Baseline Study Report
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Abstract

The baseline research in this report was conducted as part of a research project directed at strengthening innovation and practice in the education of Form 1 students in Tanzania, who are making the transition from Kiswahili-medium primary education to English-medium secondary education. The baseline study was designed to generate recommendations for the design of a Biology, an English and a Mathematics textbook for Form 1. It involved data collection in 21 schools across Dodoma, Morogoro and Lindi regions and had three main parts:

(i) a survey of 420 Form 1 students to assess their reading ability;
(ii) a survey of the availability of textbooks in schools and teachers’ and students’ use of textbooks; and
(iii) a review of Biology, English and Mathematics textbooks used in Form 1 classrooms.

The study found that the majority of Form 1 students are not ready to use English for academic purposes. Most schools do not have class sets of textbooks. The problem was most acute in Lindi, where across three subjects and seven schools, we found only one class set of a textbook.

Textbooks that are available in schools make no allowance for the fact that their intended users are not fluent in English except to offer explanations of key words in English. The language demands of Biology textbooks are greater than Form 1 English textbooks and out of step with the Tanzanian English syllabus. English textbooks and most Mathematics textbooks use simpler language but around one half of our sample of students would still struggle to read them. Kiswahili was never used. Biology and Mathematics textbooks did use illustrations and students were heavily dependent on these to help them understanding the meaning of the text. Only English textbooks had activities that support students to talk, write and read in English. Generally, textbooks offer few or no ideas for activities that support interactive learning.

Implications are drawn for textbook design in Tanzania and ongoing project research. Key recommendations are that secondary school textbooks across all subjects should be language accessible, i.e. easy to read, and language supportive, i.e. support students to improve their English proficiency. WE also recommend that secondary school textbooks be reviewed by language experts as well as subject experts before being authorised for use schools. Finally, English textbooks for primary and secondary schools should support learning of English for academic purposes as well as for informal purposes.
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Strengthening Secondary Education in Practice
Language Supportive Teaching and Textbooks in Tanzania
Report on Baseline Study

1 Introduction

1.1 Introducing the LSTT project
The Language Supportive Teaching and Textbooks in Tanzania project (LSTT) is a collaboration between three universities and the Tanzania Institute of Education. The university departments are the Graduate School of Education, University of Bristol; the College of Humanities and Social Sciences and the Faculty of Education, University of Dodoma; and the Institute for Educational Development, Aga Khan University East Africa Campus. The project is directed at supporting students transitioning from standard seven of primary school to Form 1 of secondary school in Tanzania. For the majority of students this involves a transition in the language of instruction from Kiswahili to English. Low levels of language proficiency in English is known to be a major barrier to learning in secondary schools (Brock-Utne et al., 2010). Although private primary schools generally offer English-medium education, these are an option only for a minority of students living in urban areas with parents able to pay the fees.

Rationale for LSTT
Previous research led by the University of Dodoma explored how to improve the quality of education for students transitioning from Kiswahili-medium primary education, after seven years of schooling, to English-medium secondary education. This research included analysis of the readability of textbooks and found that textbooks in Tanzanian secondary schools are too difficult for Form 1 students to read. This finding was replicated for primary school textbooks in Ghana (Afitska et al., 2011) and in Rwanda (Language Supportive Textbooks and Teaching (LAST), 2013). Our experience in other parts of sub-Saharan Africa, suggests that this is an issue for textbook design and publishing across the sub-continent. The majority of students in upper primary and secondary schools in Africa are expected to learn in a European language that is not their first language, they do not speak at home and hear very little in their local communities. Yet, most of the textbooks we have seen within schools do not take this into account. They are written using a level and complexity of language that would not be acceptable in wealthier countries such as the USA and England, where English is a first language for the majority of school students. This project therefore aims to support the development of three Form 1 textbooks for, one each in the subjects of English, Mathematics and Biology, that the majority of Form 1 students in Tanzania can read. As TIE has responsibility for ensuring that school textbooks are suitable for Tanzanian learners and compatible with the curriculum, staff of TIE will author the books and responsibility for their publication will remain with TIE. However, we expect the books to serve as a model or blueprint that will demonstrate how to design books with second language learners in mind. As such, they should be of interest to curriculum developers and publishers across East Africa and other Anglophone countries in SSA.
Textbooks support teaching and learning but they do not work alone to improve the quality of teaching and learning. Textbooks designed to be accessible to students will have the largest impact when they are in the hands of teachers, who are able to implement teaching and learning strategies that support language acquisition. These include encouraging student talk in the classroom in both the African language, in which they share fluency (where there is such a language) and English (Clegg & Afitska, 2011). In Tanzanian secondary schools this means allowing Form 1 students to use Kiswahili in the classroom to digest and process new ideas and to articulate their own ideas in both Kiswahili and English, using spoken and written English. It means giving students opportunities to read and write in lessons as well as to speak and listen. The previous project led by the University of Dodoma found that short workshops and combined follow-up school-based support was effective in changing standard seven and form 1 teachers’ pedagogy to make it more supportive of the learning of concepts in English (Afitska et al., 2011). This is a similar model of teacher development to that implemented in a pilot of INSET for primary school teachers in seven districts in Tanzania in 2011, which is now being scaled up nationally (Hardman & Dachi, 2012). This project, therefore, will also review INSET and continuing professional development (CPD) programmes run by the Tanzanian partner universities and one teacher training college in Tanzania to evaluate the extent to which language supportive pedagogy is already integrated into the provision and identify ways in which this content can be introduced or enhanced. The two pronged approach to strengthening secondary education through textbooks and INSET is captured in our theory of change diagram in figure 1.

Figure 1: LSTT Theory of Change
**LSTT goal and objectives**

The overarching goal of LSTT is to make textbooks and teaching accessible to second language learners through piloting innovations in disadvantaged rural schools and establishing expertise in key government institutions.

The overarching goal will be achieved through the project objectives, which are to:

1. Support TIE to develop three Form 1 textbooks in English, Mathematics and Biology that are accessible to second language learners;
2. Pilot chapters of new textbooks in 12 rural community schools in Lindi, Dodoma and Morogoro regions;
3. Integrate language supportive pedagogy into partner institutions’ in-service teacher education programs;
4. Evaluate project impact on teaching and learning in rural community schools and on system capacity; and
5. Communicate findings to stakeholders within Tanzania and internationally.

The project focuses on English, Mathematics and Biology because these are amongst priority subjects within Tanzanian policy. The textbooks designed within this project are intended by TIE to be suitable for all secondary schools. However, LSTT has piloted in the textbooks in low performing rural community schools. These schools include the lowest performers in examinations and serve students, who are most disadvantaged by the transition to English-medium, as they live in communities where English is spoken little outside of school. Much of the content of the Form 1 curriculum is included in the Standard 5-7 curriculum with the main difference being in the language of instruction so it is important that textbooks and teaching support students to access what they have already learned in primary school and learn how to express their knowledge through the unfamiliar language of English.

The research will be conducted in three regions of Dodoma, Lindi and Morogoro. In 2011 these three regions were ranked 21st, 12th and 13th out of 21 regions for their Form 4 exams results. In the same regions 53%, 34% and 29% respectively of households fall below the poverty line (United Republic of Tanzania (URT), 2005). The majority of learners in these rural regions speak a local vernacular language (not Kiswahili), so English is a third language for students. Each region includes rural districts where girls’ participation in secondary education is much lower than boys and less than 1% of girls completing Form 4 qualify for the next educational level.

**Context of the research**

The project is being conducted in the context of recent rapid expansion of lower secondary (Forms 1-4) in Tanzania. Prior to 2006 secondary education had been the privilege of a minority (around 15%) of young people. Two regions, Dar es Salaam and Kilimanjaro region enrolled most primary school graduates in secondary schools and these are still the only two regions where enrolment and performance of girls are level or slightly ahead of that for boys. The government’s Secondary Education Development Plan (SEDP) has transformed this scenario and for the first time in the history of Tanzania secondary schooling is available to more than a minority of the population of

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1 Four new regions have been created in the last year.
young people. This has been achieved through building a school in every ward (the lowest level of local government administration) in the country. These new community schools, known colloquially as ‘ward schools’, enrol x% of secondary school students. Whilst they have expanded access to secondary education substantially, they face serious quality challenges and these have become a matter of national debate as pass rates in the exit examinations taken at the end of Form 4, the Certificate in Secondary School Examinations, have plummeted to around 40%.

1.2 The baseline study

The baseline study was designed to generate recommendations for the design of the three textbooks. Before writing the books we needed to know the average and range of reading ability of Form 1 students, who are using the books. We also needed to know what teachers and students want from a textbook and to be sure that we are addressing a gap in the textbook market that is not filled by any of the currently available textbooks.

Aim

The aim of the baseline study is to establish the kind of textbooks, including teacher guides that will support subject learning and English language acquisition for Form 1 students in rural Community Schools.

Objectives

The baseline objectives are to:

1. Identify and review text in a range of textbooks designed for Form 1 secondary or primary school in Tanzania and elsewhere;
2. Design and pilot a text comprehension assessment tool for observing interaction with and comprehension of texts;
3. Assess Form 1 students’ ability to read and comprehend text in 16 rural community and 4 urban or government schools in Dodoma, Lindi and Morogoro and regions;
4. Survey textbook availability and use in the same 20 schools;
5. On the basis of the findings, make recommendations to the editors and authors workshop on textbook design or, if found to be more appropriate, the design of supplementary text-based learning resources to be used alongside existing textbooks.

Research Questions

1. What different forms of text are used in textbooks in Tanzania and elsewhere that may be accessible to Form 1 students in Tanzania?
2. What textbooks are available for Form 1 students and teachers in rural ward secondary schools?
3. How are the available textbooks used by students and teachers?
4. Are there any differences in textbook availability and use between different types of schools?
5. What kind of texts can students in rural ward secondary schools read and understand?
6. What form of text-based material would support subject teaching and learning and language acquisition in rural ward secondary schools?
Research design
There were three main parts to the baseline study:

(iv) A survey of 420 Form 1 students in 21 schools to assess their reading ability;
(v) A survey of the availability of textbooks in 24 schools and teachers’ use of textbooks. In eight schools, we also conducted focus group discussions with form 1 students to find out how they interact with texts; and
(vi) A review of Biology, English and Mathematics textbooks from Tanzania and other countries.

Data collection for parts (i) and (ii) was conducted in May 2013. The textbook review was conducted June – July 2013. The remainder of this report is structured according to these research parts. Chapter 2 gives more detail on data collection for stage (i) and presents findings from the survey of Form 1 reading ability. Chapter 3 is concerned with the textbook survey whilst chapter 4 presents methodology and findings for the textbook review. The final chapter draws out implications for textbook design.
Chapter 2 – Research Design for Reading Ability and Textbook Surveys

2.1 Sample

The survey was conducted in 21 schools, seven from each region (see Table 2.1) in May 2013. Five of the schools were government schools, schools which take students with higher grades, charge higher fees and are managed directly by the Ministry of Education and Vocational Training (MOEVT) and the remainder community schools. No private schools were included in the study. Five of the schools were located in urban centres, the remainder were rural. The research is targeted at students in rural community schools. Urban and government schools were included for the purpose of comparison.

Table 2.1: composition of sample for reading ability and textbook survey

<table>
<thead>
<tr>
<th>Sample - Dodoma Region</th>
<th>Govt</th>
<th>Comty</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Rural</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Totals</td>
<td>1</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample - Lindi Region</th>
<th>Govt</th>
<th>Comty</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Rural</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Totals</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample - Morogoro Region</th>
<th>Govt</th>
<th>Comty</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Rural</td>
<td>0</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Totals</td>
<td>1</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

2.1 Reading ability data collection

We used two types of test instruments to measure form 1 students’ reading ability, a comprehension tool to measure students’ reading ability of non-subject specialist texts, and a vocabulary test to measure understanding of subject specialist terms used in Mathematics and Biology in Forms 1 and 2. A comprehension tool consisted of three short stories, one taken from a Standard 4 textbook, one from a Standard 7 textbook and one from a Form 1 textbook. The textbooks were all sourced from schools in or close to Dodoma town. For each story, the respondents answered two (for the Standard 4 story) or four (for the Standard seven and Form 1 stories) questions. The comprehension survey instrument is included in Appendix 2. Analysis of the readability of the test that only took account of the length of words and sentences suggested that the text from the Form 1 textbook should be the easiest to read and the Standard Seven story the hardest to read.

The comprehension instrument was adapted from an instrument designed by the SPINE (Student Performance in National Examinations) project, which was conducted in Zanzibar 2008-2010 and studied how the language of instruction influenced students’ performance in national examinations.
The instrument tested students’ understanding of terms that appeared in Mathematics and Science Form 2 textbooks. We removed words that were not relevant to either Mathematics or Biology. The adapted instrument that we used is presented in appendix 1.

The instruments were administered to 20 students in each school to give a total sample size of 420. Instructions were given verbally and in writing on the test instruments in Kiswahili. Students were first given 30 minutes to complete the comprehension test and then 30 minutes to complete the vocabulary test.

Data was analysed in SPSS to address the following questions:

1. Is there an association between comprehension score on individual stories and grade level of story?
2. Is there an association between vocabulary and comprehension test result?
3. Is there a significant difference in the vocabulary and comprehension test scores between:
   - Rural & urban community schools
   - Community and government schools
   - Individual schools, districts and regions?
   - Girls and boys?
   - Age of school? (danger of conflation with school type)

These questions were addressed using appropriate correlation tests (question 2) and ANOVA tests (questions 1 and 3). Findings were reported that were significant at the 5% level of confidence (p < 0.05) and are displayed visually in chapter 3.

2.2 Textbook survey

In each of the 21 schools in the baseline sample, the Form 1 Biology, English and Mathematics teacher was interviewed using the questionnaire in appendix 3. If the Form 1 subject teacher was absent the head of subject department or academic master was interviewed. Responses were recorded by hand directly onto the questionnaire form. The questionnaire divided into three sections. The first section concerned school characteristics. This section was administered to one teacher only. The next section was concerned with the professional and subject qualifications of the Form 1 subject teacher and the head of department and was intended to give an indication of teachers’ subject and pedagogic expertise. The next section asked about three textbooks used by the Form 1 teacher, how the teacher used the textbooks and the number of textbooks in the school (to give an indication of availability to students).

In 13 of the baseline schools, a group of six students were also interviewed using a questionnaire schedule about the availability of textbooks across the three subjects and how they used them. In the remaining eight schools a lengthier focus group discussion was conducted with three groups of six students, each group focusing on one subject. Students answered the questionnaire about textbook availability and use for one subject only. They were then invited to look at and comment on extracts from two textbooks.
Teachers in all the sampled schools and students in groups of six in 8 of the schools were shown two texts and asked to say which they preferred and why. One text was taken from a book published within Tanzania by a local publisher and the other from a book published either outsider of Tanzania or by an international publisher. A glossary translating key terms from English to Kiswahili was added to one of the Biology and one of the Mathematics texts. In the case of Biology only, the text taken from the international book was simplified. Individual teachers and students in groups of six were asked to say which text they preferred and why. Students were also invited talk through how they would answer the questions with the interviewer, having first been given time to read the pages. Interviewers’ made handwritten notes on how the students interacted with the extracts and their views on the extracts. More detail on the extracts is given in section 4.3. Guidelines for the discussion group facilitators and the textbook extracts are presented in appendix 4.

Data from the textbook survey questionnaires was analyzed in SPSS using descriptive statistics. Analysis was aimed at addressing the following questions:

1. How many schools have a subject specialist for Biology, Mathematics and English?
2. How many schools have a subject specialist teaching Form 1 for Biology, Mathematics and English?
3. What is the level of qualifications of teachers in teaching and in Biology/Mathematics and English for different types of schools?
4. Is there a difference between rural, urban, peri-urban schools in qualifications and experience of teachers?
5. How many textbooks are teachers using? Do they have access to practical materials and teacher guides (for each subject)?
6. What textbooks are most commonly available to teachers?
7. Which textbooks do teachers say they prefer and why?
8. What do teachers want from a teachers’ guide?
9. How many schools are making textbooks available to Form 1 students and which textbooks?
10. In how many schools do students say they have their own textbooks?
11. The number of schools where students use textbooks in Biology/English/Mathematics?
12. In what ways do students say they use textbooks in Biology/English/Mathematics?

Qualitative data was discussions of textbook extracts was organised and reduced into tables. Qualitative data from student discussion of extracts was coded, organized and reduced using NVivo. Findings are presented in chapter 4.
2.3 Ethical issues

The proposal for the research project as a whole has passed through procedures for ethical clearance at the University of Bristol and the Aga Khan University. Three issues that were considered that are relevant to the baseline study are as follows. First, necessary permissions were obtained. The District Education Officers were informed of the research and, when available, consulted on the school sample.

Second, teachers and students are at all times were treated respectfully, were informed of the research purpose and what their participation involves and a school is offered the opportunity to opt into the research (rather than opt out). All participants were informed of the right to withdraw. These explanations were given orally in Kiswahili to all participants and a Participation Information Sheet, written in English, was given to each school (see appendix 1).

Lastly, reading ability tests were anonymous. All other data, e.g. interview data, was treated as confidential with only the researchers having access. Names of students involved in focus group discussions were not recorded.
Chapter 3 - Reading Ability of Form 1 Students

3.1 Characteristics of Form 1 students

Around 50% of students graduating from primary school in Tanzania continue on to secondary school. The majority of these students should be 14-15 years old, having completed seven years of primary education. They have successfully passed the Primary School Leaving Examination which includes a paper in English. Independent survey data collected by Uwezo shows that nearly a half of standard 7 pupils could not read English at the level expected in standard 2 by the Tanzanian syllabus. However, this is unlikely to represent the reading levels of the top 50%, who enter Form 1. The surveyed students were in the first half of Form 1 as the school year starts in January. It was not uncommon for Form 1 to start in February and some schools claimed that they had students arriving later still. Therefore the findings should be treated as a measure of student reading ability at the point of entry to secondary school and do not reflect any effects, other than selection effects, due to the secondary schools we visited.

3.2 Findings from reading ability survey

Table 3.1 shows the mean scores and standard deviation for each component of the two test instruments. Measures of readability suggest that story three is the easiest to read. Such readability measures are intended to indicate readability by native English speakers and have been critiqued. Students in the sample found it easier to answer the more direct questions they were asked about the shortest story, story one. Story three was the longest but had a recognisable narrative, which would enhance readability than story. Measures of readability suggest that the passages should have been readable by native speakers in their fifth year of schooling. The majority of the sample, however, could not read these texts. We conclude that books designed for Form 1 students should have readability measures of around 2 or 3 and that the text should be broken down into short sections and paragraphs.

Table 3.1: Mean percentage scores and standard deviations in the comprehension and vocabulary tests

<table>
<thead>
<tr>
<th></th>
<th>Readability score*</th>
<th>% score</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Story One – Std. 4</td>
<td>4</td>
<td>75</td>
<td>38</td>
</tr>
<tr>
<td>Story Two – Std. 7</td>
<td>5</td>
<td>32</td>
<td>23</td>
</tr>
<tr>
<td>Story Three – F1</td>
<td>2</td>
<td>37</td>
<td>24</td>
</tr>
<tr>
<td>Comprehension total</td>
<td>2-5</td>
<td>43</td>
<td>17</td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
<td>26</td>
<td>17</td>
</tr>
<tr>
<td>Biology</td>
<td></td>
<td>30</td>
<td>16</td>
</tr>
<tr>
<td><strong>Vocab total</strong></td>
<td></td>
<td><strong>28</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

* Grade level (based on the USA education system) is equivalent to the number of years of education a native English speaker has had. Score shown is average of levels yielded by Flesch Kincaid, Gunning Fog, SMOG, Coleman Liau and Automated Reading Index.

There was a positive association between the comprehension and vocabulary test scores, which was significant at the 0.01 level (1-tailed) using the Pearson correlation. Vocabulary test scores, although very low, were not very much less than those scored by Form 2 students in Zanzibar in the SPINE project, for which the mean was 33% (SPINE, 2009).
Urban schools scored higher than rural schools in the vocabulary test by about 10% and only slightly better in text 2 of the comprehension. However, there was no significant difference between scores in text 1 and text 2. Students in government schools scored higher than students in rural schools by about 10% and slightly better in texts 1 and 2 of the comprehension. A visual comparison of scores by school shows that these difference arise from two high performing government schools in urban areas, which outperformed other schools, which scored about twice the average of the lowest 80% (see figure 4). It also shows two relatively high performing community rural schools that are masking the extent of the disadvantage of students in the majority or rural and community schools. It appears therefore that students in rural community schools are less likely to know subject specialist vocabulary. More complex texts also appear to be less accessible to this group. There was no significant difference between girls and boys except that girls tended to do slightly better in Biology vocabulary (level of confidence, p = 0.046).

Table 3.2: Comparison of comprehension and vocabulary scores for rural and urban schools

<table>
<thead>
<tr>
<th>Location</th>
<th>Comprehension</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Text 1</td>
<td>Text 2</td>
</tr>
<tr>
<td>Rural N = 320</td>
<td>Mean</td>
<td>1.46</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>.775</td>
</tr>
<tr>
<td>Urban N = 100</td>
<td>Mean</td>
<td>1.60</td>
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<tr>
<td></td>
<td>SD</td>
<td>.711</td>
</tr>
<tr>
<td>Sig. (p=)</td>
<td>No (.115)</td>
<td>Yes (.000)</td>
</tr>
</tbody>
</table>

Table 3.3: Comparison of comprehension and vocabulary scores for community and government schools

<table>
<thead>
<tr>
<th>School Ownership</th>
<th>Comprehension</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Text 1</td>
<td>Text 2</td>
</tr>
<tr>
<td>Com. N = 320</td>
<td>Mean</td>
<td>1.40</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>.806</td>
</tr>
<tr>
<td>Govt. N = 100</td>
<td>Mean</td>
<td>1.79</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>.498</td>
</tr>
<tr>
<td>Significant (p =)</td>
<td>Yes (.000)</td>
<td>Yes (.000)</td>
</tr>
</tbody>
</table>
3.3 Summary of main findings

- Reading ability for the majority of Form 1 students was measured as very roughly equivalent to that expected of a native English speaker with two or three years of education. A substantial minority of students read less well than this. This finding suggests that Form 1 students are not ready for English-medium secondary education.

- Across all schools knowledge of Mathematics and Biology specialist vocabulary is very weak. However, there is more variation here than in comprehension suggesting that socio-economically disadvantaged students and students in rural areas would benefit most from textbooks that pay close attention to conveying the meanings of specialised vocabulary items through glossing, the use of visuals or other means (see chapter five).
Chapter 4 - Textbook availability and preferences

4.1 Qualifications and subject specialisms of Form 1 teachers

About one third (7 out of 19) of the survey schools indicated that they did not have a Mathematics specialist on the staff and one fifth (4 out of 20) that they did not have a Biology teacher on the staff. However, Biology was the only subject for which we found Form 1 classes had a teacher who had not studied the subject beyond Form 4 (in three schools). There were also a small number of schools in which Form 1 was taught Mathematics (three out of 18 schools) or Biology (three out of 19 schools) by an unqualified form 6 leaver, who had had no official induction. Only one of the six unqualified teachers worked in a government school, all others were in community schools. Only one teacher, a teacher in a community school, was found to have completed only the induction but not yet obtained the diploma. All other Form 1 teachers had a diploma or Bachelors degree and one English teacher had a postgraduate diploma. This suggests that a substantial minority of Form 1 students are taught Mathematics or Biology by an unqualified teacher. A substantial minority are taught Mathematics by a teacher with no specialist training in Mathematics pedagogy and a substantial minority are taught Biology by a teacher, whose own Biology education does not go beyond Form 4. This implies that Mathematics textbooks or teachers guides that are targeted at disadvantaged schools should include pedagogic guidance and Biology textbooks for these schools should be usable by teachers with limited subject knowledge.

Figure 4.1 Form 1 teachers’ highest subject qualification
Table 4.1: Form 1 teachers’ professional qualifications

<table>
<thead>
<tr>
<th>Subject</th>
<th>F6 leaver</th>
<th>F6 + induction</th>
<th>diploma</th>
<th>Bachelors degree</th>
<th>Post-Grad Diploma</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>7</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Biology</td>
<td>3</td>
<td>0</td>
<td>7</td>
<td>8</td>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td>English</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>13</td>
<td>1</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>1</td>
<td>21</td>
<td>28</td>
<td>2</td>
<td>58</td>
</tr>
</tbody>
</table>

4.2 Textbooks available in schools

There is a strong reliance within Tanzania on a small number of textbooks. Hardman and Dachi (2012) also found this to be the case for primary schools. In this research, we found that most teachers were reliant on one or two textbooks with Biology teachers tending to make use of more textbooks than English or Mathematics teachers (see figure 4.2) and a third of English teachers having just one book.

Figure 4.2 Number of textbooks used by teachers

Biology textbooks available in schools

The Form 1 Biology textbooks that most commonly available to teachers were:

Nearly all the teachers, who had the colourful Pearson Longman book or OUP book for Zanzibar stated that they liked this book, whereas half or less claimed to like the books produced by local publishers.

Figure 4.3: Biology textbooks available to and liked by teachers.

These preferences were also reflected in how the books were used with the Pearson Longman book most commonly being used in the greatest number of ways, followed by the OUP Zanzibar book. Pearson Longman was used in the most interactive way as a source of ideas for activities and practicals, as well as exercises and setting homework. OUP Zanzibar was used for exercises and homework but less likely to be used for activities and practicals. Both books were as likely to be used for lesson preparation or notes as the TIE book, with the Longhorn/Delah book not far behind.

In addition, around two-thirds (14/19) of schools have Biology practical materials and around a half (10/19) of schools have Biology teacher guides.

Over a third of schools (9 out of 21) did not have a class set of Biology text books, only one of which was in Dodoma. Those that did have class sets were more likely to have locally published books with class sets of Nyambari Nyangwine books being available in four schools and both the out of date TIE books and the OUP books for Zanzibar in three schools.
**English textbooks available in schools**

The OUP English textbook by Shekighenda & Durkin was most widely distributed within the three regions, being available in over half of schools (see figure 4.5). Three books published by Tanzanian publishers were available in roughly one third of schools, these were:

- TIE/Institute of Curriculum Development (ICD) books from the 1990s.
Out of these four books only the one published by Jamana was preferred by the majority of teachers (see figure 4.6). The most common criticism of books was that they did not match with the syllabus. Organisation of content in the OUP book was criticized and the Nyambari Nyangwine book was described as shallow and offering few illustrations to demonstrate language use. The Pearson Longman book was thought not to reflect Tanzanian culture. Conversely the Jamana book was seen as well matched to the syllabus and comprehensive, although not every teacher agreed with this assessment. In addition, around three-quarters (16/21) of schools have English readers and just under a half (9/21) have English teachers’ guides.

Most students did not have access to an English textbook through school. Only the OUP and TIE/ICD books were available as class sets and only five schools had class sets of one or both of these (defined as six or fewer students to a book) of the out of date TIE/ICD textbooks. One additional school had a set of TIE/ICD textbooks with a student to book ratio of 7:1.

Teachers claimed that they used all textbooks in a similar way for a range of purposes including preparing lessons, notes, exercises, group activities and reading exercises. Books were less likely to be used as readers or to set homework, which may well be due to the general shortage of class sets.

Figure 4.6 English textbooks available and preferred by Form 1 teachers
Mathematics textbooks available in schools

Mathematics teachers were generally the least critical of textbooks. They valued books for “matching the syllabus”, providing clear explanations, being accessible to students and providing a good source of exercises. The most common reason for disliking a book was that the order of content did not match with the syllabus. Books were also criticized for being shallow or unintelligible. Very few schools (2/18) had practical materials for Mathematics and around one quarter (4/18) had teachers’ guides.

11 out of 21 schools had a class set of Mathematics textbooks defined as one book shared between six or fewer students and four schools had a class set of more than one textbook. How textbooks were used depended more on the teacher than the textbook and most teachers used textbooks in a range of ways. They were less likely to use them to support inquiry-based project work or to set
extra questions for ‘quick’ students, consistent with findings from our review of Mathematics textbooks (chapter 3), which found books offered little or no resource for activity based learning or extension work for more able students.

Figure 4.9 Mathematics textbooks available to and preferred by teachers

Figure 4.10 Class sets of Mathematics textbooks
4.3 Textbooks available to students

Very few students reported having their own books. Just over 200 students participated in focus groups but only 6, 7 and 9 claimed to have their own copy of a Biology, English and Mathematics textbook respectively. Out of the 21 schools, students at 3, 9 and 7 claimed that a Biology, English and Mathematics textbook respectively was available to them at school. In Lindi, in particular students simply did not have access to textbooks. Only one student had their own copy of a Mathematics textbook and only at one school did students say Mathematics textbooks were available. No student in Lindi had their own copy of an English or Biology textbook and at no school did students say they were available at school. Students described a situation where they were totally reliant on what the teacher wrote on the blackboard. However, 3 schools in Lindi did have libraries compared to 5 in Dodoma and just 1 in Morogoro. Students at four other schools said the school had a bookstore or books were kept in the teachers’ office. Where schools did have books available most student focus groups reported that they could take books to class or take them home. In two schools in Dodoma, students did not know whether they could take books out of the library suggesting that they had not yet used their school library. Other text-based resources that students said they used besides textbooks were their own notes, other people’s notes, past examination papers and six out of seven schools in Dodoma were using dictionaries in English. In one school, students said that the Mathematics teacher was printing his notes and selling them to the students.

When students did get their hands on books, they described using them in a range of ways including in class, for homework, their own reading, as a source of practice questions and preparation for examinations. English books were also used to practise reading. Two student groups specifically mentioned that they looked at the pictures in books.

In summary, the textbook survey showed that for most students in the sample schools books are not available or only available when shared with several other students. Students said that textbooks were available in fewer schools than teachers indicated the availability of class sets. The situation is particularly acute in Lindi, where with the exception of Mathematics in one school, students did not have textbooks.
4.4 Students and teachers responses to different texts

Teachers in all the sampled schools and students in groups of six in 8 of the schools were shown two texts and asked to say which they preferred and why. One text was taken from a book published within Tanzania by a local publisher and the other from a book published either outsider of Tanzania or by an international publisher. A glossary translating key terms from English to Kiswahili was added to one of the Biology and one of the Mathematics texts. In the case of Biology only, the text taken from the international book was simplified. Individual teachers and students in groups of six were asked to say which text they preferred and why. Students were also invited talk through how they would answer the questions with the interviewer. The texts appear in Appendix 4.

Biology

The two excerpts each presented one page on the carbon cycle, which appears in the Form 2 syllabus, and a page of questions. An English to Kiswahili glossary was provided on the second page of the first text only. The first text, from a Tanzanian published book, was in black and white and was illustrated by a very simple diagram. The second, OUP text, offered more elaboration in the text and was illustrated with photographs (see appendix 4). A much more detailed diagram illustrating the carbon cycle appeared as part of the question, with blank boxes for writing in labels. In this respect, students were expected to be active in constructing an account of the carbon cycle. The first text had three closed and one open question, the answers to all of which could be extracted from the text. The only question appearing in text 2 was to label the carbon cycle, for which information was available in the text but the task of presenting the information in a different format required processing of information rather than just recitation.

10 out of 18 Biology teachers preferred the text taken from the OUP book for Zanzibar, five preferred the text from the Tanzanian book and three liked both. The reason most commonly cited for preferring the local textbook was that it was clear, straightforward and factual. The questions were described as direct, at the appropriate level for Form 1 and “measurable”, although the question from the OUP textbook would have been quicker to mark and grade. The OUP text was preferred because of the illustrations, which were seen to support the explanation. Four teachers also mentioned that the questions were supported with illustrations and needed thinking about.

Half of the eight student focus groups preferred the simpler Tanzanian text and three preferred both. Only one group expressed a preference for the OUP text over the Tanzanian text. Although students struggled to answer the questions in both texts they were slightly more successful with text 1. However, across all eight schools students could not answer the one open question, which appeared in the Tanzanian text, claiming they could not understand it. One interviewer noted:

They said they have not understood the question. After explaining that questions in Kiswahili, students showed that they have understood, however they could not be able to answer that question, one student said “Hili swali ni gumu sana” [this question is very difficult].

21
Table 4.2 Teachers’ comments on the two texts

Negative comments are shaded red.

<table>
<thead>
<tr>
<th>Comments on text from Tanzanian book</th>
<th>Freq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearer/straight forward/ factual</td>
<td>8</td>
</tr>
<tr>
<td>questions – direct/ appropriate level, measurable</td>
<td>5</td>
</tr>
<tr>
<td>Contains glossary that emphasizes on vocabulary</td>
<td>2</td>
</tr>
<tr>
<td>Clear diagram</td>
<td>1</td>
</tr>
<tr>
<td>Uses simple language</td>
<td>1</td>
</tr>
<tr>
<td>Text not direct, not to the point</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comments on OUP Znz text</th>
<th>Freq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illustrations (support explanation)</td>
<td>11</td>
</tr>
<tr>
<td>Clarification of diagram</td>
<td>1</td>
</tr>
<tr>
<td>Questions – “few and simple questions illustrated” “needed thinking about”</td>
<td>4</td>
</tr>
<tr>
<td>to the point</td>
<td>3</td>
</tr>
<tr>
<td>Clear “step by step how”, easy to understand.</td>
<td>3</td>
</tr>
<tr>
<td>Sufficient details</td>
<td>1</td>
</tr>
<tr>
<td>Relevant to our environment</td>
<td>1</td>
</tr>
<tr>
<td>Questions too difficult for Form 1</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 4.12 Student Focus Groups answers to questions in Biology texts

![Bar chart showing answers to questions](chart.png)
In one school, it was noted that the instructions given within the questions were not easily understood:

The questions in text one according to students employed difficult terminologies and so most of them could not understand the questions. For instance, most of the students did not grasp the meaning of the word “circle” in the instruction circle the correct answer.

It was also observed that when asked to select from a list of possible answers, most of the students were selecting randomly because they had not read or understood the text. In other words, whilst some students did answer some of the questions correctly, their interaction with neither text resulted in an understanding of the principles behind the carbon cycle.

In summary, whilst teachers were more likely to value the OUP text as a resource to support their teaching, neither text worked as standalone resource for students. It was also noted that Biology teachers were less articulate the pedagogic merit of the texts than English or Mathematics teachers.

**English**

The first text was taken from the Nyambari Nwangwine textbook (Bakugile, 2007). The second text was taken from the Pearson textbook English in Use. Both texts were on the topic of past tense but they took divergent pedagogic approaches. The Nyambari book focused entirely on written grammar, i.e. how to write regular verbs in the simple past tense. It included three exercises, all writing exercises but progressing from closed questions (change the verbs to simple past tense) to open questions (write a story). The Pearson text started with two talking activities, followed by a reading exercise that involved some writing (read the story and write down the verbs in the story using the past form).

Teachers were split evenly between the two in their preferences, with only one teacher preferring both. A range of reasons were given for preferring the Nyambari text, related to relevance to the syllabus, being systematic and direct and have questions students could use for self evaluation (see table 4.3). Comments on the Pearson text focused on the use of pictures and participatory group discussion. English teachers tended to talk about the linguistic merits of the text.

Table 4.3 Teachers’ comments on the English texts

<table>
<thead>
<tr>
<th>Nyambari text</th>
<th>Freq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions for student (self) evaluation</td>
<td>4</td>
</tr>
<tr>
<td>Logical systematic order</td>
<td>4</td>
</tr>
<tr>
<td>Clear simple language, direct</td>
<td>4</td>
</tr>
<tr>
<td>Shows how tenses formed, relevant to syllabus,</td>
<td>3</td>
</tr>
<tr>
<td>Issues mixed up ‘d” &amp; ‘ed’</td>
<td>2</td>
</tr>
<tr>
<td>Guides the teacher</td>
<td>1</td>
</tr>
<tr>
<td>Helps teacher and students to discuss together</td>
<td>1</td>
</tr>
<tr>
<td>Activities involve language skills</td>
<td>1</td>
</tr>
<tr>
<td>Does not encourage thinking</td>
<td>1</td>
</tr>
<tr>
<td>Pearson text</td>
<td>Freq</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Use of pictures</td>
<td>8</td>
</tr>
<tr>
<td>participatory, group discussion</td>
<td>4</td>
</tr>
<tr>
<td>Good arrangement of work</td>
<td>2</td>
</tr>
<tr>
<td>Critical/independent thinking</td>
<td>2</td>
</tr>
<tr>
<td>more details</td>
<td>1</td>
</tr>
<tr>
<td>many items which helps learners to grasp meaning</td>
<td>1</td>
</tr>
<tr>
<td>exercises</td>
<td>1</td>
</tr>
<tr>
<td>Relates to another subject (history)</td>
<td>1</td>
</tr>
<tr>
<td>Clear language</td>
<td>1</td>
</tr>
</tbody>
</table>

Half of the eight student focus groups preferred the Nyambari text, two said they preferred the Pearson text and the remaining two liked both. They found it easier to get started with the short answer questions in the Nyambari text but none of the groups were able to construct a story in English. Observations made of collaborative efforts (using Kiswahili to talk amongst themselves) to answer this writing question demonstrate some of the difficulties students face in using English as the language of instruction:

For exercise three, students didn’t understand what the question required them to do. They were even unable to read the words “experience, accident and witnessed”. In composing [a] story, they started using this sentence, “Xxx secondary school not laboratory at student.” They stopped composing their story after missing an English word for “Kujifunza” [to learn] which they wanted to include in their story.

For exercise three, students failed to compose the story, they started with the following sentence, “Play hard, study hard, it hard but education is are key of life” but they didn’t proceed [to] writing a story.

One of them started giving a story. They asked me to tell them how to say the Kiswahili word *mara* (suddenly) in English. They constructed their story in Kiswahili and then translated it into English; however they could not continue with the translation.

For exercise three, students tried to compose a short story as follows, “*One day at the morning I was going to school. I saw a big rolly was coming. An old man was coming and weark outside in the road, suddenly rolly coming and accident that old man.*”

Six out eight of the focus groups were able to engage with the discussion activity in the Pearson text but the other two were not able to get started with interacting with this text.
In summary, the single focus on writing English in the Nyambari text was preferred by around half the teachers. However, the jump from short structured questions to writing a short story was too demanding for students at all but one school. For most students, the Pearson approach of getting students talking in English seemed to be an important step in the language learning process. However, only half of the teachers recognised the value of the Pearson talking activities. In two schools students did not have sufficient proficiency or vocabulary in English to engage with discussion activities.

**Mathematics**

The two Mathematics texts were concerned with the topic perimeters, a topic which demands visualisation. The first text was taken from a book that is published by Educational Books/Delah publishers (2009) within Tanzania that is notable for the high standard of formatting. The second text was taken from the NCERT book, designed for children in their sixth year of schooling in India. The explanation of the topic in the Tanzanian book was abstract. The Indian book used more space and gave a wordier explanation of the concept of perimeter, including contextualised examples. Both books used diagrams to support the explanation and the NCERT book also provided a small line drawing of a girl walking around the perimeter of a field. Two worked examples were provided in the Tanzanian text. Instead of a worked example, the text from the Indian book had three fill in the blank questions that took students, step-by-step through the process of calculating the perimeter of their table and two shapes represented on the page. The Tanzanian text included four questions to try, including two questions for which the shape had been drawn and two contextualised questions where the shape was described in words. An English to Kiswahili glossary appeared on the first page of the NCERT text, immediately below the explanation.

Mathematics teachers were split evenly between the two texts in their preferences. All comments on both books were positive. The Educational Books text was preferred for the clarity of examples, illustrations and explanation and for being well-organized. With respect to the Indian text, teachers commented on its detail, elaboration and use of “real life examples” that were easy to understand.
Three teachers commented positively on the font used in the Indian book and one teacher commented on the quality of illustrations. Mathematics was the only subject for which formatting was mentioned by the participants.

Table 4.4 Teachers’ comments on the Mathematics texts

<table>
<thead>
<tr>
<th>Educational Books/Delah text</th>
<th>Freq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examples – many &amp; clear</td>
<td>7</td>
</tr>
<tr>
<td>Clear illustration</td>
<td>4</td>
</tr>
<tr>
<td>Simple straightforward explanations, well organised</td>
<td>3</td>
</tr>
<tr>
<td>Understandable language</td>
<td>3</td>
</tr>
<tr>
<td>Independent thinking, inquiry oriented</td>
<td>2</td>
</tr>
<tr>
<td>Encourages creativity</td>
<td>1</td>
</tr>
<tr>
<td>Practical measuring, application in daily life</td>
<td>1</td>
</tr>
<tr>
<td>Explains the meaning of perimeter</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NCERT (India) text</th>
<th>Freq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gives enough details, elaboration</td>
<td>4</td>
</tr>
<tr>
<td>real life examples</td>
<td>3</td>
</tr>
<tr>
<td>Examples easy to understand</td>
<td>3</td>
</tr>
<tr>
<td>Font</td>
<td>3</td>
</tr>
<tr>
<td>Glossary</td>
<td>2</td>
</tr>
<tr>
<td>follows the current syllabus</td>
<td>1</td>
</tr>
<tr>
<td>activities for students to discover</td>
<td>1</td>
</tr>
<tr>
<td>Well drawn figures</td>
<td>1</td>
</tr>
<tr>
<td>Good exercises</td>
<td>1</td>
</tr>
</tbody>
</table>

Three student focus groups preferred the NCERT text, two preferred the Tanzanian text and three liked both. They were all able to answer the questions, drawing on knowledge from primary school and referring to illustrations in the two texts. However, two groups needed the interviewer to translate ‘perimeter’ into Kiswahili before being able to get started. A further three groups, needed the word questions translated but were then able to answer them, similar to findings from SPINE (2009). One student commented:

“Mwalimu, kumbe maswali haya sio magumu, ukiyatafsiri kwa Kiswahili tunaelewa”

[“Teacher, wow, these questions are not difficult. If you translate them into Kiswahili we understand.”]

One group at first understood a question about finding the perimeter of a football pitch that is 105 m long and 70 m wide to be about a match with 105 and 70 players. Instructions in the NCERT text were also not always understood with two groups and the pilot group, trying to measure the perimeter of the diagram of table in the illustration rather than the table on which they were working.

To summarise, the quality and clarity of illustrations supporting the text were crucial to the accessibility of both the Mathematics texts. Teachers appreciated the clarity of the Tanzanian textbook and the contextualized explanations and examples in the second book. However, the use of English within both texts was a barrier to students accessing their prior knowledge from primary school.
Glossary

Only two Biology teachers and two Mathematics teachers commented, all positively, on the glossary. By contrast, students were overwhelmingly positive about the glossaries. All eight Mathematics focus groups made use of the glossary and said it was helpful, consistent with the interviewer’s observations that only language posed a barrier to engagement with the text. Six out of eight of the Biology student focus groups said that they used the glossary and it was useful. The two groups, who claimed not to make use of the glossary, nonetheless saw it as a positive feature and recommended that glossaries be included in textbooks.

Our experience with constructing the glossaries is also instructive. The glossaries were constructed by research assistants with current or recent secondary experience in consultation with local primary school teachers working in government schools in Dodoma. It was soon clear that in Biology in particular, different Kiswahili words have been used at different times by different people. Constructing a glossary should not be regarded as a quick process but one that demands consultation with upper primary school teachers and reference to textbooks used in primary school. Where necessary, short explanations rather than one word translations should be used so that the meaning of a word is clear to Form 1 students across Tanzania.

4.5 Teachers’ guides

All authorised textbooks in Tanzania are required to be accompanied by a teachers’ guide. We asked form 1 teachers in the sampled schools about their expectations of teachers’ guides. English and Biology teachers, who were most likely to have access to a teachers’ guide already, expected guides to supplement or elaborate on the book content. Across subjects, teachers also wanted guidance on how to teach and additional activities or exercises to set students. A few people commented on guidance on timing, sequencing and lesson plans although the syllabus offers guidance on how many periods to spend on each topic. Only Biology teachers said that they wanted the teachers’ guide to support their understanding of subject matter including answers to questions suggesting that the lower level of subject qualification amongst a minority of Biology teachers may be related to less confidence in the subject matter. Four of the Mathematics teachers wanted answers to some problems to only be placed in the teachers’ guide, possibly so they can use questions in the textbook for assessments and tests.

Table 4.5 What Biology teachers want from a teachers’ guide

<table>
<thead>
<tr>
<th>Comments</th>
<th>Freq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplements textbook</td>
<td>9</td>
</tr>
<tr>
<td>Suggests activities, reference materials, additional exercises</td>
<td></td>
</tr>
<tr>
<td>Guidance on how to teach</td>
<td>8</td>
</tr>
<tr>
<td>lesson objectives, points for emphasis, guidance on practicals</td>
<td></td>
</tr>
<tr>
<td>Coverage of content</td>
<td>5</td>
</tr>
<tr>
<td>Summarize, comprehensive coverage, sequencing</td>
<td></td>
</tr>
<tr>
<td>Supports textbook</td>
<td>5</td>
</tr>
<tr>
<td>Guides on use of, answers to questions in, explains new ideas</td>
<td></td>
</tr>
<tr>
<td>Relevant coloured illustrations</td>
<td>3</td>
</tr>
</tbody>
</table>
Table 4.6 What English teachers want from a teachers’ guide

<table>
<thead>
<tr>
<th>Comments</th>
<th>Freq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td></td>
</tr>
<tr>
<td>Follow syllabus, elaborate on content, relate to textbook</td>
<td>10</td>
</tr>
<tr>
<td>How to teach</td>
<td></td>
</tr>
<tr>
<td>Additional activities</td>
<td></td>
</tr>
<tr>
<td>for homework, assessment, creativity, related to environment</td>
<td>5</td>
</tr>
<tr>
<td>Lesson planning (timing)</td>
<td>3</td>
</tr>
<tr>
<td>Accessible</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 4.7 What Mathematics teachers want from a teachers’ guide

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<th>Comments</th>
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<tr>
<td>How to teach</td>
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<tr>
<td>answers to problems in textbook</td>
<td>4</td>
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<tr>
<td>What to teach</td>
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<tr>
<td>Coverage, orientation to new topics</td>
<td>3</td>
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<tr>
<td>additional activities &amp; questions</td>
<td>3</td>
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<tr>
<td>Timing</td>
<td>2</td>
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<tr>
<td>How to prepare requested T&amp;L aids</td>
<td>2</td>
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<tr>
<td>Correlate with the textbook</td>
<td>1</td>
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<td>highlight areas tested in national examinations</td>
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4.6 Chapter Conclusion

Mathematics textbooks or teachers guides that are targeted at disadvantaged schools should include pedagogic guidance and Biology textbooks for these schools should be usable by teachers with limited subject knowledge.

Textbooks appear not to be well distributed to schools in the three regions, most especially in Lindi and Morogoro. Generally, teachers are dependent on between one and three textbooks, although a third of English teachers were using just one textbook. Across subjects there is a shortage of class sets, meaning that students in most schools did not have access to a textbook. However, both teachers and students do use the textbooks that they do have in a variety of ways within and outside of the classroom. Students put a strong emphasis on examination preparation.

There are distinct differences in what teachers and students want from textbooks. Teachers want books to follow the content and organisation of the Tanzanian syllabus, to have text and illustrations
that work together to explain content, clearly and directly. At the same time they want content to be comprehensive, to refer to contextualised examples that are relevant to the Tanzanian context. They like textbooks to provide a bank of questions and activities that are a depth of resource for planning classroom activities, setting homework and designing assessment. Many, around one half of teachers, appreciate the value of activities that require critical engagement and support students to construct or discover knowledge rather than reproduce texts or facts.

Students want textbooks to support their preparation for examination through offering explanations that are simple, direct and clear. As they often do not understand meaning they are looking for words and short chunks of text that can be reproduced in examination conditions. As they struggle to read English they pay attention to and value illustrations that help them to understand concepts. They did not understand the meaning of key subject specialist, academic and non-academic words, struggled to read chunks of texts and some struggled to decode even quite short sentences. For example, “A football field is 105 m long and 70 m wide” was not understood by one focus group and, “Circle the correct answer” was not understood by another. This made students very dependent on diagrams and illustrations for understanding the text. English acted as a barrier to accessing and building on knowledge from primary school and demonstrating the knowledge. English was also a barrier to engaging with the kind of learning activities that involve active construction of knowledge that their teachers valued and the syllabus aims to promote. They enthusiastically supported the inclusion of English to Kiswahili glossaries, which helped them to bridge between their knowledge from primary school and the secondary curriculum.

There are various strategies that can be taken in text books to enhance accessibility, which we highlight below. However, the focus group discussions together with findings from the comprehension and vocabulary tests indicate that most of the Form 1 students in the schools included in the baseline study do not have sufficient proficiency in English to learn Biology or Mathematics or other subjects through the medium of English. We discuss this further in chapter 5.

We conclude glossing key terms from English to Kiswahili should be a requirement of all textbooks aimed at the Tanzanian market. They should also include a vocabulary list of academic words at the back of the book with translations into Kiswahili. However, glossaries and vocabulary lists alone will not make books intelligible to the many Form 1 students, who cannot read or construct simple sentences, let alone short paragraphs in English. Investing time and dedicating space in illustrations and diagrams that explain concepts is important as for many students the illustrations are the first and main way through which they access meaning. However, we also recommend that key concepts in Biology and Mathematics are explained in Kiswahili as well as English. Within English textbooks, discussion, writing and reading activities should be accompanied by short glossaries or vocabulary lists that provide students with the key words they will need to complete the exercise. As well as informal English, content should include academic English such as exercises interpreting the meaning of the kind of instructions (e.g. explain, describe, illustrate, discuss, solve, ...) that they encounter in other curriculum subjects.
Chapter 5 - Review of textbooks

We reviewed between three and eight textbooks for each subject, focusing on books used in Tanzanian schools. However, the Mathematics review included two books designed for other East African countries and two books from other countries (USA and India).

5.1 Review methodology

The review tool was designed to address the main question: What are the features of this textbook that could be applied in the textbook which we are writing? This question was asked with respect to the following characteristics:

1. Readability of the text for a Tanzanian Form 1 student;
2. How the text supports students to improve their written and spoken English and to understand and use concepts in English;
3. Whether subject content and cognitive demand of the text is appropriate to Form 1;
4. Socio-cultural and ecological relevance of the text to Tanzanian secondary school students; and
5. Gendered representation and representation of identifiable sociocultural groups.

The review tool had five sections relating to each of the five characteristics above (see Appendix 2).

Readability was measured using the Flesch Kincaid scale, which gives a figure for grade level for which most native English speakers living in the USA should be able to read the text. Readability measures such as Flesch Kincaid are intended to be used in a native speaker context, i.e. with learners in mind who are fluent in the language of the book. The use of these measures in a non-native speaker context such as Tanzania has somewhat limited value. With this in mind, the instrument used to assess the textbooks also focussed on a range of features which determine readability by Tanzanian learners such as the use of Kiswahili, visuals, page design and language support activities.

Support for language acquisition and concept development in English focused on how activities provided by the textbook supported learners to read, write and talk in English and Kiswahili about concepts within the three subjects.

Subject content and cognitive demand looked at the extent to which explicit links were made between topics within a subject and with other subjects, compatibility with the Tanzanian syllabus and the extent to which the development of argumentation skills are developed. The section on socio-cultural and ecological relevance looked at the extent to which the textbook was relevant to the national and local context of Tanzanian students. The last section on socio-cultural representation looked at how girls, boys, men, women, people living with disabilities and suffering from infectious diseases were represented in the text. We also noted representation of different religious identities as indicated through names.

Small adaptations were made to the review tool for each subject. So for example in section 1, the Mathematics tool alone asked whether the meanings of key subject-specific words conveyed were conveyed by worked examples. In section 2, the English tool had an extra question on whether the textbook supported acquisition of informal (conversational) or formal English (as used in academic textbooks for other subjects).
Textbooks were reviewed within subject teams that included academic researchers and TIE authors. Therefore there is likely to be some inconsistently in how the tool was used by individuals. However, the reviews were the starting point for a conversation between team members through which they identified implications for the design of the new textbooks.

5.2 Textbook sample

**English**

Four English textbooks were reviewed, two by each of two reviewers. All four were written for the 2005 Tanzanian syllabus:


Only two of these books, the Nyambari Nyangwine and the OUP book, were reviewed with respect to subject content and cognitive demand, and socio-cultural and ecological relevance.

**Biology**

Three Biology textbooks written authorized for use with the 2005 Tanzanian syllabus were analyzed linguistically and the content commented upon by two Biology experts. The textbooks were:


One older Tanzanian textbook was analyzed linguistically, published by TIE and for purposes of comparison a OUP textbook written for use in English and Welsh schools in Year 7, which is first year of secondary education in England and Wales.

Another Biology textbook designed for the Zanzibari school syllabus, produced published by OUP (T) and authored jointly by the Ministry of Education and Vocational Training, Zanzibar and South Carolina State University was reviewed only with respect to content.

**Mathematics**

Eight Mathematics books were reviewed, two by each of four reviewers. Four of the books were approved either by TIE or the Ministry of Education and Vocational Training for use with the 2005 Tanzanian syllabus. These were:


Two other Tanzanian textbooks were viewed but not selected to be analyzed systematically using the review tool as they did not appear to offer any innovation or examples of good practice in terms of readability, design or relevance. These were published by Nyambari Nyangwine and Longhorn.

Two of the four books reviewed were from neighbouring countries. This was because we are interested in the relevance of the research to other East African countries. The textbooks reviewed were:


A book written for English as a Second Language (ESL) students in schools in the USA was reviewed.


The last book was written for the Indian context with an explicit social justice agenda to be relevant and meaningful for all children in India, including rural and urban poor.


A more detailed report of the review of the Mathematics textbooks is available on request.

### 5.3 Main findings from review of textbooks

**Readability**

For English, Flesch Kincaid reading scores were around grade 3 to 4 except for the Ujuzi book with a grade level of 7. For the Mathematics textbooks, all except of the Kenyan book and the Macmillan Aidan book, had a readability score between grade 3 and 5. By comparison, our findings from the reading ability test (see chapter 3) suggest that a score of between 2 and 3 would be ideal for textbooks aimed at Form 1. By comparison, analysis of Biology textbooks yielded a native speaker grade equivalence of between 7 for the Longhorn book and English book and 11 for the Ujuzi book. Average sentence length for the sections of text we sampled were between 11 and 16 words for the Tanzanian books. This was much longer than the English textbooks, which with the exception of the Ujuzi book, had average sentence lengths of seven to eight words. The percentage of words which were found to be subject specialist terms was much higher in the Biology books written for Tanzania.
(around 6-9%) than the English book (3%). This analysis gives only a very rough indication of readability but this does suggest that the Biology textbooks aimed at Form 1 students demand a far greater reading proficiency than expectations of the English syllabus. Even given concerns about the reliability of these reading measures for non-native speakers of English (see section 5.3), the findings from our survey of students’ reading ability (see chapter 3.2) suggest that a minority of Form 1 students would be able to read these textbooks.

Only the books written for Tanzania were written for a context in which all students share a dominant language other than English but none of these books in any of the three subjects used Kiswahili to enhance accessibility of the text.

Visuals were used to enhance the text and to explain key concepts. Mathematics textbooks made heavy use of visual representations (diagrams, charts, figures), except the Kenyan book, and worked examples to explain Mathematics concepts. Biology textbooks also used diagrams, which in the local textbooks were mainly drawings. The Biology books published by international publishers Pearson Longman and OUP were by contrast colourful, with colour photographs as well as diagrams, and visuals were much more frequent appearing on every page. The English textbooks and three of the Mathematics books (Educational Books, NCERT and Pearson Longman for Tanzania) used surrounding text to explain a word, although in the Educational Books’ Mathematics textbook definitions for specialised terms involved even more specialist vocabulary. The Pearson Longman Biology textbook used the surrounding text to define specialist terms with much greater frequency than is typical in textbooks designed for native speakers in England. The Pearson Longman Mathematics books for Tanzania and NCERT both had chapter summaries, which repeated all word definitions presented in the chapter, bringing them together in one place.

Tanzanian English textbooks made little use of headings, numbering and no use of bullets to organise content. By contrast, headings and numberings were used frequently in Mathematics and Biology textbooks. Only Biology textbooks made use of bullets. Some of the Mathematics books, most notably NCERT and the Educational Books textbook, also used coloured boxes, lines marking divisions between pages, coloured font or shaded boxes to enhance accessibility or make the page more attractive.

NCERT and the book for ESL students were the only two Mathematics books to have a high number of non-mathematical illustrations, in the form of line drawings. In the ESL book, these supported language acquisition activities (examples are given in section 4.2). In NCERT book, the line drawings supported word problems or stories explaining mathematical concepts. Some drawings seemed to only to serve the purpose of making the book more attractive for young learners (the book is aimed at 11 year olds).
Support for learning concepts in English

English
English textbooks had activities that supported talking, reading and writing in English. Activities that supported talking included dialogue, guided dialogue, talk about a picture and lists of questions. Activities that supported reading included pre- and post-reading open and closed questions. Activities that supported writing provided sentence starters, guiding forms or a list of topics. Activities that supported acquisition of vocabulary involved matching, gap-filling, unscrambling, labelling diagrams or pictures and word lists. All these activities were directed towards acquisition of informal English and not English for academic purposes.

Mathematics
The American ESL book was the only book with an explicit objective of developing language skills and unsurprisingly had the greatest number of activities that supported language development. This did add considerably to the content. In terms of time, we also believed that the language development activities would displace mathematical learning. Nonetheless the book offered some positive examples of how to develop the language needed for Mathematics.

The 2005 Tanzanian syllabus encourages interactive learning and suggests to teachers points where classroom or group discussion could be used. NCERT includes a note to teachers that makes explicit the belief that student talk is integral to the process of learning Mathematics. Instructions as to when to use talk and how were not always explicit within this book but it was easy to see how many of the activities could be used to stimulate small group and classroom talk. Listening activities were not included in our analysis. However, both the Pearson Longman book for Tanzania and the one for ESL students included oral exercises, for which instructions were given to the teacher to read the questions out loud. As well as increasing aural language skills, these would save time writing exercise questions on the blackboard in classrooms with a shortage of textbooks.

Mathematics has its own system of symbols, which have their own grammar, for articulating mathematical concepts and so does not require long written answers. Secondary school Mathematics does include the skill of converting word problems into mathematical expressions and this requires distilling the relevant information from word questions that are rarely more than two or three sentences long. All textbooks modelled grammatical structures used in Mathematics (e.g. use of ‘more than’ and ‘less than’) and the use of mathematical vocabulary (e.g. asking students to identify ‘line segments’ and ‘rays’ on a diagrams). Several books asked students to write out numbers in words in the topic integers as part of teaching about place values. The ESL book was exceptional in asking students to write out full sentences throughout the book, something not usually required in Mathematics and that could divert time from subject teaching.

Biology
Laboratory activities explicitly supported discussion and writing and some end-of-chapter exercises asked students to write. In the Tanzanian textbooks these were nearly always long answer writing exercises. No activities supported reading. A range of activities, including labelling, multiple choice, true/false and matching supported acquisition of subject specialist knowledge. The sections of the Ujuzi book that were reviewed had no activities that supported talking, writing, reading or the learning of vocabulary.
Subject content and cognitive demand

Unsurprisingly, books designed for the Tanzanian context were compatible with the 2005 syllabus in terms of content and level of cognitive demand. Exercises were also of an appropriate level of difficulty. Much of the subject content in Form 1 is also covered in the primary syllabus so that insofar as subject content was concerned they did build on previous learning. However, Mathematics and Biology books offered no support for the language transition and English textbooks were oriented towards acquisition of informal English and not acquisition of language for academic purposes. Also textbooks offered little or no support for the aspiration for interactive teaching and learning within the Tanzanian syllabus. In Mathematics, only the Pearson Longman book was found to make any provision for a range of abilities through offering puzzles at the end of chapters as a form of extension work.

Across subjects, books did show links between sub-topics and the big ideas in the subject. However, there were few examples found of linking between subjects. In Mathematics the exception was the American book for ESL students, which did make explicit links to big ideas in home economics and commerce. Examples were found across books of contextualisation to the ‘everyday Mathematics’ of shopping, symmetry in architecture etc.

Examples were found in the Tanzanian books of activities that develop critical skills such as evaluation, argumentation, synthesis and analysis. In Mathematics, these mainly took the form of exercise questions that are presented as an individual activity. By contrast, the NCERT and the ESL book included cognitively challenging group tasks that encourage collaborative problem-solving skills.

Biology textbooks were found to have a very large amount of content as compared to books designed for native English speakers in the UK or US, which may reflect an overcrowded curriculum.

Socio-cultural and ecological relevance

The two English textbooks that were reviewed with respect to relevance were judged to be relevant and meaningful to Tanzanians in both urban and rural settings. Mathematics books written for the East African context were judged to have content and examples relevant to all Tanzanian students but most did not support students to relate content to their local environment and where they did there was a bias towards urban environments.

The NCERT book, consistent with its social justice agenda, had the most examples of socio-cultural relevance, including an attention to the environment and resources available to children from low income households. So, for example, to draw a circle it is suggested to use a compass or draw around a bangle. Contextualised problems related to travel referred to buses, trains and bicycles but never private cars. References to shopping involved affordable purchases, such as oranges or notebooks. There were also cultural references that take children beyond the limits of their local and home environment. The Greek etymology of ‘Geometry’ and the Arabic etymology of ‘algebra’ were explained, and at one point famous historical figures in Mathematics from India and beyond were named. Finally, designed for eleven year olds, the book was full of illustrations and stories involving children.

The Tanzanian Biology textbooks had attempted to make content relevant to the Tanzanian context with content related to diseases and health issues that are prevalent in Tanzania. The first edition of
the OUP book for Zanzibar featured a red colobus monkey on the cover, a visual reminder of Tanzania’s wide biodiversity (Biologists’ ‘Garden of Eden’). However, less use was made of this inside the cover.

Socio-cultural representation
English textbooks had illustrations to support the texts with numerous representations of people. There tended to be roughly equal numbers of pictures of girls and boys with boys more likely to be playing sports. Men and women were portrayed in family roles. Women appeared as business women (e.g. shopkeeper), doctors or hairdressers. Men were portrayed in a wider variety of occupational roles (shopkeepers, artisans, drivers, policemen, farmers).

The de-contextualised pedagogic approach of the East African Mathematics textbooks meant that human beings, male or female, made no or very few appearances except in the word problems and there were no images of people. By contrast, illustrations with people in them appeared throughout the American and Indian books. The American ESL book appeared to be targeted at older teenagers, with illustrations of roughly equal numbers of teenage boys and girls and men and women in similar roles. The NCERT book had slightly more girls than boys represented in pictures across three chapters but men appeared much more frequently than women. In the text, men and women were defined in relation to children as mothers, fathers, grandmothers and grandfathers.

Only the NCERT Mathematics book named famous mathematicians from history and these were exclusively men, belonging to different religions and coming from different regions of India and one from outside of India. Examples or little stories introducing the Mathematics, frequently had named children doing activities, whose names were representative India’s ethnic diversity. Across all eight books, we found no examples of people portrayed as having a disability.

In Tanzanian Biology textbooks illustrations of people appeared as diagrams representing anatomical features or illustrations effects of disease and other health issues (e.g. an image of a drunken father in the Ujuzi textbook). In the OUP book for Zanzibar colour illustrations of the eye portrayed the irises as blue and no book explained how lack of pigmentation affects eyesight, despite albinism being common and a topical issue in Tanzania.

5.4 Summary of main findings

1. The text in Biology textbooks is not accessible to secondary school students
Textbooks are hard to read if they have long complex sentences, contain many low-frequency general academic words, organisation is not clear, there are few visuals or visuals do not illustrate concepts adequately and they are few activities that support reading.

- Biology textbooks for Form 1 use very difficult language that is inaccessible to native English speakers studying at the secondary level and is certainly inaccessible to all but a very small minority of Tanzanian Form 1 students. In this respect, the textbooks available within Tanzania are not fit for purpose.
- The English and Mathematics textbooks available to Form 1 students in Tanzanian secondary schools are probably readable to very roughly half of Form 1 students.
2. Textbooks do not support a transition in language of instruction
Generally, subject content in Mathematics and Biology built upon or revised subject content from upper primary. The difference then is the change in language of instruction. However, textbooks made no allowance for the fact that their users are not first language speakers of English beyond offering explanations of key terms in English.

- Kiswahili is never used in the textbooks. No translations are offered of academic or subject specialist terms. Specialist terms are explained in English but these explanations are unlikely to be accessible to the majority of Form 1 students. The vocabulary test (see chapter 2) found that Form 1 students, particularly in rural areas, understand very few subject specialist terms.
- Biology and Mathematics textbooks do use visuals well to explain meanings. The locally published Biology textbooks could make more use visuals to break up long complex chunks of text.
- In the Mathematics and Biology textbooks, there are few or no activities that support students to talk, write or read in English. English textbooks focus on developing proficiency in informal English. So nowhere in the curriculum are students offered text-based resources that prepare them to use English for academic purposes.

3. Textbooks do not support interactive learning
An aspiration to interactive learning is a feature of the 2005 Tanzanian syllabus, which interprets interactive learning as involving group and pairwork, discovery activities and discussion. Interactive learning that involves students in exploring and processing ideas through talking, writing and reading in both a language in which they are fluent and the language of instruction is known to support language acquisition. Content of textbooks is generally coincides with the national syllabus but offer few or no activities consistent with the learning processes promoted by the syllabus and consistent with language supportive pedagogy.

4. Content could be more relevant to the Tanzanian context
Textbooks do make attempts to make the content relevant to the Tanzanian context but more is possible. Examples and illustrations could refer more frequently to rural contexts and portray people living with very modest means. The Biology textbooks could make more reference to Tanzania’s rich and diverse ecology.

5. There are gender biases in how adult men and women are portrayed
Despite equal representation of girls and boys, there is a tendency for women to be portrayed in a much narrower range of occupations then men. Men are rarely named (e.g. as authors, scientists) and women are never named.

6. People living with disability are invisible within the textbooks
We did not find examples of people living with disability represented within textbooks and missed opportunities to discuss some of the forms of disability that are most common in Tanzania within the Biology textbooks.
Chapter 6 - Conclusions

There is nothing in our findings to support the use of English as a medium of instruction in lower secondary in Tanzania. The majority of students in our sample are starting Form 1 without the language skills to learn academic subjects through the medium of English. Most were unable to read and extract information from texts that could be read by native speakers in the fourth year of their education. Even when working in groups, they could not read short paragraphs from textbooks designed for Form 1 in Tanzania, they could not construct grammatically correct sentences or write a short story. The use of English was a barrier to drawing on prior subject learning from primary school. It resulted in a preference amongst students for short answer recitation type problems that could be answered through reproducing words or sentences from a text without actually understanding the meaning of those words. English prevented them from engaging in learning activities that involved them in construction of knowledge.

Once they are immersed in English-medium secondary education, these students and their teachers have no resources available that support the acquisition of English for academic purposes. Only one of the Mathematics textbooks and none the Biology textbooks written for the Tanzanian context that we reviewed were written using a level of English that most Form 1 students would be able to read. English textbooks used simpler language but only focused on developing informal language and not the vocabulary and sentence structures that are commonly used in other academic subjects. As a consequence, students mainly engage with pictures and diagrams rather than the impenetrable text within textbooks. The only concession that textbooks made to the fact that they were intended to be read by students, who are mainly not fluent in English, was careful attention to defining terms. However, definitions were themselves not always easy to read or used subject specialist vocabulary.

In the past, one argument in favour of English-medium secondary education has been that textbooks are not available in Kiswahili. However, this resource issue applies equally to English-medium education as currently the textbooks that available for students do not cater for students, who speak English as a second language. Our literature review shows how using a language in which students are not fluent has implications for both pedagogy and teaching and learning resources.

Textbooks are also poorly distributed and about a third of students do not have the opportunity to use a textbook for at least one of the three subjects. Teachers do make use of the textbooks but have a small selection of one to three textbooks to draw upon. A substantial minority of Biology teachers depend on textbooks to develop or refresh their own content knowledge. Most teachers, however, need textbooks to provide ideas and resources for teaching the subject. They want textbooks to present clear ways of introducing a topic, explaining key concepts, to provide a resource of ideas for activities and a ‘question bank’ of exercises they can give to students. At the moment textbooks produced within Tanzania offer few or no ideas for group work and activities that support the aspiration for interactive learning within the syllabus. Yet, around one half of teachers within our survey were looking for ideas and resources that support interactive learning. So whilst most books are compatible with syllabus content they do not support teaching and learning processes promoted within the syllabus. Teachers also care about the quality of illustrations.
Recommendations for textbook design in Tanzania

1. Textbooks designed for the majority of lower secondary students, who have attended primary school should include bilingual content, in the form of:
   - Glossaries on each page translating key words into Kiswahili.
   - Alphabetical vocabulary lists at the end of each book translating academic terms used in the text.
   - Vocabulary lists accompanying discussion and writing activities in English books.
   - Explanations of key concepts and definitions of key words given in Kiswahili as well as English.
   Translation should aim to use the same Kiswahili terms that appear in primary textbooks and are used by upper primary teachers. In some cases, this will be the Kiswahili spelling of an English word. Time and resources needs to be dedicated to developing glossaries and vocabulary lists.

2. Textbooks should only use English at a reading level very roughly equivalent to Grade 2 or 3 on the Flesch Kincaid scale, which is intended to indicate the number of years education a native speaker would need to read the text. Text should use short sentences. As Form 1 students have very little subject specialist vocabulary unnecessary academic and subject specialist terms should be avoided. Students cannot engage with long paragraphs and chunks of text. Break up text through using paragraphs, headings, bullets and pictures. We recommend that textbooks are reviewed by language specialists as well as subject specialists before being authorized for use in Tanzanian secondary schools.

3. Explanations need to be supported by well-designed illustrations that convey meaning. In textbooks targeted at students, time and money needs to be dedicated to creating or obtaining high quality illustrations that are relevant to the Tanzanian context. In subjects, such as Biology, where illustrations are quite complex, books may need to be printed in colour.

4. One textbook is unlikely to meet the diverse needs of teachers and students. There is space in the market for more than one type of textbook. Textbooks aimed at teachers for classroom use and teachers’ guides should offer suggestions for talking, reading and writing activities that develop language skills and are consistent with the aspiration towards interactive learning within the curriculum. Reference books designed for use by students need to communicate key ideas concisely.

5. A substantial minority of Form 1 Science and Mathematics teachers are not trained as Science or Mathematics teachers. Teachers guides need to provide subject-specific pedagogic guidance.

6. Produce books that support the acquisition of English needed for learning across the curriculum and support students to learn concepts in English. This means including activities that encourage students to talk in Kiswahili as well as English in order to process concepts and support formal presentation of ideas in English. English textbooks should include English for academic purposes as well as English for social purposes.

7. Textbooks need to be socio-culturally relevant. This means using examples and illustrations that are recognisable to children from low income households and designing activities that can be completed using resources available in these environments. At the secondary level is also means including examples and illustrations that extend students’ horizons beyond their
local context and the national context of Tanzania. Socio-cultural inclusion means girls and boys are represented as well as Tanzania’s different ethnic and religious groups. The achievements of famous women, as well as men, should be represented in textbooks. The work and achievements of African women and men should be represented alongside those of other leaders in their field from across the world.

**Implications for ongoing LSTT research**

This section focuses on the implications of our findings for the development of the three textbooks.

1. **Designing the Biology textbook** will be the greatest challenge and require the most work, as language typically used in textbooks is well beyond the level that is readable by Form 1 students. We need to look for examples of Biology textbooks from outside of Tanzania that use simple accessible English. Key points to bear in mind are:
   - Avoid subject specialist terms. There seems to be a tradition within Biology teaching of focusing on careful definition of key words but these specialist terms make it harder for students to understand the concepts and processes they are supposed to describe. Can we think of a new way of teaching Biology that focuses on concepts and processes?
   - Use simple language, short sentences and avoid long chunks of texts.
   - Illustrations will need much investment. It is worth collaborating with an international publisher, which may have bank of illustrations that we can use, perhaps with adaptation. OUP may be the best option if it is willing to simplify and increase further the ecological relevance of the Zanzibar book. Copyright is owned by the Ministry of Education and Vocational Training, Zanzibar so this may require a collaboration with MoEVT, Zanzibar.
   - Suggested activities and examples need to take into account the context of schools in Tanzania by (i) referring to local fauna, wildlife and ecologies; and (ii) using only materials that are readily available in the local environment and so do not penalize students in poorly resourced schools.

2. **Mathematics** teachers want textbooks with a good bank of exercises, which may be time-consuming to generate. Is there scope for collaborating with an author, who has already generated a bank of questions? This would free the TIE authors to focus on:
   - Simplifying and contextualizing explanations;
   - Re-contextualising word problems and examples;
   - Creating bilingual content in the form of glossaries, vocabulary list, short explanations and definitions;
   - Supporting the interpretation of word problems but avoid making language development a major focus so as not to divert time from learning Mathematics; and
   - Enhancing access for students from under-resourced schools, for example, by providing templates of a ruler, protractor and circles on the cover as many students may not have their own ruler, compass or protractor.

3. For English, it is important to review the Jamana textbook written by Kadeghe to find out why it is preferred by most teachers and consider how a new publication would offer something different but still important or develop the Jamana book.
   - Include talking activities that develop students’ ability and confidence in constructing English sentences, as seen in Pearson’s *English in Use* book. Ensure activities are relevant to rural and not just urban contexts;
Focus on developing formal academic language that is used across the curriculum as well as social English;
Give careful attention to how students progress from short structured questions to constructing their own sentences and stories; and
Provide vocabulary lists to support exercises and activities.

Implications for further research
The findings suggest that it is important to conduct further research that looks at how the Tanzanian syllabus could do more to support language acquisition. This would focus on two areas. First is the English curriculum addressing the question of how it can be revised to support acquisition of English for academic purposes at secondary level and beyond. The second area is the subject content particularly of Biology and other content-oriented subjects such as Geography and Social Sciences to consider whether the expectations of the syllabuses are reasonable given the low levels of English language proficiency. The evidence in this research, like previous research in secondary schools, suggests that the ambitious subject content of the syllabus is not achievable. An alternative approach to achieving curriculum goals is to use Kiswahili as the language of instruction for lower secondary whilst focusing within the subject of English on developing English for academic purposes. On the basis of evidence from this baseline study, this is a policy change that LSTT researchers strongly support. Planning for such a change, however, should include investment in textbooks that support teaching of English for academic purposes and Kiswahili-medium subject textbooks that also support transition to English.

Textbooks are not available to students and in Lindi this is most acute, where only one school had a class set of Mathematics textbooks and there were no class sets for any other subject. Research into textbook distribution and, in particular, the most effective means to get textbooks into the hands of students is needed.
References


Appendix 1 – Participant Information Sheet

Strengthening Secondary Education in Practice
Language Supportive Teaching and Textbooks in Tanzania

A collaboration between the University of Bristol, University of Dodoma, Aga Khan University (East Africa Campus) and Tanzania Institution of Education

Baseline Study - Information for Schools

April 2013

Purpose of the research

Our previous research shows that most secondary school textbooks in Tanzania are written in English that students in the USA, who speak English as a first language, would find hard to read.

This research will help the Tanzania Institute of Education (TIE) to write of new form 1 textbooks in Biology, Mathematics and English especially designed for students, who are still learning English. If used effectively, the new textbooks will help students to improve their English.

We will also be communicating with teacher educators to encourage them to show trainee teachers how to use the textbooks to improve students’ English and subject knowledge.

What does participation involve?

For students (Form 1 only)

1. We will ask 20 Form 1 students to complete two tests:
   a. a vocabulary test (30 minutes)
   b. An English comprehension test (30 minutes)

2. We will conduct 3 focus group discussions, each with six students and, if possible, an even balance of girls and boys. We will ask the groups to read some pages taken from different textbooks, to talk to us about what they understand from the pages and which pages they found easiest to understand. We will also ask the groups which textbooks they normally use and how they use them. The discussions will last around 45 minutes.

OR

We will ask one group of six students to help us complete a 5 page questionnaire on the textbooks they normally use for Biology, English and Mathematics and how they use them. This will take approximately 30 minutes.

Biology, Mathematics and English teachers

3. We would like to interview the Head of Department for Biology, Mathematics and English to about the textbooks available in your school and the qualifications of teachers in his department. This interview should last about 30 minutes. If any of the head of departments are not available we may talk to the academic master or deputy headteacher.
4. We would like to interview the **Form 1 teacher** for English, Mathematics and about which textbooks they are using and how. Interviews will last about 30 minutes. If the Form 1 teacher is not available, the Head of Department may be able to answer our questions.

**Benefits of research**

By participating in the research you will be helping TIE to design textbooks that are suitable to the language ability of secondary school students.

We will invite just over half of the rural community schools participating in our baseline study to pilot draft chapters. This means that you will be given draft teaching materials for Biology, Mathematics and English, some time between September 2013 and January 2014. Our researchers will guide the Form 1 teachers in how to use these materials. You will also be one of the first schools to receive copies of the complete textbooks when they are available. They are expected to be available in early 2015.

**Your rights within the research**

*Confidentiality*

All data we collect will be treated as confidential. This means that your name and your school’s name will not be mentioned when we report on our research findings. If at any point we collect any data that will not be confidential, we will let the teacher and students know and ask permission separately for the activity.

*Voluntary consent*

Participation in the research is voluntary for both teachers and students. Any teacher or student may withdraw after the research has started and we will destroy any personal data we have collected from that person (e.g. test scores, information about teacher qualifications).

*Sharing the research findings*

We will send your school a short report on the baseline research when we are next in the region.

*Complaints procedure*

If you have any complaints about how this research is conducted you should contact the lead researcher at the University of Dodoma or the lead researcher at the University of Bristol.

**Contact information**
Appendix 2 - Comprehension and Vocabulary Tests

Reading Comprehension
Tafadhali, soma hadithi na jibu maswali.

Story 1
Mother likes cakes. She will prepare a big birthday cake for Amina. Father likes beer. He will buy some for the party. Amina and I like chicken and chips. I will prepare some chips. My brother Abdi will prepare the chicken and buy soft drinks. We shall invite our friends. They will all be happy.

1) Who likes chicken and chips?
☐ Mother
☐ Father
☐ Amina and I
☐ Abdi

2) Who will buy soft drinks?
☐ Mother
☐ Father
☐ Amina and I
☐ Abdi

Story 2
The ten pupils left Marangu Gate at eleven o’clock. They were very excited! They were starting to climb Mount Kilimanjaro! Their guide told them to walk slowly. He told them that they would not reach the top if they walked quickly. They walked through the forest and arrived at Mandara Hut at about three o’clock. They found a hut to sleep in and then they prepared some food. The next day they left at about ten o’clock and walked slowly all day. They reached Horombo Hut at about five o’clock in the evening. They were all very tired. That night it was very cold and they didn’t sleep very well.

Find the best way to complete each sentences

1) The pupils were going …
☐ to Marangu gate
☐ to Kibo hut
☐ to climb Mount Kilimanjaro
☐ to Horombo hut

2) On the first day, the guide told them to work slowly because …
☐ they were tired.
☐ they didn’t have much food.
☐ he was very clever.
☐ they had a long way to go.

3) The route to Mandara …
☐ went through the trees.
☐ had a lot of grass.

4) It took the pupils …
☐ about three hours to get to Mandara Hut.
☐ about four hours to get to the first hut.
Story 3

‘I’ll tell you what happened’ Ngotho went on. ‘First the sun burnt all the land. There was no water and the cattle died. Then the white man came and took the land. But not all of it, at first.’ Then came the First Big War. It was the white man’s war, but we had to fight for them. We had to clear the forest and make roads for them. We helped the British to win the war and we came back tired. We said to each other, “We have helped them. What will they give us in return for our help?” ‘They gave us nothing in return for our help. Instead they took our land.’

My father’s land was taken from him. He died lonely, waiting for the white man to go. But he white man stayed. My father died on the land, working for another man. Now I too work for another man, on the land that used to belong to us.’

7. What did the British do for the Kikuyu?
   ☐ Burn their land
   ☐ Give them their land.
   ☐ Take their land away.
   ☐ Clear the forests.

8. What happened after the First Big War?
   ☐ The British gave the Kikuyu some land.
   ☐ The British took Kikuyu land.
   ☐ The British did nothing.
   ☐ The British made roads.

9. Why did the Kikuyu fight in the First Big war?
   ☐ Because they wanted to.
   ☐ Because the British made them fight.
   ☐ Because they thought they would get their land.
   ☐ Because they wanted to help.

7. Whose land did Ngotho and his father both work on?
   ☐ Their own land.
   ☐ Land taken from them.
   ☐ Land owned by nobody.
   ☐ Land won in the war.
Vocabulary test
DODOSO LA MSAMIATI WA KIINGEREZA

Tungependa kufahamu wanafunzi wa kidato cha kwanza wanafahamu maneno yepi ya Kiingereza. Tunatoa jaribio kwa wanafunzi wa kidato cha kwanza katika shule 20. Taarifa itakayotokana na jaribio hili itatusaidia kutunga vitabu vya kiada vya kidato cha kwanza.

Huhitaji kujitambulisha watatu na jaribio hili ili watifiti na walimu wako wasibaini ni nani alijibu maswali.

Muda ni dakika 30

Jinsia yako (zungushia): K M

Maelezo

Chagua neno linalofaa zaidi kulingana na kila maana. Andika nambari ya neno hilo nyuma ya maana yake. Kwa mfano:

6 end or highest point
3 this moves a car
1 thing made to be like another

1 copy
2 event
3 motor
4 pity
5 profit
6 tip
humans eat this to be healthy
body is made up of millions of these
thing made to be like another
a shape with four equal sides
space inside a figure
take one number away from another
everything around you
this makes you ill
comes into sight
stop
watch carefully
appear or happen
a lot
next
like another
a way of doing something
amount of money to buy something
number under the line in a fraction
make a picture
make smaller
cover a surface

separate into smaller parts
guess the number or size
find the answer

include as a part
take away
make something clear

number that can be divided by two
smaller than
round

a plant grows from this
humans drink this
overview

result
cone-shaped tube
get something

put together
a line that goes up
find out a number

two things

number below zero

the sum of all parts

more than

contains nothing

not curved

does not change

below

increase in number

it lives in soil

a place where two things meet

an insect

set free

tell difference between

clear away dirt

set up

break up into smaller parts

fraction

total

diagram

negative

operation

pair

accurate

between

straight

inside

greater

empty

together

under

constant

added

combined

multiply

giant

junction

grasshopper

bandage

cheetah

earthworm

release

spray

attract

sweep

distinguish

supply

manufacture

interconnect

resemble

decompose
produce

establish

abuse

exact

proportion of something

shape with three sides

odd

triangle

percentage

precise

slope

minus

MWISHO

Asante sana kwa ushirikiano wako katika kufanikisha utafiti huu.
Appendix 3 – Textbook Survey Tools

Biology Teacher Questionnaire

Form 1 school textbook survey

Purpose: The research is designed to ascertain which Form 1 Biology, Mathematics and English textbooks are available and used in schools and how they are used.

Section 1 – Background information on school

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>School name:</td>
<td></td>
</tr>
<tr>
<td>Mobile:</td>
<td>Email:</td>
</tr>
<tr>
<td>District:</td>
<td>Ward:</td>
</tr>
</tbody>
</table>

Description of school location:

<table>
<thead>
<tr>
<th>School type:</th>
<th>Day/boarding:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year school</td>
<td>No. Form 1</td>
</tr>
<tr>
<td>established:</td>
<td>students</td>
</tr>
</tbody>
</table>

Student background (e.g. parents’ occupation, wealth, walking distance to school):
Section 2 – Biology teachers and textbooks

2.1 – **Background information on Biology teachers**

**Biology HoD**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Mobile:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Highest qualification in teaching:</th>
<th>Highest qualification in Science:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject specialisms:</th>
<th>No. of years service:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. of teachers teaching Biology in school:</th>
<th>No of teachers with Biology specialism in school.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Have you had any training that helps with (If yes, please give details):

1. Use of textbooks or other materials?  
   Y / N

2. **teaching students with low levels of English or improving students’ English ability?**  
   Y / N

---

**Form 1 Biology Teacher**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Mobile:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Highest qualification in teaching:</th>
<th>Highest qualification in Science:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject specialisms:</th>
<th>No. of years service:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No of timetabled periods per week:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Have you had any training that helps with (If yes, please give details):

3. Use of textbooks or other materials?  
   Y / N

4. **teaching students with low levels of English or improving students’ English ability?**  
   Y / N
## 2.2 Form 1 Biology textbooks

Which Form 1 Biology textbooks is the Form 1 Biology teacher using?

### Form 1 Biology Book 1

<table>
<thead>
<tr>
<th>Book title:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Author(s):</td>
<td></td>
</tr>
<tr>
<td>Publisher:</td>
<td></td>
</tr>
<tr>
<td>Year published:</td>
<td></td>
</tr>
<tr>
<td>Number of books in school:</td>
<td>Available to students:</td>
</tr>
<tr>
<td>Used by teacher:</td>
<td>Y / N</td>
</tr>
</tbody>
</table>

### How is this book used by Form 1 teacher?

1. Preparing own lesson notes | Y / N
2. Source of notes for writing on board | Y / N
3. Source of exercises/questions to give students to do in class individually | Y / N
4. Source of group activities for students to do in class | Y / N
5. Ideas for practicals | Y / N
6. Set reading for students | Y / N
7. Set homework questions for students | Y / N
8. Other (explain) | Y / N
10. Any other comments on this book? |
### Form 1 Biology Book 2

<table>
<thead>
<tr>
<th>Book title:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Author(s):</td>
<td></td>
</tr>
<tr>
<td>Publisher:</td>
<td></td>
</tr>
<tr>
<td>Year published:</td>
<td></td>
</tr>
<tr>
<td>Number of books in school:</td>
<td>Available to students:</td>
</tr>
<tr>
<td>Used by teacher:</td>
<td>Y / N</td>
</tr>
</tbody>
</table>

#### How is this book used by Form 1 teacher?

1. Preparing own lesson notes | Y / N
2. Source of notes for writing on board | Y / N
3. Source of exercises/questions to give students to do in class individually | Y / N
4. Source of group activities for students to do in class | Y / N
5. Ideas for practicals | Y / N
6. Set reading for students | Y / N
7. Set homework questions for students | Y / N
8. Other (explain) | Y / N


10. Any other comments on this book?

---

55
**Form 1 Biology Book 3**

<table>
<thead>
<tr>
<th>Book title:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Author(s):</td>
<td></td>
</tr>
<tr>
<td>Publisher:</td>
<td>Year published:</td>
</tr>
<tr>
<td>Number of books in school:</td>
<td>Available to students:</td>
</tr>
<tr>
<td>Used by teacher:</td>
<td>Y / N</td>
</tr>
</tbody>
</table>

**How is this book used by Form 1 teacher?**

1. Preparing own lesson notes | Y / N
2. Source of notes for writing on board | Y / N
3. Source of exercises/questions to give students to do in class individually | Y / N
4. Source of group activities for students to do in class | Y / N
5. Ideas for practicals | Y / N
6. Set reading for students | Y / N
7. Set homework questions for students | Y / N
8. Other (explain) | Y / N


10. Any other comments on this book?
**Student Questionnaire**

**Section 5 - Form 1 student questionnaire**

*Textbook availability*

<table>
<thead>
<tr>
<th></th>
<th>Given books</th>
<th>Studt to book ratio</th>
<th>Allowed take home?</th>
<th>Do take home?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Je, umepewa vitabu shuleni katika masoma yafuatayo?</td>
<td>Y / N</td>
<td>:1</td>
<td>Y / N</td>
<td>Y / N</td>
</tr>
<tr>
<td>Je, mnaruhusiwa kwenda na vitabu hivyo nyumbani?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Je, mnaenda na vitabu hivyo numbani?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

|                                |             |                     |                  |              |
| Biolojia? Vitaje               |             |                     |                  |              |
| Kiingereza? Vitaje             |             |                     |                  |              |
| Hisabati? Vitaje               |             |                     |                  |              |

|                                |             |                     |                  |              |
| Je, una kitaba chako mwenyewe (ambacho siyo cha shule) katika masoma yafuatayo? | | | | |
| Biolojia? Vitaje               | Y / N       |                     |                  |              |
| Kiingereza? Vitaje             | Y / N       |                     |                  |              |
| Hisabati? Vitaje               | Y / N       |                     |                  |              |

|                                |             |                     |                  |              |
| Je, shule yako ina maktaba au chumba cha kusomea kitabu? | | | | |
|                                |             |                     |                  |              |
| Je, maktaba ina vitabu vya kiada vya Biolojia/Hisabati/Kiingereza? | | | | |
| B: Y / N                       |             |                     |                  |              |
| H: Y / N                       |             |                     |                  |              |
| K: Y / N                       |             |                     |                  |              |

|                                |             |                     |                  |              |
| Je, mnapata muda wa kusoma vitabu kwenye maktaba? | Y / N       |                     |                  |              |
|                                |             |                     |                  |              |
| Je, mnaruhusiwa kwenda na vitabu vya maktaba darasani? | Y / N       |                     |                  |              |
| Je, mnaruhusiwa kwenda na vitabu vya maktaba nyumbani? | Y / N       |                     |                  |              |
### Vitabu vya Biolojia

**Unatumiaje vitabu vya Biolojia?**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Unavitumia darasani?</td>
<td>Y / N</td>
</tr>
<tr>
<td></td>
<td>Unavitumiaje?</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Unavitumia katika vikundi?</td>
<td>Y / N</td>
</tr>
<tr>
<td>3.</td>
<td>Unavitumia kufanya kazi za nyumbani ulizopewa na mwalimu?</td>
<td>Y / N</td>
</tr>
<tr>
<td>4.</td>
<td>Unavitumia kutegeneza kumbukumba zako mwenyewe?</td>
<td>Y / N</td>
</tr>
<tr>
<td>5.</td>
<td>Unajaribu kujibu mswali yalio katika vitabu hivyo?</td>
<td>Y / N</td>
</tr>
<tr>
<td>6.</td>
<td>Matumizi mengine (eleza)</td>
<td>Y / N</td>
</tr>
</tbody>
</table>

**Kuna machapisho yapi mengine yanoyotumia katika Biolojia?**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kumbukumbu zako mwenyewe</td>
<td>Y / N</td>
</tr>
<tr>
<td></td>
<td>Kumbukumbu za watu wengine</td>
<td>Y / N</td>
</tr>
<tr>
<td></td>
<td>Miongozo kwa ajili ya majaribio (eleza)</td>
<td>Y / N</td>
</tr>
<tr>
<td></td>
<td>Mengine(eleza)</td>
<td>Y / N</td>
</tr>
</tbody>
</table>
Appendix 4 –Textbook Extracts for Teacher and Student Discussion

Facilitator’s Guide

Printing: Only page 3 needs printing in colour.

Pages 2-5 may be printed with print options ‘two pages per sheet’

Equipment: Mobile phone with recorder or voice recorder

1. Introductions, explain participation is voluntary.

2. First, administer the student textbook questionnaire with the students orally, only ask questions about textbooks for the subject that is the focus of this discussion group and note answers down on the questionnaire form.

3. Then hand the group copies of the comprehension tool, explaining that the pages are copied from textbooks and you are interested in how easy it is to understand them. Allow the students time to read.

4. Ask permission to record the conversation.

Questions (to be asked in Swahili)

1. Have you studied this subject in Form 1 or in your primary schools?

2. Can you answer the questions in these pages? Encourage them to talk through how they would answer those questions and whether they know the answers just from reading the pages, or they already knew.

3. Ask which page they prefer and for what reason. Go around the group, making sure that each individual has a chance to talk about the two texts.

Examples of prompts you may use to stimulate the conversation:

i. Which is easier to read?

ii. Which is easier to understand the subject content?

iii. Which questions are easier to answer?

Ask whether they used the English-Swahili glossary and whether it was useful – making sure each individual has an opportunity to comment.
Biology Text 1 (Tanzanian Textbook) THE CARBON CYCLE

Carbon is an important component for life. This is because the bodies of all living things contain carbon.

HOW CARBON GETS INTO THE PLANTS
The air around us consists of carbon dioxide gas. So, carbon occurs in air as a gas. Plants use carbon dioxide from the air to manufacture food, the process is known as photosynthesis. The food produced by plants is carbohydrate with carbon components.

HOW CARBON DIOXIDE GETS INTO ANIMALS
Animals get carbon through the process of feeding. There are animals that eat plants, these are known as herbivores. These animals take carbon directly from plants into their bodies. On the other hand, other animals eat animals, these are known as carnivores. These animals get carbon indirectly because they eat herbivores. In this way carbon from plants gets into the bodies of animals.

HOW CARBON DIOXIDE GETS TO THE AIR
If carbon dioxide could not be returned to the air, we would have no carbon dioxide in the air; if that happened, that could be the end of life on earth. Fortunately, that process doesn’t occur because there are processes through which carbon is returned to the air. These processes are respiration, combustion as well as death and decomposition of living organisms.

- Respiration
  Through the process of respiration, animals and plants give out carbon dioxide which is returned directly to the air

- Combustion
  When living things are burned, carbon dioxide gas is released and this returns directly into the air

- Death and decomposition
  When living things dies their bodies decay and release carbon dioxide gas which returns directly to the air.

---

**CARBON CYCLE**

- Atmospheric Carbon-dioxide
- Respiration & death and decay
- Feeding
- Photosynthesis
- Animals
- Plants
- Respiration
- Death and decay

---
QUESTIONS

1. Name three processes responsible for releasing carbon dioxide into the air
   i. ______________________
   ii. ______________________
   iii. ______________________

2. Animals gets carbon dioxide through:
   (Circle the correct answer)
   a) Respiration
   b) Feeding
   c) Photosynthesis

3. “No carbon in the air, no life” Do you agree? Why?

4. Match items of list A with those of list B by writing the letter of the correct response from list B.

<table>
<thead>
<tr>
<th>LIST A</th>
<th>LIST B</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. The process through which plants get carbon -------</td>
<td>a) Respiration</td>
</tr>
<tr>
<td>II. They get carbon through eating animals-------</td>
<td>b) Carbon cycle</td>
</tr>
<tr>
<td>III. Important components of all living things------</td>
<td>c) Photosynthesis</td>
</tr>
<tr>
<td>IV. The process through which all animals get carbon-------</td>
<td>d) Feeding</td>
</tr>
<tr>
<td>V. The process which returns carbon to the air-------</td>
<td>e) Carbon</td>
</tr>
<tr>
<td></td>
<td>f) Herbivores</td>
</tr>
<tr>
<td></td>
<td>g) Carnivores</td>
</tr>
</tbody>
</table>

Glossary - Farahasa

<table>
<thead>
<tr>
<th>English</th>
<th>Swahili</th>
<th>English</th>
<th>Swahili</th>
</tr>
</thead>
<tbody>
<tr>
<td>bacteria</td>
<td>bakteria</td>
<td>fossilize</td>
<td>Mchakato wa utengenezaji wa masalia ya viumbe wa kale</td>
</tr>
<tr>
<td>carbon</td>
<td>kaboni</td>
<td>fuel</td>
<td>fueli, mfano petroli</td>
</tr>
<tr>
<td>carbon dioxide</td>
<td>kaboni dioxidi, hewa ya ukaa</td>
<td>fungi</td>
<td>Kuvu, mfano uyogo</td>
</tr>
<tr>
<td>combust</td>
<td>unguu</td>
<td>photosynthesis</td>
<td>fotosinthesis, usanisinuru</td>
</tr>
<tr>
<td>combustion</td>
<td>uunguaji</td>
<td>release</td>
<td>achia</td>
</tr>
<tr>
<td>decay</td>
<td>oza</td>
<td>respiration</td>
<td>upumuaji</td>
</tr>
<tr>
<td>fossil</td>
<td>Masalia ya viumbe wa kale</td>
<td></td>
<td></td>
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</tbody>
</table>
Biology Text 2 (from OUP textbook for Zanzibar) - The carbon cycle

Living things are made of proteins, fats and other substances. All of these substances contain carbon. The carbon comes from carbon dioxide in the air.

Living things can take carbon dioxide from the air. They can also add carbon dioxide to the air.

**Taking in carbon dioxide from the air**

Plants take in carbon dioxide from the air. They use carbon dioxide and water from the ground to make food. Sunlight gives energy, and this is called photosynthesis. Animals (herbivores) then get carbon by eating plants. Other animals (carnivores) get carbon by eating herbivores.

**Releasing carbon dioxide into the air**

Carbon dioxide gets into the air in several ways:

a) **Respiration**

- Plants and animals give out carbon dioxide into the atmosphere when they respire.

- When plants and animals die, bacteria and fungi break them down. These bacteria and fungi also respire and release carbon dioxide into the atmosphere.

b) **Combustion**

Combustion means burning. Dead plants and animals decay and slowly fossilize over millions of years. This forms coal, natural gas and oil, which are called fossil fuels. In many countries, we burn them for energy. This also releases carbon dioxide into the air.
English Text 1 - Regular verbs
(Taken from Bakugile, 2007 pp. 12-13)

The past form of these verbs is formed by added – “ed” or “d” to a verb. Observe the following examples below:

<table>
<thead>
<tr>
<th>Base form</th>
<th>Past form</th>
</tr>
</thead>
<tbody>
<tr>
<td>stop</td>
<td>stopped</td>
</tr>
<tr>
<td>crush</td>
<td>crushed</td>
</tr>
<tr>
<td>rush</td>
<td>rushed</td>
</tr>
<tr>
<td>occur</td>
<td>occurred</td>
</tr>
<tr>
<td>knock</td>
<td>knocked</td>
</tr>
<tr>
<td>block</td>
<td>blocked</td>
</tr>
<tr>
<td>injure</td>
<td>injured</td>
</tr>
<tr>
<td>discover</td>
<td>discovered</td>
</tr>
</tbody>
</table>

NB: When a verb ends in a single vowel followed by the letters d, g, m, p, r, t; those letters are doubled. E.g. Stop – stopped, occur – occurred

Look at the following sentences.
1. I just stopped to watch people who were fighting.
2. My face was almost crushed.
3. The accident occurred when I was on my way home from school.
4. I stopped in order to watch the dogs fighting.
5. The lorry knocked Mwajuma down.
6. The traffic police stopped other lorries and cars.
7. The lorry injured Mwajuma badly.

Exercise 1
Change the verbs in brackets into the Simple Past Tense in each of the following sentences.
1. Last year, Taifa Stars (play) against Senegal.
2. Motomoto Vijana Group (dance) ‘Sindimba’ very well on the form four graduation day.

Exercise 2
Construct five sentences using regular verbs.

Example: I opened the door before I left yesterday.

Writing practice
Exercise 3
From your own experience, write a story of an accident which you have witnessed.
Past times

**Introduction**  How long ago?

Work in a small group. Discuss your answers to these questions.

1 Which of the things in the picture do you think is the oldest? Discuss with your partner the order in which they appeared.

2 Work out how long ago each of the dates on the top row were and write them in your exercise book.

<table>
<thead>
<tr>
<th>Date</th>
<th>3000 BC</th>
<th>1000 BC</th>
<th>AD 500</th>
<th>AD 1600</th>
<th>1970</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of years ago</td>
<td>5000 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 Do you know when these things happened?
   a The Pyramids were built in Egypt.
   b Husuni Kubwa palace was built on the island of Kilwa.
   c Europeans arrived in Africa.
   d The independence of your country.

4 Talk about important dates in the history of your country.

**Language practice**  Past events (1)

1 Look at these sentences:
   1 We killed a snake yesterday.
   2 We started secondary school two weeks ago.
   3 During the holidays I worked on my uncle's farm.

2 What do all these verbs have in common? They are all talking about things in the past and they all use the past simple form of the verb. How many examples of this past verb form can you find in this paragraph? Write a list.

**My first day at school**
On the first day of term I felt very nervous. I arrived early, but I didn't know where to go, and nobody took any notice of me.

Suddenly, a big boy came and asked me if I was a new boy. When I told him that I was, he asked me to follow him and he showed me where to go.
Mathematics Text 1  
(Taken from book published by Educational Books, 2009 pp. 214-216)

3. A football field is 105 m long and 70 m wide. Find its perimeter.

4. A rectangular table top measures 20 dm by 15 dm. Find its perimeter.
10.2 Perimeter

Look at the following figures (Fig. 10.1). You can make them with a wire or a string.

If you start from the point S in each case and move along the line segments then you again reach the point S. You have made a complete round of the shape in each case (a), (b) & (c). The distance covered is equal to the length of the wire used to draw the figure.

This distance is known as the perimeter of the closed figure.

The idea of perimeter is widely used in our daily life.

- A farmer who wants to fence his field.
- An engineer who plans to build a compound wall on all sides of a property.
- A person preparing a track to conduct sports.

All these people use the idea of ‘perimeter’.

**Perimeter is the distance covered along the boundary of a figure when you go round the figure once.**

---

**Glossary – Farahasa**

<table>
<thead>
<tr>
<th>English</th>
<th>Swahili</th>
</tr>
</thead>
<tbody>
<tr>
<td>closed figure</td>
<td>mchoro uliofungwa</td>
</tr>
<tr>
<td>figure</td>
<td>umbo</td>
</tr>
<tr>
<td>measure</td>
<td>pima</td>
</tr>
<tr>
<td>perimeter</td>
<td>mzingo</td>
</tr>
<tr>
<td>segment</td>
<td>kipanda cha mstari</td>
</tr>
<tr>
<td>sum</td>
<td>jumla</td>
</tr>
</tbody>
</table>
1. Measure and write the length of the four sides of the top of your study table.
   
   \[
   \begin{align*}
   AB &= \underline{\phantom{0}} \text{ cm} \\
   BC &= \underline{\phantom{0}} \text{ cm} \\
   CD &= \underline{\phantom{0}} \text{ cm} \\
   DA &= \underline{\phantom{0}} \text{ cm} \\
   \end{align*}
   \]
   
   Now, the sum of the lengths of the four sides
   
   \[
   = AB + BC + CD + DA
   \]
   
   \[
   = \underline{\phantom{0}} \text{ cm} + \underline{\phantom{0}} \text{ cm} + \underline{\phantom{0}} \text{ cm} + \underline{\phantom{0}} \text{ cm}
   \]
   
   = \underline{\phantom{0}} \text{ cm}
   
   What is the perimeter?

4. Find the perimeter of the following figures:

   (a) \[
   \begin{align*}
   \text{Perimeter} &= AB + BC + CD + DA \\
   &= \underline{\phantom{0}} + \underline{\phantom{0}} + \underline{\phantom{0}} + \underline{\phantom{0}} + \underline{\phantom{0}} \\
   &= \underline{\phantom{0}}
   \end{align*}
   \]

   (d) \[
   \begin{align*}
   \text{Perimeter} &= AB + BC + CD + DE + EF + FA \\
   &= \underline{\phantom{0}} + \underline{\phantom{0}} + \underline{\phantom{0}} + \underline{\phantom{0}} + \underline{\phantom{0}} + \underline{\phantom{0}} \\
   &= \underline{\phantom{0}}
   \end{align*}
   \]

So, how will you find the perimeter of any closed figure made up entirely of line segments? Simply find the sum of the lengths of all the sides (which are line segments).
Appendix 5 – Textbook Review Tool

This document is designed to support review of English textbooks.

Findings of the review should be presented at the editors’ workshop in the first week of July. This presentation should focus on the main research question for the review.

What are the features of this textbook that could be applied in the Form 1 Biology textbook which we are writing?

The question is asked with respect to the following characteristics:

6. Readability of the text for a Tanzanian Form 1 student;
7. How the text supports students to improve their written and spoken English;
8. Subject content and cognitive demand of the text is appropriate to Form 1;
9. Socio-cultural and ecological relevance of the text to Tanzanian secondary school students;
10. Gendered representation of girls, boys, men and women in the text.

This tool is divided into 5 sections relating to the 5 characteristics above.

Guidance for conducting analysis to answer questions relating to language in sections 1 and 2 are provided in two appendices.

SECTION 0 – BOOK DETAILS

0.1 Name of Reviewer(s):
0.2 Textbook details:

Title:

Author(s):

Publisher:

Year of publication:

Place of publication:

Notes on context for which textbook is written (country context? Bilingual education? Elite/comprehensive education?)
SECTION 1 – Readability of the text

The purpose of this section is to gain an idea of how easy/difficult a typical Tanzanian learner will find it to use a given textbook. You will need to assess both the textbook as a whole and a selected passage within it.

Answer questions 1.1 - 1.4 with reference to a selected passage. Answer questions 1.5 – 1.16 with reference to the whole textbook. Choose the selected passage according to the following criteria.

- It should be the main text for one sub-topic
- It should be readable in one lesson (usually this is one double page spread)
- It should be limited in length to two textbook pages or less
- It should be typical of the textbook as a whole in terms of its general characteristics, i.e.:
  - the presence/absence of academic and subject-specific words
  - the use of signals of organisation, e.g. headings, numbering, paragraphing, highlighting key terms
  - organisation of the book as a whole – contents, glossary, index etc.
  - the number and type of visuals accompanying the text
  - the presence or absence of any accompanying activities

Details on how to do this analysis are given in Appendix A

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Selected passage</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pages selected:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chapter topics selected:</td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>How long is the selected passage in words?</td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>What is the average sentence length?</td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>What is the readability level of the text?</td>
<td></td>
</tr>
<tr>
<td>1.4</td>
<td>What percentage of the words are ‘academic’ words?</td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>If relevant², What percentage of the words are subject-specific terms?</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Whole text</strong></td>
<td></td>
</tr>
<tr>
<td>1.6</td>
<td>Are the meanings of some of the key subject-specific (or if not relevant², academic) words conveyed:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Page numbers of selected text</td>
<td>Ratio of occurrences to pages, e.g. 22/34 (22 occurrences in 34 pages)</td>
</tr>
<tr>
<td></td>
<td>• by visuals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• by giving the meaning in L1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• by the surrounding text</td>
<td></td>
</tr>
</tbody>
</table>

² May not be relevant for some English texts
### SECTION 2 – support to improve their written and spoken English

The purpose of this section is assess how the book supports the students to improve their level of written and spoken English. The analysis should be for the whole text. Further details are given in Appendix B.

<table>
<thead>
<tr>
<th>2.1</th>
<th>Are there any activities which ask learners to talk?</th>
<th>Page numbers of selected chapters</th>
<th>Ratio of talking activities to pages, e.g. 8/25 (8 activities in 25 pages)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2</td>
<td>Are there any activities which ask learners to write?</td>
<td>Page numbers of selected chapters</td>
<td>Ratio of writing activities to pages, e.g. 8/25 (8 activities in 25 pages)</td>
</tr>
<tr>
<td>2.3</td>
<td>Do these writing activities require long or short answers?</td>
<td>Page numbers of selected chapters</td>
<td>Number of short- and long-answer activities</td>
</tr>
<tr>
<td>2.4</td>
<td>Are there any support activities which help the learner to read the text?</td>
<td>Page numbers of selected chapters</td>
<td>Ratio of reading support activities to pages, e.g. 8/25 (8 activities in 25 pages)</td>
</tr>
</tbody>
</table>

Types of reading support activity:
| 2.5  | Are there any support activities which help the learner to talk? | Page numbers of selected chapters | Ratio of talking support activities to pages, e.g. 8/25 (8 activities in 25 pages) | Types of talking support activity: |
| 2.6  | Are there any support activities which help the learner to write? e.g. activities that assist learners to acquire important grammatical structures (e.g. practice use of “so that”; Composition)? | Page numbers of selected chapters | Ratio of writing support activities to pages, e.g. 8/25 (8 activities in 25 pages) | Types of writing support activity: |
| 2.7  | Comment on whether reading & writing activities support acquisition of informal (conversational) or formal English (as used in academic textbooks for other subjects)? | | | |

**SECTION 3 - Subject content and cognitive development**

| 3.1  | Is the subject content suitable for Form 1? | |
| 3.2  | Are links made between sub-topics and the big ideas with the subject? | |
| 3.3  | Are links made to big ideas in other subjects? | |
| 3.4  | Are links made to previous learning (at primary level)? | |
| 3.5  | Is the content compatible with the Form 1 syllabus? | |
| 3.6  | Is level of detail compatible with expectations of the Form 1 syllabus | |
| 3.7  | Are there activities that support the development of critical thinking skills? E.g. inquiry argumentation, analysis, synthesis, evaluation | Count |
### SECTION 4 – Socio-cultural and ecological relevance

**4.1** Is the language content taught relevant to:

(a) use of English within Tanzania?
(b) use of English internationally, including on the internet?
(c) use of English within other curriculum subjects?

**4.2** Are the examples used to illustrate subject content meaningful and relevant to:

(a) use of English within Tanzania?
(b) use of English internationally, including on the internet?
(c) use of English within other curriculum subjects?

**4.3** Do the exercises/activities support students to develop English for:

(a) informal social purposes?
(b) use internationally, including on the internet?
(c) academic purposes?

### SECTION 5 - Gender and equality analysis

**5.1** What gender biases can you detect in the text?

What roles are girls, boys, men and women given when they appear in the text?

When are ‘he’, ‘she’, ‘his’ and ‘hers’ used?

<table>
<thead>
<tr>
<th>Girls:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Boys:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Men:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Women:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Question</td>
<td>No of women</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>5.2</td>
<td>Are men and women in the field named in the text (e.g. historical figures, subject experts, authors)?</td>
<td></td>
</tr>
<tr>
<td>5.3</td>
<td>How are girls, boys, men and women represented in images?</td>
<td>Girls:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Boys:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Men:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Women:</td>
</tr>
<tr>
<td>5.5a</td>
<td>Are individuals with disabilities represented in the text or images?</td>
<td>Y / N</td>
</tr>
<tr>
<td>5.4 b</td>
<td>What kinds of disabilities are represented and how many times?</td>
<td>Kind of Disability</td>
</tr>
<tr>
<td>5.4 c</td>
<td>What roles or tasks are they performing?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How many times are they portrayed as active (doing something) or passive (having something done to them)?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>5.4 d</td>
<td>Pick out examples of images or sections of text that illustrate any trends you identify</td>
<td></td>
</tr>
<tr>
<td>5.5a</td>
<td>Does the book represent individuals suffering from infections that commonly occur in Tanzania or the country for which the book is written?</td>
<td>Y / N If Y then list the diseases covered then go to 5.5b</td>
</tr>
<tr>
<td>5.5 b</td>
<td>Are any of these infections stigmatized in society? If so does representation of the people with the infections tend to reinforce or challenge stigmatization?</td>
<td>Pick out examples of images or sections of text that illustrates any trends you identify</td>
</tr>
</tbody>
</table>