Student Performance in National Examinations:
the dynamics of language in school achievement

SPINE WORKING PAPERS № 2
REPORT for STUDY 5.1

Investigating the Language Factor in School Examinations:
Exploratory Studies

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Acknowledgements

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EXECUTIVE SUMMARY

1. Aims

Study 5.1 is the first in a series of four studies. Exploratory in design, the aim of this study was to investigate whether achievement in formal Form II Examinations may be inhibited through language factors.

The data from this study (and Studies 5.2 and 5.3) will provide the basis for the design and implementation of the final study, 5.4, which will comprise examination items that provide 'best' opportunities for students to show how much they know in each of the core curricula subjects (Mathematics, Chemistry, Biology), as opposed to what they do not know, and to limit any obfuscating language barriers that affect students' ability to access examination items in these specialist subjects.

I. Research design

i) Preliminaries

During a week long workshop with the Zanzibar research team in Bristol, together with subject specialists (Science: Dr Sibel Erduran; Mathematics: Professor Rosalind Sutherland and Jan Winter) specific examination items from past papers were selected in order to attempt to identify the nature of the difficulty of the items for test takers and in particular the extent to which these difficulties might be linguistically or subject knowledge oriented. Selection decisions of examination items were based on a number of variables that included:

- nature of context provided: context reduced, context embedded
- linguistic complexity of instructions
- linguistic complexity of 'task'
- visual presentation of items – with diagrams, tables, etc
- range of types of questions: e.g. multiple choice, open ended, explaining, matching items

In addition, on the basis of this analysis, the construct base was developed for the interviews and interview questions for students were prepared and agreed.

ii) Design: Phase 1 – Original Examination Items

This study focused on four subjects: English, Mathematics, Biology and Chemistry.

Study 5.1 took place as planned:

- in June – August 2008
- in a total of 8 schools – on Unguja, Tumbatu, Pemba
- 6 targeted learners in Form II classes per school took the *original items*
- these 6 learners were then interviewed – one student interviewed by 2 researchers to ensure both content coverage and use of Kiswahili and English
- all targeted learner interviews were audio recorded
- a total number of between 48 students took part in Phase 1.

In summary, the procedure for Study 5.1 involved the administration of selected examination items from past papers (original items) to 6 targeted learners in each of the research schools, followed by individual interviews with each.

iii) Design: Phase 2 – Modified Examination Items

From the interviews with the students on the *original items*, a host of different factors emerged as proving problematic and being potentially inhibiting to student examination performance (see Section 6 below). It was therefore decided to select a few of the original items that were found to be particularly challenging for the students, or 'interesting' in some way, and to explore further the specific difficulties through two Targeted Learner (*henceforth TL*) Workshops. In addition, since the analysis of student performance revealed that some students had a very poor command of English vocabulary, an English vocabulary test was administered.

Targeted Learner Workshops

- These took place in January 2009 – one on Pemba and one on Unguja
- The workshops were video recorded and some audio recording during small group learner discussions took place
- Each targeted learner who attended the workshops received the *Oxford English Dictionary* in recognition of their contributions to the research study.

II. Findings

i) Findings for Original Examination Items:

- There were significant differences in the achievement of students across the different school subjects (see Report, Table 4.2).
- Student achievement was found to be lowest in Mathematics, as compared to English, Chemistry and Biology (see Report, Tables 4.1 and Figure 4.1).
- Students achieved highest scores in English, with a very wide range of English ability evidenced (see Report, Figure 4.6).
- There was a significant difference between Reading Comprehension Passage 1 (RC1) and Reading Comprehension Passage 2 (RC2). RC2 appears to be more demanding – this is in line with the intentions of the examination setters/moderators (source: Interview Data with Examination Personnel)
- A separate analysis of the length of the two Reading Comprehension Passages revealed significant divergence in passage word length, ranging from 122 – 323 words for RC1 and between 396 and 1798 words for RC2.
- In the English exam, RC1 was easier and possibly less challenging than the other three sections (RC2, Structure and Writing (see Report, Table 4.6).
- There was a strong relationship between English achievement – evidenced by the English original items test and the vocabulary test – and performance in the other subjects (see Report, Tables 4.7 and 4.8).

ii) Findings for Modified Examination Items:

- **Performance levels:**
- There was an overall increase in student response rates for the modified tasks in all subjects (Mathematics, Biology and Chemistry) and a decrease in the percentage of wrong answers, as compared to the original tasks.
- There was a correspondence between the learners' ability to translate the modified Mathematics items correctly into Kiswahili and their ability to provide correct or partially

correct answers. In other words, learners who experienced difficulties translating items also did not perform well on them;, either giving incorrect or no responses at all (see Report, Sections 5.2, 5.3 and 5.4).

- A strong relationship between student performance levels on the English and the receptive vocabulary tests was observed, with evidence of the key role of English language proficiency in examination achievement in all three subjects: Chemistry, Biology and Mathematics (see Report, Section 4.2.3).

- **Linguistic difficulties:**
- Across all subjects (Mathematics, Biology and Chemistry) learners demonstrated significant difficulties in the interpretation and understanding of content and other more general words (see Report, Sections 5.2.2(ii) and 5.3.1 (iii)).
- Across all subjects (Mathematics, Biology and Chemistry) learners demonstrated difficulties in constructing sentences to communicate their answers (see Report, Sections 5.2.2(ii) and 5.3.1 (iii)).

- **Subject specific (conceptual) difficulties:**
- In mathematics specifically, it was observed that some of the learners demonstrated applying the correct method to the problem but with some errors in the process, probably due to a lack of conceptual understanding of the ideas, rather than linguistic factors. (see Report, Section 5.2.3).

- **Manipulations with the task structure:**
- It was revealed that changing the structure of questions sometimes could affect the performance on these questions, for example, modifying question from being open ended to multiple choice in Biology, could reduce the number of correct answers (see Report, Section 5.3.2(iv)).
- Adding visuals to a question, alongside linguistic simplification of instructions and questions resulted in more students answering a question and getting it partially or wholly correct across all subjects. (see Report, Sections 5.2.1, 5.2.2, 5.3.1, 5.3.2, 5.4.1).

- **Modifications: supporting performance or exposing "conceptual" gaps:**
- In Chemistry, there was evidence that modified items helped learners to show what they know as they either provided responses or provided better responses to the tasks as compared to the original items. On other occasions, however, the modified items exposed learners to showing lack of their understanding of the concept being assessed. (see Report, Section 5.4.1).

- **Vocabulary difficulties:**
- There was evidence of students experiencing significant lexis related difficulties in respect of: (a) technical subject-specific language: these are words that carry specific meanings in science contexts; (b) everyday/non-technical language use in a subject specific way, (c) correctly decoding (i.e. reading) lexical items given in the test, and (d) everyday high frequency vocabulary (See report, Section 6).

iii) Other factors inhibiting student examination performance (from student interviews)

The focus of Study 5.1 was on language factors affecting student performance in examinations. Whilst the analysis of the data suggest that there are issues inherent within the examinations that affect student performance on the examinations, there are also several other 'external' factors which also inhibit student performance. The extent to which these external factors may be more significant than

those pertaining to language is unclear. They do however present a threat to students achieving their potential and raise issues of test reliability and validity.

III. Conclusions

The main conclusions we draw from Study 5.1 are as follows:

1. Students **do** experience language problems in processing examination questions and producing responses (as evidenced by their performance on the original, modified items and through interview).

2. There appears to be a strong relationship between student performance levels on the English and the receptive vocabulary tests with evidence of the key role of English language proficiency in examination performance in all three subjects: Chemistry, Biology and Mathematics.

3. Restructuring and modifying (e.g. use of visuals, context, simplifying the wording of items, changing layout of items.) the original examination items generally impacted positively on student performance. Specifically, we observed an increase in:

   - overall student response rates to the examination questions
   - the number of correct or partially correct responses to the examination questions

   We also gained insights into some of the learning that **had** taken place which was not evidenced through the original examination items

4. There is evidence to suggest significant threats to test reliability and validity, i.e. when students have first to struggle with the construct of 'English language' in order to access the constructs of Mathematics, Biology and Chemistry.

5. Several other factors other than language appear to inhibit student learning and, ultimately, the ability of Form II students to achieve their potential in their Form II examinations.

Studies 5.2 and 5.3 will explore these findings in more depth in an attempt to investigate the extent of the "language" difficulties experienced by students. These studies, to be conducted in November 2009, are summarised in the Report, Section 7.2.

1. INTRODUCTION

1.1 Aims of Study 5.1

Study 5.1 is the first of a series of five studies that have as their overall aim:

- *In what ways may learners be disadvantaged by having to demonstrate their subject knowledge and learning through examinations in a language other than their home language?*

These studies are detailed in *Appendix 1.1*. Studies 5.1 to 5.3 are exploratory, with the aim of investigating whether student achievement in formal Form II Examinations is inhibited through language factors. The data from these 3 studies will provide the basis for the design and implementation of the final study, 5.4, which will comprise items that provide 'best' opportunities for learners to show how much they know in each of the core curricula subjects – as opposed to what they do not know - and to overcome any barriers of language that are evidenced. These items will be developed through workshops with the involvement of key Examination Personnel (e.g. Setters, Moderators) and aim to provide exemplars of 'best practice' in terms of examination tasks.

1.2 Overview of SPINE Studies

The data from studies 5.1 – 5.4 are augmented from findings from other SPINE research studies, see SPINE Research Overview Diagram in *Appendix 1.2*.

1.3 Research Outcomes

The long-term goals/outcomes for Study 5 are as follows:

- *Develop innovative examination components with exemplars trialled for Science, Chemistry and Biology, Mathematics and English as a second language congruent with quality classroom practice.*

Linked to this study but identified as an output for Study 3:

- *Guidance for the development and implementation (including rating and moderation processes) of contextually and instructionally appropriate examinations in the support of effective and valid examining practices, congruent with quality classroom practice to maximise positive test consequences.*

2. RESEARCH DESIGN OF STUDY 5.1

2.1 Preliminaries

During a week long workshop with the Zanzibar research team in Bristol, together with subject specialists (Science: Dr Sibel Erduran; Mathematics: Professor Rosalind Sutherland and Jan Winter) specific examination items from past papers were selected in order to attempt to tease out potential difficulties of the items for test takers and in particular the extent to which these difficulties might be linguistically or subject knowledge oriented. Selection decisions were based on a number of variables that included:

- nature of context provided: context reduced, context embedded
- linguistic complexity of instructions
- linguistic complexity of 'task'
- visual presentation of items – with diagrams, tables, etc.

- range of types of questions: e.g. multiple choice, open ended, explanations, matching items.

On the basis of these decisions, the construct base was developed for the interviews and indicative interview questions for learners were prepared and agreed (*Appendix 2.1*).

2.2 Design: Study 5.1 Original Items

(i) Items were selected – as detailed above - for the following subjects:

- English (as a subject)
- Physics (but see below)
- Chemistry
- Biology
- Mathematics

The original design focused on one Science subject only but at the request of the Zanzibar Research team all three science subjects were included. In the event, it did not prove feasible to investigate all three science subjects, and Physics was dropped. The original exam questions selected for Study 5.1 appear as *Appendix 2.2*.

(ii) Study 5.1 Phase 1 took place as planned:

- in June – August 2008
- in a total of 8 schools – on Unguja, Tumbatu, Pemba
- 6 targeted learners in Form II classes per school took the *original items*
- these 6 learners were then interviewed – one student interviewed by 2 researchers to ensure both content coverage and use of Kiswahili and English
- all targeted learner interviews were audio recorded
- a total number of between 48 learners took part in Phase 1.

In summary, the procedure for Study 5.1 involved the administration of selected examination items from past papers to 6 targeted learners in each of the research schools, followed by individual interviews with each (see *Appendix 2.3*).

2.3 Design: Study 5.1 Modified Examination Items

(i) From the interviews with the learners on the *original items*, a host of different factors emerged as proving problematic and being potentially inhibiting to student examination performance (see Section 6 below). It was therefore decided to select a few of the original items that were found to be particularly challenging for the learners, or 'interesting' in some way, and to explore further the specific difficulties through two Targeted Learner (*henceforth TL*) Workshops. In addition, since the analysis of student performance revealed that some learners had a very poor command of English vocabulary, an English vocabulary test was administered.

(ii) Targeted Learner Workshops – Phase 2

- these took place in January 2009 – one on Pemba and one on Unguja
- the selected items for these workshops appear as *Appendix 2.4*
- these workshops were video recorded and some audio recording during small group learner discussions took place
- each targeted learner who attended the workshops received the Oxford English Dictionary in recognition of their contributions to the research study.

Having provided an overview of the design of the studies, the way we analysed the data is described next.

3. ANALYSES OF EXAMINATION ITEMS

3.1 Study 5.1 Original Examination Items

Spread sheets were developed aggregating the following data from the *original examination items* for English, Mathematics, Biology and Chemistry:

- the original test items/questions
- TLs' responses to these test items;
- TLs' comments on some of the items;
- marks given by the subject specialists on the TLs performances, and
- comments by the subject specialists on the learners' performances and the nature/content of the test items.

See *Appendix 3.1* for an example of how the data archive is organised.

3.2 Modified Items

Spread sheets were developed for the *modified* Mathematics, Biology and Chemistry test items **–** worked on during the TL Workshops and contain the following information:

- original test items which were used for developing modified test items;
- TLs' responses to these original test items;
- marks given by the subject specialists on the TLs' performances on the original test items;
- TLs' responses to the modified test items;
- marks given by the subject specialists on the TLs performances on these modified test items.

See *Appendix 3.2* for an example of how the data archive is organised.

4. RESULTS

This section presents the findings for Study 5.1 Phase 1, i.e. the administration of the original items. We first present an overview of TL performance across the 4 subjects (**4.1**) and then identify the performance by subject in **4.2**.

4.1 Total Test Scores: all subjects

The overall TL performance across the 4 school subjects is summarised in Table 4.1 and Figure 4.1 below.

Table 4.1 Total scores (%) - original items

	Valid N	Minimum	Maximum	Mean	Std Deviation
Chemistry test	46	.0	64.0	26.9	15.3
Biology test	46	.0	58.0	22.1	15.9
Mathematics test	45	.0	67.0	14.1	17.7
English test	45	2.4	95.2	43.2	27.0

Note: max. score for each test was converted to 100

From Table 4.1, we observe the highest mean score for English and the lowest for Mathematics. It is noted that 1 student scored zero in Chemistry, 4 in Biology, and 19 learners (i.e. 42.2%) in Mathematics, which further confirms that Mathematics has the lowest mean score. The finding of the lowest performance reported in Mathematics is also corroborated by data collected from Exam Personnel in Study 3 who assert that learners, overall, perform poorly in Mathematics. Furthermore, there was a very wide spread of scores for English ranging from 2.4 to 95.2, compared with Biology ranging from 0 to 58. English has the biggest standard deviation than other subjects, which suggests that the learners' English language abilities vary more widely than their abilities in other subjects. It is also important to point out that overall the mean score for each subject is very low. For example, we observe a mean of only 14 (out of 100) for Mathematics but the highest mean score for English is only 43 (out of 100) We should take into consideration, therefore, this wider context when interpreting the variability and the mean differences in scores across the four subjects. Further information about the learners' performance in the four subjects is reported through the histograms and frequency tables below.

Figure 4.1 Mean score of student performance in original items in four subjects
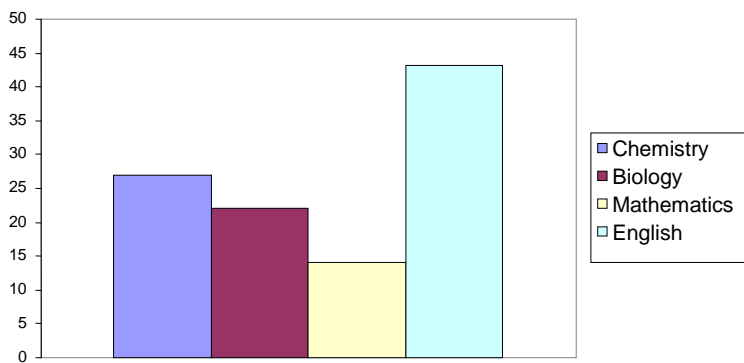
Student performance in original items in four subjects

A paired samples test of significance was computed to examine the mean differences in student performance between subjects. As shown in Table 4.2 below, the differences between subjects are all statistically significant: between Chemistry and Biology (t=2.58, p.<0.05), between Chemistry and math (t=6.39, p.<0.001), between Chemistry and English (t=-6.46, p.<0.001), between Biology and Mathematics (t=3.26, p.<0.005), between Biology and English (t=-8.15, p.<0.001), between Mathematics and English (t=-9.55, p.<0.001). The differences between English and other subjects are particularly significant (p.<0.001).

Table 4.2 Differences in student performance across school subjects

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Chemistry - Biology	4.85	12.76	1.881	1.059	8.636	2.577	45	.013
Pair 2	Chemistry - math	12.73	13.22	1.992	8.709	16.745	6.388	43	.000
Pair 3	Chemistry - English	-17.21	17.66	2.663	-22.576	-11.837	-6.463	43	.000
Pair 4	Biology - math	8.39	17.04	2.569	3.205	13.568	3.264	43	.002
Pair 5	Biology - English	-20.93	17.04	2.569	-26.116	-15.753	-8.148	43	.000
Pair 6	math - English	-29.67	20.37	3.107	-35.944	-23.405	-9.552	42	.000

Figure 4.2 below visually represents each student's performance in the four subjects. (N.B: not all learners took all four tests; the sample size is indicated against each table/figure below).

Figure 4.2 Individual student performance in the four subjects
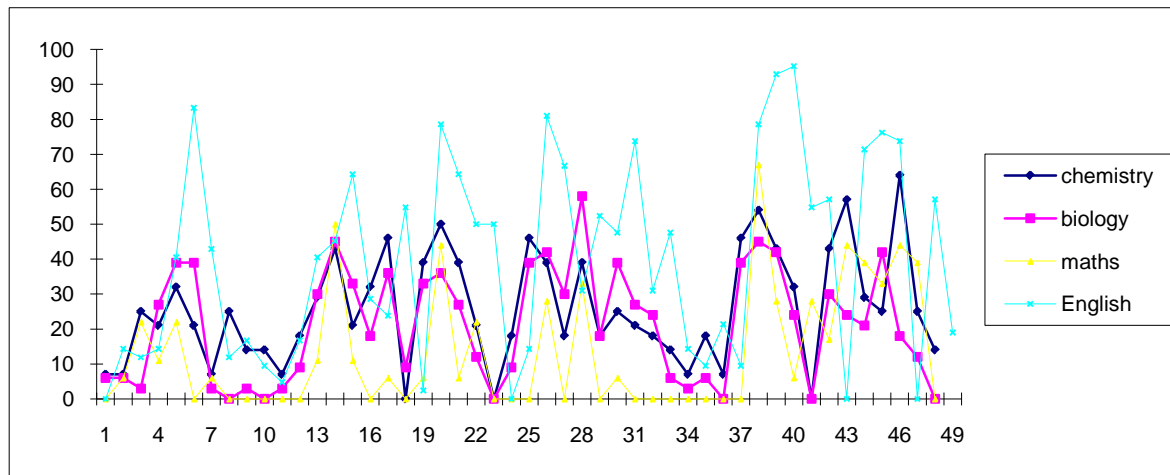
Note: x axes = student ID; N = 48

As can be seen from Figure 4.2, the majority of the learners consistently obtained the highest scores in English, with the lowest in Mathematics. Information about the frequency of the learners' performance in each subject is presented in Figures 4.3 – 4.6 and Tables 4.3 - 4.6 below.

Figure 4.3 Distribution of scores – Mathematics

Mean = 14.111
Std. Dev. = 17.687
N = 45
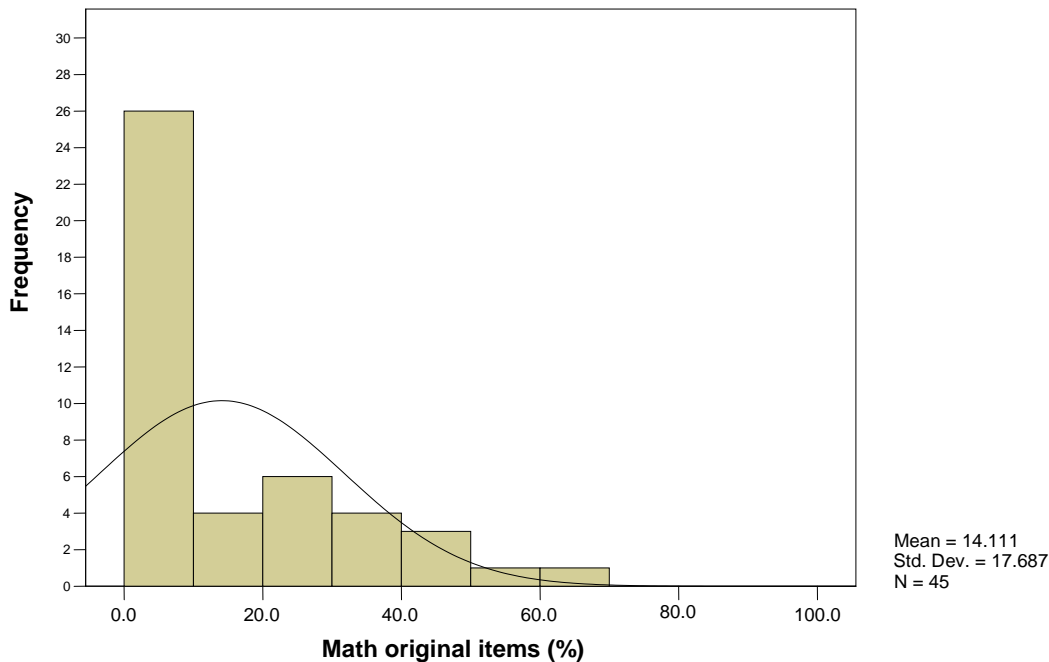
Table 4.3 Frequency of student performance in Mathematics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	19	39.6	42.2	42.2
	6.0	7	14.6	15.6	57.8
	11.0	3	6.3	6.7	64.4
	17.0	1	2.1	2.2	66.7
	22.0	3	6.3	6.7	73.3
	28.0	3	6.3	6.7	80.0
	33.0	2	4.2	4.4	84.4
	39.0	2	4.2	4.4	88.9
	44.0	3	6.3	6.7	95.6
	50.0	1	2.1	2.2	97.8
	67.0	1	2.1	2.2	100.0
	Total	45	93.8	100.0	
Missing	System	3	6.3		
Total		48	100.0		

For the Mathematics test, we observe a mean score of 14.1 and a standard deviation of 17.7 (see also Table 4.1). Twenty-six learners got less than 10% correct (19 got zero, and 7 scored 6 out 100), only 1 student scored just above 60%. In other words, if for example 50% were considered as "a pass", only 2 learners would have passed this Mathematics test.

In respect of performance in Chemistry (Figure 4.4) and Biology (Figure 4.5), we note higher mean scores of 26.9% and 22% respectively, and the difference between Biology and Chemistry is also significant (see Table 4.2).

Figure 4.4 Distribution of scores – Chemistry

Mean = 26.913
Std. Dev. = 15.2954
N = 46
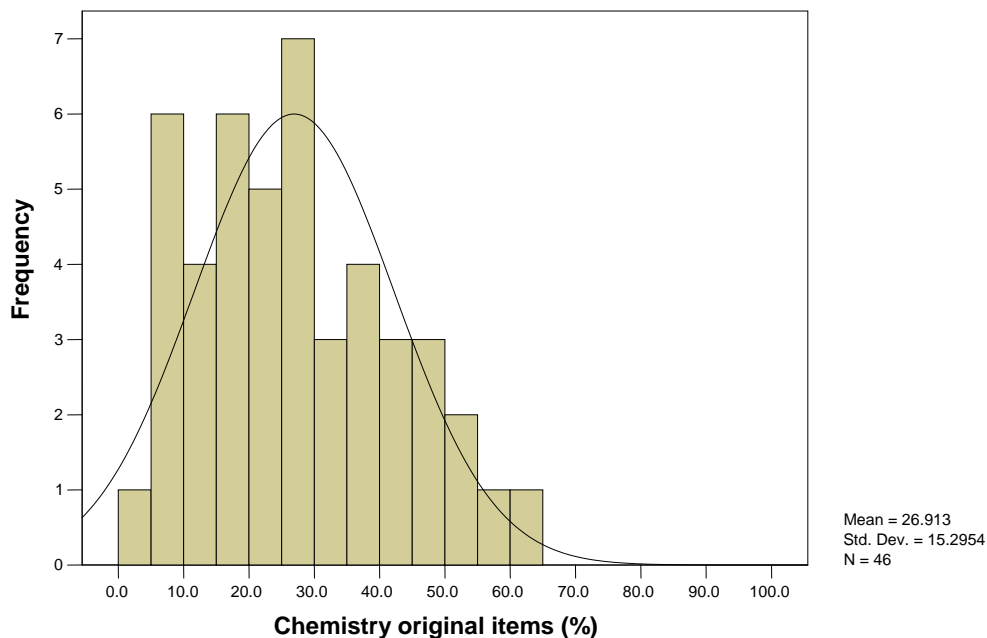
Table 4.4 Frequency of student performance in Chemistry

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	1	2.1	2.2	2.2
	7.0	6	12.5	13.0	15.2
	14.0	4	8.3	8.7	23.9
	18.0	6	12.5	13.0	37.0
	21.0	5	10.4	10.9	47.8
	25.0	5	10.4	10.9	58.7
	29.0	2	4.2	4.3	63.0
	32.0	3	6.3	6.5	69.6
	39.0	4	8.3	8.7	78.3
	43.0	3	6.3	6.5	84.8
	46.0	3	6.3	6.5	91.3
	50.0	1	2.1	2.2	93.5
	54.0	1	2.1	2.2	95.7
	57.0	1	2.1	2.2	97.8
	64.0	1	2.1	2.2	100.0
	Total	46	95.8	100.0	
Missing	System	2	4.2		
Total		48	100.0		

As shown in Table 4.4, in the Chemistry test, only 41.3% (i.e. n=19) of the learners have scores above the mean of 26.9%, and only 4 learners achieved a score of 50% or above.

Figure 4.5 and Table 4.5 below presents the learners' performance in the Biology test.

Figure 4.5 Distribution of scores – Biology

Mean = 22.065
Std. Dev. = 15.9393
N = 46
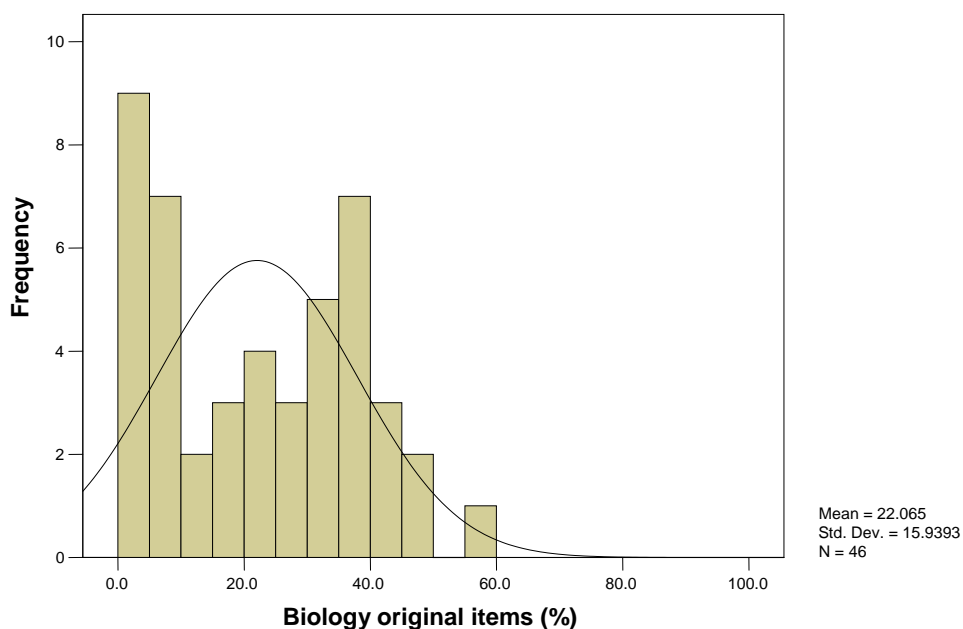
Table 4.5 Frequency of student performance in Biology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	4	8.3	8.7	8.7
	3.0	5	10.4	10.9	19.6
	6.0	4	8.3	8.7	28.3
	9.0	3	6.3	6.5	34.8
	12.0	2	4.2	4.3	39.1
	18.0	3	6.3	6.5	45.7
	21.0	1	2.1	2.2	47.8
	24.0	3	6.3	6.5	54.3
	27.0	3	6.3	6.5	60.9
	30.0	3	6.3	6.5	67.4
	33.0	2	4.2	4.3	71.7
	36.0	2	4.2	4.3	76.1
	39.0	5	10.4	10.9	87.0
	42.0	3	6.3	6.5	93.5
	45.0	2	4.2	4.3	97.8
	58.0	1	2.1	2.2	100.0
	Total	46	95.8	100.0	
Missing	System	2	4.2		
Total		48	100.0		

Four learners scored zero in the Biology test, and only 1 student scored above 50% out a maximum of 100%.

A summary of the learners' overall performance for each test is presented in Figure 4.6. It presents the frequency of each score/band for each subject, i.e., 0-5%, 5-10%, up to 95-100% (see also Figure 4.2 which reports on each individual student's performance in the four subjects). As can be seen from Figure 4.6, the largest number of learners whose scores fall within the band of 0-5% is observed in Mathematics, followed by Biology and Chemistry, whilst no learners scored zero in the English test. The English test scores also distributed more evenly across the different score bands than Mathematics, Biology and Chemistry scores. Scores higher than 70% were only achieved in English, while in the other subjects they were all below 70%.

Figure 4.6 Comparison of score distributions across the four subjects
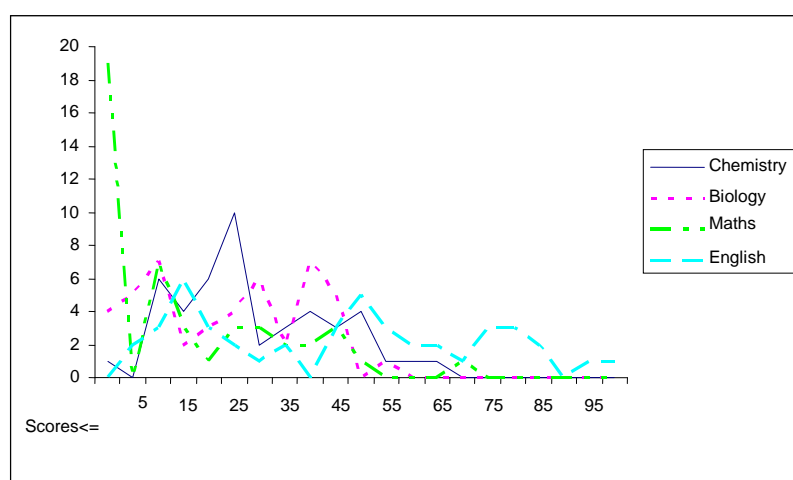
Further information about the English measures is presented next.

4.2 English

4.2.1 The English Examination: original items

The role of the English examination is different in this research from that of the other core subject examinations. The main aim for requiring learners to sit an English exam was:

(i) to capture evidence about the English language proficiency of the targeted Form II learners and to develop insights into the relationships between the learners' English language ability and their performance in other subjects (i.e. Mathematics, Biology and Chemistry) and

(ii) to identify particular difficulties that the TL faced in answering the English paper.

The analysis of the English examination papers also relates to a secondary aim of the research in relation to the quality of the English examination papers and will feed into the design of innovative items in Study 5.4 (see *Appendix 4.1*).

4.2.2 TL Performance on original items: total and sub-test scores

There were 3 main components to the English test administered, with a total of 4 items (9 questions) spread over: RC1 and RC2, Structure, and Writing (see *Appendix 2.2*). We converted the raw sub-scores for each section and the total raw scores into percentages (that is, a maximum score of 100%), in order to compare the learners' performance across the different sub-tests. The frequency tables for the sub-tests on the English paper are provided in *Appendix 4.2*. Table 4.5a below presents the learners' overall performance in the English test.

Table 4.5a: Student performance in the English test (across 8 schools)

	N	Minimum	Maximum	Mean	Std. Deviation
Total of RC1	45	.0	100.0	50.19	25.282
Total of RC2	45	.0	93.3	39.26	30.292
Total of RC 1 & 2	45	.0	96.3	44.12	25.815
Structure	45	.0	100.0	42.22	35.183
Writing	45	.0	100.0	40.95	33.169
Total of English Test	45	2.4	95.2	43.23	26.971

When excluding data from two schools whose students have greater exposure to English, we noticed that the mean scores for all sections of the English test for the remaining 6 schools were much lower, as shown in Table 4.5b below.

Table 4.5b: Student performance in the English test (across 6 schools)

	N	Minimum	Maximum	Mean	Std. Deviation
Total of RC1	35	.0	91.7	45.952	24.3688
Total of RC2	35	.0	93.3	30.857	26.0761
Total of RC 1 & 2	35	.0	88.9	37.566	22.6563
Structure	35	.0	87.5	34.286	32.9805
Writing	35	.0	100.0	33.469	31.1722
Total of English Test	35	2.4	83.3	36.259	24.2335

We may note, however, that the wide range observed in the English scores in Table 4.1 remains fairly stable.

The comparison of student performance in the different sections of the test across the 8 schools is presented in Table 4.6 below. When excluding data from the same schools from the analysis, we notice a similar pattern of results as observed in Table 4.6.

**Table 4.6 Comparison of student performance in the different sections of the English test**

		Mean	Std. Deviation	Paired Differences Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	RC1 - RC2	10.93	22.718	3.387	4.101	17.751	3.226	44	.002
Pair 2	RC - Structure	7.96	25.358	3.780	.345	15.581	2.107	44	.041
Pair 3	RC1 - Writing	9.23	26.246	3.913	1.348	17.118	2.360	44	.023
Pair 4	RC2 - Structure	-2.96	24.936	3.717	-10.455	4.529	-.797	44	.430
Pair 5	RC2 - Writing	-1.69	20.679	3.083	-7.906	4.520	-.549	44	.586
Pair 6	Structure - Writing	1.27	20.893	3.115	-5.007	7.547	.408	44	.685

As shown in Table 4.5, the learners received lower scores in RC2 than in RC1. We also observe from Table 4.6 above a significant difference between the two Reading Comprehension passages (mean difference = 10.93, t=3.23, p.<0.005). This difference reflects the aim expressed by examination personnel that RC2 should be of a higher level of difficulty than RC1. In addition, the differences in the learners' performance between RC1 and Structure (t=2.1, p.<0.05), between RC1 and Writing (t=2.36, p.<0.05) are also significant. However, the differences between RC2 and Structure, RC2 and Writing, between Structure and Writing, are not. It appears that RC2, Structure, and Writing are equally challenging for the learners.

4.2.3 Student Vocabulary Knowledge and Exam Performance

Data from the pilot studies revealed frequent student comments about 'not understanding the words'. For example, in some cases learners reported not knowing the majority of the content words of the English Reading Comprehension passages. The interviews with the TL in connection with the original test items revealed similar difficulties with vocabulary (see Section 6). Across all the subjects, learners reported difficulty in understanding words or phrases in the instruction rubrics for the examination items as well as within the test items themselves. When learners were asked to provide synonyms or to provide Kiswahili equivalents, they often failed to do so. In addition, words which learners reported 'knowing' were also investigated and it became clear that for some of the learners the meanings they attributed to a word or phrase were also incorrect. For these reasons, although not part of the original research design, it was decided to probe further whether the hypothesis – that learners were inhibited from answering the Form II examinations through low levels of vocabulary – was valid. This is discussed below.

For the TL Workshops, therefore, sections from Nation's Vocabulary Level Tests (*Appendix 4.3*) were administered (general vocabulary, 1000, 2000, 3000, academic list) to the 31 learners who attended these workshops in January 2009, with findings as follows.

Figure 4.7 Student performances in the vocabulary level test
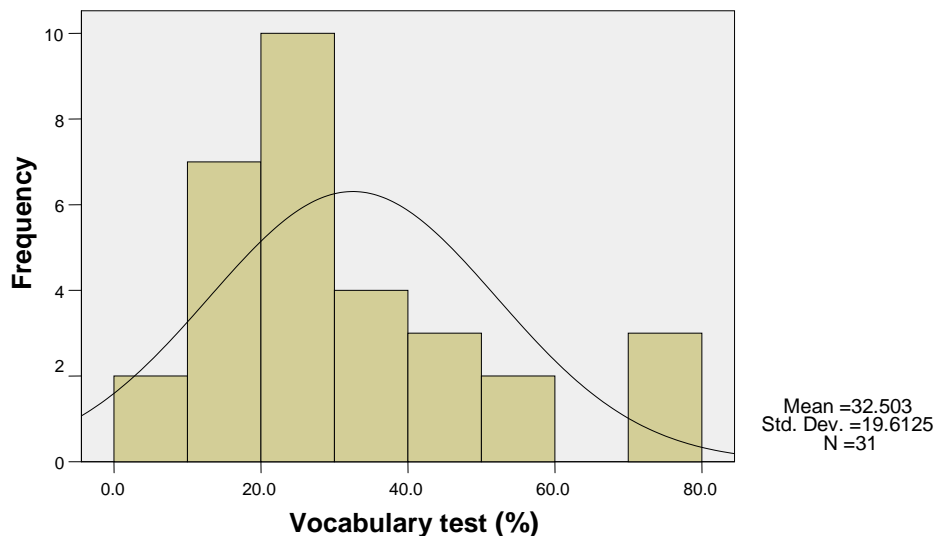
Among these 31 learners, a significant correlation between their English test performance and the vocabulary levels test was observed ($r=0.798$, $p.<0.01$). Several simple regression analyses were conducted to understand how English language abilities - as measured by the vocabulary levels test (Tables 4.7a and 4.7b) and the English test using the original Form II items - affected the learners' performance in other subjects (Tables 4.8a and 4.8b).

Table 4.7a Student performance in other subjects and vocabulary levels test (by 8 schools)

Model	Dependent	R	R square	df	F	sig.
1	Chemistry	0.704	0.495	1, 29	28.47	.000
2	Biology	0.531	0.282	1, 29	11.38	.002
3	Mathematics	0.742	0.551	1, 28	34.32	.000

Note: Predictors: (constant), vocabulary levels test performance

Table 4.7b Student performance in other subjects and vocabulary levels test (by 6 schools)

Model	Dependent	R	R square	df	F	sig.
1	Chemistry	0.510	0.260	1, 23	8.09	.009
2	Biology	0.455	0.207	1, 23	6.00	.022
3	Mathematics	0.461	0.212	1, 23	6.20	.020

Note: Predictors: (constant), vocabulary levels test performance

Table 4.8a Student performance in English and other subjects (by 8 schools)

Model	Dependent	R	R square	df	F	sig.
1	Chemistry	0.812	0.660	1, 42	81.46	.000
2	Biology	0.807	0.651	1, 42	78.44	.000
3	Mathematics	0.648	0.420	1, 41	29.69	.000

Note: Predictors: (constant), English test performance

Table 4.8b Student performance in English and other subjects (by 6 schools)

Model	Dependent	R	R square	df	F	sig.
1	Chemistry	0.795	0.631	1, 33	56.51	.000
2	Biology	0.828	0.686	1, 33	71.99	.000
3	Mathematics	0.480	0.231	1, 32	9.60	.004

Note: Predictors: (constant), English test performance

As shown in Tables 4.7 and 4.8 above, there are strong correlations between the learners English language abilities and their performance in other subjects. The learners' performance in the vocabulary levels test can predict around 28% of their Biology performance, 50% of Chemistry performance and 55% of Mathematics performance (Table 4.7a). Their performance in the English test using some original Form II items can predict 42% of the learners' performance in Mathematics test, 65% in Biology and 66% in Chemistry (Table 4.8a). We are aware that there are two schools in our data that have greater, or potentially greater, exposure to English exposure than our other target schools, we therefore also analysed the data excluding these two schools (see Tables 4.7b and 4.8b). In excluding the two schools, the most noticeable change is in the Mathematics model (3), r=0.648 to r=0.48. Overall, we can say that the general patterns of the effects of English language ability on performance in other subjects remain more or less the same, whether or not the two schools with greater English exposure are included in the analysis. Such effects, however, seem to become less prominent in all subjects but Biology (model 2 in Table 4.8b) when the data from these two schools are excluded from the analyses. In other words, the power of English language ability in predicting performance in Mathematics, Chemistry and Biology seemed to be weaker in the data of six schools (Tables 4.7b, 4.8b), possibly explained by variability in the English language proficiency levels of the students in the six schools as opposed to a more homogeneous levels of English language proficiency in the two schools with greater exposure to English. However, this finding should not be over-interpreted because the students' overall performance across all the schools was poor: there might be some kind of "floor effect" for poorer performing schools in terms of the effects of English language ability on the examination results in the other subjects.

4.3 Summary

The central findings that arise from this analysis of the original examination items and the vocabulary tests are that:

- Student achievement is lowest in Mathematics, as compared to English, Chemistry and Biology (Tables 4.1 and Figure 4.1)
- There are significant differences in the achievement of learners across the different school subjects (Table 4.2)
- Learners achieved highest scores in English, but with a very wide range of English ability evidenced (Figure 4.6).
- There was a significant difference between RC1 and RC2 with the RC2 being the more demanding.
- RC2, Structure and Writing were found to be equally challenging for learners (Table 4.6)
- There is a strong correlation between English achievement – evidenced by the English original items test and the vocabulary test – and performance in the other subjects (Tables 4.7 and 4.8).

5. TARGETED LEARNER WORKSHOPS

5.1 Introduction

It will be recalled (2.3) that following student performance on the original exam items, further probing on the specific difficulties faced by learners was conducted. The exam items for these workshops were those that had proved to be particularly problematic for most learners. We present the findings from this second round of investigations below.

5.2 Modified items for the Mathematics workshop

For Mathematics, two tasks were selected to be modified to investigate further whether the difficulties expressed by learners could be explained by reasons of 'language' or by 'other' factors. These items together with the ways in which they were modified, and the rationale for their modifications, are presented in *Appendix 5.1*.

5.2.1 The results: modified item – Mathematics question 6

Table 5.1 below summarises the performance of the learners in one of the TL Workshops on the original Mathematics Word Problem (item 6 – see opposite) alongside their results on the modified item. The results are provided for 26 TLs.

Table 5.1: TLs' performance on original Mathematics test item (Q6) and modified versions (N=26)

	ORIGINAL TASK	MODIFIED TASK2a	MODIFIED TASK2b	MODIFIED TASK2c	MODIFIED TASK2d	MODIFIED TASK2e
Wrong answer	38% (10)	73% (19)	62% (16)	58% (15)	This task was to translate the item into L1	35% (9)
Partially correct answer	8% (2)	0% (0)	4% (1)	19% (5)		15% (4)
Correct answer	8% (2)	15% (4)	15% (4)	15% (4)		12% (3)
No answer	38% (10)	12% (3)	19% (5)	8% (2)		0% (0)
Not present	8% (2)	0% (0)	0% (0)	0% (0)		38% (10)

The results are presented visually in Figure 5.1 below.

Figure 5.1: TLs' performance on original Mathematics test item (Q6) and modified versions (N=26)
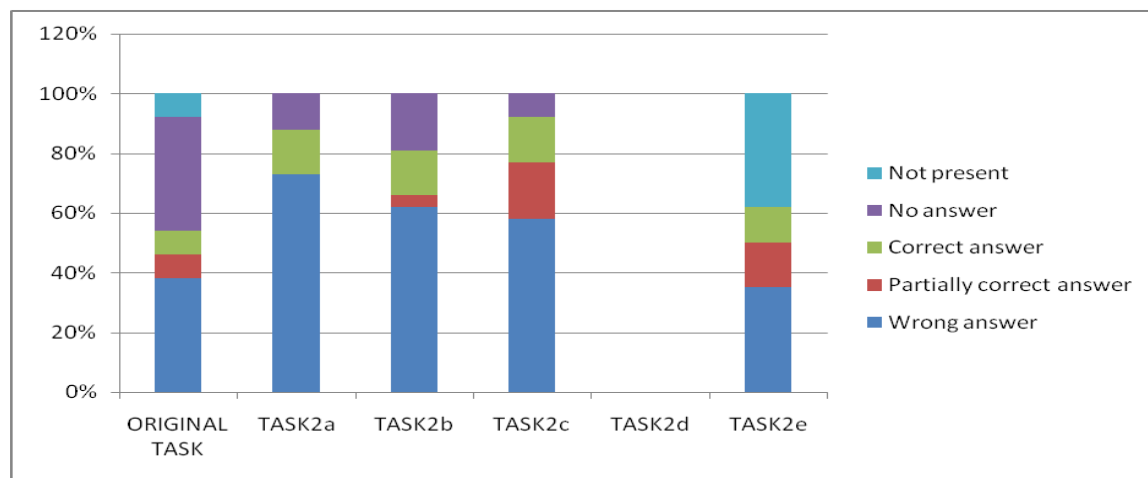
Below, we compare the TL responses to the original items with those on the modified tasks. We also analyse some of the typical errors that the learners made in the original items.

(i) Overall performance on modified Mathematics items

The modification of the original exam questions resulted in:

- an overall increase in student response rates. In the original task, 38% of learners did not attempt an answer. By way of contrast, the modified tasks achieved a much higher overall response rate from the learners: the percentage of those who did not answer the questions fell significantly, as follows:

MATHEMATICS

Question 6: The combined ages of Juma and Asha are 10 years. The difference of Asha's age from twice Juma's age is 8 years. Find the ages of each one.

_____

_____

_____

_____

_____

_____

_____

_____

	ORIGINAL TASK	MODIFIED TASK2a	MODIFIED TASK2b	MODIFIED TASK2c	MODIFIED TASK2e
Response rate	58%	88%	81%	92%	100%
No answer	42%	12%	19%	8%	0%

- a decrease in the percentage of wrong answers was also observed from parts 2a to 2b and 2c (with prompts) (See table 5.1). In 2c (prompts with words): 34 % of learners achieved either partially correct or correct answers, with only 8% of learners providing no answer.

Conjecture: The modified items used the same language as the original item (aside from part 2e), but included prompts (on cards). The improvements observed might, therefore, be attributed to the process of transformation of the statement into the system of equations. In other words, the difficulties faced by the learners in the original items may be more about the Mathematics and the mathematical language.

(ii) Linguistic modification of the Mathematics task

As shown in *page 14*, the final part of the modified task was in Kiswahili (part 2e) – requiring learners to provide a direct translation of the original item into Kiswahili. We observe in student responses:

- an improvement in response rate on the Kiswahili version: all attempted this task (2e), whereas 42% of learners did not attempt the original item.
- 44% of learners gave either a correct or partially correct answers to task 2e as compared with only 17% on the original task.

Conjecture: It is not clear whether this represents a 'language' effect as Task 2e was the final part of the modified item and, thus, there may have been a 'practice effect'. On the other hand, it might be the case that providing the question in Kiswahili allowed more learners to access and answer the question and thus, provided an effective support.

(iii) Learner performance on translation Mathematics task (from L2 into L1)

- All three learners who gave the correct answers to the modified versions of the task gave a correct translation of the task. This finding may be seen as evidence of the fact that these learners had no difficulties with either language of the task nor its mathematical load;
- three out of seven learners who either got the wrong answers or did not respond to any/some parts were able to provide a partially correct translation. This finding may be seen as evidence of the fact that these learners had partial lack of L2 knowledge and, perhaps, a lack of Mathematics knowledge needed to solve the problem.

(iv) Learner errors in Mathematics original question 6

An analysis of the errors learners made in answering the original item revealed that some learners were:

- trying to do something with the numbers in the statement without setting up equations, e.g.
    - $10 - 2 = 8$
    - *Juma's age is 8 years* –reading just one part of the text
- setting up wrong equations (particularly the second equation), e.g.
    - $2x + y = 8$ instead of $2x - y = 8$
- making errors in the solution of the system of equations, e.g.
    - Change of sign $+/-$

(v) Key findings for Mathematics question 6 and modified versions

The main findings from this analysis are as follows:

- an overall increase in student response rates
- a decrease in the percentage of wrong answers from parts 2a to 2b and 2c (with prompts);
- a general improvement in response rate on the Kiswahili version of the task: 44% of learners gave either a correct or partially correct answers to this task as compared with only 17% on the original task
- a relationship between the learners' ability to translate the task correctly into the L1 and their ability to solve it correctly/partially correctly. Learners who experienced difficulties translating the task also did not perform well on it: providing either wrong responses or no responses at all.

5.2.2 The results: modified item – Mathematics question 7

The TLs' performance on the original test item (item 7 – see opposite) and on its modified version is summarised below in Table 5.2.

Table 5.2: TLs' performance on original Mathematics test item (Q7) and modified versions (N=10)

	ORIGINAL TASK	MODIFIED TASK1a	MODIFIED TASK1b	MODIFIED TASK1c
Wrong answer	70% (7)	60% (6)	50% (5)	60% (6)
Partially correct answer	0% (0)	30% (3)	40% (4)	40% (4)
Correct answer	0% (0)	10% (1)	0% (0)	0% (0)
No answer	30% (3)	0% (0)	10% (1)	0% (0)

The results are presented visually in Figure 5.2 below.

Figure 5.2: TLs' performance on original test item (Q7) and modified versions (N=10)
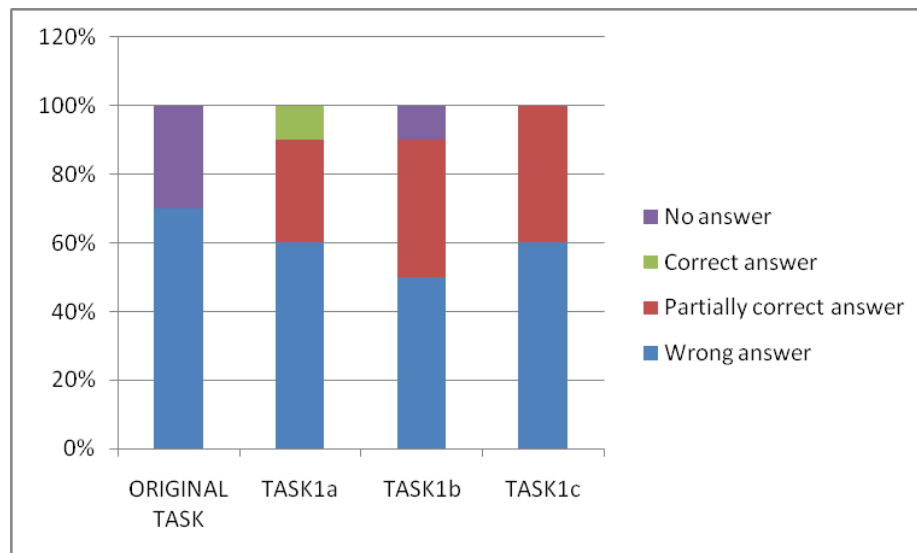
Below, we compare the TL responses and also analyse some of the typical errors that the learners made in the original items.

MATHEMATICS

Question 7: The table below shows the age group of children in a class.

Age	10	11	12	13	14	15
F	3	2	5	4	2	4

Use the table to find out:

i) The number of children below 14 years

_____

_____

_____

_____

ii) The % of children who are 12 years old in a class

_____

_____

_____

_____

(i) Overall performance on modified Mathematics items

The findings from this investigation were as follows:

- Modified Task 1a: all learners attempted the task, with 10% correct answers, 30% partially correct, 60% wrong answers;
- On the original item, there were no correct answers at all and 30% of the learners did not attempt the item at all. By way of contrast, all modified tasks acheive some correct or partially correct answers and only a very small percentage of learners did not attempt the question at all.
- Modified Tasks 1b and 1c accounted for the largest number of partially correct answers – 40%, but no fully correct answers.

(ii) Linguistic modification of the Mathematics task

Linguistic accommodations were made for this item and would appear to have impacted significantly on the way in which learners processed the item, as follows:

- The change in the formulation of the task – i.e. by changing the word 'below' to 'under'/ 'younger') made a big difference in terms of student interpretation of the task. In the original task the word *'below 14 years'* (refer to the age where the item is) was interpreted in 3 different ways:
    - includes the 14 year olds (3+2+5+4+2=16)
    - cells on the left of the cell containing 14 (10,11,12,13)
    - cell below the cell containing 14 (which says 2)

- In the modified task only one student made the same mistake in interpreting this item.

(iii) Learner performance on translation Mathematics task (from L2 into L1)

Part (a) of the task
- All six learners who got the correct answer for part (a) (first part of the original question 7) were able to give the translation, whether fully or partially correct.
- Three out of four who got the task wrong in part (a) did not provide the translation at all. This suggests that the learners could not perform the task because they did not understand the instruction/task requirements in the first place.
- One learner out of four who got the task wrong in part (a) could however provide a correct translation. This finding suggests that this learner could not perform the task clearly not because he/she did not understand the instruction (which he/she did understand), but because of inadequate relevant subject (mathematical) knowledge to solve the task.

Part (b) of the task
- One out of five learners who got the correct answer to part (b) was able to give the correct translation. The rest of the learners, i.e. four, got the task partially correct. This finding suggests that these four learners lacked mathematical knowledge rather than difficulties with understanding the language of the task.
- Four out of five learners who either did not respond to part (a), (b) and (c) or got the wrong answer, could not provide the translation at all. This finding suggests that the learners could not perform the task because they did not understand the instruction in the first place, i.e. that the English language presented an initial hurdle in the processing of this item.

(iv) Learner errors in Mathematics original question 7

As indicated above, student responses to the instruction 'below 14 years' varied in three different ways:
- includes the 14 year olds (3+2+5+4+2=16);
- cells on the left of the cell containing 14 (10,11,12,13);
- cell below the cell containing 14 (2).

In addition, the data suggest that learners try to do calculations:
- with the available numbers (related to 14) without understanding what they are asked to do:
  - adding cells 14 + 2=16
- with available numbers (no relation to 14):
  - adding 10+11+12+13+14+15.

(v) key findings for Mathematics question 7 and modified versions

The findings overall for Mathematics item 7 are summarised as follows:

- increase in student response rates
- the accuracy of student responses increased with the simplified item: with all learners getting some parts either correct or partially correct answers and only a very small percentage left the item blank (this contrasts with the original task: no correct answers (0%) and 30% did not respond at all)
- a correlation between the learners' ability to translate the task correctly into L1 and their ability to solve it either correctly or partially correctly. Learners who experienced difficulties translating the task experienced difficulties providing either wrong responses or no responses at all.

5.2.3 Summary of findings for Mathematics

The student errors presented in sections 5.1.2 and 5.2.2 are typical of the errors made, and can be classified as:

- doing some calculations with the numbers/expressions in the statement without really understanding what they are asked to do.
- remembering the correct method and applying it but with some errors in the process – due to a lack of conceptual understanding of the ideas and therefore it is difficult to just remember the correct method to 'answer the question'
- (mis-)interpretation of particular words in the text (see also Section 6).

A similar investigation was carried out for two of the original Biology items. This is reported next.

5.3 Modified items for the Biology workshop

For Biology, two tasks were selected to be modified to investigate further whether the difficulties could be explained by reasons of 'language' or by 'other' factors. These items together with the ways in which they were modified, and the rationale for their modifications, are presented in *Appendix 5.2*.

5.3.1 The results: modified item – Biology question 3

Table 5.3 below summarises the performance of the learners in one of the TL Workshops on the original Biology task (item 3 – see opposite) alongside their results on the modified item. The results are provided for 20 TLs on original item and 19 TLs on modified items.

BIOLOGY

Question 3: Give a brief explanation on what will happen on the following: A locust not suffocating when its head is immersed in water while the remaining part of body is outside.

_____

_____

_____

_____

_____

_____

Table 5.3: TLs' performance on original Biology test item (Q3) (N=20) and modified versions (N=19)

	ORIGINAL TASK	MODIFIED TASK 1a	MODIFIED Task 1b
Wrong answer	15% (3)	58% (11)	47% (9)
Partially correct answer	15% (3)	0% (0)	32% (6)
Correct answer	5% (1)	42% (8)	21% (4)
No answer	65% (13)	0% (0)	0% (0)

The results are presented visually in Figure 5.3 below.

Figure 5.3: TLs' performance on original Biology test item (Q3) (N=20) and modified versions (N=19)
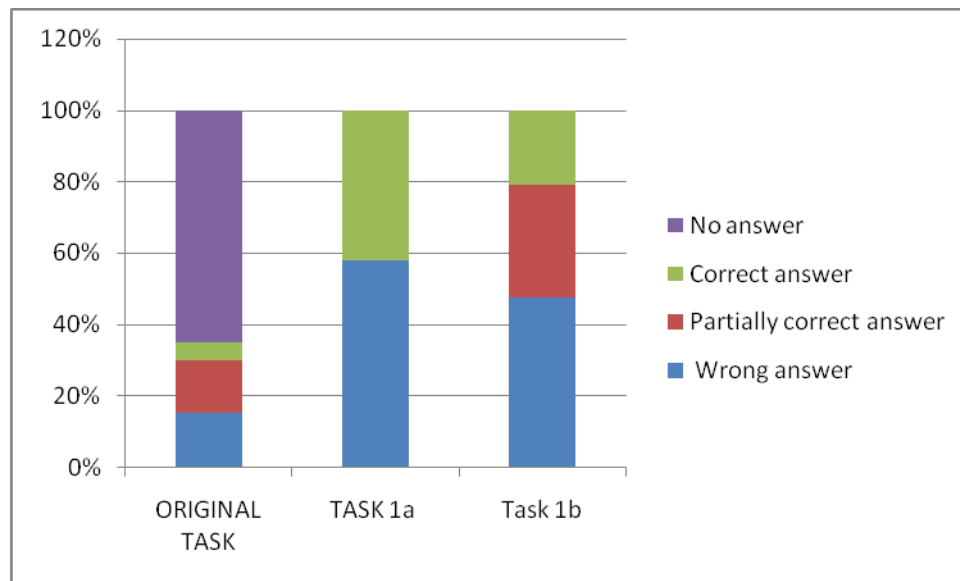
Below, we present and analyse the TL responses in relation to different issues.

(i) Facility: modified item – Biology question 3

- 100% of the learners attempted the modified tasks 1a and 1b in contrast to 35% of the learners on the original task

It is suggested that this significant increase in student responses to this revised item can be accounted for by the presence of the diagram, the simpler language and the breaking down and structuring of a complex problem into discrete stages.

(ii) Quality of answer: modified item – Biology question 3

- 42% of the learners gave a partially correct or correct answer to modified task 1a and 53% of the learners gave a partially correct or correct answer to modified task 1b. This contrasts with only 20% of the learners in the original task,

Interestingly, some pupils gave a partially correct answer to modified task 1b, whilst giving an incorrect answer to modified task 1a.

(iii) Learner errors in original Biology question 3

"Scientific" vs "non-scientific" answers

If a learner uses informal "folk" science, i.e. everyday common place experiences as a basis for his/her answer (as shown in the example below), he/she might not get a score as the examiner may be looking for a formal (e.g. rote learned) science in the learner's answer – this was suggested during discussions with a Biology exam setter (May 2009).

Example:
I think its because of its body covered (immersed) completely in the water, and its terrestial not an aquatic. It can't survive in water (G2)

G2's [a TL from school G] thinking is naturally 'scientific' in the sense that he/she takes empirical observation as the basis for his/her answer and applies it to a novel situation - since locusts are not naturally aquatic in that area, they are unlikely to survive being immersed in water.

Language issues

- Poor reading skills/misreading the task – omitting the definite article "the":

   'A locust not suffocating when its head is immersed in water while [the] remaining part of the body is outside'

Misreading the wording of original item 3 by omitting the emboldened 'the' leads to an interesting anomaly that is equivalent to:

   'the head remaining part of the body, whilst being immersed in water is outside'

which is effectively what A5 has said:

   This Because its head when immersed in water it cannot breath but remains part of body when outside of water can take place and it can breathe (A5)

- Poor understanding of the meaning of the words – "will/may die":

48% of learners used the phrase will/may die verbatim from modified item 1. This is typical of the way in which less proficient English language users in examinations tend to rely heavily on the language of the question to support their own responses, thus confirming that the learners are trying to master the understanding of the science at the same time as trying to master the language.

(iv) Key findings for modified item - Biology question 3

The key findings from the student responses on this first modified item for Biology are as follows:

- all learners attempted the modified items whereas only 35% of them attempted the original task.
- more than twice as many learners gave correct or partially correct answers to the modified items as compared to their answers to the original test item: i.e. restructuring the question doubled the proportion of correct answers (from 20% to 40-50%);
- various language factors could have hindered learners' abilities to complete the task successfully, such as poor reading skills and inadequate grasp of the meaning of individual words or phrases;
- providing "non-scientific" answers to the test items could have resulted in no scores being awarded for these items.

5.3.2 The results: modified item – Biology question 4

Table 5.4 below, summarises the performance of the learners in one of the TL Workshops on the original Biology task (item 4 – see opposite) alongside their results on the modified item. The results are provided for 20 TLs on original item and 19 TLs on modified items.

Table 5.4: TLs' performance on the original Biology test item (Q4) (N=20) and the modified versions (N=19)

	ORIGINAL TASK (1a)	ORIGINAL TASK (1b)	ORIGINAL TASK (1c)	ORIGINAL TASK (2)	MODIFIED TASK 1a	MODIFIED TASK 1b	MODIFIED TASK 1c
Wrong answer	40% (8)	0% (0)	30% (6)	10% (2)	21% (4)	5% (1)	5% (1)
Partially correct answer	20% (4)	0% (0)	25%(5)	20% (4)	0% (0)	5% (1)	0% (0)
Correct answer	20% (4)	90% (18)	25% (5)	55% (11)	74% (14)	79% (15)	84% (16)
No answer	20% (4)	10% (2)	20% (4)	15% (3)	5% (1)	11% (2)	11% (2)

The results are presented visually in Figure 5.4 below.

Figure 5.4: TLs' performance on the original Biology test item (Q4) (N=20) and on its modified versions (N=19)
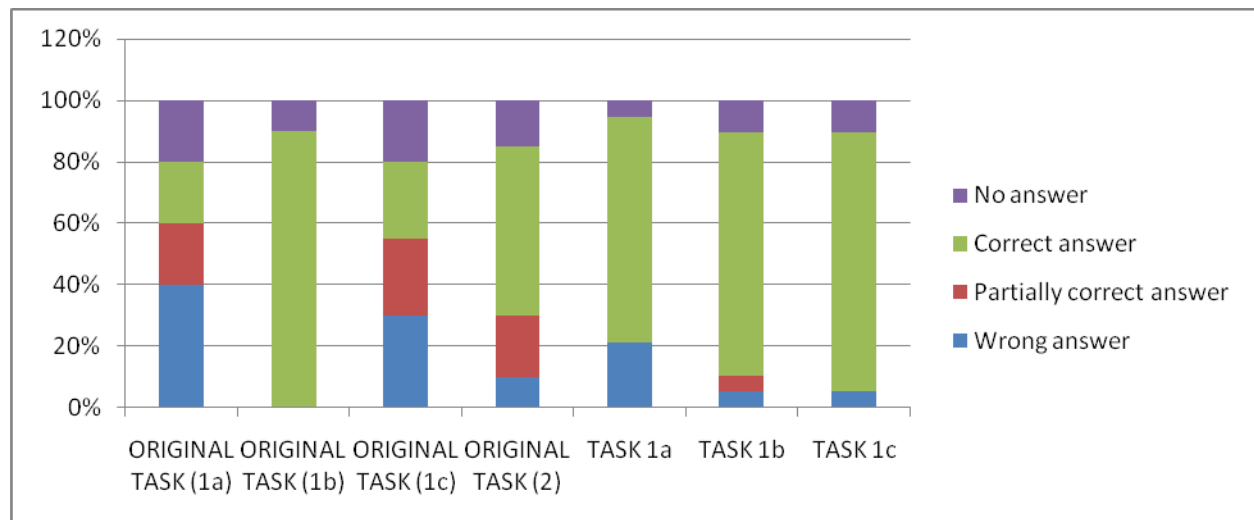
Below, we present and analyse the TL responses in relation to different issues.

(i) Facility: modified item – Biology question 4

The ways in which learners responded to the modified item contrasted significantly with their responses on the original test item:

- on average, 79% of learners got the answers correct to the modified tasks as opposed to 45% of correct answers (on average) on the original version;
- on the original question (Task 1), 90% of the candidates answered at least one part correctly, which is comparable with the number of correct answers to modified item – 84%.
- original Task 1a and 1c were difficult questions with only about 20-25% facility.

The correct answers were "cardiac sphincter" and "pyloric sphincter". However, it is to be noted that two terms do not appear in Magasi's (2007) Biology textbook which – we understand - is used to teach Biology in some schools. Nonetheless, these terms were remembered by some of the learners from three of the target schools.

BIOLOGY

Question 4: Study the diagram below and answer the questions that follow.

i) **Label the parts A, B, C**

A_____

B_____

C_____
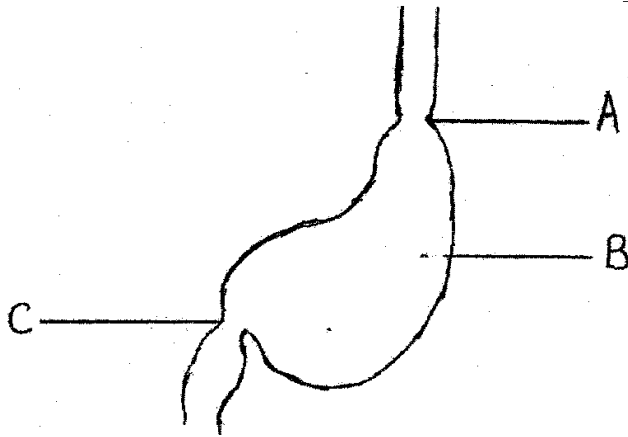
ii) **What does the above diagram represent**

_____

(ii) Quality of the answer: modified item – Biology question 4

- Task 1b of the original question and Task 1b of the modified question, were comparable questions, requiring the naming of the stomach. Candidates found them easy, as the % correct answers show (90% and 79% respectively). However, modified Task 1b was a multiple choice question and there is some evidence that this made the question less (rather than more) accessible (11% fewer learners answered it correctly as compared to original Task 1b). Below are some examples:

Two candidates (A1, C3) chose "pancreas" as the answer, the first term in the list. One candidate (A6) wrote:

> *"These organs are called digestion system"* - which suggests that the student did not understand the structure of the question

Each of these learners got the answer "stomach" correct in original Task 1b.

- There was room for ambiguity in the original task 2: the correct answer was "the diagram shows part of the digestive system", although "the stomach" had to be accepted as correct. Thus a student could get two marks for writing "stomach" in Task 1b and Task 2.

(iii) Learner errors in original Biology question 4

There is a lack of precision in the wording of some questions that leads to uncertainty as to the correct answer. Question 4 ii) What does the diagram above represent, for example, could be answered in a variety of ways such as:

- The stomach (since this is the main feature)
- Part of the digestive system
- The place where food is digested
- Part of the human body

These answers are looking at different levels of organisation in the human organism and each has their merits as an answer. An over-prescriptive marking scheme could miss evidence of real thinking by the candidates.

(iv) Key findings for Biology question 4 and modified versions

The main findings are as follows:

- overall, the modified questions in the structured Task 1 appeared easier for the learners and they performed better
- changing the nature of the question structure can affect the performance on this question - modifying question from being open ended to multiple choice, reduced the number of correct answers for its one part (1b) by 11%.

5.3.3 Summary of findings for Biology

Overall, breaking the complex questions into discrete stages increased the facility of the questions significantly and the quality of answers, too. The significance of this effect needs to be tested with a larger sample. The use of diagrams seemed to be important visual cues to help the pupils to understand the question and also visual 'cues' to help retrieval of relevant learned knowledge.

5.4 Modified item for the Chemistry workshop

For Chemistry, one task was selected to be modified to investigate further whether the difficulties could be explained by reasons of 'language' or by 'other' factors. This item together with the ways in which it was modified, and the rationale for its modifications, is presented in *Appendix 5.3*.

5.4.1 The results: modified item – Chemistry question 2

Table 5.5 below, summarises the performance of the learners in one of the TL Workshops on the original Chemistry (item 2) alongside their results on the modified item. The results are provided for 26 TLs.

The targeted learners' performances on the original and on the modified test items were compared. Four issues arising from these responses are summarised in the Table 5.5 below.

Table 5.5: Issues arising from the targeted learners' responses on the original Chemistry test item (Q2) and the modified version.

№	Instance	Description	Example
1	Exposing lack of understanding	Statements at the workshop that are wrong whilst the original description/definition by the same student might have been correct.	**Response to original test item***: (b) is a mixture of liquid which is diluted from its normal state (unsaturated solution)* **Response to modified test item***: (i) a concentrated mixture is the mixture where solvent and solute diccolve in solution by higher concentration which molecule or atom dilute (A5)*
2	Yielding correct response	The workshop yielded correct definitions whilst the original was wrong.	**Response to original test item***: a) the meaning of these words is to mix liquid* **Response to modified test item***: (i) solution is a mixture solute and solvent (A1)*
3	Providing a response	The student did not respond to original test item but responded in interview albeit with a misconception.	**Response to original test item***: No response* **Response to modified test item***: molecule is many big particles and atom is small particles (B4)*
4	Transforming a vague definition to precise definition	Student formulates a key aspect of the concept in the workshop context.	**Response to original test item***: (a) is a mixture of liquids in which when mixed with other mixture yield onother mixture* **Response to modified test item***: (i) concentrated solution is the mixture of molecule which solute higher (C1)*

The results indicate that the learners had major difficulties in the construction of the sentences even with the verbal support provided in the workshops. However, the change in the nature of the modified task has yielded some results that suggest that learners were more engaged. For example, whereas questions were not even attempted in the original test, learners became engaged and produced sentences in the workshops. Other observations include the way the workshop context exposed some misconceptions, whereas in the original test the student might have provided a correct definition. In other words, the problematisation of the question resulted in incorrect definitions in the workshop task. At times, the learners' responses seemed more precise in the workshop than in the original test item.

5.4.2 Summary of findings for Chemistry

- Overall, learners had major difficulties in the construction of the sentences even with verbal support provided in the workshop

CHEMISTRY

Question 2: What do you understand by the following terms

a) Solution_____

_____

_____

b) Dilute solution_____

_____

_____

c) Concentrated solution_____

_____

_____

- On some occasions, the modified item helped learners to show what they know, that is they provided a response or provided a better response in cases where learners attempted the original items (see Table 5.5 №2, 3 and 4)
- On other occasions, however, the modified item exposed learners' lack of understanding of the concept being assessed (see Table 5.5 №1).

5.5 Some conclusions from learner performance on the modified items

Overall, workshops with the targeted learners revealed the following findings:

(1) Performance: there was an overall increase in the student response rates for the modified tasks in all subjects (Mathematics, Biology and Chemistry) and a decrease in the percentage of wrong answers was observed as compared to the original tasks (Sections 5.2, 5.3, and 5.4).

A relationship was observed between learners' ability to translate the task correctly into L1 and their ability to solve it correctly/partially correctly was observed for Mathematics tasks - learners who experienced difficulties translating the task also did not perform well on the item: they gave either wrong responses or no responses at all (Sections 5.2.1(iii) and 5.2.2(iii)).

(2) Linguistic difficulties: across all subjects (Mathematics, Biology and Chemistry) learners demonstrated difficulties with interpretation/understanding of the content and other words, and construction of the sentences as part of their responses; some of the learners also indicated that they had poor reading skills (Section 5.2.2 (ii) and 5.3.1(iii)).

(3) Subject specific (conceptual) difficulties: in Mathematics specifically, some of the learners demonstrated applying the correct method to the problem but with some errors in the process – due to a lack of conceptual understanding of the ideas (Section 5.2.3).

(4) Manipulations with the task structure: it was revealed that changing the nature of the questions' structure could affect the performance on these questions, for example, modifying question from being open ended to multiple choice, could reduce the number of correct answers (Section 5.3.2(iv)).

(5) Modifications: supporting or exposing to "conceptual" gaps: it was observed that on some occasions modified items helped learners to show what they knew as they either provided responses or provided better responses to the tasks as compared to the original items, on other occasions however the modified items exposed learners to showing lack of their understanding of the concept being assessed (link to the point (3) (Section 5.4.1)).

(6) Limitations of the marking scheme: in our research some learners provided "non-scientific" answers (e.g. in Biology). As conventional working schemes may not reward "non-scientific" answers, this means that learners' ability to relate scientific knowledge to the real world may not be recognized (Section 5.3.1(iv)).

6 LEARNER INTERVIEW FINDINGS

The interviews that followed the administration of the *original test items* across the 4 subjects raised a wide range of issues, some of which relate directly to the exam items themselves, the ways in which the students process the items and the challenges they faced in responding to the items. A considerable number of 'other' factors emerged during the data collection which, although of relevance to the performance of students in Form II exams, are not within the specific focus of the SPINE research design. These are summarised below in 6.2 below.

6.1 Issues relating to exam items

A wide range of issues were identified through the student interviews in relation to their ability to perform their best in the examinations. These are grouped around the following factors:

- Not understanding the task
- Not understanding specific words and phrases
- The meaning/function of diagrams and tables
- Unfamiliarity or partial knowledge of topic area and question type
- Students' English language proficiency
- Examination practice effects
- What constitutes an 'easy' question.

These are explored further below.

6.1.1 Understanding the tasks set

One of the barriers reported by students had to do with not understanding the requirements of the question and what they were expected to do. This phenomenon was observed across the different subjects and items.

For example in the Mathematics Paper:

Extract 6.1 - [MT-Q1; B3: 153-154]

I: What was the problem with this question, question 1?
L: silifahamu {*I don't understand it*}

I = interviewer; L=targeted learner

Here the learner reported not understanding what the question asked him/her to do.
A similar situation was observed when learners were required to complete some tasks from the English paper. In this question, the learners were required to *Complete the character grid by putting (√) in the appropriate space in relation to the information given.* When asked to explain what was required by this examination item, learner A2 responded in Kiswahili:

Extract 6.2 - [ENG-Q2a, A2: 35-36]

I: did you understand what you had to do in this task?
I: mfano kama hapa ulifahamu ulitakiwa ufanye nini {*for example here did you understand what you were required to do?*}
L: mie naona xx (inaudible) nkatia right tu *I saw xx (inaudible) and I just ticked it*

This learner actually put a tick in all the boxes, and not just selected ones.

One of the approaches taken in the interviews when learners reported difficulties in understanding or responding to a question was to ask for a translation. An example is given with reference to question 4 on the writing section of the English paper:

Extract 6.3 - [ENG-Q4; A2: 84-86].

I1:   Can you translate these instructions into Kiswahili?
I2:   unaweza kuzitafsiri hizi kwa kwenda kwenye Kiswahili {*can you translate these into Kiswahili?*}]
L   mie hapo ndipo paliponichanganya manaake mie sijui ntumie jina gain nkaandika tu kama nkaambiwa ntumie jina ilo hapo Kawaone au sijui vipi mie ndio natumia tu {*that is what confuses me because I don't know which name I should use so I just wrote I was not sure if I was required to use that name 'Kawaone' I actually don't know so I just wrote*}

Again, the learner reported not being able to process the instructions as he/she did not know what they meant.

6.1.2 Vocabulary Issues

As already highlighted in Section 5.2.2 (ii) and 5.3.1(iii), some students reported experiencing significant difficulties in understanding the meanings of individual words and/or phrases. Again, this was not specific to any individual subject but arose across all four subjects examined.

In Mathematics, students reported problems in understanding individual words. Some of these were part of subject specific terminology, as with the words 'fractions' and 'evaluate' (Extract 6.4).

Extract 6.4 - [MT-Q1; B3: 159-165; 174-177]

I: Hufahamu pana maneno hapa huyafahamu? {*Are there words that you don't understand here?*}
L: Yapo {*there are*}
I: Yepi. Hebu nionyeshe {*What are they? Let's show me?*}
L: 'Fractions' sifahamu {*I do not understand*}
I: 'Fractions' [hufahamu] {*you don't understand 'fractions'*}
L: [Linanipiga chenga] {*it confuses me*}
         …………………..
I: Okay [mhu hapa na hapa swala la pili kuna neon ambalo hulijui] {*and here the second question, is there any word that you don't know?*}
L: Mhu {*yes*}
I: lipi {*which one*}
I: uhm 'evaluate' [kwahivyo haya maswali yamekushinda kujibu kwasababu hujui maana ya maneno?]{*so were you unable to answer these questions because you didn't know the meaning of words?*}

Less surprising, however, is the fact that learner B3 below did not understand the word 'terms' in the instruction of the Chemistry paper (extract 6.5 below) as it is documented in the research literature that everyday or familiar words that take on new meanings in a scientific or maths context constitute a barrier for L2 speakers.

Extract 6.5 - [CH-Q2; B3: 11-12]

I: ukitazama haya maneno yote haya katika swala namba 2 kitu gain kilichokufanya usifahamu maneno gain magumu ambayo yamekufanya usifahamu {*if you look at all these words in question number 2 what thing caused you not to understand? What difficult words you didn't understand*}
L: 'Terms'
I: Terms aha so word 'terms' in question two you found it difficult you couldn't understand the meaning of it
TL: Eee {*yes*}

Extract 6.6 below, from the Biology paper, is also an example of how vocabulary provided a barrier to the student in responding to the question.

Extract 6.6 - [BIO-Q1; A4: 132-133]

I: kuna neno gumu ambalo hukulielewa {*is there any difficult word that you didn't understand?*}
L: Humu humu yamo ee 'photometer' {*there are yes 'photometer'*}

In the student self-reports below (extracts 6.7- 6.9), we note that the 'language of the instruction' itself rather than the subject specific terminology created a barrier for students in processing exam questions. The first three relate to questions in the Structure section of the English paper where the students were asked to:

> **Question 3b:** Rewrite the sentences according to the instructions given after each sentence.
> i) His friend name is Rashid (Punctuate);
> ii) Nihifadhi didn't know the man. The man came in her room last week. Join by using ....who....;
> iii) Wahida answers some questions. (Put it into negative).

Extract 6.7 - [ENG-Q4; A3: 152-155]

I: [what does the word] negative [mean]
L: Inayokubali {*that which agrees*}
I: Inayokataa? {*that which disagrees?*}
L: Siijui {*I don't know*}

Extract 6.8 - [ENG-Q3b; B5: 256-258]

I: 'Negative' maana yake {*'negative', what does it mean?*}
L: Nzuri, safi safi {*good, clean*}

Extract 6.9 - [ENG-Q3b; A2: 63-64; 70-71]

I: Aha okay 'punctuate' in Kiswahili. 'Punctuate' maana yake nini {*What is the meaning of 'punctuate?'*}
L: Mie siijui {*I don't know it*}
        ....
I: 'Join' maana yake nini {*what is the meaning of 'join'?*}
L: Mie sijui naona kama jina maana inakuwa 'John' jina {*I don't know. It appears to me, it's like a name 'John'*}

The difficulty with the 'language of the instruction' was also reported by students in Biology. The following extract provides evidence of challenges of understanding non-technical words in this subject (extract 6.10).

Extract 6.10 – [BIO-Q2; B6: 104-105]

I: what about the word 'similarity' similar
L: *Sifa* {*quality*}

Two further examples of the challenges students faced with the instructions to the questions are taken from the Maths interview data where translation was used to probe understandings. The following are typical of the types of responses provided by students. The following translations were provided by students with reference to the following Maths 'word problem':

> **Question 6:** The combined ages of Juma and Asha are 10 years. The difference of Asha's age from twice Juma's age is 8 years. Find the ages of each one.

Extract 6.11 - [MT-Q6, B6: 422-429]

I: What about question no 6 umefahamu na umefahamu nini unatakiwa utafute {*have you understood what you are supposed to do?*}
L: Mmm {*no*}
I: Mhu hebu nitafsirie { *Let's translate it to me*}
L: Kuchanganyisha miaka ya Juma na Asha ni 10 {*to combine Juma's and Asha's ages*} differences of Asha's age from twice Juma's age
I: So 'twice' means twins twins

L: Twins pacha ni nane {*twins are eight* } find the ages of each one tafuta kila mmoja miaka yake {*find the age of each one*}

I: Okay sasa ukafanyaje wewe ulijua unachokifanya au uli {*so what did you do? Did you know what you were doing or you just guessed?*} just guess.

L: Nilibahatisha tu sijui {*I just guessed*}

Extract 6.12 [C1: MT]

I: Do you understand this instruction?

L: Some of instructions

I: ….'Combine' and what? Many students find it difficult can you try and translate it for X? So what do you think that means, 'the combined ages of Juma and Asha are ten'

I: Huwezi kupata idea yoyote? {*can't you get any idea?*}

I: Just guess

L: Hapa {here}

I: Een {*yes*}

L: Napata {*I can*}

I: Enhe hebu sema {*Alright, let's speak*}

L: Mayai ya Juma na Asha {*Juma's and Asha's EGGS*}

I: Enh {*Okay*}

L: Mayai ya Juma na Asha yalikuwa ni kumi miaka kwa miaka {*Juma's and Asha's eggs were ten years*}

I: Enhe {*Okay*}

L: The differences of Asha'a and from twice Juma's age is ten [yaani tofauti ya Asha tofauti ya iyo mayai ya miaka ya Asha kutoka kwa Juma] {*it means the difference of Asha the difference of those eggs of Asha's age from Juma's*}

I: I: Mhu *(Okay)*

L: Ni nane *(are eight)*

I: Mhu {*okay*}

L: Find the age of each one tafuta mayai ya kila mmoja {*find how many EGGS for each one*}

It is to be noted that 84% of students either did not answer this question or provided incorrect answers.

In 6.11, we observe that 'twice' was translated as 'twins' which can be assumed to have created a complete barrier for this student in responding to the question. The student who confused the meaning of 'ages' with 'eggs' in Extract 6.16 also failed to answer this question.

Turning to a problem of a slightly different type, as presented and discussed below, students were asked to write a letter to a friend:

> **Question 4:** Write a letter to your friend KAWAONE, whom you will visit during your holidays. The letter should contain the following details.
>
> - Reason(s) for visiting him/her.
> - Your arrangement for the journey
> - Means of getting to the station.
> - Day, date and time of your arrival
> - The place where he/she could collect you.
> - Your name is TUWENAO

This item can be seen as an example of 'good examining practice' whereby students are scaffolded, i.e. supported in their writing through written prompts. It is also best practice in the sense that examiners are more likely to receive answers that are more similar in structure and are therefore likely to be more reliably marked. In such cases, it is obvious that unless a student knows what each of the scaffolding bullet points means, they cannot begin to fulfil the requirements of the exam question. What emerged

from the interview data is that rather than supporting students in their writing, these structuring prompts constrained the students. In other words, many students reported not knowing the meaning of the very information in the instructions that was meant to assist them in structuring the writing of the letter. This is exemplified by:

Extract 6.13 - [ENG-Q4; B6: 239-265]

I: What was the reason that you did not write the content (main part of the letter)?

L: [sijui Kiingereza changu sikijui] {*I don't know. I don't know English*}

Extract 6.14 – [ENG-Q4; B5: 265-274]

L: Umwandikie kama utafikia wapi hapa sijafahamu {*you have to tell him/her where he/she will stay. I don't understand here*}

I: So, the word 'journey' is not clear

          ....

L: Utaje siku tarehe na muda neno 'arrival' sinalijua {*you have to mention day, date, and time, I don't know the word 'arrival'*}

I: 'Arrival' is not clear

L: The place where he/she could 'collect' you halafu umwandikie kama kuhusu ni mwanamke au mwanamme {*and then you should write to him/her if he/she is male or female*}

In summary, there is evidence of students experiencing various lexis related difficulties in respect of processing examination items across all subjects: Mathematics, Biology, Chemistry and English.

6.1.3 Diagrams and tables

We have already seen in 5.2.2, how an exam question which required students to process information on the basis of a table had proved particularly problematic in solving an algebraic problem. Other evidence provided through the student self-reports also revealed that they did not always understand the meaning nor the function of the visual information provided within exam questions. Issues that arose in the interview data related to:

- Not knowing what the diagram was about or what it represented, or
- Unfamiliarity with the diagram/visual.

A number of problems emerged with the Maths paper.

Extract 6.15: [MT-Q7; B5: 117-119]

I: Have you seen this type of table before *[umewahi kuona hesabu kama hili kabla]* {*have you ever seen this problem like this before* }

L: [bado] {*not yet*}

I: [kweli] {*true?*}

L: Mhu] {*yes*}

I: [Popote pale] {*anywhere?*}

L: aa-a bado] {*no, not yet*}

This last extract also evidences assertions made by students that they had not done work like this before, or had not covered certain topics. We do not have the corroborating evidence either way, nor is this a focus of this research.

6.1.4 Unfamiliarity or partial knowledge of topic area and question type

Unfamiliarity with facets of the exams is a current that runs through the student interviews:

- Unfamiliarity with the question
- Unfamiliarity with topics set

- Unfamiliarity with the lexis/terminology

Extract 6.16: [MT-Q5; B3: [455-458]

I: You have never seen this one question 5
L: sijawahi kuiyona hasa wala sifahamu chochote] {*I have never seen it and I don't understand anything*}
I: Never ok

Extract 6.17: [MT-Q5; B6: 408-409]

I: Have you come across this topic "sets"
L: No

Extract 6.18: [BIO-Q5; A6: 146-147]

I: What was difficult in this question? na kwanini ilikuwa ngumu…….. unafikiria {*and why do you think was difficult?*}]
L: Because we have not to learn these items

Extract 6.19: [BIO-Q4; B6: 158-165]

I: Why you did not know how to answer this question? … kwanini hukujua kama hiyo ni {*why didn't you know that it is….*}
L: [Darasani hatujasoma nimeiona kwenye kitabu tu {*we haven't learned it in class I just read it in a book*}
……
I: Haya maneno umeyapata wapi {*where did you get these words from?*}
L: [Nimeangalia huku {*I looked at here*}

The leaner said that they have not learned what the question asked in class yet, and what she did she just looked back at question number 1 and selected several words from there, from the list B.

Extract 6.20: [BIO-Q6a; A3: 92-93]

I: What makes this question to be the most difficult? [kitu gain limefanya liwe gumu zaidi kwa upande wako {*what made it to be the most difficult for you?*}
L: hatujasoma {*we haven't learnt it*}

Extract 6.21: [BIO-Q6a; A5: 67]

L: We have not taught {or talked} about this question *STATE AS PRECISELY AS YOU CAN WHERE IN HUMAN BODY YOU WOULD FIND* ...we have not talked about it

Extract 6.22: [BIO-Q6a; B5: 84-91]

L: then last question number six nini umefahamu hapa hapa kuhusu swala hili {*what have you understood here about this question?*}
L: sijafahamu kitu {*I haven't understood anything*}
      ……
I: So the question 6a again was not clear even the easy terminology umewahi kuzikukutana nazo hizi {*have you ever come across these (terminologies)*}
L: Bado {*not yet*}

We have provided several extracts as they evidence a student perspective that what they are presented with in the exams has not been covered in class. Whether this is a reliable perception is not the focus of this research.

6.1.5 Students' English language proficiency

Poor writing skills and limited vocabulary leading to incomplete answers, poor answers or no answers, as in the following examples:

Extract 6.23: [ENG-Q4; B6: 239-241]

I: What was the reason that you did not write the content (main part of the letter)?
L: ilikuwa sijui kiingereza changu sikijui {*I didn't know. I don't know English*}

Extract 6.24: [BIO-Q6b; B5: 94-102]

I1:   Why you have not elaborated these or put more English… you just put down major points of the answer of this question

I2:   kwanini hukujaribu kwa urefu {*why didn't you try to elaborate your answer*} mhu sema kwa Kiswahili kwanini hujaandika kwa urefu ningekwambia unieleze kwa Kiswahili unaweza {*say in Kiswahili why haven't you given an extended answer if I told you to tell me in Kiswahili would you be able to do that*}
L: Een {*yes*}
I: Mhu nielezee {*Okay tell me*}
L: Kwasababu sigareti inasababisha maradhi mbalimbali na maradhi hayo kwa mfano yanaharibu mapafu {*because cigarette causes various diseases and the diseases for example damage lungs*}
……
I: Kwanini hujaweza kuelezea sasa {so why haven't you able to explain}
L: Kizungu kinanitatiza {*English is difficult to me*}

A strong message from the data is that students do struggle in communicating their ideas/answers through written English and this struggle was also evidenced in the student interviews.

6.1.6 Practice effects

When asked about what made an exam question easy or difficult, students expressed the view that easy questions are those which have been covered in class and which have been practiced a lot, as in:

Extract 6.25: [CH-Q1, A5: 27-30]

I: What makes this question to be easy?
L: Oh because we have studied it for many time and we have seen it in so many papers
I: So because you are familiar with this
L: Yeah so I tried to answer it so many times and then this time I know it

There is some suggestion running through the interview data (with teachers and students) that students are thrown when an item does not appear in the very same format as it has been worked on in class. This raises a question about the extent to which students are able to transfer their understandings gained in class to situations and/or examination items that may be parallel but not exactly what they have practiced on in class. This has implications for classroom pedagogy and teacher education.

6.1.7 Students' exam strategies

(i) Guessing

Extract 6.26: [BIO-Q1; B3: 79-81]
I: why did you choose your answers ulifikiaje kuamua kwamba hii uchague ujaze hapa? *{how did you decide choosing this to fill here }?*
L: na kuwa niache hino swala hivi hivi inakuwa kubahatisha tu *{I didn't want to leave out that question so I guessed}*

 We also noted in the data that students reported not having enough time to answer the exam questions, as in the extracts below:

Extract 6.27: [A1: 70-73]

I: In number four you had to write a letter, you started writing it but you did not write anything, why?   …uli anasema uliambiwa hapa uandike barua na ilikuwa ushaonesha unaandika barua sasa nini kilikuzuia
L: muda]
I: Time

Extract 6.28: [E4: 765, 768]

L: The time, if you give me more time I'll [pass] very well; I think biology and chemistry I {would} perform very well but if I get more time

At this point in the research it is difficult to determine the reasons for this reported lack of time but one possibility is that working through a second language imposes additional constraints on language processing constraining the speed with which learners are able to produce well formulated written responses. In addition, the extent to which students have the opportunity to produce spontaneous language within class time has been observed to be very limited, as shown in Table 6.1 below. This, too, together with the reported use of Kiswahili in teaching and learning (see 6.1.9 below) will impact on processing time.

Table 6.1: Pupils' creative and spontaneous language production (N = 73 lessons)
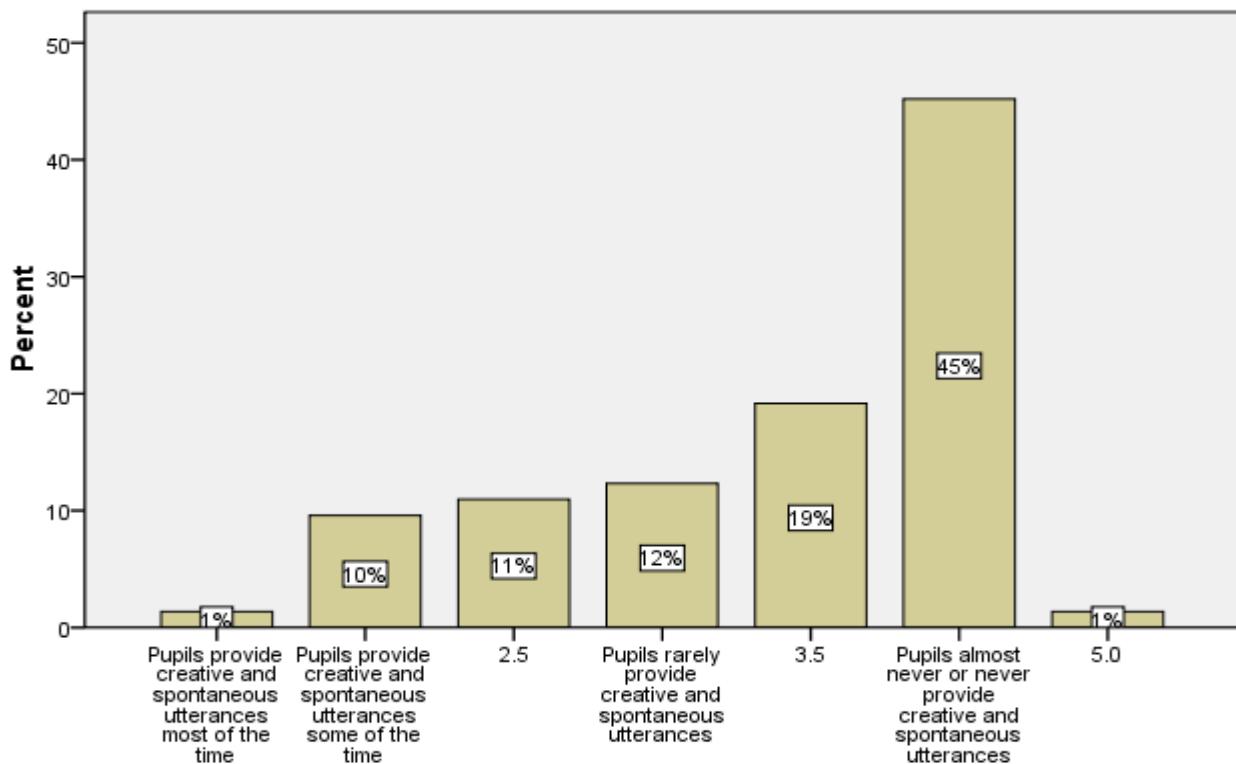
This data was gathered through systematic classroom observations across the four subjects. It is observed in Table 6.1 that only 1% of learners were seen to provide spontaneous utterances most of the time and that by far the majority rarely or never used English creatively within their classroom learning.

6.1.8 Classroom teaching and learning

We observed that sometimes class teaching was conducted through the medium of the L1 (Kiswahili). The students' knowledge is, however, tested through then L2 (English). This issue was raised with the students in interview.

Extract 6.29: D4: [149-152]

I: So if teacher teaches you with using English and teacher teachers you the same topic with using Kiswahili do you think there will be any differences in your understanding [umelielewa swali kama mwalimu atakufundisha kitu kwa Kiswahili halafu akufundishe kitu kwa kiingereza unafikiri kuna tofauto yoyote ya kufahamu itakayotokea kwako wewe{*have you understood the question? If the teacher teaches in Kiswahili and then teaches in English do you think there will be any difference of understanding to you?*}

L: hapo ipo enhe {*yes, there will*}

I: Wapi utafahamu zaidi {*which would you understand more*}

L: Kwa Kiswahili {*in Kiswahili*}

Extract 6.30: [D4: 119-120]

I: So was it taught in English or in Kiswahili

L: In English and Kiswahili

Extract 6.31: [E4: 246-251]

I: Was it taught to you in Kiswahili or English or both language

L: In Kiswahili

I: So the teacher used Kiswahili

L: Kiswahili and English but in many times he use Kiswahili

6.1.9 Language(s) of Examinations

Students were then asked whether they would prefer to be examined at Form II through English or Kiswahili. An overwhelming response was that students prefer to have exams in English. Reasons given included:

- English as a language of wider communication
- Access to further studies
- Provides practice in using English.

Extract 6.32: [A4: 101-106]

I: If you had a choice to learn in classroom in English or Kiswahili and have exam either in English or in Kiswahili which one would you prefer

I: Kama itakuwa unahiari kwamba ufundishwe kwa Kiswahili au Kiingereza na mtihani uje kwa Kiswahili au Kiingereza ungalipenda lipi] {*if you have an opportunity to choose to be taught and to be examined in Kiswahili or English which one would you prefer?*}

L: [Ningalipenda] {*I would like*} English

I: English Why?

L: [kwasababu naipenda na nna mpango wa kujifunza zaidi na zaidi]   {*because I like it and I have a plan to learnt it more*

Extract 6.33: [E4: 473-474]

I: In which language do you want to be tested?

L: I want to be {tested} in English because if I do not know... if the exam come in Kiswahili it can make me to don't know how to speak English

Extract 6.34: [D2: 198-204]

I: Huhisi kwamba kiingerza ni kikwazo katika kuelewa masomo ya science {*don't you think that English is a hindrance in understanding science subjects*}

L: Si kikwazo kwangu naona ukifahamishwa tu basi lakini si kikwazo {*it is not a hindrance to me I think just getting explanation is enough but is not a hindrance*}

I: Kwa mfano ukiambiwa jee masomo ya sayansi yasomeshwe kwa Kiswahili wewe utafurahi? {*Suppose you are told that science subjects should be taught in Kiswahili would you be happy?*}

L: Mie ningependelea iwe ni kiingerza {*I would favour English language*}

I: Sasa mbona hapa tunasema kiingereza unasema twende kwenye kiswahili {*but why? we want here to speak in English you are asking us to speak in kiswahili*}

L: Kwasababu mie bado ni mwanafunzi na niko katika process ya kujifunza sijawa mtaalamu sana wa hii lugha {*because I'm still a learner and I'm in the process of learning, I haven't yet been very proficient in this language*}

6.1.10 Teaching and learning – classroom talk

It was reported in interview that sometimes teachers never follow up questions that the learners might have. For example, A2 stated that if she had not understood something she prefered to approach the teacher individually and see the teacher privately after class for support. She said, however, that this does not happen as when she approaches the teachers to explain she does not understand, the teachers sometimes *say 'ok' go to the class I'll call you later in my convenience time and that never happens* (translation from Kiswahili). There is also some suggestion in the data that students are afraid of contributing in class as they fear rebuke from their teachers, especially when they do not come up with the right answer [B6: 301-303].

A comment that refers specifically to gender effects in terms of classroom participation is revealed by the following comment:

Extract 6.35: [B6: 392-399]

I: Unahisi that will occur in groups [unahisi watoto wanawake mbali ya wewe mwenyewe wewe nakuona unajibu sana maswali lakini watoto wengine wanawake kwanini wanakuwa hawajibu sana maswali wako na wanaume hawajibu lakini wanawake kwanzai] {*do you think girls in exception of you I observed that you were frequently answering questions but other girls why aren't they answering questions frequently boys don't answer questions as well but let's start with girls*}

L: [Wanajisikia kama yaani ile au tuseme au tuchekwe darasani] {*they feel that they will be laughed at in class*}

I: [Na wanaume je waliokuwa hawajibu] {*What about boys who were not answering?*}

L: [Yaani ile kama wanajisikia kama aibu hivi] {*they feel shy*}

I: [Wote au wanahisi sawasawa] {*Do all feel the same?*}

L: [Mm yaani mtu ile kusimama anaona tabu]{*even to stand up one feels*}

I: Wote wanaona haya zaidi wanawake wanaume {*Who feel more shy girls or boys?*}

L: Sawasawa naona yaani mtu mpaka umlazimishe simama {*I think they have similar feelings you have to force a person to stand up*}

These last are worrying findings if they were found to be widespread given the importance of dialogue in developing understanding.

6.2 Non-examination specific findings

The focus of this research is firmly on the linguistic factors affecting student examination performance. However, the interviews with students also revealed other aspects of the school context which they felt impacted on the ways in which they could perform in their exams. These related to:

- Teacher absences
- Limited resources
- Overcrowded timetable
- Learning opportunities in and out of class/school.

Exemplar findings and typical student quotes are summarised in Table 6.2 below.

Table 6.2 Factors affecting student achievement

Teacher absence	**Extract 6.36:** [E3: 107-109]
	I: You say the teacher should attend class properly ok
	L: kwasababu kama sasa hivi kipindi cha kusahihisha karatasi kuna madarasa pengine twaweza tukaja mpaka tukarudi mwalimu hajaingia darasani] {because for example in this period of marking papers there are classes we can come and go back home no teachers enters the class}
Limited resources	
(i) Books[1]	**Extract 6.37:** [D2: 438]
	L: Mie naona vitabu havitoshi kwasababu tuna kitabu kimoja tu cha biology {*I think books are not enough because we have only one book of biology*}
(ii) Practical activities for learning science	**Extract 6.38:** [E4: 190-208; 301]
	I: How in your opinion science should be taught in schools
	L: We must use labo
	I: Use a laboratory
	L: Yes, some of thing we must see but we can't see because we haven't {got a lab}
	I: Do you think use of laboratory help in teaching science
	L: Yes yes, because if we study in laboratory our teacher can make he can show us a lot of thing which we did not see but if we learn in class we can't see them... I think if I learn it in laboratory I will benefit very well than in class
	Extract 6.39: [E4: 685-692]
	L: In Biology I think we haven't any experiment which use laboratory, I think there is no any experiment which use like laboratory
	I: But yesterday your teacher showed you how to identify ... kind of showing reactions
	L: I think in only in on that day
	I: On that day, so normally there is no demonstration

In addition, factors to do with student and teacher classroom behaviours also emerged. These are presented next.

6.2.1 In-class teaching and learning

The first set of comments has to do with student attitudes to learning as well as general awareness of schooling expectations, with some suggestion in the data or problems in student motivation (also corroborated through teacher interviews). For example:

Extract 6.40: [A5: 267]

L: There are so many people {in our class} and some people do not want to study some people come in our school to enjoy yourselves …In our class there are just so many boys who can perform, try... but ladies or girls they do not want to try it

Reporting on a student comment made in Kiswahili, one of the interviewers said:

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[1] Since these interviews took place all schools have received complete sets of textbooks for each students for Maths, Chemistry, Biology and Physics.

Extract 6.41: [E3: 114-115]

L: Enhe ndo mpaka kwasababu kuna watu wengine mpaka hawajajitambua kama wako Form II wakifika wanakimbilia migombani {*yes because until now there are some people who have not yet understood that they are in Form II. Once they come to school they go straight outside*}
Wanafanya nini {*What do they do?*}
Na akija mwalimu hamna darasani ndo hapo anapata chance ao wanakwenda migombani {*And when he/she comes the teacher is not in class, he/she gets chance to go out*}

There is, on the other hand, evidence of a commitment to consolidating learning outside of class and an awareness of the need to work outside of the school day. Ways in which learning was taken forward outside formal class hours had to do with:

- Opportunities/time to do homework
- Extra tuition

In terms of availability of time to concentrate on any homework set, one targeted learner explained that she had to help her family once she was out of school:

Extract 6.42: [E4: 316]

L: I get few chance to repeat my book because many times I help my father

On the other hand, it was also clear that students did get help from a variety of sources outside of class: from other students from higher forms or through extra tuition, as shown in the following quotes:

Extract 6.43: [E4: 634]

L: I get one student from Form IV {his tutor} he taught me sekeleton but he taught me skeleton in Form III topic so I was {I had} idea

Extract 6.44: [E4: 209-212]

I: Have you learned about this? (*points to the question in test taper, Question 3 in chemistry*)
L: Yes
I: When
L: Tuition

In talking about the Maths Venn question (see Appendix 2.2), one student reported not having done this in class but having covered this topic in private tuition:

Extract 6.45: [E4: 597; 599]

I: Where and who used it?
L: Not in class... only in tuition

Extract 6.46: [E6: 156-157]

I: Who taught you how to construct sentences like this where were you taught?
L: In the tuition.

6.3 Summary

We conclude from these findings in section 6 that whilst there are issues inherent within the examinations that affect student performance on the examinations, there are also several other 'external' factors which also inhibit student performance. The extent to which these external factors may be more significant than those pertaining to language is unclear. They do however present as threats to students achieving their potential.

7. CONCLUSIONS & NEXT STEPS

7.1 Summary of findings

A summary of conclusions per section of this report has been provided on pages 12, 17, 21, 22, 35 respectively. In terms of the overarching conclusions across all the data sets analysed so far, the key findings are summarised as follows:

- Learners do experience language problems in processing examination questions and producing responses as evidenced by their performance on the original and modified items and through interviews).

- The statistical data highlights a very strong relationship between students' levels of English language proficiency and receptive vocabulary knowledge and their performance in all three subjects: Chemistry, Biology and Mathematics. In other words, there is evidence of a key role of English language proficiency in examination achievement/underachievement.

- Restructuring and simplifying the original examination items gave rise to – with some exceptions – an increase (i) in student response rates to the examination questions and (ii) correct or partially correct responses to the examination questions.

- Factors other than language appear to inhibit student learning and, ultimately, their ability to achieve their potential in their Form II examinations.

- Studies 5.2 and 5.3 will explore these findings in more depth in an attempt to investigate the extent of the "language" difficulties experienced by learners. These studies are outlined below.

7.2 Next steps

Two studies are planned to investigate further the challenges that students face in communicating their subject knowledge through English. The first study (5.2) takes a *process* perspective whilst the second (5.3) is focused on the *product* of learning as evidenced through examination performance. These studies are summarized below.

7.2.1 Process Studies in Mathematics and Chemistry - Study 5.2

Aims:

- To investigate students' use of and need for English and Kiswahili to explain and understand mathematical and scientific concepts.
- To observe the process of students working together solving Mathematics and Chemistry tasks and through this to attempt to disentangle their use of language(s) and their mathematical knowledge (the linguistic and the conceptual demands) in solving curricular tasks
- To investigate when and why students might want to speak Kiswahili and how that affects the expression of their subject specialist knowledge
- To investigate students' engagement with scientific versus everyday terminology.

Participants:

- Four schools
- Two groups of four students in each school – high ability and average ability.

Procedure:

For each subject area, two groups of four students will be presented with a series of tasks involving the use of short video clips gathered through the classroom observation (Study 4). The tasks will focus on a variety of issues (see aims above), for example scientific/mathematics terminology versus the use of general academic vocabulary and everyday words; switching between English and Kiswahili, in particular the transition points from one language to another; how students do a 'problem solving' task (e.g. which resources, including linguistic resources, do they use?). A set of questions will be generated to guide the probing of students' discussions.

Projected data analyses:

Students' discussions across the tasks will be studied using a grounded theory approach where the particular categories of themes emerging from the data will be classified and investigated in depth. The first level of analysis will be qualitative and descriptive. Where appropriate, subsequent frequency counts of the emerging categories will be summarised and trends reported.

7.2.2 Product Studies in Mathematics, Biology, Chemistry - Study 5.3

Aim:

- To explore further the linguistic processing of examination items in Mathematics, Chemistry and Biology in relation to student achievement on formal examinations.

Participants:

- All Form II students in the target schools.

Procedures:

1) Examination papers for Chemistry, Maths and Biology
There will be 4 versions of these papers, randomly assigned to Form II students in the target schools:

- English only
- Kiswahili only
- Bilingual: English and Kiswahili
- English only plus Glossary of key words.

2) A specifically designed receptive vocabulary test – based on relevant corpora derived from the Zanzibar educational context – will be administered to all Form II students in the target schools.

3) A Student Questionnaire will also be administered to capture data about students' exposure to English, literacy related activities as well as SES data.

Study 5.4: scheduled for 2010

On the basis of findings for Studies 5.1 - 5.3, a final study, 5.4, will be developed in collaboration with examination setters, item writers and class teachers and will include working with 'new' examination components for each of the three school subjects that are congruent with quality classroom practice and appropriate for the given context.

APPENDICES

Study 5: Qualitative case studies focused on learners' demonstration of subject learning
This study has four parts: studies 5.1 & 5.2 take place in the 8 schools detailed above, in the 3 school subject areas, focused on the same targeted learners (3 male, 3 female) in Form 2. The learners will be identified by their teachers as high, average and low achieving (excluding students with special educational needs), i.e. 24 girls and 24 boys. For study 5.4, an additional 8 schools that share similar characteristics with the first group of schools will be identified.

Study 5.1:

6 learners in each class (Maths, Science, English) sit a 'typical' Form 2 examination (i.e. a past paper under examination conditions), followed by individual interview (stimulated recall) to identify – through analysis of examination transcripts and interviews - specific factors that may cause difficulty in the examinations e.g. varying test item difficulty and formats, use of L1 and L2, presentation on page, use and interpretation of images.

Study 5.2:

Administration of 'exploratory' examination tasks (same learners as in 5.1) in each subject with a range of accommodations (e.g. allowing language choice in responses, providing translation of items, providing dual language question papers etc.). The 'new' formats will be developed from the findings from study 5.1. Individual interviews using the examination transcripts will be used for stimulated recall. The analysis of transcripts and interviews will identify ways in which test items/tasks are processed with accommodations and how these interact with performance levels across studies 5.1 and 5.2 and with level of the individual learners' language proficiency.

Data capture for both 5.1 and 5.2
• Video and audio-recording of classroom observation;
• Learners' test transcripts;
• Interview data; stimulated recall;
• In addition, from study 4, transcription of video and audio classroom observation data for the analysis to (i) establish what these learners can do unaided/aided within routine instructional and (ii) identify how they perform in formal teacher assessments in class (25% of final grade).

Study 5.3:

On the basis of data from 5.1 & 5.2 above develop, in collaboration with examination setters, item writer and class teachers - 'new' examination components for each of the 3 school subjects.
Study 5.4:

In the additional 8 schools (see above), administer innovative examination tasks to 6 targeted learners (design as 5.1 above), followed by individual interview. Analyse findings against the data elicited in studies 5.1 and 5.2 above, i.e. a further set of 24 boys and 24 girls.

The above procedures will enable the development of profiles on learner performance for the three achievement groups (high, average, low) and exploration of the impact of accommodations and the relationship between scores on formal tests and Teacher Assessment.

STUDENT PERFORMANCE IN NATIONAL EXAMINATIONS: THE DYNAMICS OF LANGUAGE IN SCHOOL ACHIEVEMENT

EXAMINATION SYSTEM ISSUES

OVERVIEW OF STUDIES

CURRICULUM IMPLEMENTATION ISSUES

EXAMINATION DEVELOPMENT & SETTING
Study 3.1

TEACHER PEDAGOGY & ASSESSMENT
Study 4

SYSTEMATIC REVIEW OF RESEARCH
Study 1

FACETS OF QUALITY IN EXAMINATION DEVELOPMENT
Study 3.2

STUDENT PERFORMANCE IN NATIONAL EXAMINATIONS

Learner achievement outcomes

SYSTEM WIDE ISSUES:
Influences other than language on examination outcomes, e.g. SES, gender, teacher qualifications
Study 2

LEARNER DEMONSTRATION OF SUBJECT LEARNING:
Maths and Science
Studies 5.1-5.4

DEVELOPMENT OF EVIDENTIAL BASE FOR THE VALIDITY OF SCHOOL EXAMINING PROCESSES LEADING TO INNOVATIONS IN THE ASSESSMENT OF SCHOOL SUBJECT LEARNING AND GUIDANCE FOR 'BEST PRACTICE'.

The construct base for the learner interviews

This analysis is provided as a guide to Study 5.1. It will also inform Study 4 and the analysis of classroom discourse.

- **It first sets out (in A) a suggested focus and sequence of the stimulated recall questions**
- **It then (in B) identifies the key constructs that motivate each of the 6 sets of questions**
- **It then (in C) provides examples/rationale related to the different questions**
- **In D, a summary of exemplar questions for the interviews is provided**

A. HOW DO WE FOCUS THE INTERVIEWS?

It is suggested that the focus and flow of questioning should be broadly as follows:

1. What is this item about/testing?
2. Student's performance on the items
3. Ease and difficulty of the items
4. Language issues related to the items
5. How did the students learn about the subject knowledge tested in the items?
6. How were the concepts/subjects taught and practised in class?
7. Perception on equal opportunities for learning

B. WHAT IS THE RATIONALE FOR OUR QUESTIONS? UNDERLYING CONSTRUCTS

Below we attempt to set out the rationale/constructs underlying the 6 questions in A) above, summarised as follows:

1. Student perceptions of the item/**activity,** in particular what content / skills / understandings they think is being assessed?
2. Perceptions of **learning** and **teaching** in the particular subject? – recall, problem solving, connecting subject to real life, data driven analysis, series of facts
3. Perceptions of their **own performance**: how well do they think they have done?
An important part of this question has to do whether they think they have been able to show what they know/how much they know through the formal examination process
4. Perceptions of **ease** and **difficulty**? What makes one activity easy and another difficult?
5. Perceptions of **language** used in an activity/test item: words, syntax, genre, register
6. Perceptions of **teaching** and **assessment**:
What do they have to say about how they were taught, in particular how the specific subject matter/skills of the individual items. Questions in this area have to do with how they were taught and how effective it was
7. Perceptions on equal opportunities for learning – gender issues

C. WHAT DO WE WANT TO FIND OUT?
This section specifies the areas and questions to cover in our student interviews. The shaded boxes provide an indication of some of the theoretical issues involved.

Appendix 2.1 - The construct base for the learner interviews

C1. Student perceptions of the **ACTIVITY,** in particular what content/skills/understandings they think is/are being assessed?

- What is the item measuring (using an example)?
  Question: I don't understand what this question is about. Can you explain what you are supposed to do?

- How did they come up with their answer? For example: Do they *reason* which is the right/wrong answer? For example for multiple choice questions:
  Questions: What makes A right? What makes B wrong? How did you select your 'right' answer? How did you not select (eliminate the other answers?)

- Is there coherence of test items?
  The test items assess students' knowledge about certain different aspects of science, covering quite a wide range of topics/aspects. What do students think about the coherence in the presentation of the test items and whether/to what extent the test items are related (or contributing to the assessment of their knowledge of certain aspects of science in breadth or/and in depth).
  Questions: Does answering one question help you answer another/following question? Are there any clues in the questions that help you answer them? How logical do you find the order of the questions? Would you change the order of any questions? Why? How?

- What does the student's answer say about the nature of subject knowledge, and learning (see **C2** below). For example:

Science:	Maths
- ability to calculate, recall of information (e.g. different units of measurement, different equipments of measurements), recall of concepts, recall of representations (i.e. graphs)? - knowledge, understanding (recall of information, units, equipment, representation) - reasoning; - literacy, writing skills	- learning as recall, e.g. of definitions; learning as problem solving; - learning as guessing (they might have guessed the answers)

  Questions: Looking at your answer to Qx, what skills or knowledge do you think you were tested on? (e.g. ability to calculate, explain, use diagrams, predict, reason, recall information) How do you know? What in the question tells you about it? (this question may allow eliciting data on learner's understanding of the question)

C2. Perceptions of **LEARNING** and **TEACHING** in the particular subject?

LEARNING
- Is there any correspondence between how they learn in class and how they are examined? How do they show what they know in class? What opportunities for them to show their knowledge of X through classroom activities? How do they do this (e.g. orally, discussion, in writing?)
  Questions: Is this how you learned this subject?; Is this question familiar to you? (preparation); How often have you come across this activity in class?; Do you find it useful to learn about science? Why?/Why not?; What suggestions do you have to improve this activity and to help you learn better?

- Concept difficult to learn, e.g. rotation/revolving; volume & mass

> **Question:** What would make this activity better/clearer/easier/more helpful for you? (i.e. as a learning tool for Maths, Physics etc.)

- What are the assumptions about student learning and teaching in Maths, Science and English? (links with **C1** above):
Recall/Problem solving/Connecting subject to real life/Data driven analysis (e.g. lab work, figures)/Series of facts...

In England, for example, teaching of science has changed and has focused on understanding and discovery, not just definitions (but the science papers of Zanzibar seem to focus on overwhelmingly definitions with few items on problem solving, no items on how science works through investigation, no analysis of data (using data/evidence to make arguments/reach conclusions. They would seem to focus on recall/calculation/manipulation of numbers.

What are the assumptions about science and science experimentation?

For example: **2005 Biology, item 10, page 9**
This item demonstrates a strong positivist attitude towards science experimentation – what is the "correct" order of the experimentation. (Note: there is also a typo in the test item: dat**e** collection instead of dat**a** collection). This item is also interesting as it is probably an attempt to assess students' science skills/thinking processes but it turns out to be exactly the same as the other items in the examination paper, i.e. mainly tests recall and memorization of information.
This kind of item could be easily converted to be more interesting where students are presented with a problem and asked to report the process of solving the problem (i.e. what they have done to solve the problem). For example:

Put sugar in tea. What would happen to the weight of the tea if you put in tea and sugar which dissolves in the tea? Does the tea become heavier, the same, or lighter? (see #8 below with regard to engaging students in examination, and making examination items meaningful/interesting).

TEACHING
- Not taught in class so new content (Was this concept taught to you in the class? (briefly/ in detail/over one lesson/over several lessons))
- Covered in class but not understood (If so, how well do you think you understood it? (properly/ poorly)
- Language(s) use in class, e.g. was this concept taught through English only; Kiswhaili only? Both?
- Is it in the text book? (if there is one)
- Was blackboard used? If so, how used? (e.g. notes to copy; bullet points or full sentences?)
- Were any visual aids used? If so how helpful were they? Did they make explanation any clearer?
- What do they have to say about how they were taught, in particular how the specific subject matter/skills of the individual items.
- How well did they think this topic was taught in class?
Was it taught in the same way that it is tested? Same or different and if different, in which ways?

C3. Student Perceptions of their **OWN PERFORMANCE**

How well do they think they have done? An important part of this question has to do whether they think they have been able to show what they know/how much they know through the formal examining process

Appendix 2.1 - The construct base for the learner interviews

- How well do students think they have done on this item?
  Question: Do you think you got answer/item right, or wrong? Why (ask them to explain; but avoid overlap with **C1**)

- Could they have done better?
  Question: What would make this item better for you?
  (i) so that you can show what you know in Maths, Biology etc., i.e. how well did they think they did on the activity?
  (ii) as a learning tool for Maths, Physics etc.

- Is there something about the item that has constrained their performance (e.g. decontextualised item – see yellow box below)
  Question: Were there any parts in this question that you found difficult, not clear, confusing? (Language issues/ Understanding of concept as learning tool/ ability to apply additional knowledge, e.g. use of diagrams)

- How could they have done better? In what ways? Why?

A decontextualised (i.e. more abstract)   item/activity: has been described by Cummins as *context-reduced* as opposed to *context-embedded* which is contextualised & scaffolded in some way and hypothesised as being easier for English L2 learners.

"They are distinguished by the fact that in context-embedded communication the participants can actively negotiate meaning (e.g. by providing feedback that the message has not been understood) and the language is supported by a wade range of meaningful paralinguistic and situational cues; context reduced communication, on the other hand relies primarily (or at the extreme of the continuum, exclusively) on linguistic cues to meaning and thus successful interpretation of the message depends heavily on knowledge of the language itself. In general, context-embedded communication is more typical of the everyday world outside the classroom, whereas many of the linguistic demands of the classroom (e.g. manipulating text) reflect communicative activities which are closer to the context-reduced end of the continuum" (p138-139)

Figure 1: Range of contextual support and degree of cognitive involvement in communicative activities
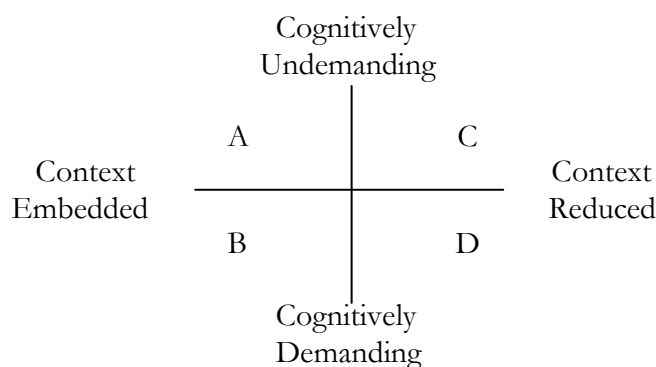
Drawing from Donaldson (1978), Cummins' quadrant (e.g. 1984) shows how the range of contextual support is linked to the degree of (hypothesised) cognitive complexity.

"The upper parts of the vertical continuum consist of communicative tasks and activities in which the linguistic tools have become largely automatized (mastered) and thus require little active cognitive involvement for appropriate performance. At the lower end of the continuum are tasks and activities

in which the communicative tools have not become automatized and thus require active cognitive involvement. Persuading another individual that your point of view is correct and writing an essay are examples of quadrant B and D skills respectively" (p. 139).

For example, it is hypothesised that diagrams facilitate access to a question such that an abstract and conceptually demanding area in maths or science might be communicated through some additional support such as a diagram or table (quadrant B in Figure 1 above). Thus: does having a diagram support the students in any way? Neither supports nor hinders? Confuses the student?

For example:

Biology 2005, viii (item on sunlight/photosynthesis)
- what story is this diagram telling? [also informs on 'nature of science' and 'what is being tested];   - what is happening in this diagram? [also potentially informs on how photosynthesis is taught/learned];   - does the diagram help you? If so, how? If not, can you say why not?

- Is the assessment fair, credible, relevant to 'real life'?
  Questions: Do you think your answers to these questions would show what you've learned? If not, what kind of items/questions you would like to be tested?

C4. Perceptions of **LANGUAGE** used in an item/activity: instructions and response required in relation to lexis, syntax, genre, register.

- What is the language of the item/activity:
  Which aspects of language are required in order to best (a) process the item and (b) answer the item, i.e. what is the nature of 'language' required in a response
- What is it about the use of English (in the items and in their performance) that may constrain /promote the students' responses?
- Do they understand the instructions and what they have to do? [this question can build on C1 and what the students think this item is measuring]
- Their perceptions re grammar (syntax), vocabulary, register, genre

C4.1. Vocabulary: familiar/known vs. new terminology: new or known

Some terms (e.g. pressure) are part of everyday life vocabulary, but take on new and specific meaning(s) in science subjects. There may be certain assumptions by the item writers: firstly that the students have learned certain language/scientific language (but only in classroom), and secondly that students have learned to differentiate the everyday words and their meanings from those that take on different meanings in the science subjects.
Questions: Can you underline any words that you don't know in this item?; Can you guess what this word means (with reference to an underlined word)? Then check on any words you think might be difficult that they haven't underlined e.g. can you tell me what XX is in Kiswahili?

C4.2. Syntactic complexity: to what extent does the syntax used in the question support/inhibit students' responses?
Question: Were there any linguistic structures in this question that found hard to process/ did not understand/ was not sure about? Were there any questions in this paper that you found very clear in terms of how they were formulated? (even if you did not know the answer to them) Were there any

questions which you though were grammatically inaccurate in places? Could you still process them? If so, what helped you to process them? How would you reformulate such questions?

C4.3. Genre in subject learning: what are the different genres in the Science and Maths teaching and learning observed in the Examination Papers (and in the observational data of Study 4).
For example:

Science:		
Main Purpose	**Genre**	**Staging/Organisation**
Doing Science	Procedure	Aim Materials Needed Steps
	Procedural Recount	Aim Record of Events Conclusion
Explaining Events Scientifically	Sequential Explanation	Identification of Phenomena Temporal Sequence
	Causal Explanation	Exemplification of Phenomena Implication of Sequence
	Theoretical Explanation	Identification of Phenomena Statement of Theory
	Factorial Explanation	Input Factors Reinforcement of Factors
	Consequential Explanation	Outcome Consequences Reinforcement of Consequences
Organizing Scientific Information	Descriptive Report	Identification Description
	Taxonomic Report	Classification Description of types/parts
Arguing Using Science	Exposition	Thesis Arguments Reinforcements of thesis
	Discussion	Issue Argument Thesis/Position

From Veel (1997:171), key genres in school science

Question: Did you have to use specific form/style/genre of language to answer this question? (arguing, exploring, explaining cause effect relationships, in literacy – formal/informal styles) Did this helped or prevented you from articulating your answer successfully/clearly?

C4.4. Register issues: [as with the above, this will link to data from Study 4 and the nature of classroom discourse]
Question: Does the English language of your class teacher differ from the English language used in this test paper? If it does, which one do you find easier to process? Did your exposure to hearing you class teacher speaking in English help you to process the content/meaning of the questions set in this test paper?

C4.5. Choice of language in examinations.
Questions: What language would you like to be used in formal examinations? Why?;
e.g. If the items were in Kiswahili, what difference would this make for you?; If you had a choice in the exams, what would you choose:
- Exam all in Kiswahili and respond in writing in Kiswahili
- Exam all in Kiswahili and respond in writing in English
- Exam all in Kiswahili and respond orally in Kiswahili

Appendix 2.1 - The construct base for the learner interviews

- Exam all in Kiswahili and respond orally in English
- Having right to choose between two languages: Exam paper, that is, each question in it is given in both English and Kiswahili and respond in allowed in either language. For example, student may choose to answer questions 3,5,7 in English, and questions 1,2,4,6 in Kiswahili.

C5. Perceptions of **EASE** and **DIFFICULTY**? What makes one activity easy and another difficult?
Questions: Is the question easy/difficult to understand? Explain why?; Which was the easiest/most difficult question? Explain/

Possible reasons why an item is easy or difficult:
* (Too) abstract as a concept (e.g. mass / volume distinctions)?

For example:
Biology 2005 question 10: - maybe this Experiment Flow is too abstract for the students (in addition it is an abstract and decontextualised item)
Questions: Why did you choose this order?; Would another order be OK?; Have you done science experiments in class?; Give me an example of one or two? (i.e. Can they give examples that show they understand the subject knowledge?)

Physics 2006 question X: - the test item is probably getting at textbook knowledge but it would be surprising if any students really understand what is "fundamental quantity"
Is there a language issue here? (**see C3** above: is "fundamental quantity" a term actually used in the textbook? Or is it a correct term in English? Is "fundamental quantity" new English vocabulary to the students?)
Question: Can you tell me/explain to me what 'fundamental quality' is?

Physics 2005 question 20: - Another example of a decontextualized test item about what colour absorbs more heat (Note; double check the paper). Sibel presents a very interesting example of how this kind of knowledge may be tested in an interesting way: using cars as examples to link to daily life, and stimulate students to make reasoning/judgement – which would make the test item more engaging (Note: ask a photocopy of this example from Sibel).

p.8 (physics), why am I pulling the scale (this item is an example of the decontexualized items).

* Just too difficult for Form 2 students?
The students may be able to get a correct answer, but do not necessarily understand the concept. For example, in 2005 Chemistry examination paper, the question on periodic table may require A-level knowledge (in England). The Form II students may not understand at all the so-called f-, d-, s-blocks. It seems that there could be a lack of appreciation of students' views. Could Form 2 students really be expected to understand these models so are the items only assessing students' memorization
* Is ease/difficulty related to the layout of the item?
* Is ease/difficulty related to the format/type of item?
* Linguistically inaccessible – see C3 above
* Was not taught – link to C6: teaching issues

C6. Perceptions of **ASSESSMENT and TEACHING**
* How do they usually do (perform) in their [subject] exams? What grades/marks do they typically get in (i) exams and (ii) teacher /class tests?
* Do they do better in class than in exams?
* Are they assessed in class? If so how does their teacher assess them?

Appendix 2.1 - The construct base for the learner interviews

- How do they know how well they have done in class? Grades, teacher feedback (what form?)
- Any self- and/or peer-assessment opportunities in class (more a question for Study 4 and the observational data captured there)

Questions: Do you like to be assessed through formal examinations? Do you like examinations? If yes/no, then why? Do you get any assistance when taking an exam? If yes, what kind? What factors do you think make you do well/not so well in exams? Explain. Do you think that you perform better in a class or exam setting? Do you get any feedback from the teacher on your performance in the class? If so, what kind of feedback is this? How regular is it? How helpful do you find it?

C7. What have we not covered? Equal opportunities for learning
Maybe we should also ask learners about how they feel gender issues may affect their performance? For example, do you feel that in the class your teacher helps/ provides feedback / interacts more with some learners than with others? If so, are these boys or girls who get most attention? Sharing resources - how fair is it? Showing an experiment – everybody have an equal chance to see properly how it is carried out? Try themselves? Explain what they learned, observed? Interact with the teacher?

D. SUMMARY OF EXEMPLAR QUESTIONS FOR THE INTERVIEWS

1. Student perceptions of the item/**activity,** in particular what content / skills / understandings they think is being assessed?

   - I don't understand what this question is about. Can you explain what you are supposed to do?
   - What makes A right? What makes B wrong?
   - How did you select your 'right' answer? How did you not select (eliminate the other answers?)
   - Does answering one question help you answer another/following question? Are there any clues in the questions that help you answer them? How logical do you find the order of the questions? Would you change the order of any questions? Why? How?
   - Looking at your answer to Qx, what skills or knowledge do you think you were tested on? (e.g. ability to calculate, explain, use diagrams, predict, reason, recall information) How do you know? What in the question tells you about it? (this question may allow eliciting data on learner's understanding of the question)

2. Perceptions of **learning** and **teaching** in the particular subject? – recall, problem solving, connecting subject to real life, data driven analysis, series of facts

Learning:
   - Is this how you learned this subject?
   - Is this question familiar to you? (preparation)
   - How often have you come across this activity in class?
   - Do you find it useful to learn about science? Why?/Why not?
   - What suggestions do you have to improve this activity and to help you learn better?
   - What would make this activity better clearer/easier/more helpful for you? (i.e. as a learning tool for Maths, Physics etc.)

Teaching:
   - Was this concept taught to you in the class? (briefly/ in detail/over one lesson/over several lessons) If so, how well do you think it was taught?
   - How well do you think you understood it? (properly/ poorly)
   - Was this concept taught through English only; Kiswhaili only? Both?
   - Is it in the text book? (if there is one)

Appendix 2.1 - The construct base for the learner interviews

- Was blackboard used? If so, how used? (e.g. notes to copy; bullet points or full sentences?)
- Were any visual aids used? If so how helpful were they? Did they make explanation any clearer?
- Was the concept taught in the same way that it is tested? Same or different and if different, in which ways?

3. Perceptions of their **own performance**: how well do they think they have done?

- Do you think you got answer/item right, or wrong? Why?
- What would make this item better for you?
    (i) so you can show what you know in Maths, Biology etc., i.e. how well did they think they did on the activity?
    (ii) as a learning tool for Maths, Physics etc.
- Were there any parts in this question that you found difficult, not clear, confusing? (Language issues/ Understanding of concept as learning tool/ ability to apply additional knowledge, e.g. use of diagrams)
- Do you think your answers to these questions would show what you've learned? If not, what kind of items/questions you would like to be tested?

4. Perceptions of **language** used in an item/activity: instructions and response required in relation to lexis, syntax, genre, register.

- Can you underline any words that you don't know in this item?
- Can you guess what this word means (with reference to an underlined word)?
- Then check on any words you think might be difficult that they haven't underlined e.g. can you tell me what XX is in Kiswahili?

- Were there any linguistic structures in this question that found hard to process/ did not understand/ was not sure about? Were there any questions in this paper that you found very clear in terms of how they were formulated? (even if you did not know the answer to them) Were there any questions which you though were grammatically inaccurate in places? Could you still process them? If so, what helped you to process them? How would you reformulate such questions?

- Did you have to use specific form/style/genre of language to answer this question? (arguing, exploring, explaining cause effect relationships, in literacy – formal/informal styles) Did this helped or prevented you from articulating your answer successfully/clearly?

- Does the English language of your class teacher differ from the English language used in this test paper? If it does, which one do you find easier to process? Did your exposure to hearing you class teacher speaking in English help you to process the content/meaning of the questions set in this test paper?

- What language would you like to be used in formal examinations? Why?;e.g. If the items were in Kiswahili, what difference would this make for you?; If you had a choice in the exams, what would you choose:

- Exam all in Kiswahili and respond in writing in Kiswahili
- Exam all in Kiswahili and respond in writing in English
- Exam all in Kiswahili and respond orally in Kiswahili
- Exam all in Kiswahili and respond orally in English

Appendix 2.1 - The construct base for the learner interviews

- Having right to choose between two languages: Exam paper, that is, each question in it is given in both English and Kiswahili and respond in allowed in either language. For example, student may choose to answer questions 3,5,7 in English, and questions 1,2,4,6 in Kiswahili.

5. Perceptions of **ease** and **difficulty**? What makes one activity easy and another difficult?

- Is the question easy/difficult to understand? Explain why?; Which was the easiest/most difficult question? Explain/
- Why did you choose this order?
- Would another order be OK?;
- Have you done science experiments in class?;
- Give me an example of one or two? (i.e. Can they give examples that show they understand the subject knowledge?)
- Can you tell me/explain to me what 'fundamental quality' is?

6. Perceptions of **teaching** and **assessment**:

- Do you like to be assessed through formal examinations?
- Do you like examinations? If yes/no, then why?
- Do you get any assistance when taking an exam? If yes, what kind?
- What factors do you think make you do well/not so well in exams? Explain.
- Do you think that you perform better in a class or exam setting? Do you get any feedback from the teacher on your performance in the class? If so, what kind of feedback is this? How regular is it? How helpful do you find it?

7. Perceptions on equal opportunities for learning

- Do you feel that in the class your teacher helps/ provides feedback / interacts more with some learners than with others?
- If so, are these boys or girls who get most attention?
- Sharing resources - how fair is it? Showing an experiment – everybody have an equal chance to see properly how it is carried out? Try themselves? Explain what they learned, observed? Interact with the teacher?

ENGLISH – PART I

SECTION A 1
READING SKILLS
ANSWER ALL QUESTIONS

Reading Passage A 1
Read the following passage very carefully then answer the questions that follow it:

Whales and man are warm-blooded, air breathing mammals. Whales have lungs and need to come to the surface of the sea to breathe air. They can be separated into two groups, the baleen whales and the toothed whales.

There are about twelve species of baleen whales, all feeding on small plankton organisms. The baleen whales feed by swimming through vast shoals of plankton with mouths open.

The toothed whales feed on fish and squid which they have to chase in deeper water. Some of these whales can dive to great depths.

The largest animal that has never lived on this planet is the blue whale, which can grow to 100 feet (30 metres) and about 100 tons in weight.

Questions
Give out short, clear and meaningful answers.

1. What are the four living things mentioned in the passage?
_____
_____

2. How many mammals are shown in the story? Name them_____
_____
_____

3. What are the four things that man could resemble whales?
_____

4. Write the letter of the correct answer in order to answer the question:

We can tell that the story from the passage is about: (   )
    A. The largest living mammals
    B. The feeding habit of living things
    C. How whales grow
    D. The man and the warm-blooded animals

READING PASSAGE 2
Read the passage very carefully than answer the questions that follow.

The next morning Salahadin went with Leila and Fuad to the Cairo Museum. They took the Black Cat with them. They met a friend called Faisal who worked in the museum.

Salahadin gave the Black Cat to Faisal and told him the story.

'It looks old', said Faisal, and perhaps its valuable. But I don't know about the gold and diamonds, I'll have to look at it carefully'.

Salahadin, Leila and Fuad, went and had some coffee. They came back to the museum about two hours later.

'Well, what's the answer'? Asked Fuad. 'It's very old', replied Faisal. 'But it's not made of gold and there are no diamonds. The eyes and collar are made of stone. The cat is made of heavy kind of wood'.

'So, It isn't valuable', said Leila, 'Seven men have died for a piece of wood.'

'No, you're wrong', said Faisal. 'It's very, very valuable. It's more than two thousands years old. The gold and diamonds aren't important'.

'Perhaps there really was a gold cat', said Salahadin. 'Perhaps tomb robbers stole the real cat thousands of years ago. Then they put this wooden cat into the tomb'.

'We'll never know', said Fuad. 'But we are lucky to have this one'

'Yes, we are lucky', said Faisal. Can we have it for our museum'?

'Of course you can' replied Salahadin. 'This is the right place for it'.

'Come back in November', said Faisal. 'Then you will see the Black Cat in its right place'.

'And we'll come back, too', said Leila. 'Fuad's been working too hard. He needs a real holiday. We'll come back to Cairo for two weeks in November'.

'That's a good idea', said Faisal. 'I'll see you all then'.

Six months later, Salahadin was sitting in his office. Summer was over and the weather was getting cool. The telephone rang.

'You remember your promise, don't you?' Asked Faisal.

'My promise?'

'To come to the museum,' continued Faisal. 'The new room is going to be opened tomorrow at ten o'clock'.
'Oh –of course', said Salahadin. 'I'll be there'.

The next morning, there was a crowd of people in the museum. Faisal met Salahadin and took him to the room. There was a large notice outside the door.

THE TREASURES OF ANKUTEN

Archaeologists had found the tomb of An-kuten. Pearson's map had helped them. They had brought many things from the tomb to Cairo. They were all in this room.

Ahmed was standing in the middle of the room. He was talking to Fuad and Leila. The taxi driver who had taken Boorkman to Cairo station was there, also. Salahadin went there to say hello.

'Do you see what's behind me'? Asked Ahmed. There, in the centre of the room, was a large glass case. The black cat was inside. Underneath there was a notice:

> **The Black Cat Ankuten**
> **Given by Salahadin El Nur**

QUESTIONS FOR READING PASSAGE A 2
Character Grid

2a. Complete the character grid by putting (√) in the appropriate space in relation to the information given. One has been done for you as an example.

	Worked in the museum	Stole the Cat	Needs a holiday	Was with Fuad, Ahmed and Leila	Suggested a place for the Cat	Kept a promise
ROBBERS						
FAISAL						
SALAHADIN					√	
FUAD						
TAXI DRIVER						

SUMMARY
2b. Complete the following summary according to the passage given above.

At last the three 1_____went to the 2_____ Museum. Salahadin gave 3 _____ the Black Cat for the 4 _____ The Cat was very 5 _____ and was very 6 _____ Together with the Black Cat there were many 7 _____ from the 8 _____to Cairo. Finally, Faisal found the right 9 _____ for the Black 10 _____.

ENGLISH – PART II

SECTION B
STRUCTURE
Answer all questions from this section. Underline the right answer from the bracket for each sentence.

3a. Construct meaningful sentences using the given word for each number.
(a)   (Slowly) _____

_____

(b)   (Between) _____

_____

(c)   (Strongest)_____

_____

(d)   (Happily)_____

_____

(e)   (True)_____

_____

b. Rewrite the sentences according to the instructions given after each sentence.
i)   His friend name is Rashid

     (Punctuate) _____

ii   Nihifadhi didn't know the man. The man came in her room last week.
     Join by using _____who_____)

     _____

iii)   Wahida answers some questions.
       (Put it into negative)
       _____

4. Write a letter to your friend KAWAONE, whom you will visit during your holidays. The letter should contain the following details.

- Reason(s) for visiting him/her.
- Your arrangement for the journey
- Means of getting to the station.
- Day, date and time of your arrival
- The place where he/she could collect you.
- Your name is TUWENAO

CHEMISTRY

Question 1:   Write the letter of the most correct answer in the brackets against each question.

Example

The element which is not an alkali metal is

A: Potassium   B: Calcium
C   Lithium   D: Sodium   (B)

i) The electronic configuration of an element is 2:6, therefore its valency is equal

      A: 1   B: 3   C: 2   D: 6   (   )

ii) Pure water boils at

A: 50°C   B: 70°C
C: 100°C   D: 80°C   (   )

Question 2: What do you understand by the following terms

a)   Solution_____

      _____

b)   Dilute solution_____

      _____

c)   Concentrated solution_____

      _____

Question 3: Complete and balance the following equations

a) $Ca(OH)_2 + H_2SO_4$ ⟶

b) $Na + H_2O$ ⟶

c) $ZnCo_3 + HCl$ ⟶

Question 4: Name the process that could be used to obtain the named compound in the following mixture

a)   Coconut oil from water
      Process is_____

b)   Iodine and sand
      Process is_____

Appendix 2.2 – Original test items

c)   Salt from salt solution
Process is_____

Question 5: Explain the complete meaning of the following

a)   2 H_2SO_4_____

_____

b)   5 $CuCl_2$_____

_____

c) S_8_____

_____

BIOLOGY

Question 1: The following are matching items. Match the statement in List A with the correct one in List B. Write its number against the space provided.

List A	List B
i) _____ Glass of orange juice	**1.** Potometer
ii) _____ Top halves of the heart	**2.** Diarhoea and vomiting
iii) _____ Salmonella	**3.** Hydrometer
iv) _____ Depends on one another	**4.** Eukaryotes
v) _____ Does not secrete digestive juice	**5.** Sweat and urine
vi) _____ Measure the rate of water loss in plants	**6.** Salivary glands
vii) _____ Carries blood from main aorta to the kidney	**7.** Villus
viii) _____ Organism with no nuclei	**8.** Atriums
ix) _____ Human wastes	**9.** Oesophagus
x) _____ Digest and absorbs food	**10.** Ventricles
	11. Prevents Scurvy
	12. Renal artery
	13. Prokaryotes
	14. Refreshes the body
	15. Renal vein
	16. Ileum
	17. Parasites
	18. Symbionts

Question 2: List down characteristic similarities and differences between birds and mammals

Mammals	Birds
Similarities	
1.	1.
2.	2.
Differences	
1.	1.
2.	2.

Question 3: Give a brief explanation on what will happen on the following: A locust not suffocating when its head is immersed in water while the remaining part of body is outside.

_____

_____

_____

Appendix 2.2 – Original test items

Question 4: Study the diagram below and answer the questions that follow.

i) **Label the parts A, B, C**

A_____

B_____

C_____
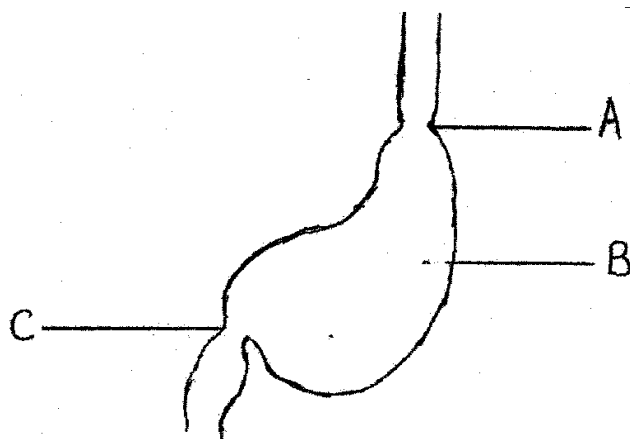
ii) **What does the above diagram represent**

_____

Question 5: Draw a well labelled diagram of an anterior views of a thoracic vertebrae

Question 6:

a) State as precisely as you can where in the human you would find:

     A. The radius_____

     B. Synovial fluid_____

     C. The humerus_____

     D. The tibia_____

     E. Phalanges_____

     F. The femur_____

     G. Carplas_____

     H. The scapula_____

b) Cigarette smoking is dangerous to health. Give two reasons explaining why?

_____

_____

_____

_____

_____

MATHEMATICS

Question 1: Which of the following fractions are equal?

$$\frac{4}{15} \ , \quad \frac{7}{30} \ , \quad \frac{1}{4} \ , \quad \frac{16}{60} \ , \quad \frac{4}{20}$$

$\frac{4}{15}$ = _____

_____

_____

$\frac{7}{30}$ = _____

_____

_____

$\frac{16}{60}$ = _____

_____

_____

_____, _____, _____are equal

Question 2: Given that $a^2 - b^2 = (a+b)(a-b)$. Evaluate $(204)^2 - (196)^2$

$(204)^2 - (196)^2 =$

_____

_____

_____

_____

_____

Question 3: Solve

$4x - \frac{3}{4} > 2x + \frac{1}{4}$

_____

_____

_____

_____

Question 4: Calculate the lateral angles in the figure below

(7½ marks)

_____
_____
_____
_____
_____
_____
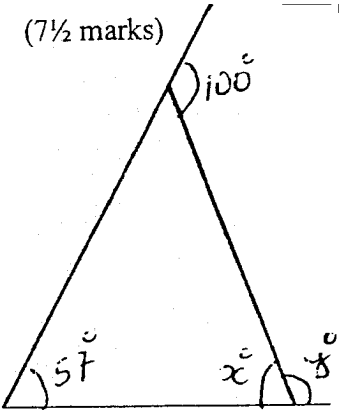
Question 5: In a certain hotel of 30 customers, 17 enjoy Cocacola, 19 enjoy Fanta and 2 do not enjoy either. Fill in the venn diagram below and use it to find how many enjoy:

i) Cocacola only?

_____
_____
_____
_____
_____
_____
_____

$U =$

(3 marks)

(1 mark)

_A_

_B_
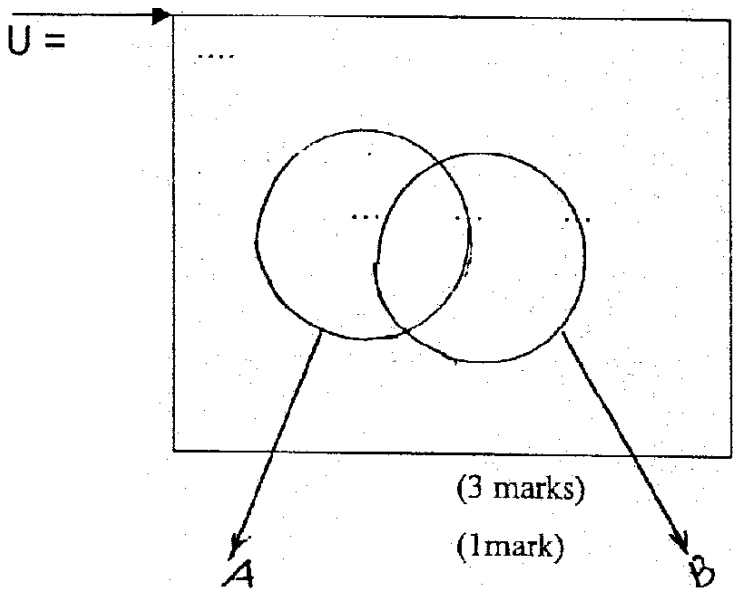
ii) Fanta only?

_____
_____

iii) Both Cocacola and fanta?

_____
_____
_____

59

Appendix 2.2 – Original test items

Question 6: The combined ages of Juma and Asha are 10 years. The difference of Asha's age from twice Juma's age is 8 years. Find the ages of each one.

(03 Marks)

_____

_____

_____

_____

_____

_____

_____

_____

_____

Question 7: The table below shows the age group of children in a class.

Age	10	11	12	13	14	15
F	3	2	5	4	2	4

Use the table to find out:

i) The number of children below 14 years

_____

_____

_____

_____

ii) The % of children who are 12 years old in a class

_____

_____

_____

_____

Question 8: Find each of the following quotients leaving your answers in standard form

a) $\dfrac{7 X 10^4}{28 X 10^{-2}} =$ _____

_____

_____

b) $\dfrac{2 X 10^4}{5 X 10^2} =$ _____

_____

_____

c) $\dfrac{2X10^{-5}}{4X10^{-6}} =$ _____

_____

_____

Question 9: The figure below represents an equation of y = $\dfrac{-x}{2}$ +3. Find value of x at A and y at B.

At A: _____

_____

_____

$y = \underline{x} + 3$
    2
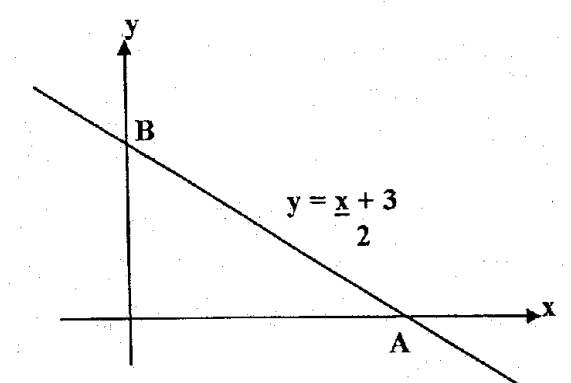
At B: _____

_____

_____

Appendix 2.3 – Targeted Learner interviews: achieve

Learner and Teacher Interview audio data – July – August 2008

	Learner Interview						Teacher interview							
							Post-Observation				Assessment			
	1	2	3	4	5	6	BI	EN	MT	CH	BI	EN	MT	CH
School A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
School B	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
School C	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓
School D	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	
School E	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
School F	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
School G	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
School H		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓

Mathematics

Task 1a: This table shows the age of children in a class.

Age	10 years	11 years	12 years	13 years	14 years	15 years
Number of children	3	2	5	4	2	4

Find out:

i) The total number of children under 14 years old

ii) The % of children who are 12 years old in the class

Answer:

Task 1b: This table shows the age of children in a class.

Age	10 years	11 years	12 years	13 years	14 years	15 years
Number of children	3 children	2 children	5 children	4 children	2 children	4 children

Find out:

i) The total number of children younger than 14 years old

ii) The percentage (%) of children who are 12 years old in the class

Answer:

Task 1c: This table shows the age of children in a class.

Age	10 years	11 years	12 years	13 years	14 years	15 years
Number of children	3 children	2 children	5 children	4 children	2 children	4 children

Use the card from the envelope to help you find out:

i) The total number of children younger than 14 years old

ii) The percentage (%) of children who are 12 years old in the class

Answer:

Task 1d: Translate into Kiswahili (Tafsiri kwa Kiswahili)

This table shows the age of children in a class.

Age	10 years	11 years	12 years	13 years	14 years	15 years
Number of children	3	2	5	4	2	4

Find out:

i) The total number of children under 14 years old

ii) The % of children who are 12 years old in the class

Your translation:

Task 1e: Jadweli hii inaonesha umri wa wanafunzi katika darasa.

Age	10 years	11 years	12 years	13 years	14 years	15 years
Number of children	3	2	5	4	2	4

Tafuta:

i) Jumla ya watoto walio chini ya umri wa miaka 14

ii) Asilimia ya watoto walio na umri wa miaka 12 katika darasa

Children in class

10 years old

11 years old

12 years old

13 years old

14 years old

15 years old
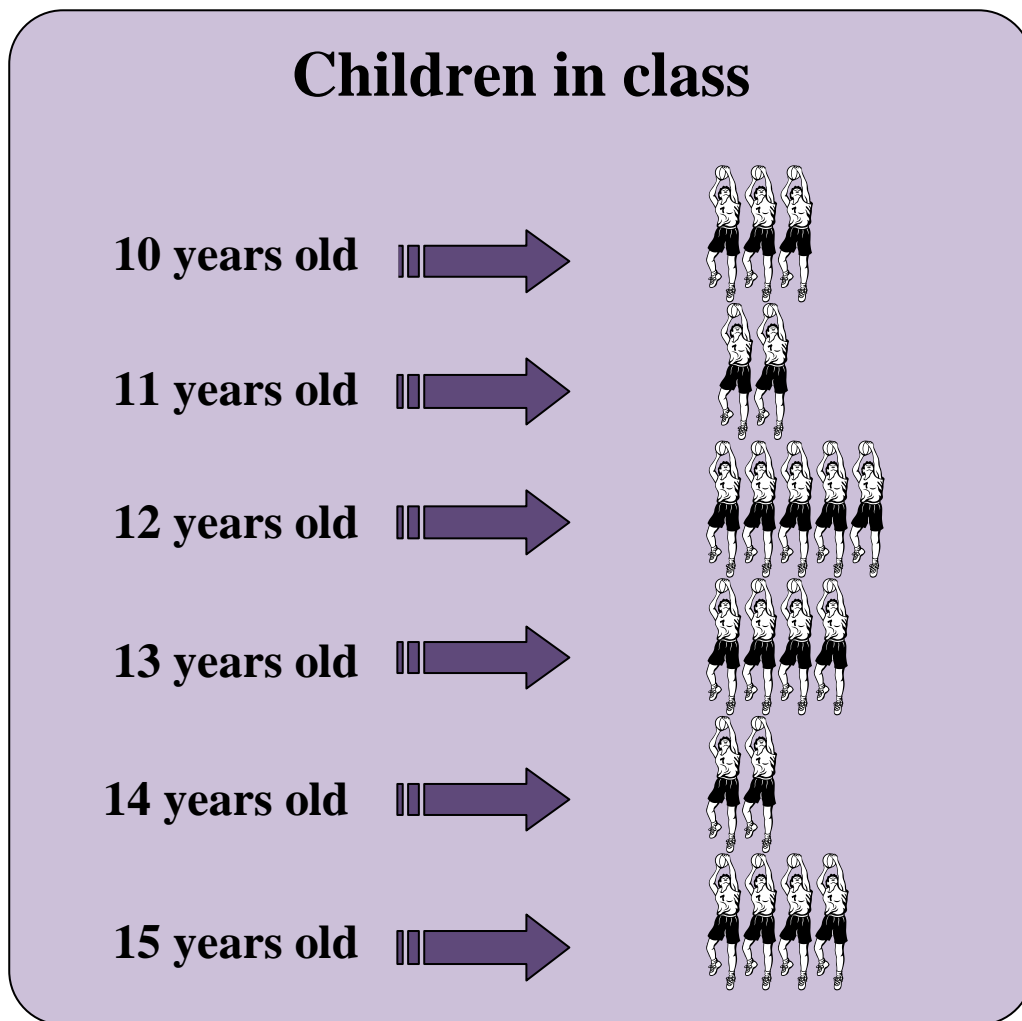
Instructions for the researchers:

Part I:
1. Hand out **Task 1a.** Give learners **10 minutes** to do this task **individually**. Collect **Task 1a.**
2. Hand out **Task 1b.** Give learners **10 minutes** to do this task **individually**. Collect **Task 1b.**
3. Hand out **Task 1c** and **Envelope 1**. Give learners **10 minutes** to do this task **individually.** Collect **Task 1c** and **Envelope 1.**
4. Hand out **Task 1d**. Give learners **10 minutes** to do this task **individually**. Collect **Task 1d.**
5. Hand out **Task 1e**. Give learners **10 minutes** to do this task **individually**. Collect **Task 1e.**

Part II:
1. Invite learners to work in groups or pairs. Ask them to discuss the tasks just completed.
- Which task was the easiest? Why?
- Which was the most difficult? Why?
- What helped you to do the task(s)?

2. Invite learners to work in small groups. Discuss:
- Which task was the easiest? Why?
- Which was the most difficult? Why?
- What helped you to do the task(s)?

3. Plenary session/discussion. Share the ideas/views with the researchers and other learners.
N.B. Throughout tasks - as learners complete the tasks take pictures of their work.

Appendix 2.4 Modified test items – TL Workshop

Task 2a: The combined ages of Juma and Asha are 10 years.
The difference of Asha's age from twice Juma's age is 8 years.
Find out:
How old is Juma?
How old is Asha?

Task 2b: The combined ages of Juma and Asha are 10 years.
The difference of Asha's age from twice Juma's age is 8 years.
Use the cards from **Envelope 1** to help you find out:
How old is Juma?
How old is Asha?

Task 2c: The combined ages of Juma and Asha are 10 years.
The difference of Asha's age from twice Juma's age is 8 years.
Use the cards from **Envelope 2** to help you find out:
How old is Juma?
How old is Asha?

Task 2d: Translate into Kiswahili (Tafsiri kwa Kiswahili)
The combined ages of Juma and Asha are 10 years.
The difference of Asha's age from twice Juma's age is 8 years.
Find out:
How old is Juma?
How old is Asha?
Your translation:

Task 2e: Umri wa Juma na wa Asha ukichanganywa ni miaka 10.
Katika umri wa Asha ukitoa umri wa Juma uliozidishwa mara mbili jawabu yake ni miaka 8.
Tafuta:
Je , Juma atakuwa na umri gani?
Je, Asha atakuwa na umri gani?

Envelope 1 (2b)

+	=	x	y	10

−	8	x2	x	y	=

Envelope 2 (2c)

Asha's age (**y**)	Combined (**+**)	Juma's age (**x**)	**10 years**	**=**

Juma's age (**x**)	Twice (**x 2**)	Asha's age (**y**)	Difference (**−**)	**=**

8 years

Appendix 2.4 Modified test items – TL Workshop

Instructions for the researchers:

Part I:
1. Hand out **Task 2a.** Give learners **10 minutes** to do this task **individually**. Collect **Task 2a.**
2. Hand out **Task 2b** and **Envelope 1.** Give learners **10 minutes** to do this task **individually**. Collect **Task 2b.**
3. Hand out **Task 2c** and **Envelope 2**. Give learners **10 minutes** to do this task **individually.** Collect **Task 2c** and **Envelope 1.**
4. Hand out **Task 2d**. Give learners **10 minutes** to do this task **individually**. Collect **Task 2d.**
5. Hand out **Task 2e**. Give learners **10 minutes** to do this task **individually**. Collect **Task 2e.**

Part II:
1. Invite learners to work in groups or pairs. Ask them to discuss the tasks just completed.
- Which task was the easiest? Why?
- Which was the most difficult? Why?
- What helped you to do the task(s)?

2. Invite learners to work in small groups. Discuss:
- Which task was the easiest? Why?
- Which was the most difficult? Why?
- What helped you to do the task(s)?

3. Plenary session/discussion. Share the ideas/views with the researchers and other learners.
N.B. Throughout tasks - as learners complete the tasks take pictures of their work.

BIOLOGY

Task 1:

Picture A
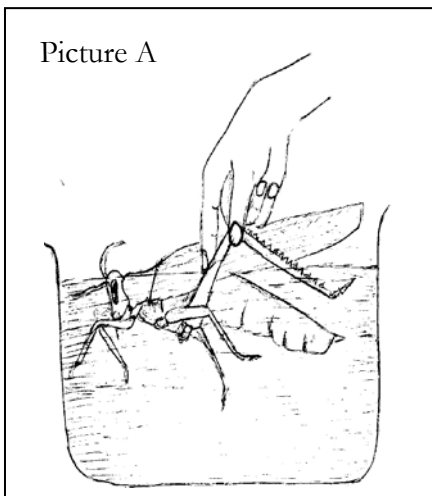
In picture A the boy is dipping the locust in water. Look at the locust. All of its body is covered with water.

Picture B
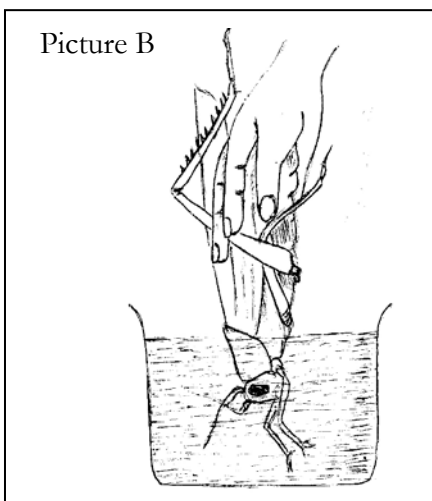
In this picture (Picture B) the young boy is dipping the head of the locust in water. Look at the locust's head. It is all covered in the water, but the other part of its body is not in the water.

Questions:

a) In which picture do you think the locust will/may die?

_____
_____
_____

b) Why do you think it will/may die?

_____
_____
_____

Task 2:
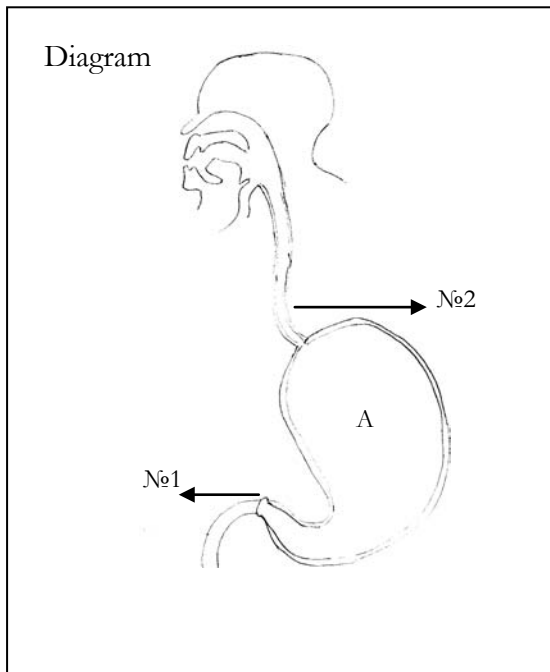
Diagram

№2

A

№1

The diagram above shows an organ in the human body. The organ is labelled letter A. Look at it carefully and then answer the following questions by choosing the correct answer from the bracket.

a) What is the name of this organ (pancreas, stomach, liver)?

_____

b) What is the name of the part labelled with number 1 (duodenum, pyloric sphincter, gall bladder)?

_____

c) What is the name of the part labelled with number 2 (trachea, bile duct, oesophagus)?

_____

CHEMISTRY

Original chemistry question: What do you understand by the following terms?

(a) Solution   (b) Dilute Solution   (c)Concentrated Solution

_____ _____ _____
_____ _____ _____
_____ _____ _____
_____ _____ _____
_____ _____ _____

Dilution task: Revised

We will give you two envelopes with some cards.
The cards have some pictures and words.
We would like you to write up sentences using the words.
Put your sentence next to a picture that goes with it.
When you finish, explain your how you made your sentence and why you put it next to picture.

My sentence is…… (in Kis)
The picture that goes with my sentence is… (in Kis)
I chose the words and the picture because… (in Kis)

lower	higher

together	A	both	or	and	below

where	is	which	big	the	little

These are 2 pictures of solutions.
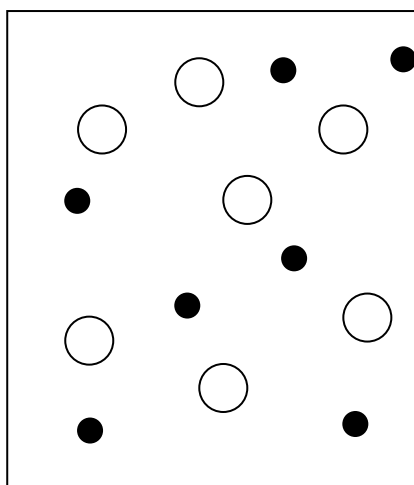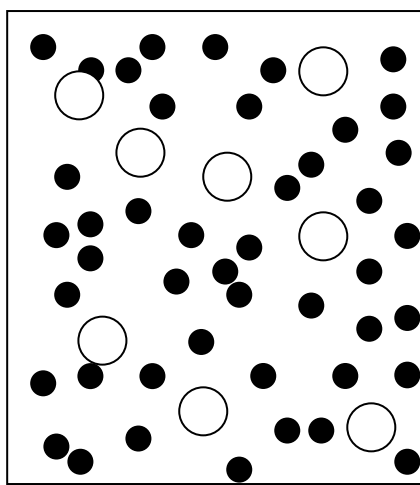
PICTURE A   **PICTURE B**

Dilute	Solution	Solvent	Solvent	Concentrated

Mixture	Concentrated	Solute	Mixture	Molecule

Concentration	Atom	Dissolve	Molecule	Solute	Ion

Revision rationale:

Scaffold with (a) visual, (b) vocabulary; (c) grammar; (d) language medium

GUIDELINES FOR TASKS
Original test item already completed/conducted (in English)
At Learner Workshops (questions in Kis/English bilingually):

INDIVIDUAL SENTENCE CONSTRUCTION (KiS MODIFICATION)
1. First, distribute a KiS translation of the original test item with no other modifications. Learners will do this individually. Take Photograph of individual sheets.

INDIVIDUAL WORK WITH REVISED RESOURCES (ENGLISH MODIFICATION)
2. Second, get students to do the revised version individually. Distribute the directions and ask them to glue words/pictures on poster paper and write name on the poster (take photo/picture of the final product). Ask them to complete the writing frame in KiS to explain the reasons for selection/construction.

PAIR WORK TO CONTRAST (KiS)
3. Third, ask students to compare their sentences in pairs. Ask them to talk about how they got the answer. Prompt if necessary.eg. Did you change your mind? How?

PAIR PRESENTATION TO WHOLE GROUP (ENGLISH)
4. Fourth, ask the pairs to present their work in English to the rest of the group. -- 5 Groups (5 schools, 30 learners, 5 groups of 6, 3 pairs). Present pair work. E.g. What was your answer and why?

PLENARY DISCUSSION
5. Finally, get everyone to evaluate the tasks. They might need to be reminded by reviewing the 3 version (Original English, KiS and revised). Ask, which exercise was the easiest and why? What made it easy? What made it difficult? Can you give an example of what made it easy/difficult?
6. Probe further if these examples don't get mentioned. Give an example of how (Kis/picture/words) helped or didn't help.
7. Extension: If you were the teacher, how would you ask this question? Did you say/write anything differently? What would you say?

DATA TO COLLECT:

1. Individual sentences – PHOTOGRAPH (CAMERA)
2. Pair discussion – AUDIO TAPE (DIGITAL VOICE RECORDER)
3. Plenary discussion – VIDEOTAPE (CAMCORDER)

Appendix 3.2 Data archive for modified exam items

Original exam items – Chemistry

Learner	Gender	Teacher assessment level	Form II exam result	Score		Chemistry test paper Question 1: Write the letter of the most correct answer in the brackets against each question. Example: The element which is not an alkali metal is A: Potassium B: Calcium C Lithium D: Sodium (B) i) The electronic configuration of an element is 2:6, therefore its valency is equal A: 1 B: 3 C: 2 D: 6 ( ) ii) Pure water boils at A: 50°C B: 70°C C: 100°C D: 80°C ( )		Researcher's comments, categories, observations
						Learner answers	Learner comments	
A1	M	3		0	2	i) A ii) C		
A2	F	3		0	2	i) B ii) C		
A3	M	2		0	2	i) A ii) C	98-104: <i think it is in relation to this question> most easiest the easiest questions what was the easiest question [in Kiswahili] - Question - Why that was the easiest [in Kiswahili] - [in Kiswahili] - So because you know the question and they are also provided with the examples have you come across this type of question before this exam [in Kiswahili] - [in Kiswahili] - So you have seen such type of questions ok ⊡	
A4	M	1		0	2	i) A ii) C	26-32: And let's come to this question PURE WATER BOILS AT 100 DEGREES CENTIGRADE what makes C the correct answer - I am sure C is the correct - Why not B - Because I - What make you sure that B C is the correct answer - Because [in Kiswahili] - Because you have knowledge on ok	
A5	M	1		2	2	i) C ii) C	11-24: ok in fact you almost managed to attempt correctly the the choice item questions specifical for chemistry - Yes - And you say the answer is C - Yeah - What makes C the answer - Because the the in this question this question has said THE ELECTRONIC CONFIGURATION OF AN ELEMENT is 2 AS TO 6 this is the oxygen so	

Appendix 3.2 Data archive for modified exam items

Original exam items – Biology

Learner	Gender	Teacher assessment level	Form II exam result	Score	Biology test paper — Question 3: Give a brief explanation on what will happen on the following: A locust not suffocating when its head is immersed in water while the remaining part of body is outside.		Researcher's comments, categories, observations
					Learner answers	Learner comments	
A1	M	3		99	no answer		
A2	F	3		99	no answer		
A3	M	2		99	no answer		
A4	M	1		1	the process of respiration it need every time so when head is Immersed in water the reasons it will to keep your mouth and respirate slowly in water you can help about dead. The happens will do it is heat	136-138: <I think it is about this question> what was the most difficult question in this paper - [in Kiswahili] - So this was the most difficult question and it was difficult because of this long instruction [in Kiswahili]	
A5	M	1		1	this becouse its head when immersed in water it cannot breath but remaini port of body when outside of water can take place and it can breath	67-71: were not taught to me ... this question here - Question number 3 - Number 3 these too we have not talked teacher but I tried to answer it in my opinion how I was I was understand this question here - Uhm so you say you would use your general knowledge - General knowledge	
A6	M	2		99	no answer		
B1	F	1		0	refreshes the body cocacola and juice		
B2	M	1		99	no answer		
B3	M	2		99	no answer		
B4	M	3		99	no answer		
B5	F	2		99	no answer	62-71: number 3 you have not answered this question at all [in Kiswahili] - [in Kiswahili] - You have not understood the question you have any difficult word in here [in Kiswahili] - [in Kiswahili] - Like what - Locust - Locust any other - Suffocating - Suffocating immersed any other remaining ok have you seen this figure before [in Kiswahili] - [in Kiswahili]	

Appendix 3.2 Data archive for modified exam items

Original exam items – Maths

Learner	Gender	Teacher	assessment level	Form II exam result	Score	Maths test paper Question 2: Given that $a^2 - b^2 = (a+b)(a-b)$. Evaluate $(204)^2 - (196)^2$ $(204)^2 - (196)^2 =$		Researcher's comments, categories, observations
						Learner answers	Learner comments	
A1	M	3			0	$(204)^2-(196)^2=(8)^2+(196)^2=(204)^2$ ans		
A2	F	3			1	$204^2-196^2=(204+196)$ $(204-196)$		
A3	M	2			2	$(204)^2-(196)^2=(204+196)(204-196)$ $= 400 \times 8$ $=3200$		
A4	M	1			1	204^2-196^2 $=204 \times 204-196 \times 196$ $=41616-38416$ $=2200$ ans	83-93: But can you maybe was this concept taught in your class take this type of concept DIFFERENCE OF TWO SQUIRE A square minus B square this called difference of two square was this concept taught in your class [in Kiswahili] - [in Kiswahili] - Was it taught in English or Swahili - English - [in Kiswahili] - It was not so clear in the class and if so you go to find somebody with level above you who can assist you [in Kiswahili] - Who will it be will it be a teacher or your friend - [in Kiswahili] - [in Kiswahili] - He said it is one of the students who was once here and who is now out of school - Alright	mistake in the calculation, not using the given formula but the question does not ask explicitely to use the formula, although it is
A5	M	1			0	solution $(204)^2-(196)^2=(41616+41616)-(35416+35416)$ 93232-40832 524		
A6	M	2			3	no answer		
B1	F	1			0	$204^2-196^2=$ $204+204-196+196$ 804-293 804 -293		doesn't understand the formula

Appendix 3.2 Data archive for modified exam items

Modified exam items – Chemistry

learner	gender	teacher assessment level	Question 2: What do you understand by the following terms a) Solution b) Dilute solution c) Concentrated solution					score	best result
			test		workshop				
			performance	score	original item but in L1	score	(i) make your sentence to describe any of the pictures (ii) the picture that goes with your sentence is (iii) you chose the words and the pictures becuase	score	
A1	M	3	a) is the stady of solute of solution		a) maana ya maneno haya ni kuchanga nyisha maji a) the meaning of these words is to mix liquid b) kuchanganyisha maji yalio polea uliokua haukukorogwa b) to mix cold liquid to a mixture which was not stirred c) machanganyo maji maji yaliokolezwa ni maji yaliyo moto yaliyo changani shwa uliokua umekorogwa c) saturated solution is concentrated solution which was mixed and stirred		(i) solution is a mixture solute and solvent solution ni mchanganyiko wa solute na solvent (ii) picture B picha B (iii) is kwa sababu inahusiana na picha hiyo (iii) because it related with that picture	2,2,1	
A2	F	3			a) mchanganyo majimaji ni hali ya kuchanganya ili mchanganyo uwe sawa (a) saturated solution is a process of mixing in order to be equal b) mchanganyo majimaji uliozimuliwa ni ule mchanganyo uliokuwa rangi tofauti (b)				

Appendix 3.2 Data archive for modified exam items

Modified exam items – Biology

learner	gender	teacher assessment level	test — Question 4: Study the diagram below and answer the questions that follow. <Diagram of a stomach strucrure> i) Label the parts A, B, C ii) What does the above diagram represent — performance	score	workshop — Task 2: The diagram above shows an organ in the human body. The organ is labeled letter A. Look at it carefully and then answer the following questions by choosing the correct answer from the bracket. a) What is the name of this organ (pancreas, stomach, liver)? b) What is the name of the part labeled with number 1 (duodenum, pyloric sphincter, gall bladder)? c) What is the name of the part labeled with number 2 (trachea, bile duct, oesophagus)? — performance	score	best result
A1	M	3	i) A radius; B stomuch; C synoria fluid ii) the diagram of the stomuch of human	0 2 0 1	a) it is a pancreas b) the name of the part labeled with number 1 duodenum c) the name of part labeled with number 2 oesophagus	0 2 2	
A2	F	3	i) A stomach; B stomach; C osphohagus	0 2 0 3	a) stomach is the name of this organ b) duodenum of the part labeled with number c) trachea is the name of the part labeled with number	2 2 0	
A3	M	2	i) B stomach	3 2 3 0	a) stomach b) sphincter c) oesophagus	3 3 3	
A4	M	1	i) A doudenum; B stomach; C reeticuluum ii) the diagram represents about digestion system	0 2 0 2	a) the name of this organ is stomach b) the name of the part labeled with number 1 is pyloric sphincter c) the name of the part labeled is oesophagus	2 2 2	
A5	M	1	i) A cudis sphinter; B stomach; C polyoric sphinter ii) it is represent of part of digestive system	2 2 2 2	a) the name of this organ is stomach b) the name of the part labeled with number 1 is pyloric sphincter c) the name of the part labeled with number 2 is oesophagus	2 2 2	
A6	M	2	i) A cardiac sphynter; B stomach; C polyric/pyloric sphynter ii) diagram represent digestion in the stomuch	2 2 2 2	a) these organs are called digestion system b) pyloric sphincter c) oesophagus	0 2 2	

Appendix 3.2 Data archive for modified exam items

Modified exam items – Maths

score	best result	learner	gender	teacher assessment level	**test** performance	score	**workshop** Simplification 1 (Task 1a)	score	simplification 2 (task 1b)	score	simplification 3 (Task 1c)	score	Translating into L1 (Task 1d)	score	best result
					Question 7: The table below shows the age group of children in a class. Age 10 11 12 13 14 15 F 3 2 5 4 2 4 Use the table to find out: i) The number of children below 14 years ii) The % of children who are 12 years old in a class										
		F3	M	2	i) solution 10+11+12+13+14+15 =65 ii) 65/12=5.4		i) the total number of children under 14 years old are 2/20 ii) the % of children who are 12 years old in the class are 5/100/5=20/100	0	i) the total number of children younger than 14 years old are 2/20 ii) the percentage (%) of children who are 12 years old in the class are 5/100/5=20/100	0	i) the total number of children younger than 14 years old are 2/20=2/20/2=10 ii) the percentage (%) of children who are 12 years old in the class are 20	0	i) the total number of children under 14 years old are 2/20=2/20 ii) the % of children who are 12 years old in the class are 5/100=5/100/5=20	0	
		F4	F	2	no answer		i) the total number of children under 14 years old solution = 3+2+5+4+2+4=20 =total number of the children = 20 ii)	3	i) the total number of children younger than 14 years old solution ii)	0	i) the total number of children younger than 14 years old are 4 ii) the percentage (%) of children who	0	diagram hili linaonesha jinsi umri wa watoto	0	
		F5	M	3			i) total number of				i) ii) the percentage		Namba kamili za watoto		

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Appendix 4.1 – example of analysis of English test paper

Original test items – English

Learner	Gender	Teacher assessment level	Form II exam result	Score	English test paper – Passage 2	Researcher's comments, categories, observations
					2b. Complete the following summary according to the passage given above. At last the three 1_____ went to the 2_____ Museum. Salahardin gave 3_____ the Black Cat for the 4_____. The Cat was very 5_____ and was very 6_____. Together with the Black Cat there were many 7_____ from the 8_____ to Cario. Finally, Faisal found the right 9_____ for the Black 10_____ .	
					Learner answers / **Learner comments**	
A1	M	3		0	1 - fuad, 2 - laila	
A2	F	3		1	1 - year, 2 - right, 3 - place, 4 - promise, 5 - old, 6 - day, 7 - robbers, 8 - form II, 9 - suggested, 10 - holiday.	
A3	M	2		1	1 - salahardin, 2 - cario, 8 - museum	
A4	M	1		3	1 - weeks, 3 - him, 4 - gold diamonds, 5 - valuable, 9 - place, 10 - cat.	
A5	M	1		10	1 - person, 2 - cairo, 3 - faisal, 4 - museum, 5 - old, 6 - valuable, 7 - thing, 8 - tomb, 9 - place, 10 - cat	
A6	M	2		1	2 - cairo	229-234: can you tell me why you did not do this one - Passage - Yes why you did not fill it in what was the reason why you did not do this task - I am not understand it because I am not reading passage careful - So it was hard to fill the spaces because you did not understand the passage very much - Yes
B1	F	?		2	1 - salahardin, 2 - back to, 3 - black, 4 - faisal, 5 - valuable, 7 - next morning, 8 - eyes and, 9 - place, 10 - in november	137-140: you mentioned here the words VALUABLE here you said you do not know it but in this 2b you put it right yes was it just guessing - [in Kiswahili]- Just guessed
B2	M	?		1	1 - three, 2 - cairo, 3 - told, 4 - faisal, 5 - museum, 6 - coffee, 7 - salahardin, 8 - fuad, leila, 9 - perhaps valuable, 10 - cairo ??? November	53-56: in summary task you have a couple of spaces filled in correctly the rest of them are sort of incorrect did you guess did you know what to put into these spaces or did you just guess had a go putting something you thought would fit - [in Kiswahili] - [in Kiswahili] -Ok he was trying to read from here and then put in words here which look like
B3	M	?		#	no answer	246-264: can you tell me why you did not do this task you did not have enough time or there was another reason - [in Kiswahili]- Not understand - Do not understand did not understand the task or sort of did not know the words that to put into it - [in Kiswahili] - [in

Appendix 4.2 – Targeted learners' performance on original English test items

Frequency of student performance in reading comprehension passage 1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	2	4.2	4.4	4.4
	8.3	1	2.1	2.2	6.7
	16.7	6	12.5	13.3	20.0
	25.0	2	4.2	4.4	24.4
	33.3	1	2.1	2.2	26.7
	41.7	5	10.4	11.1	37.8
	50.0	5	10.4	11.1	48.9
	58.3	10	20.8	22.2	71.1
	66.7	3	6.3	6.7	77.8
	75.0	5	10.4	11.1	88.9
	83.3	2	4.2	4.4	93.3
	91.7	2	4.2	4.4	97.8
	100.0	1	2.1	2.2	100.0
	Total	45	93.8	100.0	
Missing	System	3	6.3		
Total		48	100.0		

Frequency of student performance in reading comprehension passage 2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	2	4.2	4.4	4.4
	6.7	4	8.3	8.9	13.3
	13.3	7	14.6	15.6	28.9
	20.0	8	16.7	17.8	46.7
	26.7	3	6.3	6.7	53.3
	33.3	4	8.3	8.9	62.2
	46.7	1	2.1	2.2	64.4
	53.3	1	2.1	2.2	66.7
	60.0	1	2.1	2.2	68.9
	66.7	4	8.3	8.9	77.8
	73.3	1	2.1	2.2	80.0
	80.0	4	8.3	8.9	88.9
	86.7	2	4.2	4.4	93.3
	93.3	3	6.3	6.7	100.0
	Total	45	93.8	100.0	
Missing	System	3	6.3		
Total		48	100.0		

Appendix 4.2 – Targeted learners' performance on original English test items

Frequency of student performance in Structure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	13	27.1	28.9	28.9
	12.5	5	10.4	11.1	40.0
	25.0	1	2.1	2.2	42.2
	37.5	1	2.1	2.2	44.4
	50.0	6	12.5	13.3	57.8
	62.5	5	10.4	11.1	68.9
	75.0	6	12.5	13.3	82.2
	87.5	7	14.6	15.6	97.8
	100.0	1	2.1	2.2	100.0
	Total	45	93.8	100.0	
Missing	System	3	6.3		
Total		48	100.0		

Frequency of student performance in Writing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	12	25.0	26.7	26.7
	14.3	3	6.3	6.7	33.3
	28.6	6	12.5	13.3	46.7
	42.9	5	10.4	11.1	57.8
	57.1	5	10.4	11.1	68.9
	71.4	8	16.7	17.8	86.7
	85.7	3	6.3	6.7	93.3
	100.0	3	6.3	6.7	100.0
	Total	45	93.8	100.0	
Missing	System	3	6.3		
Total		48	100.0		

Vocabulary in the 8 schools
In school A, 6 students did the vocabulary test, with a sum of 191.8, mean=31.97
In school B, 3 students did the vocabulary test, with a sum of 68.9, mean=22.97
In school C, 6 students did the vocabulary test, with a sum of 162, mean=27
In school D, no student did the vocabulary test (or I don't have data)
In school E, 4 students did the vocabulary test, with a sum of 106.3, mean=26.58
In school F, 6 students did the vocabulary test, with a sum of 97.6, mean=12.27
In school G, 3 students did the vocabulary test, with a sum of 229.1, mean=76.37
In school H, 3 students did the vocabulary test, with a sum of 151.8, mean=50.60

Appendix 4.3 – Vocabulary test

ENGLISH - VOCABULARY
PART I

Instructions:

- ☐☐Choose "T" if a sentence is true.
- ☐☐Choose "N" if a sentence is not true.
- ☐☐Choose "X" if you do not understand the sentence.

Example: We can stop time. T (This is **True**) N (This is **Not true**) X (I do **Not understand** the question)

1. Two of these are little. T N X

2. You must look when you want to find the way. T N X
3. When someone says, 'What are you called?', you should say your name. T N X
4. There are many ways to get money. T N X
5. All the world is under water. T N X
6. When you keep asking, you ask once. T N X
7. Sometimes people die when they fall off a building. T N X
8. Day follows night and night follows day. T N X
9. *Remain here* means 'stay'. T N X
10. This is a person. T N X

11. When there is a change of scene, we see a different place. T N X
12. *Often* means 'many times'. T N X
13. This is a mountain. T N X

14. Every month has a different name. T N X
15. People follow the orders of a chief. T N X
16. Green is a colour. T N X
17. Dirty hands cannot make marks on glass. T N X
18. You need at least five people to make a group. T N X
19. Cars move on a road. T N X
20. You can eat silver. T N X
21. You can see more when you are on a hill. T N X
22. Your child will be a girl or a boy. T N X
23. When you are sure, you know you are right. T N X
24. Each society has the same rules. T N X
25. Three examples of food are: shops, homes, and markets. T N X
26. This is a picture. T N X

27. It is good to attack people. T N X
28. Rome is an ancient city. T N X
29. A stream is a small river. T N X
30. When you promise something, you say you will really do it. T N X
31. Dreams are about things that really happened. T N X
32. When we give a date, we say the day, the month, and the year. T N X
33. It is impossible to live for a long time without water. T N X
34. Very young children drink milk. T N X
35. This is a square. T N X

36. This is a boat. T N X

37. It is a short way from one side to the other side of a wide river. T N X
38. A detail is a small piece of information. T N X
39. A handle is part of our body. T N X

PART II-A

Instructions: You must choose the right word to go with each meaning. Write the number of that word next to its meaning. If you have no idea about the meaning of a word, do not guess. But if you think you might know the meaning, then you should try to find the answer.

1 copy
2 event   _____ end or highest point
3 motor   _____ this moves a car
4 pity   _____ thing made to be like
5 profit   another
6 tip

1 accident
2 debt   _____ loud deep sound
3 fortune   _____ something you must pay
4 pride   _____ having a high opinion of
5 roar   yourself
6 thread

1 coffee
2 disease   _____ money for work
3 justice   _____ a piece of clothing
4 skirt   _____ using the law in the right
5 stage way
6 wage

1 clerk
2 frame   _____ a drink
3 noise   _____ office worker
4 respect   _____ unwanted sound

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Appendix 4.3 – Vocabulary test

5 theater
6 wine

1 dozen
2 empire   _____ chance
3 gift   _____ twelve
4 opportunity   _____ money paid to the
5 relief   government
6 tax

1 admire
2 complain   _____ make wider or longer
3 fix   _____ bring in for the first time
4 hire   _____ have a high opinion of
5 introduce   someone
6 stretch

1 arrange
2 develop   _____ grow
3 lean   _____ put in order
4 owe   _____ like more than something
5 prefer else
6 seize

1 blame
2 elect   _____ make
3 jump   _____ choose by voting
4 manufacture   _____ become like water
5 melt
6 threaten

1 ancient
2 curious   _____ not easy
3 difficult   _____ very old
4 entire   _____ related to God
5 holy
6 social

1 bitter
2 independent   _____ beautiful
3 lovely   _____ small
4 merry   _____ liked by many people
5 popular
6 slight

PART II-B
1 bull
2 champion   _____ formal and serious manner
3 dignity   _____ winner of a sporting event
4 hell   _____ building where valuable
5 museum   objects are shown

Appendix 4.3 – Vocabulary test

6 solution

1 blanket
2 contest   _____ holiday
3 generation   _____ good quality
4 merit   _____ wool covering used on
5 plot beds
6 vacation

1 comment
2 gown   _____ long formal dress
3 import   _____ goods from a foreign
4 nerve country   _____ part of the body which
5 pasture   carries feeling
6 tradition

1 administration
2 angel   _____ group of animals
3 frost   _____ spirit who serves God
4 herd   _____ managing business and
5 fort affairs
6 pond

1 atmosphere
2 counsel   _____ advice
3 factor   _____ a place covered with grass
4 hen   _____ female chicken
5 lawn
6 muscle

1 abandon
2 dwell   _____ live in a place
3 oblige   _____ follow in order to catch
4 pursue   _____ leave something
5 quote   permanently
6 resolve

1 assemble
2 attach   _____ look closely
3 peer   _____ stop doing something
4 quit   _____ cry out loudly in fear
5 scream
6 toss

1 drift
2 endure   _____ suffer patiently
3 grasp   _____ join wool threads together
4 knit   _____ hold firmly with your hands
5 register
6 tumble

Appendix 4.3 – Vocabulary test

1 brilliant
2 distinct   _____ thin
3 magic   _____ steady
4 naked   _____ without clothes
5 slender
6 stable

1 aware
2 blank   _____ usual
3 desperate   _____ best or most important
4 normal   _____ knowing what is happening
5 striking
6 supreme

PART II-C

1 area
2 contract   _____ written agreement
3 definition   _____ way of doing something
4 evidence   _____ reason for believing
5 method   something is or is not true
6 role

1 debate
2 exposure   _____ plan
3 integration   _____ choice
4 option   _____ joining something into a
5 scheme   whole
6 stability

1 access
2 gender   _____ male or female
3 implementation   _____ study of the mind
4 license   _____ entrance or way in
5 orientation
6 psychology

1 accumulation
2 edition   _____ collecting things over time
3 guarantee   _____ promise to repair a broken
4 media product   _____ feeling a strong reason or
5 motivation   need to do something
6 phenomenon

1 adult
2 exploitation   _____ end
3 infrastructure   _____ machine used to move
4 schedule   people or goods
5 termination   _____ list of things to do at
6 vehicle certain times

Appendix 4.3 – Vocabulary test

1 alter
2 coincide   _____ change
3 deny   _____ say something is not true
4 devote   _____ describe clearly and exactly
5 release
6 specify

1 correspond
2 diminish   _____ keep
3 emerge   _____ match or be in agreement
4 highlight with   _____ give special attention
5 invoke   to something
6 retain

1 bond
2 channel   _____ make smaller
3 estimate   _____ guess the number or size
4 identify   of something
5 mediate   _____ recognizing and naming
6 minimize   a person or thing

1 explicit
2 final   _____ last
3 negative   _____ stiff
4 professional   _____ meaning `no' or `not'
5 rigid
6 sole

1 abstract
2 adjacent   _____ next to
3 controversial   _____ added to
4 global   _____ concerning the whole world
5 neutral
6 supplementary

PART II-D

1 analysis
2 curb   _____ eagerness
3 gravel   _____ loan to buy a house
4 mortgage   _____ small stones mixed with
5 scar sand
6 zeal

1 cavalry
2 eve   _____ small hill
3 ham   _____ day or night before a
4 mound   holiday
5 steak   _____ soldiers who fight from
6 switch   horses

1 circus
2 jungle   _____ musical instrument
3 nomination   _____ seat without a back or
4 sermon   arms
5 stool   _____ speech given by a priest
6 trumpet   in a church

1 artillery
2 creed   _____ a kind of tree
3 hydrogen   _____ system of belief
4 maple   _____ large gun on wheels
5 pork
6 streak

1 chart
2 forge   _____ map
3 mansion   _____ large beautiful house
4 outfit   _____ place where metals are
5 sample   made and shaped
6 volunteer

1 contemplate
2 extract   _____ think about deeply
3 gamble   _____ bring back to health
4 launch   _____ make someone angry
5 provoke
6 revive

1 demonstrate
2 embarrass   _____ have a rest
3 heave   _____ break suddenly into small
4 obscure   pieces
5 relax   _____ make someone feel shy or
6 shatter   nervous

1 correspond
2 embroider   _____ exchange letters
3 lurk   _____ hide and wait for someone
4 penetrate   _____ feel angry about something
5 prescribe
6 resent

1 decent
2 frail   _____ weak
3 harsh   _____ concerning a city
4 incredible   _____ difficult to believe
5 municipal
6 specific

Appendix 4.3 – Vocabulary test

1 adequate
2 internal   _____ enough
3 mature   _____ fully grown
4 profound   _____ alone away from other
5 solitary   things
6 tragic

Appendix 5.2 – Targeted learner workshop – Maths

Maths

Table 5.1 below summarises the students' performance per test item on the *original* Maths paper. This shows how the students overall performed on the 9 items that made up the Maths test. The scores in the left hand column of the table refer to the nature of the students' response, namely:

0 -   if a student answered the item incorrectly
1 -   if a student provided a partially correct answer
2 -   if a student provided the correct answer
3 -   blank, i.e. the student did not answer the question

Table 5.1: TLs' performance on original test items (9 tasks) N=45

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8	Task 9
Wrong answer	26 (54%)	23 (48%)	18 (38%)	26 (54%)	21 (44%)	21 (44%)	26 (54%)	23 (48%)	13 (27%)
Partially correct	3 (6%)	5 (10%)	3 (6%)	3 (6%)	1 (2%)	3 (6%)	6 (13%)	13 (27%)	1 (2%)
Correct	13 (27%)	9 (19%)	5 (10%)	2 (4%)	0 (0%)	2 (4%)	4 (8%)	3 (6%)	0 (0%)
No answer	3 (6%)	8 (17%)	19 (40%)	14 (29%)	23 (48%)	19 (40%)	9 (19%)	6 (13%)	31 (65%)
Did not do the test	3 (6%)	3 (6%)	3 (6%)	3 (6%)	3 (6%)	3 (6%)	3 (6%)	3 (6%)	3 (6%)

The above information is presented visually in Figure 5.1 below.

Figure 5.1: TLs' performance on original test items (9 tasks)
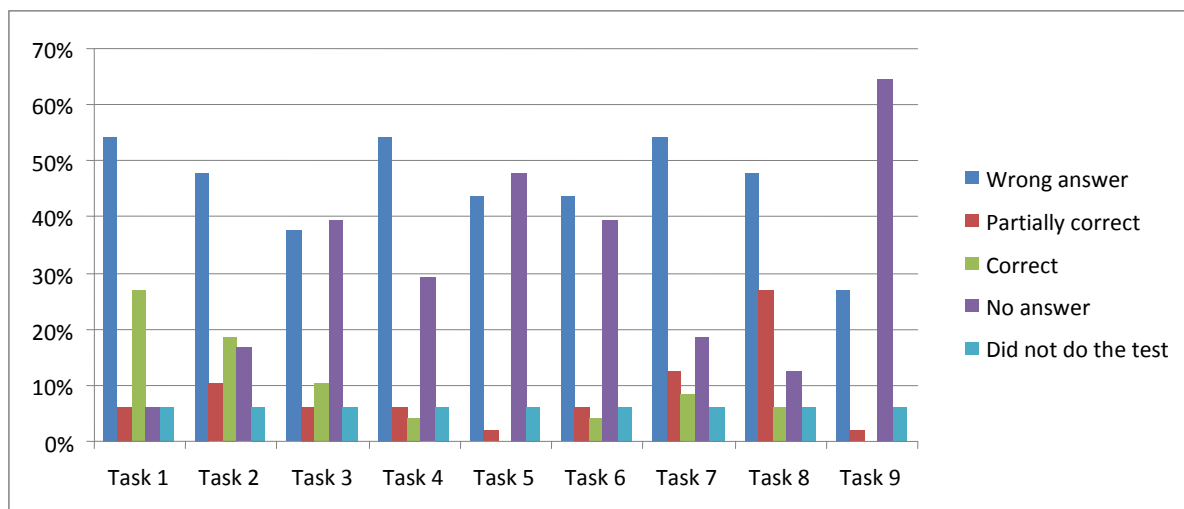
From the above, we observe the following:

(i) No answer + incorrect answer

Overall, the students found this test difficult, i.e. they achieved low scores. Aggregating the percentages for students who either answered incorrectly or did not attempt the item at all, the findings are as follows:

Items 9 & 5:   92%

Item 6:	84%
Item 4:	83%
Item 3:	77%
Item 7:	73%
Item 2:	65%
Items 1 & 8:	60%

In other words, over 60% of the students were unable to provide acceptable responses to the items set.

(ii) Most "right answers"

Students provided more correct answers for Items 1, 2 and 3 (27%, 19% and 10% respectively). In selecting the items for this study, no attempt was made to have easier items at the beginning so it is unlikely that the 'ease' of the items influenced the results. Besides, the percentage correct are still relatively low. In respect of these specific items (see (i) above).

- Question 1 (Type 3): the way the item is formulated does not seem very clear, although the students seem to be able to do something with the fractions remembering the method to put them in the same form to be compared.
- Question 2 (Type 1): requires applying a given formula. If they know how to apply the formula it is easy to get it correct. Most attempt the question. Errors are: (i) not knowing how to apply the formula to that example; (ii) not understanding the meaning of that task and therefore not understanding where to stop: finish just by expressing in the form (a+b)(a-b) or calculating a number; (iii) errors in the calculations
- Question 3 (Type 1): gets some right answers and many did not attempt this question. If the learners remember and apply the method, they get it right. If they don't remember the method correctly – and they had no understanding of what an inequality is – they can't start it. If they start it and get it wrong, the errors made are: Using numbers to solve the inequality – no understanding of what inequality is; Trying to remember a procedure - attempts at rationalising both sides but not correctly; confusion with equations and simultaneous equations.

Aggregating the findings to include students who either provided the correct answer or a partially correct answer, we get the following summary:

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8	Task 9
% correct or partially correct	33%	29%	16%	10%	2%	10%	20%	33%	2%

(iii) Most "wrong answers":

At one level, with the exception of item 9, no items appeared to be significantly more difficult than the others for the students. However, all students got between 44% and 54% of all items wrong (save item 9: 27% answered incorrectly; item 3: 37% incorrect). This finding needs to be considered in conjunction with numbers of students who provided no answer at all to items.

(iv) Most "no answer": (see 5.1(i) below re. Question Type)

- Question 9 (Type 3): it was the last question – maybe they didn't have time?
- Question 5 (Type 2): in interview several commented that they had not covered this in class

- Question 3 (Type 1): this is the question with least amount of words, but it's a mathematically difficult topic. If the learners are trying to remember the method they can apply here without understanding the concept of inequality, it is a difficult task. No language issues here, only mathematical issues;
- Question 6 (Type 2): word problem that requires interpretation of the text in order to get started with the solution.

Items 6 and 7 were selected for further investigation during the TL Workshops, see below.

Modified Items for TL Workshops

The Items

For Maths, 2 tasks were selected to be modified to investigate further whether the difficulties could be explained by reasons of 'language' or by 'other' factors. The items modified were as follows:

> *Original item*
> Question 6: The combined ages of Juma and Asha are 10 years. The difference of Asha's age from twice Juma's age is 8 years. Find the ages of each one.

This item in the original proved difficult for 84% of the students: 44% attempted the question but got it completely wrong and a further 40% did not attempt the question. Given that word problems in Maths have been singled out as difficult for the EL2 learners, it was decided to investigate further the difficulties encountered by the students.

> *Original item*
> Question 7: The table below shows the age group of children in a class.
>
> | Age | 10 | 11 | 12 | 13 | 14 | 15 |
> |-----|----|----|----|----|----|----|
> | F | 3 | 2 | 5 | 4 | 2 | 4 |
>
> Use the table to find out:
> i) The number of children below 14 years
> ii) The % of children who are 12 years old in a class

This item in the original proved difficult for 73% of the students: 54% attempted the question but got it completely wrong and a further 19% did not attempt the question. Given that word problems in Maths have been singled out as difficult for the EL2 learners, it was decided to investigate further the difficulties encountered by the students.

The items were modified in the following ways:

Question 6:

> *Question 6: Modification 1:* The combined ages of Juma and Asha are 10 years. The difference of Asha's age from twice Juma's age is 8 years. Use the cards from Envelope 1 to help you find out: How old is Juma? How old is Asha?

Aim of modification: This modification aimed to support learners with mathematical part of the task. The cards included in the envelope contained only mathematical symbols which could help learners

construct the correct equations needed to solve the problem. No linguistic help was provided to the learners at this stage.

Hypothesis: It was anticipated that this modification could help learners who had understood the language of the problem but had difficulties with its mathematical side.

> *Question 6: Modification 2:* The combined ages of Juma and Asha are 10 years. The difference of Asha's age from twice Juma's age is 8 years. Use the cards from Envelope 2 to help you find out: How old is Juma? How old is Asha?

Aim of modification: This modification aimed to support learners with both mathematical and linguistic part of the task. The cards included in the envelope contained not only mathematical symbols which could help learners construct the correct equations needed to solve the problem but also the linguistic presentations of these symbols. For example, in a card with sign "+" it is also written "combined", or in the card with sign "–" it is also written "difference". The linguistic items that appear in the cards are the actual linguistic items that appear in the task.

Hypothesis: It was anticipated that this modification could help learners who had difficulties understanding both language of the problem and mathematics involved in solving it. However, the emphasis is put more on the linguistic side of the problem here.

> *Question 6: Modification 3:* Translate into Kiswahili (Tafsiri kwa Kiswahili) The combined ages of Juma and Asha are 10 years. The difference of Asha's age from twice Juma's age is 8 years. Find out: How old is Juma? How old is Asha?

Aim of modification: This modification aimed to reveal the level of learners' understanding of the meaning/content of the problem.

Hypothesis: It was anticipated that this modification could show the source of difficulties which learners experienced while completing this task. If the learner had not attempted to solve the problem or solved it incorrectly, but translated the task to L1 correctly, then it is most likely that the difficulty for this learner lied in understanding the mathematics of the task rather than its language. If the learner could not translate the task from L2 to L1 or translated it incorrectly then it is most likely that the problem for this learner was in understanding the language of the task first of all.

> *Question 6: Modification 4:* Umri wa Juma na wa Asha ukichanganywa ni miaka 10. Katika umri wa Asha ukitoa umri wa Juma uliozidishwa mara mbili jawabu yake ni miaka 8. Tafuta: Je , Juma atakuwa na umri gani? Je, Asha atakuwa na umri gani?

Aim of modification: This modification aimed to reveal whether learners' difficulties related to solving the task lied in them not understanding mathematics involved in completing the task.

Hypothesis: It was anticipated that given that the learners could understand the language of the task they would be able to solve the problem if they knew *how* to solve it.

Question 7:

Question 7: Modification 1: This table shows the age of children in a class.

Age	10 years	11 years	12 years	13 years	14 years	15 years
Number of children	3	2	5	4	2	4

Find out: i) The total number of children under 14 years old; ii) The % of children who are 12 years old in the class

Aim of modification: This modification aimed to provide more familiar linguistic context and clearer/simpler presentation to the task. It also supported understanding of the table by adding linguistic items to it. In such a way, mathematical term "F" for "frequency" was changed into "number of children" in the second row of the table, the numbers 10.11, 12...15 were accompanied by the word "years" in the first row of the table, the word "below" was changed into word "under".

Hypothesis: It was anticipated that if learners were provided with a more meaningful, i.e. familiar, context/task they would perform better on it as opposed to them performing on a task linguistically reduced but mathematically complex (e.g. use of "F", use of numbers only in the table).

Question 7: Modification 2: This table shows the age of children in a class.

Age	10 years	11 years	12 years	13 years	14 years	15 years
Number of children	3 children	2 children	5 children	4 children	2 children	4 children

Find out: i) The total number of children younger than 14 years old; ii) The percentage (%) of children who are 12 years old in the class

Aim of modification: Like preceding modification, this modification aimed to further provide more familiar linguistic context and clearer/simpler presentation to the task. It also supported understanding of the table by adding linguistic items to it. In such a way, mathematical sign "%" was accompanied by its linguistic presentation – word "percentage", the numbers 3, 2...4 were accompanied by the word "children" in the second row of the table; the word "under" was changed into word "younger".

Hypothesis: It was anticipated that if learners were provided with a more meaningful, i.e. familiar, context/task they would perform better on it as opposed to them performing on a task linguistically reduced but mathematically complex.

Question 7: Modification 3: This table shows the age of children in a class.

Age	10 years	11 years	12 years	13 years	14 years	15 years
Number of children	3 children	2 children	5 children	4 children	2 children	4 children

Use the card from the envelope to help you find out: i) The total number of children younger than 14 years old; ii) The percentage (%) of children who are 12 years old in the class

Aim of modification: as above, however, this modification also aimed to provide children with visual support – a card with appropriate number of children per age group as presented in the table in the task.

Hypothesis: It was anticipated that if learners were provided with a visual support in addition to more meaningful, i.e. familiar, context/task they would perform better on it as opposed to them performing on a task linguistically reduced but mathematically complex.

Question 7: Modification 4: Translate into Kiswahili (Tafsiri kwa Kiswahili)
This table shows the age of children in a class.

Age	10 years	11 years	12 years	13 years	14 years	15 years
Number of children	3	2	5	4	2	4

Find out: i) The total number of children under 14 years old; ii) The % of children who are 12 years old in the class

Aim of modification: This modification aimed to reveal the level of learners' understanding of the meaning/content of the problem.

Hypothesis: It was anticipated that this modification could show the source of difficulties which learners experienced while completing this task. If the learner had not attempted to solve the problem or solved it incorrectly, but translated the task to L1 correctly, then it is most likely that the difficulty for this learner lied in understanding the mathematics of the task rather than its language. If the learner could not translate the task from L2 to L1 or translated it incorrectly then it is most likely that the problem for this learner was in understanding the language of the task in the first place.

Question 7: Modification 5: Jadweli hii inaonesha umri wa wanafunzi katika darasa.

Age	10 years	11 years	12 years	13 years	14 years	15 years
Number of children	3	2	5	4	2	4

Tafuta: i) Jumla ya watoto walio chini ya umri wa miaka 14; ii) Asilimia ya watoto walio na umri wa miaka 12 katika darasa

Aim of modification: This modification aimed to reveal whether learners' difficulties related to solving the task lied in them not understanding mathematics involved in completing the task.

Hypothesis: It was anticipated that given that the learners could understand the language of the task they would be able to solve the problem if they knew *how* to solve it.
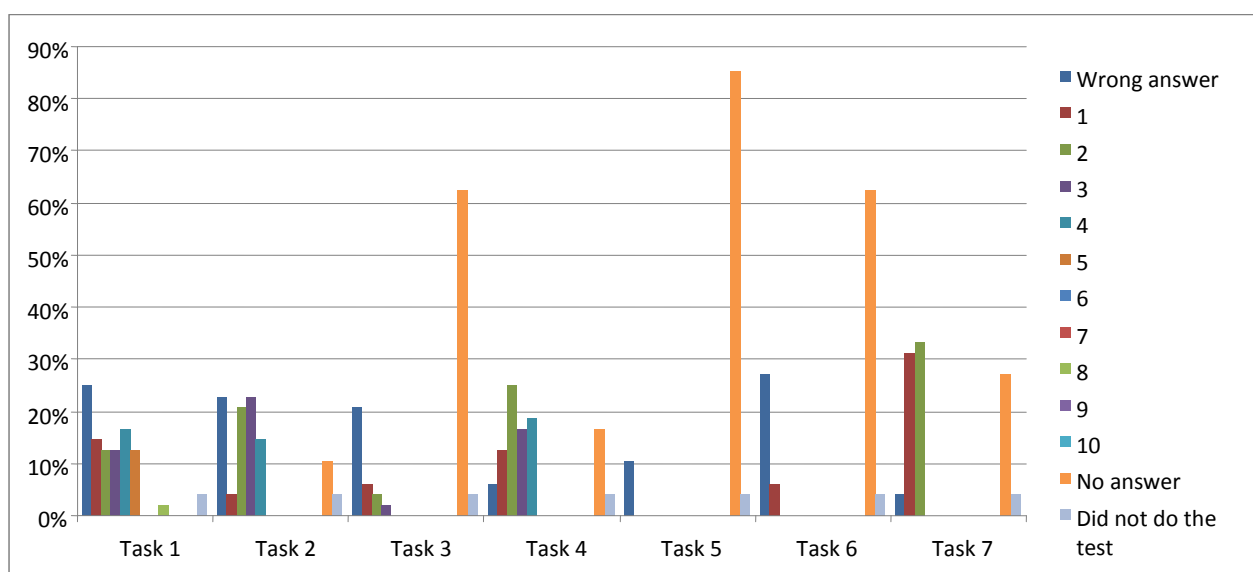
Biology

Table 5.2 below summarises the students' performance per test item on the *original* Biology paper. This shows how the students overall performed on the 7 items that made up the Biology test. The scores in the left hand column of the table refer to the nature of the students' response, namely:

Task 1:	Task 2:	Task 3:	Task 4:	Task 5:	Task 6:	Task 7:
0 – wrong answer	0 – wrong answer	0 – wrong answer	0 – wrong answer	0 – wrong answer	0 – wrong answer	0 – wrong answer
1 to 10 – points for correct answers	1 to 4 – points for correct answers	1 to 3 – points for correct answers	1 to 4 – points for correct answers	1 to 2 – points for correct answers	1 to 8 – points for correct answers	1 to 2 – points for correct answers

Table: 5.2: TL's performance on original test items (7 tasks) N=46

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7
Wrong answer	12 (25%)	11 (23%)	10 (21%)	3 (6%)	5 (10%)	13 (27%)	2 (4%)
1	7 (15%)	2 (4%)	3 (6%)	6 (13%)	0 (0%)	3 (6%)	15 (31%)
2	6 (13%)	10 (21%)	2 (4%)	12 (25%)	0 (0%)	0 (0%)	16 (33%)
3	6 (13%)	11 (23%)	1 (2%)	8 (17%)		0 (0%)	
4	8 (17%)	7 (15%)		9 (19%)		0 (0%)	
5	6 (13%)					0 (0%)	
6	0 (0%)					0 (0%)	
7	0 (0%)					0 (0%)	
8	1 (2%)					0 (0%)	
9	0 (0%)						
10	0 (0%)						
No answer	0 (0%)	5 (10%)	30 (63%)	8 (17%)	41 (85%)	30 (63%)	13 (27%)
Did not do the test	2 (4%)	2 (4%)	2 (4%)	2 (4%)	2 (4%)	2 (4%)	2 (4%)

The above information is presented visually in Figure 5.2 below.

Appendix 5.2 – Targeted learner workshop - Biology

No answer + incorrect answer

Overall, the students found this test difficult, i.e. they achieved low scores. Aggregating the percentages for students who either answered incorrectly or did not attempt the item at all, the findings are as follows:

Item 5:   95%
Item 6:   90%
Item 3:   84%
Item 2:   33%
Item 7:   31%
Item 1:   25%
Item 4:   23%

In other words, for items 5, 6 and 3 over 84% of the students, and for items 2, 7, 1 and 4 over 23% of the students were unable to provide acceptable responses to the items set.

Most "right answers"

Students provided more correct answers for Items 2, 4 and 7 (15%, 19% and 33% respectively). In selecting the items for this study, no attempt was made to have easier items at the beginning so it is unlikely that the 'ease' of the items influenced the results.

Aggregating the findings to include students who either provided the correct answer or a partially correct answer, we get the following summary:

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7
% correct or partially correct	63%	60%	12%	74%	0%	6%	64%

Items 1, 2, 4 and 7 seemed to be least problematic to the learners as between 60 to 74% of students were able to answer them either correctly or partially correctly.

Most "wrong answers" and "no answer"

Items 1, 2, 3 and 6 generated between 21 to 27% of wrong answers, the biggest number across all tasks. However the items 3, 5 and 6 seemed to be even more problematic to the students as 63% to 85% of them did not even attempt to answer them.

Items 3 and 4 were selected for further investigation during the TL Workshops, see 4.2.1 below.

Learner workshops

For Biology, 2 tasks were selected to be modified to investigate further whether the difficulties could be explained by reasons of 'language' or by 'other' factors. The items modified were as follows:
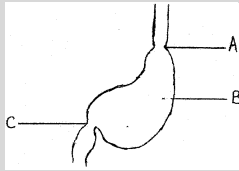
Original item
Question 3: Give a brief explanation on what will happen on the following: A locust not suffocating when its head is immersed in water while the remaining part of body is outside.

Appendix 5.2 – Targeted learner workshop - Biology

This item in the original proved difficult for 84% of the students: 21% attempted the question but got it completely wrong and a further 63% did not attempt the question.

Original item
Question 4: Study the diagram below and answer the questions that follow.

i)   Label the parts A, B, C
ii)   What does the above diagram represent

This item in the original proved difficult for 23% of the students: 6% attempted the question but got it completely wrong and a further 17% did not attempt the question. Even though items 5 and 6 seemed to be even more problematic for the learners (95% of students got item 5 wrong or did not attempt it and 90% of students got item 6 wrong or did not attempt it) they were not selected for the workshop as learners reported not studying these items in the class.

The items were modified in the following ways: (see also Appendix xx)

Question 3:

Question 3: Modification 1: In picture A the boy is dipping the locust in water. Look at the locust. All of its body is covered with water. In picture B the young boy is dipping the head of the locust in water. Look at the locust's head. It is all covered in the water, but the other part of its body is not in the water.

Questions: a) In which picture do you think the locust will/may die?; b) Why do you think it will/may die?

Aim of modification: This modification aimed to support learners with understanding the meaning/content of the task. This support was done on two levels: linguistic and visual.

Hypothesis: It was anticipated that pictures and shorter clearer sentences, as well as more familiar, everyday vocabulary, as part of the task will help learners to understand the task and if they knew the answer to the task (biological subject knowledge), to complete it.

Question 4:

Question 4: Modification 1: The diagram above shows an organ in the human body. The organ is labelled letter A. Look at it carefully and then answer the following questions by choosing the correct answer from the bracket.

a) What is the name of this organ (pancreas, stomach, liver)?
b) What is the name of the part labelled with number 1 (duodenum, pyloric sphincter, gall bladder)?
c) What is the name of the part labelled with number 2 (trachea, bile duct, oesophagus)?

Appendix 5.2 – Targeted learner workshop - Biology

Aim of modification: This modification aimed to support learners with understanding the meaning/content of the task. This support was done on two levels: linguistic and visual. In addition the students were provided with several possible responses to choose their answer from (multiple choice item).

Hypothesis: It was anticipated that a diagram clearer than the one given in the original task (more context embedded as opposed to context reduced) and a possibility to choose the answers from the given list might help learners to perform better on the task.

The learner workshops showed that the simplification and revision of the original test items made a significant improvement for Question 3/Task 1 (the locust) and a lesser difference for Question 4/Task 2 (digestion).

Chemistry

Table 5.3 below summarises the students' performance per test item on the *original* Chemistry paper. This shows how the students overall performed on the 5 items that made up the Chemistry test.

Table: 5.3: TL's performance on original test items (5 tasks) N=46

The above information is presented visually in Figure5.3 below.

	Task 1a	Task 1b	Task 2a	Task 2b	Task 2c	Task 3a	Task 3b	Task 3c	Task 4a	Task 4b	Task 4c	Task 5a	Task 5b	Task 5c
Wrong answer	17 (35%)	5 (10%)	14 (29%)	23 (48%)	19 (40%)	17 (35%)	41 (85%)	27 (56%)	31 (65%)	32 (67%)	20 (42%)	31 (65%)	30 (63%)	25 (52%)
Partially correct	0 (0%)	0 (0%)	7 (15%)	3 (6%)	3 (6%)	20 (42%)	4 (8%)	15 (31%)	0 (0 %)	0 (0%)	1 (2%)	5 (10%)	5 (10%)	5 (10%)
Correct answer	29 (60%)	41 (85%)	20 (42%)	5 (10%)	5 (10%)	7 (15%)	1 (2%)	1 (2%)	7 (15%)	6 (13%)	16 (33%)	1 (2%)	1 (2%)	0 (0%)
No answer	0 (0%)	0 (0%)	5 (10%)	15 (31%)	19 (40%)	2 (4%)	0 (0%)	3 (6%)	8 (17%)	8 (17%)	9 (19%)	9 (19%)	10 (21%)	16 (33%)
Did not do the test	2 (4%)	2 (4%)	2 (4%)	2 (4%)	2 (4%)	2 (4%)	2 (4%)	2 (4%)	2 (4%)	2 (4%)	2 (4%)	2 (4%)	2 (4%)	2 (4%)
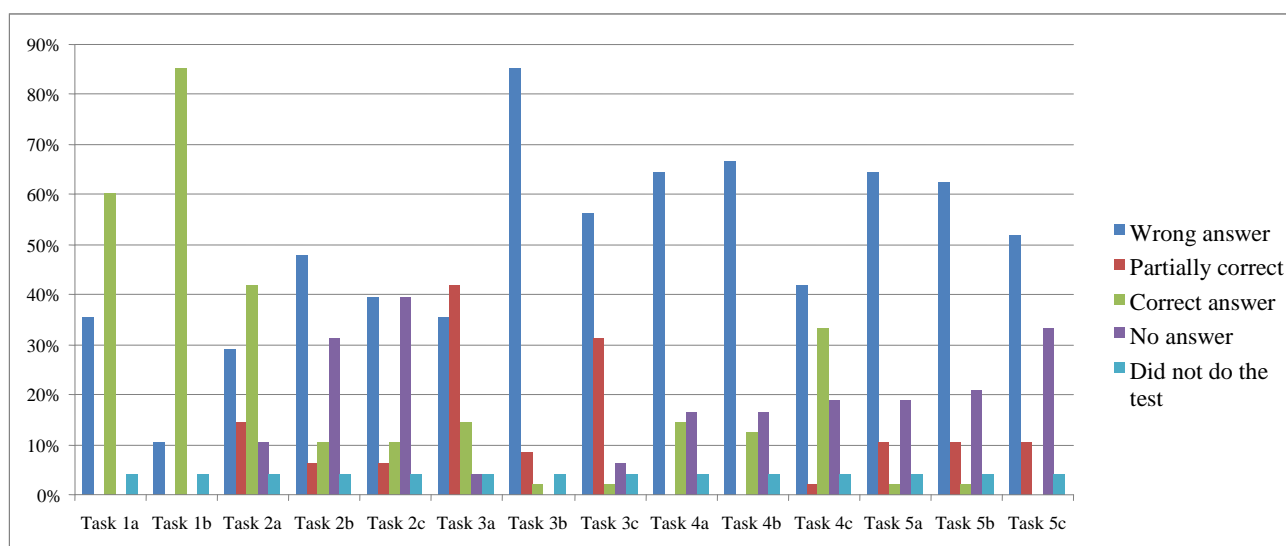
No answer + incorrect answer

Overall, the students found this test difficult, i.e. they achieved low scores. Aggregating the percentages for students who either answered incorrectly or did not attempt the item at all, the findings are as follows:

Item 3b: 85%
Item 5c: 85%
Item 4b: 84%
Item 5a: 84%
Item 5b: 84%
Item 4a: 82%
Item 2c: 80%
Item 2b: 79%
Item 3c: 62%
Item 4c: 61%
Item 3a: 39%

	Item 2a:	39%

Item 2a: 39%
Item 1a: 35%
Item 1b: 10%

In other words, for items 5 (all three parts), 4 (all three parts), 3 (parts b and c) and 2 (parts b and c) over 61% of the students, and for items 1 (part a), 2 (part a) and 3 (part a) over 35% of the students were unable to provide acceptable responses to the items set.

Most "right answers"

Students provided more correct answers for Items 1 (both parts), 2a and 4c (60%, 85%, 42% and 33% respectively). In selecting the items for this study, no attempt was made to have easier items at the beginning so it is unlikely that the 'ease' of the items influenced the results.

Aggregating the findings to include students who either provided the correct answer or a partially correct answer, we get the following summary:

	Task 1a	Task 1b	Task 2a	Task 2b	Task 2c	Task 3a	Task 3b	Task 3c	Task 4a	Task 4b	Task 4c	Task 5a	Task 5b	Task 5c
% correct or partially correct	60%	85%	57%	16%	16%	57%	10%	33%	15%	13%	35%	12%	12%	10%

Items 1 (both parts), 2a and 3a seemed to be least problematic to the learners as between 57% to 85% of students were able to answer them either correctly or partially correctly.

Most "wrong answers" and "no answer"

Items 2b, 3b, 3c, 4 (all parts) and 5 (all parts) generated between 48 to 85% of wrong answers, the biggest number across all tasks. The biggest number of learners who did not even attempt the task was between 31 and 40% for Items 2c, 5c and 2b.

(iv)   Summary of findings

Across all the concepts, the majority of the students answered the questions incorrectly except for the question on valency (Item 1a) and boiling point (Item 1b).
In terms of chemical concepts involved, the test items cover a range of issues from understanding concepts and conventions to recognising the suitability of an experimental procedure in application to the separation of substances.
In terms of language, there are numerous vague references to what the students are supposed to do, difficult vocabulary capturing the underlying chemistry and very specific use of particular words such as 'process'.

Item 2 was selected for further investigation during the TL Workshops, see 4.2.1 below.

Learner workshops

For Chemistry, 1 task was selected to be modified to investigate further whether the difficulties could be explained by reasons of 'language' or by 'other' factors. The item modified was as follows:

Original item

Question 2: What do you understand by the following terms?
(a) Solution
(b) Dilute Solution
(c) Concentrated Solution

This item in the original proved difficult on average for 66% of the students: 39% attempted the question but got it completely wrong (with a range from 29 to 48%) and a further 27% did not attempt the question (with a range from 10 to 40%).

The item was modified in the following ways: (see also Appendix xx)

Question 2:
We will give you two envelopes with some cards.
The cards have some pictures and words.
We would like you to write up sentences using the words.
Put your sentence next to a picture that goes with it.
When you finish, explain your how you made your sentence
and why you put it next to picture.
These are 2 pictures of solutions.
[PICTURE A] [PICTURE B]
These are the cards to help you with the task [.....]
Writing frame
• My sentence is…… (in Kis)
• The picture that goes with my sentence is…(in Kis)
• I chose the words and the picture because…(in Kis)

Firstly, diagrams were provided to contribute some visual support for the concepts of 'dilute' and 'concentrated'. Secondly, students were given words that could be used to construct sentences around the particular concepts. Along the same line of reasoning, a writing frame (including a set of guiding statements) were used. Overall the key aim of the learner workshops was to provide a less reduced and more holistic context for the interpretation of the concepts around solutions. Furthermore the task environment required that the students would be actively engaged in solving the problem through group work and construction of and reflection on a poster.

Aim of modification: This modification aimed to support learners with understanding the meaning/content of the task. This support was done on the following levels: linguistic (vocabulary, grammar, language medium and writing), visual and contextual (from context reduced to contextually rich task).

Hypothesis: It was anticipated that pictures/diagrams, cards with chemical terms and provision of more familiar, everyday vocabulary, as part of the task will help learners to understand the task and if they knew the answer to the task (chemical subject knowledge), to complete it.