachers treat boys and girls and use the texts in science class. The study comprised classroom observations, as well as information from the respective teachers, i.e., a teacher interview supplemented by a questionnaire (see Appendices C, D and E). The data were collected in two primary schools in January/February 1996 by a local research team, three graduate students under the supervision of Rosemary Gordon (University of Zimbabwe), that visited four teachers and their grade 7 science classes. Each classroom was visited three times, including a pre-observation that was intended to get the students and their teachers used to the researchers.

The two schools differ in the composition of the student population they cater for and to some degree in their resources. School 1 (Epworth Primary School) is peri-urban and most of its students are from low income families. School 2 (Blakiston Primary School) used to be a white school during the colonial era. Today, the urban school is multiracial and caters for students that come mainly from middle and high income groups. Both schools were described as very old, but well maintained and spacious by the local researchers. At School 1, however, three classrooms were built using asbestos sheets and wooden supports. Epworth and Blakiston both have a library whose books, according to the teachers



interviewed, were inadequate due to their foreign “content,” or in other words, the lack of cultural relevance.

The two teachers (T1 and T2) visited at School 1 (Epworth) are both male, aged 31 and 29. At School 2 (Blakiston), both teachers (T3 and T4) are female, aged 35 and 40. All four teachers had a Certificate in Education from a Teachers’ College.

Table 8 - Number of Pupils per Class

Class	Boys	Girls	Total
T1	22	22	44
T2	28	16	44
T3	21	22	43
T4	16	28	44
Total	87	88	175

The physical differences observed between the four classes relate to their gender ratio, seating arrangement and availability of science textbooks. While the classes have approximately the same size, 44 students and 43 in the case of Teacher 3’s class, the boy to girl ratio varies from 1:1 (T1 and T3), to 7:4 (T2) and 4:7 (T4) (see Table 8).

The seating arrangement in Teacher 1 and Teacher 3’s classes were rows, and the students in the remaining two classes (T2 and T4) were seated in clusters.

In two classes, boys and girls were either seated separately (T1) or mixed (T4). The arrangement in Teacher 2 and Teacher 3's classes was a combination of mixed and separate seating. In Teacher 2's classroom, for instance, there were four groups or clusters of mixed seating and two with boys only.

The availability of science textbooks also varied. At School 1 (Epworth) and in T3's class (Blakiston) two students shared a textbook, while there was one copy per student in T4's classroom (Blakiston).

When asked about the purpose of primary science education, all four teachers agreed that it should lay a base for further science education and that the application of knowledge gained in students' daily lives should be the objective. However, when asked to rank four goals of science education, the teachers' prioritized those somewhat differently. Those goals were: (1) teaching scientific methods, (2) teaching scientific principles, (3) forming a basis for later science learning, and (4) teaching scientific knowledge needed for everyday living. The first two goals could be considered to be oriented towards science as an academic discipline, while the third and fourth goal relate more to the practical applications of science knowledge.<sup>43</sup> Three teachers (T1, T2 and T4) ranked the goals very similarly. They prioritized goals 3 and 4, or in other words the practical application of science knowledge. Teacher 3 on the other hand prioritized the more "academic" orientation, goals 1 and 2.

When asked about their main teaching tool, only Teacher 1 named the textbook, the other teachers considered themselves to be the main tool for teaching science. They stated that as long as the syllabus is followed, the teacher can utilize the environment and visual aids, and he or she can also present information

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<sup>43</sup> It could be argued that the third goal cited is related to the first two. However, the intention was for that goal to address the practical aspect, i.e., preparing for the demands of the secondary science curriculum, for instance.

that is not included in the textbook. In addition, the teacher has the possibility to break down information to the level of the students.

With regard to the teachers' actual use of textbooks during the observed lessons, it first needs to be pointed out that an absence of direct use of or references to the textbook does not necessarily indicate that the teacher does not rely on it to some degree. There was more additional information to that found in the text during the lesson on Landforms, possibly because the unit does not offer sufficient material on which to base a lesson. However, the lesson on Health was of particular interest to an observation of teachers' use of the text. For instance, Teacher 1 who had indicated that his main teaching tool was the textbook, was the teacher who adhered to it the least. While the only evidence of textbook use was found in the classes of Teacher 3 and Teacher 4 who referred to the text and made some use of the questions given at the end of the unit, it is assumed that Teachers 1, 2 and 3 relied on the text to a great degree. This assumption is based on the topics addressed in class and how they relate to each other. Although all four teachers seemed to be most interested in talking about diseases and germs, Teachers 1, 2 and 3 also talked about topics such as the senses or the physical needs of the body which are not directly linked to the topic disease, but are part of the unit on Health in the textbook. This may suggest that T1, T2 and T3 merely followed the text, rather than selected information based on the objective for that lesson.

When asked what their main teaching style for science education was, Teacher 2 and 3 claimed not to adhere to one style of teaching. They maintained that the nature of the topic dictates the style to be used. Teacher 1 and 4 named group work as the most useful method of teaching science which, according to them, involved the students in the learning process. If the seating arrangement in a

teacher's classroom is any indication of his or her preferred teaching method, i.e., individual student work or group work, it should be mentioned again that T2 and T4's students are seated in clusters, while the students in T1 and T3's classes are seated in rows.

However, despite teachers' answers, it was lecturing and question-and-answer sessions that were found to be predominant during the classroom observations. Question-and-answer sessions were used in all eight lessons, and lecturing in at least six.<sup>44</sup> Group work was used in four lessons, by three different teachers (T1, T2 and twice by T4) and tended to remind of the question-and-answer method, except that it was to be done in writing.

Asked to evaluate the science textbook they use, *Environmental and Agricultural Science* by Sylvia Parker,<sup>45</sup> the teachers suggested that some changes would improve it. Teacher 1 and Teacher 2 indicated that the texts presented problems and were somewhat inappropriate for their students. They cited students' backgrounds and the religious community in which the school is located as reasons for this, and mentioned topics such as reproduction and volcanoes as inappropriate. Both teachers also believed that students had language difficulties both with English and with scientific concepts for which there are no Shona equivalents. Teacher 3 and Teacher 4, on the other hand, found that students in their school had no problems with language, scientific terms and concepts. Suggestion for improvements by T3 and T4 include simplifying illustrations and contents (T3 found that "there are too many topics and they are too broad"), and including more experimental work and exercises for students.

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<sup>44</sup> Since even lectures can involve simple questions by the teachers, lectures and question-and-answer sessions are not mutually exclusive.

<sup>45</sup> Parker, S. (1994). *Environmental and agricultural science. Grade 7*. Harare: Longman Zimbabwe.

With regard to the teachers' awareness of language problems, whether due to the second language context or the additional difficulty of scientific terms, generally, no attention to such problems was demonstrated by any of the teachers during the observed lessons. The only exception was Teacher 4 who seemed to have previously introduced the meaning of the word "mineral," namely "from below the surface." However, it needs to be emphasized that this finding is based merely on the data obtained during two lessons in each classroom. Therefore, no generalizations can be made about the four teachers involved or teachers in general.

An examination of the teachers' views on the ability and performance of boys and girls, respectively, showed disparities between teachers' answers in the questionnaire and in the interviews. In the questionnaire, all teachers seemed to agree that boys and girls are equally able and perform the same in science education. With the exception of one question, the teachers consistently answered the same way in reference to boys and girls, respectively. For instance, they all said that it is important to give support and encouragement to boys and girls equally. The only exception was in regard to who needs more time and attention in class: T3 and T4 answered that boys and girls require about the same amount of time and attention, whereas T1 and T2 thought girls needed more.

Gender differentiated views were more apparent in the interviews. T1 and T2 distinguished between the usefulness and applications of science knowledge for boys and girls. They mentioned nursing and health science as of importance to girls, while boys would prefer to be scientists. T1, T2 and T3 share the belief that boys are more adventurous, enjoy "challenging" work, want to discover things and are good at manipulating things and interacting with the environment. Girls, on

the other hand, are described as more passive, spending much time indoors and not really interested in science.

Inconsistencies or contradictions were evidenced both between the questionnaire and the interviews, as well as within the interviews themselves. Asked about boys and girls' performance, in the interview T1, T2 and T3 claimed that girls do better in class, but then score lower grades than boys. All four teachers said that boys and girls both have the potential to do well in science, and that this potential is affected by home background and teachers' attitudes. However, T1, T2 and T3 displayed gender differentiated perceptions themselves. T2, for instance, said that girls are good at factual exercises and boys are good at inventing and making things. While it may be difficult to distinguish between a teacher's belief and his or her experiences in the classroom, T3's statement was very clear. She believed that differences between boys and girls are genetic and hereditary. The fact that girls think science is for boys, was explained by T3 as "they are born that way."

In order to examine whether teachers treat boys and girls differently in the classroom, the number of questions each teacher asked and the number of questions answered by boys or girls were recorded (see Table 9).

Considering that the total number of boys and girls was 87 and 88, in other words they were almost equal, it was evident that more questions were answered by boys, namely 210 versus 196. In Lesson 1 on Health, which may have favoured girls due to the topic which is culturally perceived as of more importance and interest to girls, girls answered almost as many questions as boys. In Lesson 2 on Landforms, the difference was somewhat bigger: 13 more questions were answered by boys. However, the differences were not considered to be significant

(for instance, boys answered 14 more questions in both lessons combined; 14 answers represent 3.45% of all questions asked).

Table 9 - Number of Questions Answered by Male and Female Students

	Lesson 1	Lesson 2	Total
Boys	104	106	210 (51.72%)
Girls	103	93	196 (48.28%)
Total	207	199	406 (100%)

Gender differentiated expectations and roles were however apparent in the teachers' discourse. Teacher 2 in his lesson on health, emphasized that it is important that fathers dig pits so that their families have a rubbish pit, and that wives cover the food. Teacher 4 referred to mothers who make salt and sugar solutions to treat diarrhea. Adherence to traditional images, e.g., "who is wearing the trousers," was well exemplified by the following comment: "It is very important that during the night we put on shirts, maybe with long sleeves, or we put on long gowns, ladies. And a man would probably put on long trousers" (Teacher 1 in his lesson on Health).

## CHAPTER FOUR

### CONCLUSION

The main findings of this content analysis and classroom study relate to the language of textbooks, as well as of classroom discourse, and to the use of textbooks in the classroom. The level of language, particularly in the grade 1 and 4 science texts, was not considered to correspond to the students' vocabulary and understanding of English. As mentioned earlier, the common practice in grade 1 is that teachers translate the grade 1 text. However, official use of English as the medium of instruction starts in grade 4, and the grade 4 science text is not appropriate for a subject taught in a second language for the first time.

In addition, attention to, or even awareness of the language needs of the science curriculum was not demonstrated in any science or English syllabus or textbook. The language structures used in science are not taught or practiced, and the way science vocabulary is defined and used in the science texts could be improved.

Teachers, on the other hand, represent another important agent in science education. It was evident that teachers' views do not always necessarily correspond to how they teach. For instance, they may have expressed concerns with the level of students' understanding of English and science specific terms. Yet, awareness of students' linguistic needs, i.e., for clarifications or illustrations of a word's etymological origin, was not evident in the classroom. Also, teachers indicated that parents, the community and even teachers influence girls' academic self-concepts, for instance. Yet, they still expressed gender differentiated views on girls' interests and abilities.



With regard to the analysis of gender portrayal in the textbooks, the findings were as expected. Females are underrepresented and portrayed in a stereotypical manner: as mothers and secretaries, for instance. This corresponds to the data western studies collected particularly in the 1970's and 1980's.

Based on the findings of this study, recommendations to textbook designers should address the "presentation" of subject matter, attention to language issues and the balanced portrayal of males and females. If textbooks are designed to be sources of information, which is one of their main functions, their content should be presented in a clear, logical and structured manner. Since teachers should select subject matter on the basis of an educational objective, and not randomly or in "blind" adherence to the syllabus or textbook, a textbook should be well structured in order to facilitate the process of finding and selecting subject matter. The same can be said in the case of students who use texts for independent work or reading.

A logical structure and presentation of textbook content involve the order of content and the system of headings as noted earlier, there is a difference between the content of science texts and English texts. The subject matter of English texts, with the exception of literary pieces such as stories and poems, is secondary to the objectives of the English curriculum. Therefore, the question may be asked whether there can or should be a particular order of content. This author believes that a thematic order is recommended for early grades, for instance grades 1 to 3. Possible themes may include family and friends, hobbies, the village or city. It is not so much the order or content of these chapters that are important, but teaching vocabulary and sentence structures in a context - particularly in a context familiar to the student - are. For later grades, a thematic order may be less imperative. However, as an alternate option to chapters on grammar or essay writing, for

instance, a thematic order is still useful. Therefore, the way the Zimbabwean grade 4 and 7 English texts are structured is acceptable. In order for students - and teachers - to be able to look up vocabulary or grammar rules, a list of vocabulary, for instance at the end of the book, may be recommended, as well as an index that indicates where what grammar is being taught in the book.

In the case of science texts, the subject matter is closely linked to the objectives of the science syllabus. It is therefore important to present this subject matter in a logical order. And an order different from that found in the analyzed texts may be more efficient. It would seem more useful to group chapters that deal with the same or similar topic, creating different “subjects” such as the human body and hygiene; plants; and animals. These “subjects” need not necessarily be the same as the nine syllabus topics.<sup>46</sup> This order or “grouping” of content would allow teachers and students to find information quicker, while leaving it up to the teachers what order they want to teach these chapters in.

Headings are similarly important to the way subject matter is interpreted. As long as the headings are logical and consistent, their importance may not be recognized. However, the examination of the grade 4 science text demonstrated a need for “good” headings. Scanning a text or a chapter, the titles of the chapters are essential to knowing what the subject matter is. Similarly, in order to present different sections of a chapter, subheadings are important. The use and the identification of different level sub-headings (as through numbering or characteristics such as size, bold print and capital letters) tell the reader about how those sections relate to each other, whether they are equivalent sections or sub-

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<sup>46</sup> The grade 1, 4 and 7 syllabi comprise nine topics: Water, Soil, Grass and Grazing; Trees and Forestry; Crop Plants and Animals; Health and Pollution; Energy and Fuels; Weather; Materials and Technology; Landforms and Maps (see, for instance, the Primary School Environmental Science Syllabus for Grade 4 and 5, 1994, p. i).

sections of the main sections. “Good” headings are therefore helpful in interpreting the subject matter.

Attention to language issues and awareness of how language can affect a student’s access to education, i.e., his or her understanding and mastering of curriculum content, are very important. As indicated in Chapter One, the question remains unanswered when and how a second language should be introduced as the medium of instruction. Thus, provided that there is no final answer to that question, designing textbooks in a second language demands particular attention and responsibility. The level of difficulty of language should be appropriate. An analysis using readability formulas showed that the readability level of the textbooks did not correspond to the grade level for which they had been designed. Although these formulas were developed for first language texts not texts that are written in a language different from the mother tongue, they still indicate how the texts relate to each other. It is somewhat alarming that the grade 4 science and both grade 7 texts were found to have the same readability level, i.e., a grade 5 level. This leads us to two conclusions. First, textbook designers need to insure that science texts are not more difficult than English texts for the same grade level. Second, the level of difficulty of language should gradually and continually increase, instead of stagnate, as the grade 4 and grade 7 science texts do.

With regard to science specific language skills, i.e., mastering the language structures and the vocabulary of science, textbooks should aim to teach these skills. Texts can, for instance, use the language structures themselves and include exercises so students can practice using them. For teaching vocabulary, glossaries are recommended, especially at the beginning of a chapter. It is also important that the English and science curricula both recognize and attend to these language

demands; there is a danger that one curriculum may assume that the other is teaching these skills.

Recommendations for a more balanced portrayal of males and females include an increase in the number of females portrayed verbally and pictorially, and - maybe more importantly - changes in the way females are portrayed with regard to occupations, roles and other characteristics. The fact that females are not only mothers and wives, but are also professionals, for instance, should be reflected. Agriculture is a particularly good example of how the contribution of females is ignored or insufficiently recognized. As a Unicef report (1985, as cited in Marira, 1991, p. 119) indicated, crop production is one of the burdens of rural *women*. However, the textbooks analyzed in this study contained no references to female farmers, at all.

The data from the classroom study, indicated two points worth mentioning. First, the way language is dealt with, in teachers' general discourse or interpretation of texts, is critical. Attention to L2 needs and the language needs of the science curriculum is imperative. Second, while gender bias does not have to be overt, teachers are often affected by cultural and traditional views and perceptions of males and females. Teachers may not be aware of their gender differentiated views or expectations, but they are believed to nevertheless have an impact on how boys and girls are "treated" in the classroom.

A general observation, based on the classroom based study, relates to the educational system's orientation towards the British school system, and particularly the British examination system. While this author is more familiar with a western school system and may not sufficiently understand the context of Zimbabwe's situation and needs, a recommendation for further examination relates to the question whether an orientation towards an examination system, responds to

the needs of learners. Schools are capable of teaching other things that are equally important, such as reasoning and personal development. In light of the variety of learners and their needs, this remains a difficult question to answer.

Directions for further study include research on how the language demands of the science curriculum are dealt with in the second language context of Zimbabwe's classrooms. It needs to be established what can be achieved, or in other words, what is possible and what demands on the students are too great? Based on the limited evidence of this study, a case could be built for input by curriculum developers in countries such as Zimbabwe for integrating the language needs throughout the curriculum.

Further study should also be directed at classroom processes, focusing on teachers as crucial agents in the classrooms with regard to the treatment of girls, the interpretation of textbooks, and the teaching of science skills. Findings may be of interest to teachers themselves, as well as to teacher training.

## Bibliography

- Ajeyalemi, D. (Ed.). (1990). *Science and technology education in Africa: Focus on seven sub-Saharan countries*. Lagos, Nigeria: University of Lagos Press.
- Altbach, P.G. (1987). The oldest technology: Textbooks in comparative context. *Compare*, 17, 2, 93-106.
- Ampene, E.K. (1978). *Persistent issues in African education*. Occasional Papers in Continuing Education (No. 16). Vancouver: University of British Columbia, Centre for Continuing Education.
- Anderson, J. (1981). Analysing the readability of English and non-English texts in the classroom with Lix. (ERIC Document Reproduction Service No. ED 207 022)
- Anyon, J. (1980). Social class and the hidden curriculum of work. *Journal of Education*, 162, 67-92.
- Apple, M.W. (1979). *Ideology and curriculum*. London: Routledge & Kegan Paul.
- Apple, M.W. (1992). Education, culture, and class power: Basil Bernstein and the Neo-Marxist sociology of education. *Educational Theory*, 42, 2, 127-145.
- Apple, M.W. (Ed.). (1982). *Cultural and economic reproduction in education*. London: Routledge and Kegan Paul.
- Apple, M.W. & Taxel, J. (1982). Ideology and the curriculum. In A. Hartnett (Ed.), *The social sciences in educational studies*. London: Heinemann Educational Books.
- Apple, M.W. & Weis, L. (1986). Seeing education relationally: The stratification of culture and people in the sociology of school knowledge. *Journal of Education*, 168, 1, 7-34.
- Apple, M.W. & Weis, L. (Eds.). (1983). *Ideology and practice in schooling*. Philadelphia: Temple University Press.
- Aronowitz, S. & Giroux, H. (1985). *Education under siege*. New York: Bergin and Gavin.
- Bagunywa, A.M.K. (1970). The teaching of vernacular languages in primary schools. In T.P. Gorman (Ed.), *Language in education in eastern Africa*. Nairobi, Kenya: Oxford University Press.
- Bangbose, A. (Ed.). (1976). *Mother tongue education*. Paris: Unesco Press.
- Banks, J.A. (1993). The canon debate, knowledge construction, and multicultural education. *Educational Researcher*, 22, 5, 4-14.

- Bernstein, B. (1973). Social class: Language and reproduction. In A.S. Abramson et al. (Eds.), *Current trends in linguistics. Vol. 12*. The Hague: Mouton.
- Bourdieu, P. (1973). Cultural reproduction and social reproduction. In R. Brown (Ed.), *Knowledge, education, and social change*. London: Tavistock.
- Bourdieu, P. (1991). Language and symbolic power (G. Raymond and M. Adamson, Trans.). Cambridge, Massachusetts: Harvard University Press. (Original work published 1982)
- Bourdieu, P. & Passeron, J.-C. (1977). *Reproduction in education, society, and culture*. London: Sage.
- Bowles, S. & Gintis, H. (1976). *Schooling in capitalist America*. New York: Basic Books, Inc.
- Bowles, S. & Gintis, H. (1981). Contradiction and reproduction in educational theory. In R. Dale et al. (Eds.), *Education and the state. Vol. 1. Schooling and the national interest*. Lewes, England: Falmer Press.
- Bowles, S., Gintis, H. & Meyer, P.J. (1975). The long shadow of work: Education, the family, and the reproduction of the social division of labor. *The Insurgent Sociologist*, 5, 4, 3-22.
- Bray, M., Clarke, P.B. & Stephens, D. (1986). *Education and society in Africa*. London: Edward Arnold.
- Britton, G.E. (1974). Why Jane can't win - Sex stereotyping and career role assignments in reading materials. (ERIC Document Reproduction Service No. ED 092 919)
- Britton, G.E. & Lumpkin, M.C. (1976). For sale: Subliminal bias in textbooks. (ERIC Document Reproduction Service No. ED 140 279)
- Brock, L. (ed.) (1979). A classroom teacher's guide to reading improvement in middle school science. Washington, D.C.: Office of Education. (ERIC Document Reproduction Service No. ED 214 123)
- Campbell, B.K. & Loxley, J. (Eds.). (1989). *Structural adjustment in Africa*. New York: St. Martin's Press.
- Cassels, J.R.T. & Johnstone, A.H. (1985). *Words that matter in science*. London: The Royal Society of Chemistry.
- Chimombo, M. (1989). Readability of subject texts: Implications for ESL teaching in Africa. *English for Specific Purposes*, 8, 3, 255-64.
- Clarricoates, K. (1981). The experience of patriarchal schooling. *Interchange*, 12, 2-3, 185-205.

- Cleghorn, A. (1992). Primary level science in Kenya: Constructing meaning through English and indigenous languages. *Qualitative Studies in Education*, 5, 4, 311-323.
- Cleghorn, A., Mtetwa, D., Dube, R. & Munetsi, C. (1996). *Classroom language use in multilingual settings: Mathematics lessons from Quebec and Zimbabwe*. Unpublished paper.
- Cole, M. (Ed.). (1988). *Bowles and Gintis revisited: Correspondence and contradictions in educational theory*. Philadelphia: Falmer Press.
- Collins, R. (1977). Functional and conflict theories of educational stratification. In J. Karabel and A.H. Halsey (Eds.), *Power and ideology in education*. New York: Oxford University Press.
- Constable, H., Campbell, B. & Brown, R. (1988). Sectional drawings from science textbooks: An experimental investigation into pupils' understanding. *British Journal of Educational Psychology*, 58, 89-102.
- Datta, A. (1984). *Education and society: A sociology of African education*. New York: St. Martin's Press.
- de Castell, S., Luke, A. & Luke, C. (Eds.). (1989). *Language, authority and criticism: Readings on the school textbook*. London: The Falmer Press.
- Decroux-Masson, A. (1979). *Papa lit, maman coud - Les manuels scolaires en bleu et rose*. Paris: Les Éditions Denoël/Gauthier.
- Dorsey, B.J. (1989). Educational development and reform in Zimbabwe. *Comparative Education Review*, 33, 1, 40-58.
- Dorsey, B.J., Matshazi, M & Nyagura, L. (1991). *A review of education and training in Zimbabwe*. A Report prepared for the Canadian International Development Agency and the Government of Zimbabwe. Harare, Zimbabwe: University of Zimbabwe.
- Dukes, R.J. & Kelly, S.A. (1979). The readability of college astronomy and physics texts. *The Physics Teacher*, 17, 3, 168-73.
- Edwards, R.C. (1976). Individual traits and organizational incentives: What makes a "good" worker? *The Journal of Human Resources*, 11, 1, 51-68.
- Edwards, R.C. (1977). Personal traits and "success" in schooling and work. *Educational and Psychological Measurement*, 37, 125-138.
- Fawcett, R.P. (1970). The medium of education in the lower primary school in Africa with special reference to Kenya. In T.P. Gorman (Ed.), *Language in education in eastern Africa*. Nairobi, Kenya: Oxford University Press.



- Fuller, B. et al. (1994). Focus on gender and academic achievement - When girls learn more than boys: The influence of time in school and pedagogy in Botswana. *Comparative Education Review*, 38, 3, 347-376.
- Gappa, J.M. & Pearce, J. (1982). *Sex and gender in the social sciences: Reassessing the introductory course*. Washington, D.C.: American Sociological Association.
- Giroux, H.A. (1983). *Theory and resistance in education - A pedagogy for the opposition*. South Hadley, Massachusetts: Bergin and Garvey Publishers, Inc.
- Goke-Pariola, A. (1993). Language and symbolic power: Bourdieu and the legacy of Euro-American colonialism in an African society. *Language and Communication*, 13, 3, 219-234.
- Gordon, J., Shay Schumm, J., Coffland, C. & Doucette, M. (1992). Effects of inconsiderate versus considerate text on elementary students' vocabulary learning. *Reading Psychology: An International Quarterly*, 13, 157-169.
- Gordon, R. (1993, September). *Legislation, education and gender in Zimbabwe: The state and the reproduction of patriarchy*. Paper (revised) presented at the BERA Conference, Liverpool, England.
- Gordon, R. (1994). Education policy and gender in Zimbabwe. *Gender and Education*, 6, 2, 131-139.
- Gordon, R. (1995a). *Attitudes towards girls*. Harare, Zimbabwe: Unicef.
- Gordon, R. (1995b). *Factors affecting the underachievement of secondary school girls in Zimbabwe*. (Occasional Paper Number 8). Harare, Zimbabwe: Human Resources Research Centre.
- Gordon, R. (1996, May). *Structural adjustment and women in Zimbabwe: Effects and prospects*. Paper presented at the Meeting of CAAS, Montreal, Canada.
- Gorman, T.P. (Ed.). (1970). *Language in education in eastern Africa. Papers from the first Eastern Africa Conference on Language and Linguistics*. Nairobi, Kenya: Oxford University Press.
- Gupta, A.F. & Yin, A.L.S. (1990). Gender representation in English language textbooks used in the Singapore primary schools. *Language and Education*, 4, 1, 29-50.
- Hawes, H. (1982). *Curriculum and reality in African primary schools*. Harlow, Essex: Longman.
- Hitchcock, M.E. & Tompkins, G.E. (1987). Basal readers: Are they still sexist? *The Reading Teacher*, 41, 3, 288-292.

- Hitchens, C. & Stephen, D. (1981). *Inequalities in Zimbabwe*. (Report No. 8). London: Minority Rights Group.
- Hyönä, J., Destefano, C., Hujanen, H., Lindeman, J., Poskiparta, E., D'Heurle, A. & Niemi, P. (1995). Primers as socializing agents in American and Finnish schools. *Comparative Education Review*, 39, 3, 280-299.
- Irvine, S.H. & Sanders, J.T. (Eds.). (1972). *Cultural adaptation within modern Africa*. New York: Teachers College Press, Columbia University.
- Johnson, D.F. (1990). The politics of literacy and schooling in Zimbabwe. *Review of African Political Economy*, 48, 99-106.
- King, K. (1991). *Aid and education in the developing world*. Harlow, England: Longman.
- Lanham, L.W. (1970). English teaching in African schools. In B. Rose (Ed.), *Education in southern Africa*. London: Collier-Macmillan.
- Lockheed, M.E. & Verspoor, A.M. (1991). *Improving primary education in developing countries. A World Bank publication*. Oxford: Oxford University Press.
- Luke, A. (1988). *Literacy, textbooks and ideology: Postwar literacy instruction and the mythology of Dick and Jane*. London: Falmer Press.
- Marira, C. (1991). Gender issues in Zimbabwe's two main English language textbooks in the primary schools. *Zimbabwe Journal of Educational Research*, 3, 108-124.
- Mugore, M. (1993). *Language learning and teaching English only as the medium of instruction in schools*. Proposal for Doctoral Dissertation, McGill University, Montreal, Canada.
- Michel, A. (1986). *Down with stereotypes: Eliminating sexism from children's literature and school textbooks*. Paris: Unesco.
- Ministry of Public Service Labour and Social Welfare (1994). *Women, work and poverty in Zimbabwe*. A Zimbabwe Country Paper, prepared for the Seminar on the Impact of Economic Restructuring on the Employment, Training and Working Conditions of Women for Selected English Speaking African Countries, October 24-28, 1994, Harare.
- Mungazi, D.A. (1982). *The underdevelopment of African education*. Washington, D.C.: University Press of America.
- Mungazi, D.A. (1990). *Education and government control in Zimbabwe*. New York: Praeger.
- Nash, R. (1990). Bourdieu on education and social and cultural reproduction. *British Journal of Sociology of Education*, 11, 431-447.

- Neumann, P.H. (1980). *Publishing for schools: Textbooks and the less developed countries*. Washington, D.C.: World Bank.
- Newton, D.P. & Gott, R. (1989). Process in lower school science textbooks. *British Educational Research Journal*, 15, 3, 249-258.
- Obura, A.P. (1991). *Changing images*. Nairobi, Kenya: Acts Press.
- Odetola, T.O. & Ademola, A. (1993). *Sociology - An introductory African text*. London: The Macmillan Press.
- Opare, J.A. (1996). Boys and girls in science: Does the gender composition matter? *Zimbabwe Journal of Educational Research*, 8, 1, 27-44.
- Orr, M.H. & Schutte, C.J.H. (1992). *The language of science*. Durban: Butterworths.
- Oyedemi, O.A. (1996). Assessing gender factor in some secondary school mathematics textbooks in Nigeria. *Zimbabwe Journal of Educational Research*, 8, 1, 45-54.
- Parker, F. (1973). African education in Rhodesia. In B. Rose (Ed.), *Education in southern Africa*. London: Collier-Macmillan.
- Peacock, A. (Ed.) (1992). *Science in primary schools - The multicultural dimension*. London: Routledge.
- Persell, C.H. (1979). *Education and inequality*. New York: The Free Press.
- Poth, J. (1988). *National languages and teacher training in Africa. A methodological guide for the use of teacher training institutes*. Paris: Unesco.
- Reid, D.J. & Beveridge, M. (1986). Effects of text illustration on children's learning of a school science topic. *British Journal of Educational Psychology*, 56, 294-303.
- Reid, D.J. & Beveridge, M. (1990). Reading illustrated science texts: A micro-computer based investigation of children's strategies. *British Journal of Educational Psychology*, 60, 76-87.
- Richmond, E.B. (1983). *New directions in language teaching in sub-Saharan Africa*. Washington, D.C.: University Press of America.
- Riddell, A.R. & Nyagura, L.M. (1991). *What causes differences in achievement in Zimbabwe's secondary schools*. Working paper for the Population and Human Resources Department, World Bank. Washington, D.C.: World Bank.
- Roller, C.M. (1988). Transfer of cognitive academic competence and L2 reading in a rural Zimbabwean primary school. *TESOL Quarterly*, 22, 2, 303-318.

- Sachikonye, L. (1990). Strains and stresses in the Zimbabwean education system: An interview with Fay Chung, Minister of Education and Culture. *Review of African Political Economy*, 48, 76-81.
- Scardina, F. (1972). Sexism in textbooks in Pittsburgh public schools, grades K-5. (ERIC Document Reproduction Service No. ED 096 224)
- Scott, K.P. (1978). Effects of sexist vs. non-sexist reading materials on children's preferences, sex role attitudes, and comprehension. (ERIC Document Reproduction Service No. ED 169 496)
- Scrase, T.J. (1992). Education and cultural reproduction in India: A content analysis of selected textbooks. In R. J. Burns and A. R. Welch (Eds.), *Contemporary perspectives in comparative education*. New York: Garland Publishing.
- Shapiro, S. (1988). Beyond the sociology of education: Culture, politics and the promise of educational change. *Educational Theory*, 38, 4, 415-430.
- Shumba, O. (1995). Science teachers' assessment of the interaction of indigenous African culture with science education in Zimbabwe. *Zimbabwe Journal of Educational Research*, 7, 3, 259-300.
- SIDA (1990). *Education in Zimbabwe - Issues of quantity and quality*. Education Division Documents. (No. 50). Harare, Zimbabwe: Author.
- Sleeter, C.E. & Grant, C.A. (1991). Race, class, gender, and disability in current textbooks. In M.W. Apple & L.K. Christian-Smith (Eds.), *The politics of the textbook*. New York: Routledge.
- Stoneman, C. (1989). The World Bank and the IMF in Zimbabwe. In B.K. Campbell & J. Loxley (Eds.), *Structural adjustment in Africa*. New York: St. Martin's Press.
- Swainson, N. (1996). *Redressing gender inequalities in education - A review of constraints and priorities in Malawi, Zambia and Zimbabwe*. A report for the British Development Division in Central Africa. London: Overseas Development Administration.
- Sylvester, C. (1991). *Zimbabwe - The terrain of contradictory development*. Dartmouth: Westview Press.
- Taxel, J. (1978). Justice and cultural conflict: Racism, sexism and instructional materials. *Interchange*, 9, 1, 56-84.
- Thompson, A.R. (1987). *Education and development in Africa*. London: The Macmillan Press Ltd.

- Trappes-Lomax, H.R. (1990). Can a foreign language be a national medium? In C.M. Rubagumya (Ed.), *Language in education in Africa: A Tanzanian perspective*. Clevedon, England: Multilingual Matters.
- Unicef (1990). *Children and women in Zimbabwe. A situation analysis update*. Harare, Zimbabwe: Author.
- Vachon, M.K. & Haney, R.E. (1988). A procedure for determining the level of abstraction of science reading material. (ERIC Document Reproduction Service No. ED 291 582)
- Vaughn-Roberson, C., Tompkins, G.E., Hitchcock M.E. & Oldham, M. (1989). Sexism in basal readers: An analysis of male main characters. *Journal of Research in Childhood Education*, 4, 1, 62-68.
- Walford, G. (1981). Tracking down sexism in physics textbooks. *Physics Education*, 16, 261-265.
- Wheeler, G. & Sherman, T.F. (1983). Readability formulas revisited. *Science and Children*, 20, 7, 38-40.
- White, J. & Welford, G. (1988). *The language of science*. Report prepared for The Assessment of Performance Unit. (Science report for teachers: 11). London: Department of Education and Science.
- World Bank (1992). *Zimbabwe: A review of primary and secondary education from successful expansion to equity of learning achievements*. (Report No. 8976-ZIM. Volume I). Harare, Zimbabwe: Author.
- World Bank (1990). *Women in development. A progress report on the World Bank initiative*. Washington, D.C.: Author.
- Woodward, A. (1987). Textbooks: Less than meets the eye. *Journal of Curriculum Studies*, 19, 6. 511-526.
- Young, M.F.D. (Ed.). (1971). *Knowledge and control*. London: Collier-Macmillan Publishers.

## Appendix A

### LIST OF TEXTBOOKS ANALYZED

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Grade	Textbook Title
<b>English</b>	
1	Longman Zimbabwe (1993). <i>New Zimbabwe primary English. Pre-reader.</i> Harare: Longman Zimbabwe.
1	Longman Zimbabwe (1993). <i>New Zimbabwe primary English. Book 1.</i> Harare: Longman Zimbabwe.
1	Longman Zimbabwe (1993). <i>New Zimbabwe primary English. Book 2.</i> Harare: Longman Zimbabwe.
1	Longman Zimbabwe (1993). <i>New Zimbabwe primary English. Book 3.</i> Harare: Longman Zimbabwe.
4	Longman Zimbabwe (1993). <i>New Zimbabwe primary English. Pupils' Book.</i> Harare: Longman Zimbabwe.
7	Longman Zimbabwe (1994). <i>New Zimbabwe primary English. Pupils' Book.</i> Harare: Longman Zimbabwe.
<b>Science</b>	
1	House, J. and House, M. (1990). <i>Ventures environmental and agricultural science. "Living in our world." Group Activity Book.</i> Harare: The College Press.
4	Heberden, R. (1994). <i>Ventures environmental and agricultural science. "Living in our world." Pupils' Group Activity Book.</i> Harare: The College Press.
7	Darwin, A., House, J. and Mackay, N. (1995). <i>Ventures environmental and agricultural science. "Living in our world." Pupils' Activity Book.</i> Harare: The College Press.

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## Appendix B

### LIST OF SYLLABI

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Grade	Syllabus Title
<b>English</b>	
1	Ministry of Primary and Secondary Education (1984). <i>Primary English syllabus - Grade 1</i> . Harare: Curriculum Development Unit.
4	Ministry of Education and Culture (1992). <i>Primary English syllabus - Grade 4</i> . Harare: Curriculum Development Unit.
7	Ministry of Primary and Secondary Education (1989). <i>Primary English syllabus - Grade 6 and 7</i> . Harare: Curriculum Development Unit.
<b>Science</b>	
1	Ministry of Education and Culture (1994). <i>Primary school environmental science syllabus - Grades 1 to 3</i> . Harare: Curriculum Development Unit.
4	Ministry of Education and Culture (1994). <i>Primary school environmental science syllabus - Grades 4 and 5</i> . Harare: Curriculum Development Unit.
7	Ministry of Education and Culture (1994). <i>Primary school environmental science syllabus - Grades 6 and 7</i> . Harare: Curriculum Development Unit.

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## Appendix C

### **GENERAL BACKGROUND** (to be answered before or after class)

#### Physical setting:

- arrangement of desks (rows, groups, etc.)
  - pictures on the walls, 'models', etc.
- Statistics on the performance and enrollment of the students:
    - how many boys/girls are enrolled (in grade 7, in all grades)
    - e.g., how many boys/girls pass the science exam at the end of the year (grade 7)

### **CLASSROOM OBSERVATION PROTOCOL**

- Physical setting:
  - are there ability groupings (by row or by cluster of students)?
  - does seating arrangement change during the class? If "Yes": when, why, how?
  - books: how many books, and how many students per book?  
access to books - only at formal lesson times?  
where are they kept  
is there a school library, or a community library?
  - availability of supplies (chalk, paper, etc.)
- Student interaction:
  - is there any interaction between students during class? Is interaction encouraged/initiated by teacher? What kind of interaction is encouraged/discouraged (cognitive/practical tasks)? Is there interaction between boys *and* girls? i.e., including students asking a question to someone at their table/desk
  - how are boys and girls seated? At random, or next to/with their own gender?
- Participation by students:
  - Do boys and girls seem to participate in the same way? i.e., number of times they ask questions, answer questions, raise their hands, actively participate in 'group' work (if any)



- Involvement of students by teacher:
  - Does the teacher seem to try to involve all students equally, or differently based on their gender? i.e., if the teacher is asking questions to particular students, does he/she pick more boys/girls? When asking questions to the whole class, does the teacher choose more boys/girls to answer them? When going around the class, does the teacher seem to encourage/offer more help to boys/girls?  
Do you see any reason for any of these observations? i.e., boys/girls are very persistent at asking for help
- Style of teaching:
  - what methods is the teacher using, is any of them predominant: lecture, questioning, students work on a 'task' on their own/in groups, (what are these tasks?), etc.
  - does the teacher invite input (questions, comments, requests for clarification) from the students? How does the teacher respond to student input? Does the teacher respond differently to boys and girls?
  - what is the teacher's style of classroom management: (very/moderately/a little) strict, friendly, varies depending on the context, etc.
  - does the teacher sense that students don't understand something? How does the teacher react to that: repeat what was said before, rephrase it, try to find (other) examples, use the children's own experiences, etc.
- Use of the textbook:
  - when and for how long is the textbook used? How is it used; for instance, does the text serve as an introduction to what the students will hear/do afterwards, or is the text the main tool the teacher works with
  - who reads the text aloud (teacher? students? nobody?), and is the reading intelligible?
  - how are the illustrations used? Do they serve to illustrate what is talked about, and how well are they 'integrated'/used? Are they discussed, or simply presented?
  - where graphics transmit essential information, does the teacher check students' understanding of it? Does the teacher show her/his understanding of its relevance?
  - If there are people in the pictures, does their gender matter and how? For instance, if a man using a tool was depicted, would the teacher refer to a *person* using the tool, expressing that *anyone* could work with that tool; (deliberately) use an example with a girl/woman; or use *that* image the way it is?

## Appendix D

### TEACHER INTERVIEW GUIDE

1. What do you believe is the purpose of science education?
  - in general
  - at the end of primary education
  - academic/practical application
2. Does this purpose vary for different students depending on certain factors (e.g., gender, abilities, family background, student's interests)?
3. What can you say about the achievement of boys, and girls respectively in your science classes?
4. Based on your teaching experience, what can you say about boys and science education:
  - their grades
  - the way they generally perform in the classroom (i.e., questions they ask, comments they make, observations and findings they come up with)
5. See question #4: What can you say about girls?
6. With regard to science education, how do you see the abilities of boys and girls in comparison?

(Abilities = intelligence/cognition, 'scientific reasoning,' 'scientific processing' such as coming up with ways to find the answer to a problem.)

  - Are those abilities similar/the same in boys and girls?
  - If they are different, how are they different?
7. Do you have any opinion on the potential of boys and girls in regard to science?
  - Do you think that boys and girls have the same potential with regard to science?
  - Do they usually reach their full potential?
    - If 'Yes', what can this be attributed to: inherited, schooling, their home, other?
    - If 'No': why can't they reach their full potential?

8. Do you feel that boys and girls need to be treated differently in science classes? If 'Yes': why, and how?  
(‘Treating’ refers to giving support and encouragement, answering questions, inviting questions and comments, choosing students to speak.)
9. Do you like the science textbook that you are using in your class? Why (not)?
10. Do you find the text useful in attaining the objectives laid out by the syllabus?
11. Is the text appropriate for your students, i.e., their age, gender, and the environment they are in (rural/urban)?  
Do you feel they should be learning more about things relevant to their lives?
12. Are there any difficulties for the teacher and/or the students in the text that are due to language:
  - the way the text is written, e.g., length of sentences, clarity
  - English as a second language, e.g., vocabulary
  - the language of science, e.g., scientific terminology, concepts, processes
13. If you feel that the science text you are currently using, needs some changes or improvements, what should they be?
14. Do you rely on the science textbook for all, or most of your teaching? i.e., do you
  - follow the steps suggested in the teacher's resource book;
  - do the activities the book refers to;
  - read to the class, or have students read only what is in the text (no additional reading material);
  - use only illustrations in the textbook (no additional illustrations)?
15. Do you see the textbook as merely a tool that is supposed to help the students understand?  
i.e., do you feel that the teacher should be the one that is the main 'tool,' or comes up with different 'tools' (i.e., activities, reading materials, pictures), as opposed to the textbook being the main tool?
16. If all students don't have a textbook, how do you deal with that?  
- writing on the blackboard? group work? other?
17. What do you think about the illustrations in your science textbook?
  - Are they useful?
  - Do they relate well to the text?

- Do you feel that this is another area that needs some improvements?
18. a) Do you feel that males and females are portrayed realistically in your science book? Why (not)?
- b) Is there a difference between how they are portrayed in the (written) text and in the illustrations?
19. *With regard to the unit* that we were able to observe you teach today:
- How useful did you find the text?
  - Could it be improved in any way?
20. What about the illustrations in the specific unit:
- Did you find them useful and connected to the text?
  - Do you have any ideas for other more useful illustrations?
21. What was/were the objective(s) for the unit in question?
- Do you believe that this/these objective(s) has/have been reached?
  - Why (not)?
22. What do you believe is your (main) teaching style?
- Is there a reason for it, e.g., to maintain discipline in the classroom, to make the students feel at ease?





b) The way we teach science is geared towards the needs of girls.

1	2	3	4	5
not true	partially true			true

8. The content of the science textbook we use in my class is \_\_\_\_\_

1	2	3	4	5
poor	in need of improvement			excellent

9. The illustrations in the text are \_\_\_\_\_

1	2	3	4	5
inappropriate	acceptable			very useful

10. In my view, the illustrations relate to the text \_\_\_\_\_

1	2	3	4	5
barely	somewhat			very well

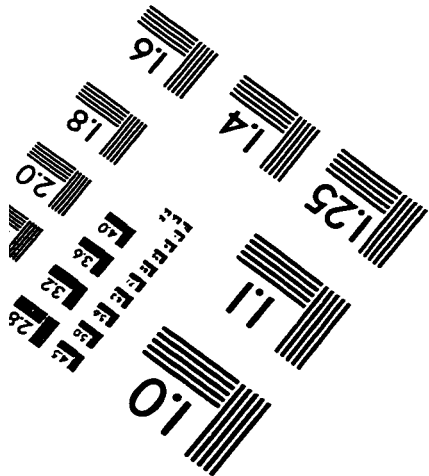
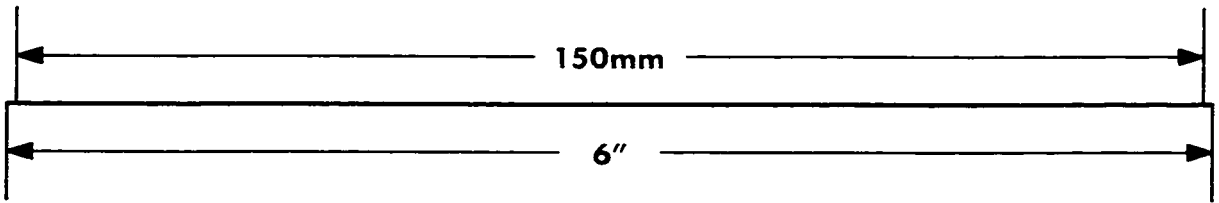
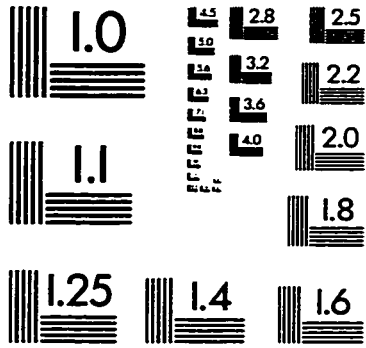
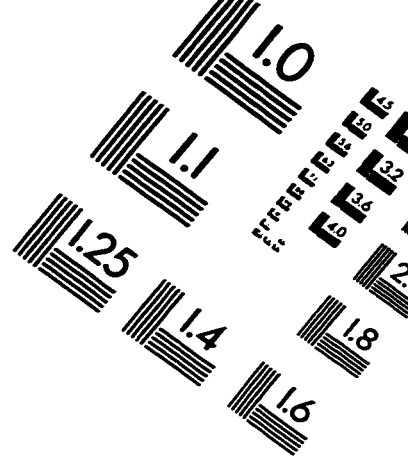
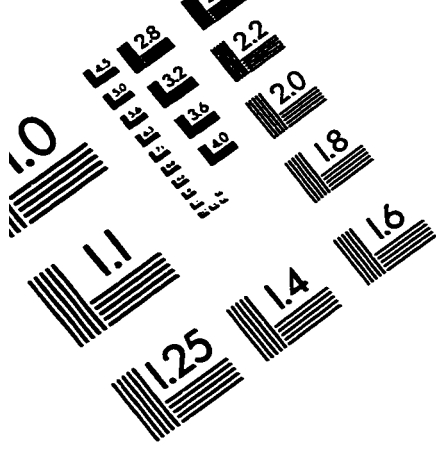
11. With regard to the unit I taught today: The text has proven to be \_\_\_\_\_

1	2	3	4	5
poor	in need of improvement			excellent





TEST TARGET (QA-3)



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