

# Teacher Preparation and Continuing Professional Development in Kenya



Learning to Teach Early Reading and Mathematics

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Prepared by

Grace W. Bunyi, Joyce Wangia, Charles M. Magoma and Charity M. Limboro  
Kenyatta University

## Foreword

Teachers are key to improving quality education in any educational system. It is often said that the quality of an educational system cannot be greater than the quality of its teachers, and yet often not much attention is paid to understanding how systems that produce teachers can be made more effective to impact on learning outcomes. This report is an attempt to look closely into the ‘black box’ of teacher preparation in Kenya for clues as to how this gap can be filled.

There is widespread concern about children in primary schools who are failing to read and do basic mathematics. The question has been asked - how can this problem be adequately addressed? To which often the answer has been that teachers need more in-service training to improve their skills. Although this is true, this report offers deeper insights into the problems by investigating what happens in typical teacher education institutions in Kenya and the role these institutions can play in improving teacher quality.

If Kenya is to deliver on its promises to provide quality primary education to all its population, then it must heed the insights provided by the research presented in this report. This report provides a basis for policy dialogue for improving teacher quality and challenges those who make policy to pay more attention to both initial teacher education and continuous professional development, and to target teacher reforms that can ensure that every Kenyan child has access to a teacher with understanding of how to help that child learn effectively and progress to higher levels of education.

Dr. Kwame Akyeampong  
Senior Policy Analyst  
Global Monitoring Report Team, UNESCO  
Paris

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Key participants in the study including principals and deputy principals of the four teacher training colleges in which we collected data and of the college in which we conducted the pilot study, deans of curriculum, mathematics and English teacher educators and teacher trainees as well as primary school head teachers, newly qualified teachers and continuing professional development teachers of the three programmes studied – the school-based teacher development (SbTD), EGR and RTL as well as their students.

Members of the National Reference Group that consisted of representatives of the Ministry of Education, the Kenya Institute of Education, the Kenya National Examinations Council, the Teachers Service Commission, the Kenya Teacher Training Colleges Principals' Association and the Kenya Primary Schools Head Teachers' Association provided us with advice and various kinds of support throughout the study period.

This study was part of the Teacher Preparation in Africa (TPA) six country project (Ghana, Kenya, Mali, Senegal, Tanzania and Uganda) that was led by a team of researchers from the University of Sussex Dr. Jo Westbrook, Dr. John Pryor and, Dr. Kwame Akyeampong who supported the Kenya study. The study also benefitted from ideas generated in meetings of the Sussex-based researchers and the lead researchers of the other case studies and the technical and administrative support of the Project Research Officer Dr. Kattie Lussier. Stephen Anderson and David Chard provided valuable comments on the draft report.

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## List of Acronyms and Abbreviations

AIDS	Acquired Immune Deficiency Syndrome	PTA	Parents Teachers Association
APHRC	African Population and Health Research Centre	PTE	Primary Teacher Education
ASALs	Arid and Semi-Arid areas	PTTCs	Primary Teacher Training Colleges
BED	Bachelor of Education	QASO	Quality Assurance and Standards Officer
CPD	Continuing Professional Development	RTL	Reading to Learn
DICECE	District Centre for Early Childhood Education	RoK	Republic of Kenya
DFID	Department for International Development	SACMEQ	Southern and Eastern Africa Monitoring Educational Quality
DQAS	Directorate of Quality Assurance and Standards	SbTD	School-based Teacher Development
ECDE	Early Childhood Development and Education	SMASSE	Strengthening of Teaching of Mathematics and Science in Secondary Education
EFA	Education for All	SNE	Special Needs Education
FGDs	Focused Group Discussions	SSA	Sub-Sahara Africa
EGR	Early Grade Reading	TE	Teacher Education
FGD	Focus Group Discussion	TAC	Teacher Advisory Centre
FPE	Free Primary Education	TPA	Teacher Preparation in Africa
GER	Gross Enrolment Ration	TLMs	Teaching-learning Materials
HIV	Human Immunodeficiency Virus	UPE	Universal Primary Education
ICT	Information Communication and Technology	UNESCO	United Nations Educational, Scientific, and Cultural Organization
JICA	Japanese International Corporation Agency	USAID	United States Agency for International Development
INSET	In-service Education and Training		
ITE	Initial Teacher Education		
KANU	Kenya National Union		
KCSE	Kenya Certificate of Secondary Education		
KESI	Kenya Education Staff Institute		
KESSP	Kenya Education Sector Support Programme		
KIE	Kenya Institute of Education		
KISE	Kenya Institute of Special Education		
KJSE	Kenya Junior Secondary Education		
KNEC	Kenya National Examinations Council		
KNUT	Kenya National Union of Teachers		
KRT	Key Resource Teacher		
KTTC	Kenya Technical Training College		
MDGs	Millennium Development Goals		
MoE	Ministry of Education		
MOEST	Ministry of Education, Science, and Technology		
NACECE	National Centre for Early Childhood Education		
NARC	National Rainbow Coalition		
NASMLA	National Assessment System for Monitoring Learning Achievement		
NGO	Non-government Organisation		
NQTs	Newly Qualified Teachers		
P1	Primary 1		
P2	Primary 2		
P3	Primary 3		
P4	Primary 4		
PCK	Pedagogical Content Knowledge		

# Executive Summary

## 1. Research Context and Introduction

Since 1990 and more especially since 2000, the goal of Education for All by 2015 has galvanized many countries in sub-Saharan Africa (SSA) into confronting their historically low rates of enrolment. They have been remarkably successful in attracting many more children into schools (UNESCO, 2008). However filling the classrooms is not enough; education for all, if it is to have positive social and economic consequences, must involve children learning at least the basic minimum competences of literacy and numeracy that will enable them to benefit from and contribute to their society's future.

Following the introduction of the free primary education programme in 2003, enrollment increased by over 1 million pupils or by 17.6%. However, this exponential increase in enrollment has not been matched by increase in learning. The 2010 UWEZO assessment reported that nearly half of Standard 4 learners could not read a Standard 2 level story and that only half of the children in Standard 1-8 aged 6-16 years have acquired the highest numeracy competency expected of Standard 2 learners (UWEZO, 2010). Similarly, the Kenya National Examinations Council's (KNEC) assessment of Standard 3 learners in numeracy and literacy reported poor learning achievement. The report indicates that achievement in both reading (297.58) and numeracy (295.6) was below the standardized mean of 300 (KNEC, 2010). Correspondingly, poor reading attainment was reported by the RTI Early Grade Reading Assessment (EGRA) study which found that 14% of pupils tested in English, 19% in Kiswahili, 15% in Gikuyu, and 20% in Dholuo in their last term of Standard 3 could not read a single word correctly (Piper, 2010). These reports point to the need for investigations into the teaching and learning of reading and mathematics in Kenya.

The centrality of the teacher in the teaching and learning process is widely acknowledged and the link between low pupil achievement and the skills and competence of teachers is consistently made (UNESCO, 2005). Research examining teacher quality confirms the logical conclusion that poor quality of students' learning correlates strongly with poor quality of teachers' teaching and it is widely assumed that initial teacher education (ITE) and continuing professional development (CPD) make a difference to teachers' pedagogic knowledge and skill which in turn is reflected in enhanced student learning outcomes (Dembélé & Lefoka, 2007). Unfortunately, there has been little research into how teachers in Kenya are prepared to teach that would inform teacher-training policy and practice reforms.

The Teacher Preparation and Continuing Professional Development study, funded by the William and Flora Hewlett Foundation, was set up to fill the gap in knowledge about how the initial and continuing education of teachers impacts on the practice of teachers in Kenya. Because of the extreme importance of early reading and mathematics for future progress, it focuses on the preparation that teachers who teach in the lower primary grades receive and what support is available through CPD and other routes to teach these subjects. A central issue is whether the process of learning to teach reading and mathematics at lower primary level (Standards 1-3) draws attention to, and emphasizes the kind of teaching known to be important for developing lower primary school children's abilities to read and understand basic mathematical concepts.

In this research, we conceptualize competence in terms of knowledge, understanding and practice. Practice is central to good teaching but successful teachers would concur with the great body of research into teaching that good practice cannot just depend on the unreflective application of techniques. It is a complex process which requires a great deal of different knowledge:

- Content knowledge, that is, knowing about the subject matter to be taught;
- Pedagogic knowledge, that is, knowing how to engage with learners and to manage a classroom;
- Pedagogical content knowledge (PCK) which involves knowing how to represent and formulate the subject matter, in this case of early reading and mathematics, that make it comprehensible to students.

The research hinges on establishing the different knowledge, understanding and practices that are expected of teachers during their preparation and then comparing them with those that they actually exhibit at different points in their training and career.

First, we established the competences relevant to the teaching of reading and mathematics that the programme of initial teacher education seeks to develop in trainee teachers. This was accomplished from an analysis of documentation including the analysis of programme aims/objectives, and expected standards as well as from interviews with the providers. Secondly, we built up a picture of the knowledge, understanding and practice of actual trainee teachers at the end of their training, of newly qualified teachers (NQTs), and of teachers having taken part in continuing professional development programmes (CPDs). Both quantitative and qualitative data were used to develop this.

The quantitative data derived from a questionnaire administered to 1,299 trainees from 4 different colleges, 137 NQTs and 23 experienced teachers who had been on CPD for reading or mathematics. The qualitative data came from 19 focus group discussions (eight for mathematics and 11 for reading) with teacher trainees from the four colleges; in-depth interviews following lesson observations with 19 teacher educators (eight for mathematics and 11 for reading), 34 NQTS (19 for mathematics and 15 for reading) and 23 CPD teachers (10 for mathematics and 13 for reading).

The qualitative data from interviews and focus groups were transcribed and imported into NVivo 8 qualitative data analysis software with other appropriate texts such as summaries of observations. Data were coded and sorted out into systems of hierarchical categories – knowledge, understanding and practice. This enabled patterns to be identified and queries to be run. Quantitative data from the trainees and teachers questionnaires were analyzed using STATA software. Interpretation of the data was largely based on descriptive statistical analysis.

## 2. Initial Teacher Education

Although the history of primary education and teacher education is imbued with discourse on teacher quality, the rhetoric on improving the quality of teachers has not been matched with action with the result that primary teacher education programmes have remained virtually unchanged since attainment of independence in 1963.

Policies to improve the quality of teachers have focused chiefly on raising academic requirements for entry into PTE. The PTE formal and co-curriculum is overloaded leaving little time for focus on development of the knowledge, understandings and skills that trainee teachers will need to help primary school students learn reading and basic mathematics. Further, the PTE curriculum lays heavy emphasis on subject content and acquisition of theoretical knowledge about teaching reading and mathematics rather than on understandings and skills for teaching; and there are gaps between the PTE and the primary school reading and mathematics curricula.

Teacher educators in Kenya are drawn largely from university trained secondary school teachers and they receive no training or induction on teaching PTE reading or mathematics. This coupled with lack of materials on training teachers leads to teacher educators' inadequate knowledge, understanding and pedagogical knowledge for teaching reading and mathematics to those who will teach these subjects to young children. In reading lessons, emphasis is on the use of the 'look and say' method with little focus on phonics. In both reading and mathematics lessons, teacher educators used a combination of methods – demonstration, whole class teaching using question and answer, lecture and some simulation. In their teaching, teacher educators focus more on theoretical knowledge about teaching - how to structure reading and mathematics lessons, what teaching-learning activities to use, and the use of teaching learning materials (TLMs) - and less on understanding and pedagogical knowledge.

Trainees expressed confidence about their preparedness to teach reading and mathematics in the lower primary based on their perceived knowledge about teaching methods for reading and mathematics in the lower primary, knowledge about the structure of reading lessons and knowledge about the use of TLMs. However, the trainees seemed to lack a grasp of why the teaching techniques they had learnt would work in helping children learn reading and mathematics or how TLMs ought to be used in ways that are effective in helping learners learn to read and do mathematics considering the learner, environmental and other learner factors.

## 3. Newly Qualified Teachers

Newly qualified teachers' knowledge, understanding, and practice about teaching reading in the lower primary were mostly derived from their training as there were no induction programmes in the schools as it was assumed that they were competent. We found that for most NQTs, their understanding of reading as trainees, for example, had not changed. They continued to associate reading only with decoding, vocabulary development, sentence building and word level understanding despite the fact that reading in their practice referred to reading of fairly long stories indicative of the unreflective approach to practice learnt in their training.

In both reading and mathematics, NQTs adopted a highly structured approach in their teaching. In mathematics lessons, for example, the four-steps lesson procedure was predominant. The lessons started with an introduction in which the NQTs asked questions on the previous lesson. The introduction was followed by what they called lesson development in which time they taught the new concept usually through individual students or the whole class doing some activities using TLMs or the teacher working out a sum while asking questions about what she/he was doing. The third step involved the students working on assigned exercises individually in writing with the teacher going round the room marking. In the fourth and last step of the lesson, the NQTs worked out some of the problems in the assigned exercise on the blackboard or got some of the students do so. However, the NQTs were not able to explain how teaching mathematics in this way that they described as 'systematically' was helping their students learn or why and how TLMs aid understanding. NQTs didn't seem to know how to help weak students learn to read or do basic mathematics. Their chosen strategy was to give weak students extra tuition after school during which time they followed the same methods they had used in the class. When the methods did not work, they blamed the children or their social economic background. From the survey data, it emerged that trainees tended to be overconfident in their ability to teach, but NQTs felt less so once they encountered real classroom teaching.

## 4. Experienced Teachers who have Participated in Continuing Professional Development

In education policy pronouncements, there seems to be recognition of the importance of CPD. However, the recognition remains theoretical, as little has been done to institutionalize and improve the quality of CPD programmes in Kenya. Further, there has been little CPD focus on key curriculum areas such as early reading and mathematics despite the importance of these subjects. In this study, we observed lessons taught by a few teachers trained in the school-based teacher development (SbTD) programme, the only nationally implemented CPD programme, which trained teachers for reading and mathematics in early 2000s. We also visited schools where the now abandoned Early Grade Reading (EGR) intervention was implemented briefly and schools where the implementation of the Reading to Learn (RTL) programme was just beginning.

The SbTD programme adopted the reflective teaching model of teacher education in training of Key Resource Teachers (KRTs) who were expected to train other teachers in their schools. The KRTs attributed their knowledge and practice to different sources - their initial training, the CPD programme and personal practice. The KRTs differed from the NQTs in various ways:

1. The KRTs had a broader and deeper knowledge and understanding of reading and mathematics for lower primary learners;
2. The KRTs seemed to have better pedagogical knowledge than NQTs. For example, the KRTs demonstrated good knowledge and understanding of both the 'look and say' and the phonics methods for teaching reading and of when to use which method and they taught for understanding;
3. They were more reflexive in their teaching;

4. The KRTs taught for understanding and used different languages (English, Kiswahili and the mother tongue) to enhance understanding by all learners;
5. The KRTs were more aware of the importance of time on task and gave learners ample opportunities and time to practice and learn mathematics, for example;
6. They seemed to know where different students were at in their learning and attempted to provide different learning experiences for the different learning levels in their classes;
7. The KRTs were more aware than NQTs (and trainees) of the enormity of the challenge of getting all the children to learn to read and understand basic mathematical concepts;
8. They were more likely than NQTs to use different strategies to help each student, even in large classes, learn to read and do mathematics. They taught the class as a whole, in groups and individuals and even used peer teaching strategies;
9. The KRTs used learner-centered approaches more than the NQTs; and
10. Like the NQTs (and the trainees), the KRTs talked of the importance of TLMs. However, unlike the NQTs, they used TLMs judiciously.

As a consequence, reading levels and learning achievement in mathematics in classes taught by KRTs were higher than in those taught by NQTs and the students were more engaged in learning.

## 5. Recommendations

### Policy on Teacher Education

1. There is an urgent need for teacher quality and teacher education policy dialogue with a view to the development of a comprehensive research-based policy on teacher education generally and on teacher education for teachers of reading and mathematics in the lower primary;
2. Teacher education curriculum policy should be reviewed to focus on approaches that link more closely with the classroom experiences of teaching and learning reading and mathematics. The curriculum should focus on equipping trainees with a deeper understanding of the kinds of content knowledge, pedagogical knowledge and pedagogical content knowledge that can support effective teaching and learning at the early stages of primary education; and
3. A policy on CPD should be articulated urgently as a first step to institutionalizing CPD as a strategy for improving the quality of teaching and education in Kenya. In this regard, it is necessary that further critical analysis of the CPD programmes discussed in this report – SbTD, EGR, RTL and SMASSE – is carried out to inform a government driven and sustained reading and mathematics CPD programme for lower primary teachers.

### Initial Teacher Education

1. The PTE programme should be restructured to provide more opportunities for trainees to practice teaching and thereby learn through integration of theory and practice. More importantly, theory of teaching should be developed from the context of practice to ensure that real classroom challenges of learning inform how teachers understand teaching and how to promote effective learning;

2. The PTE curriculum should offer a specialization in lower primary teaching;
3. A programme for training and/or inducting PTE teacher educators should be developed and implemented;
4. Teacher educators already in the colleges should be availed of CPD opportunities to enhance their knowledge, understanding and practice of teaching those who are going to teach young children. It is important that such CPD opportunities include working with experienced classroom teachers who have practical knowledge of teaching; and
5. For the quality of training for teachers to improve, it is imperative that funding of teacher education is increased.

### The Teacher Education Curriculum and Practice

1. The teacher education curriculum should be reviewed to entrench the reflective teacher practitioner model envisaged in policy statements on TE and in the goals and objectives of the curriculum;
2. The curriculum should be reviewed to de-emphasise acquisition of theoretical knowledge about teaching reading and mathematics and to emphasise understandings and skills for teaching reading and mathematics;
3. Because of the extreme importance of early reading and mathematics, the teacher education curriculum should put particular emphasis on these two areas of TE and the primary school;
4. The TE reading and mathematics curricula for lower primary should be reviewed to enhance the link with the lower primary school reading and mathematics curricula;
5. The teacher education curriculum for reading in the lower primary should be strengthened to include particular emphasis on the phonics approach which has been shown to be effective in helping struggling readers decode print and thereby become independent readers; and
6. The practice in TE should mirror the practices expected of trainee teachers once they graduate. This means that teacher trainers should practice what they teach.

### In Schools

Becoming a competent teacher should be viewed as a process rather than a training event. Induction programmes for NQTs should therefore be put in place in schools as the first stage of continuing professional development for teachers.

## 1.1 Research Context

The Kenya Government made its commitment to provide universal primary education (UPE) soon after independence in 1963 (ROK, 1965) and in 1974, it abolished direct payment of primary school fees from Standards I to IV and thereafter in Standards V to VII by 1980 and to Standard VIII in 1985. However, user fees found their way back into primary education through the structural adjustment policies of the International Monetary Fund (IMF) and the World Bank of the 1980s. Following the Education for All conferences in Jomtien, Thailand in 1990 and in Dakar in 2000 where the EFA goals articulated in Jomtien were reiterated, and the re-emphasis of the EFA goal in the millennium development goals (MGDs) also of 2000, education policy in Kenya focused on expanding access at the basic education level. On coming to power in December 2002, the National Alliance Rainbow Coalition (NARC) government reintroduced free primary education (FPE) in January 2003. The immediate impact of the FPE programme was a massive increase in enrollment in public primary schools where enrollment increased by over 1 million pupils or by 17.6% (Ministry of Education, 2005). In 2007, the gross enrolment rate (GER) stood at 107% (girls 104.4% and boys 110.7%) (Ministry of Education, 2008a).

Unfortunately, the increase in enrollment has not been matched by an increase in the quality of education. Learning assessment studies focusing on literacy and numeracy conducted in the last 14 or so years have reported very low and unequal achievements in these areas. In 1998, Southern and Eastern Africa Monitoring Educational Quality (SACMEQ) study reported that while 64.8% of Standard 6 pupils had reached the minimum level of mastery on the reading test, only 23% had attained the English reading mastery level deemed desirable for successful learning in Standard 7 (UNESCO IIEP, 2001). The 2010 UWEZO assessment found that nearly half of Standard 4 learners tested could not read a Standard 2 level story and that only half of the children in Standard 1- 8 had acquired the highest numeracy competency expected of Standard 2 learners (UWEZO, 2010). The second UWEZO assessment of 2011 reported little change. Similarly, poor learning achievements in reading and mathematics were reported by the government's National Assessment System for Monitoring Learning Achievement (NASMLA) Kenya National Examinations Council (KNEC, 2010) which reported that both reading and numeracy achievement were below the standardized mean of 300. Correspondingly, poor reading attainment was reported by the RTI Early Grade Reading Assessment (EGRA) study conducted in Central and Luo-Nyanza provinces in 2009. The study assessed Standard 3 pupils in reading in English, Kiswahili, Gikuyu and Dholuo. The study found that 14% of pupils tested in English, 19% in Kiswahili, 15% in Gikuyu, and 20% in Dholuo in the last term of Standard 3 could not read a single word correctly. These reports point to the need for investigations into the teaching and learning of reading and mathematics in Kenya.

The centrality of the teacher in the teaching and learning process is widely acknowledged and the link between low pupil achievement and the skills and competence of teachers is consistently made (UNESCO, 2005). Research examining teacher quality confirms the logical conclusion that poor quality of students' learning correlates strongly with poor quality of teachers' teaching and it is widely assumed that initial teacher education (ITE) and continuing professional development (CPD) make a difference to teachers' pedagogic knowledge and skill which in turn is reflected in enhanced student learning outcomes (Dembélé & Lefoka, 2007).

Unfortunately, there has been little research into how teachers in Kenya are prepared to teach that would inform teacher-training policy and practice reforms. The current study was set up to fill the gap in knowledge about how the initial and continuing education of teachers impacts on the practice of teachers in Kenya. Children’s early learning experiences shape their attitudes and commitment to education more than at any other stage. What happens in the early grades impacts children’s educational future. Unless learning is meaningful at this stage, children are likely to drop out of school and relapse into illiteracy and innumeracy, or if they continue, they become disengaged and thereby find work in the later grades increasingly difficult (Liddell and Rae, 2001; Lewin, 2009; UNESCO, 2010; Glick and Sahn, 2010). Because of the extreme importance of early reading and mathematics for future progress, the study has focused on the preparation that teachers who teach reading and mathematics in the lower primary classes receive and what support is available through CPD and other routes to teach these subjects.

## 1.2 Research Questions

The research was guided by the following questions:

1. How do pre-service teacher education programmes prepare trainee teachers to teach reading and mathematics in the early grades?
2. How do trainee teachers develop their understanding of teaching reading and mathematics to early grade students?
3. How do newly qualified teachers teach reading and mathematics in their first few years of teaching?
4. What are the characteristics of professional development programmes with a mathematics and/or reading focus that have been implemented over the past three years?
5. How do the graduates of recently implemented professional development programmes with a mathematics and/or reading focus teach reading and mathematics to early grade students?

In this research, we conceptualize teacher competence in terms of knowledge, understanding and practice. Practice is central to good teaching but successful teachers would concur with the great body of research into teaching that good practice cannot just depend on the unreflective application of techniques. It is a complex process which requires a great deal of different knowledge:

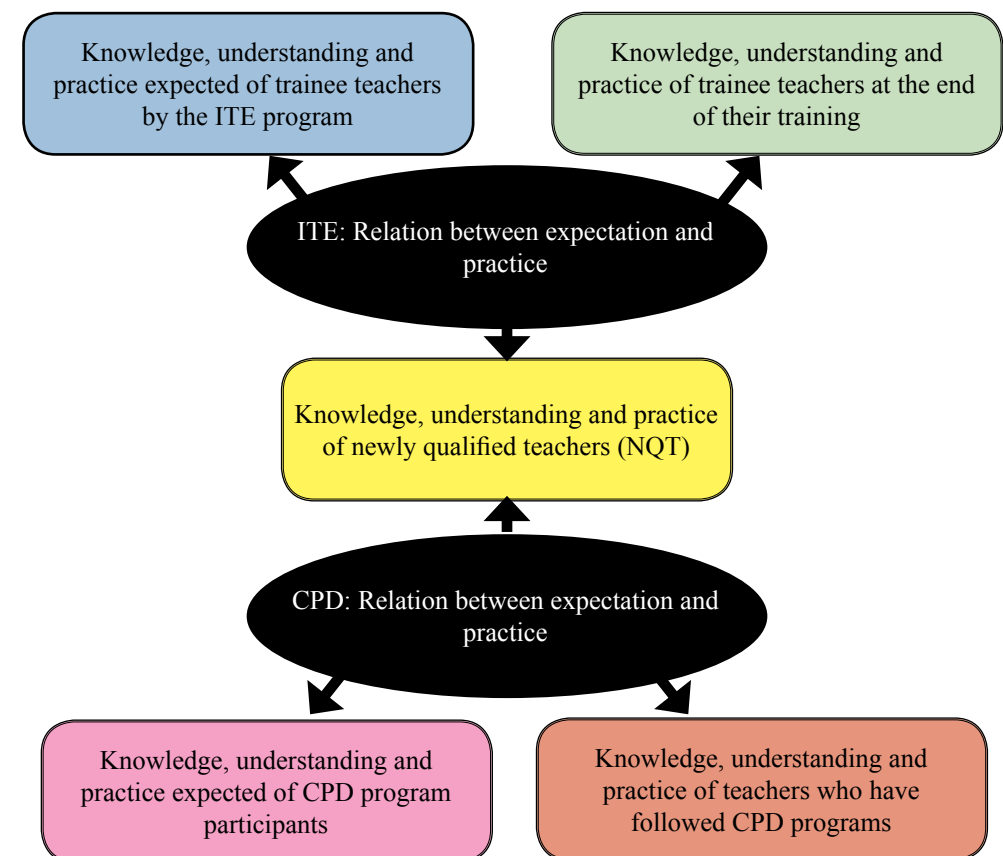
- Content knowledge, that is, knowing about the subject matter to be taught;
- Pedagogic knowledge, that is, knowing how to engage with learners and to manage a classroom; and
- Pedagogical content knowledge (PCK) which involves knowing how to represent and formulate the subject matter, in this case of early reading and mathematics, in ways that make it comprehensible to students.

The research investigated the different kinds of knowledge that teachers at various stages of preparation have and their understandings of how this can be applied to construct classroom practice.

## 2.1 Introduction

The research sought to establish the different knowledge, understanding and practices that are expected of teachers during their preparation in PTTCs and then compared them with those that teachers actually demonstrate at different points in their training and career. The points of comparison are summarized in Figure 1.

Figure 1: Comparisons and tensions



## 2.2 Design and Methods

First, we established the competences relevant to the teaching of reading and mathematics that the PTE programme seeks to develop in trainee teachers. This was accomplished through an analysis of documentation including the analysis of the PTE programme aims/objectives, and expected standards as well as from interviews with the providers. Secondly, we built up a picture of the knowledge, understanding and practice of actual trainee teachers at the end of their training, of newly qualified teachers (NQTs), and of teachers having taken part in continuing professional development (CPDs). Both quantitative and qualitative data were used to develop this.

The quantitative data was derived from a questionnaire administered to 1,299 trainees from 4 different colleges, 137 NQTs and 23 experienced teachers who had been on CPD for reading or mathematics. Two of the colleges (both public) were drawn from Central Province while the other two (one public and the other private) were drawn from the Coast Province. Coast Province was sampled for focus because a large section of the province falls within the educationally marginalized Arid and Semi-Arid areas (ASALs) of Kenya where education indicators are very low. Further, the EGR and the RTL CPD programmes – two of the three CPDs with a focus on mathematics and reading that the study focused on are implemented only in the Coast Province.

The qualitative data came from 19 focus group discussions (eight for mathematics and 11 for reading) with teacher trainees from the four colleges; in-depth interviews following lesson observations and videoing with 19 teacher trainers (eight for mathematics and 11 for reading), 34 NQTS (19 for mathematics and 15 for reading) and 23 CPD teachers (10 for mathematics and 13 for reading).

## 2.4 Data Analysis

Quantitative data were analyzed using STATA software. The qualitative data interviews and focus group discussions as well as other appropriate texts such as summaries of observations were transcribed and imported into the NVivo 8 qualitative data analysis software. Data were coded and sorted using a system of hierarchical categories of knowledge, understanding and practice. This enabled patterns to be identified and queries to be run. Quantitative data from the trainees and teachers questionnaires were analyzed using STATA software. Interpretation of the data was largely based on descriptive statistical analysis.

## 3.1 Introduction

The training of lower primary reading and mathematics teachers takes place within the broad Primary Teacher Education (PTE) programme. To fully appreciate the findings on how teachers are trained to teach reading and mathematics at the lower primary, it is important to understand the pre-service teacher education environment in which the training takes place.

## 3.2 A Brief Historical Overview of Teacher Education

The history of teacher education in Kenya goes back to the early twentieth century when Christian missionaries introduced teacher education to Kenya. However, few teachers were trained under the colonial missionary Teacher Education (TE) programme with the result that only 31.7% of the primary school teachers were trained at independence in 1963. Following attainment of independence in 1963, the government expanded teacher training through establishing new Primary Teacher Training Colleges (PTTCs) and through the introduction of an in-service teacher-training programme for the untrained teachers in the schools.

The PTE expansion efforts have paid off and virtually all primary school teachers in public schools are now trained. Further, judged by teacher grade, the quality of trained teachers has risen considerably. At independence, the percentage of teachers at each of the four grades Primary 1 (P1), Primary 2 (P2), Primary 3 (P3) and Primary 4 (P4) was 5.3, 9.4, 44.0 and 9.6% respectively (RoK, 1965). As Table 1 shows, the situation is now significantly different.

**Table 1: Distribution of Primary School Teachers by Qualification 2003-2007**

Qualifications	2003		2004		2005		2006		2007	
	No.	%	No.	%	No.	%	No.	%	No.	%
Graduate	254	0.1	925	0.5	890	0.5	1,020	0.6	1,083	0.6
Approved*	16,760	9.5	49,100	27.8	47,202	27.8	40,874	25.2	43,422	25.2
SI/Dip**	4,512	2.6	4,338	2.5	6,786	4.0	7,209	4.4	14,646	8.5
P1	129,785	74	99,549	56.4	95,701	56.4	93,275	57.6	99,090	57.6
P2	24,298	13.8	15,775	8.9	15,165	8.9	11,418	7.0	12,130	7.0
P3	3,972	2.3	1,865	1.1	1,793	1.1	1,698	1.0	1,804	1.0
Total trained	176,316	98.7	176,381	99.0	169,564	99.1	162,072	99.4	172,175	99.4
Total Untrained	2,306	1.3	1,803	1.0	1,469	0.9	921	0.6	978	0.6
Grand Total	178,622	100	178,184	100	171,033	100	162,993	100	173,153	100

Source: Ministry of Education Science and Technology (2008) Statistical Book

Currently, primary school teachers in Kenya are trained in 21 mixed gender public PTTCs and many but small private colleges in a 2-year residential PTE programme. In 2007, enrolment in the public PTTCs stood at 18,406 (50.53% male and 49.46 female). Enrolment in private colleges was 3,945 (45.65 males and 45.63 female).

### 3.3 Policy Initiatives

Policy initiatives to improve the quality of teachers through teacher education have focused on raising the teacher grades through raising the academic requirements for entrants into PTTCs. Initially, PTTCs trained primary school completers (and in some cases even non-completers) as P3 or P4 grade teachers. Currently, PTTCs train only P1 teachers and only Kenya Certificate of Secondary Education (KCSE) graduates who have obtained a mean grade of C plain and above are eligible to join PTTCs. Further, since 2004, the requirement is that an applicant must also have obtained a minimum of grade D plain in mathematics and C minus in English. However, this policy has not been implemented. Currently, the government has accepted proposals that the PTE programme be raised from a certificate to a diploma level.

Unfortunately, raising teacher grades and academic requirements for entry into PTTCs has not resulted in better teachers as the poor student learning achievements reported in various studies referred to in Chapter 1 reveal. This points to the need to pay attention to what actually goes on in PTTC classrooms particularly with regard to the types of knowledge the curriculum and teaching and learning in these institutions is emphasising.

### 3.4 The Primary Teacher Education Curriculum and Assessment

#### Curriculum

Like the school curriculum, the Primary Teacher Education (PTE) curriculum is developed centrally by KIE (currently known as Kenya Institute of Curriculum Development). The PTE curriculum comprises of primary school content subjects, teaching methods, professional studies and teaching practice. The current PTE curriculum is outlined in the 2004 PTE syllabus (RoK, 2004a) which comes in two volumes. Volume 1 contains the syllabuses for English, Kiswahili, physical education, social studies, creative arts, art and craft, music and information communication and technology (ICT) while Volume 2 contains the syllabuses for mathematics, science, agriculture, home science, professional studies, Christian religious education, and Islamic religious education. Content subjects and teaching methods are integrated in the syllabus.

The trainees are required to take 10 subjects and go on teaching practice (TP) in the first year and nine subjects and teaching practice in the second year. In the second year, trainees specialize either in the humanities or in science. Although the 2004 syllabus represents a reduction in the number of required subjects, the curriculum remains considerably overloaded given the duration of the PTE programme. Further, the syllabus has integration of many areas of study and issues such as library science, guidance and counselling, special needs education and legal issues, HIV/AIDS pandemic, drug and substance abuse, environmental education and human rights and gender awareness. The PTTCs principals and teacher trainers also pointed out the heavy co-curriculum load of the PTE programme ranging from games and other sporting activities to the music and drama festivals.

The 2004 syllabus introduced specialisation by subjects (sciences or humanities) which is not in line with practices in most schools where specialisation is more by level – lower, middle and upper primary. It is also the case that the teacher competences required for introducing young children to reading and mathematics are somewhat different from those of higher classes.

The curriculum pays inadequate attention to acquisition of pedagogical knowledge through practice. TP gets only nine weeks, split into three sessions of three weeks each in the entire year programme. The third TP session is devoted almost entirely to assessment, leaving only six weeks for the trainees' hands-on experience of teaching.

Of concern, is that aspects of the PTE curriculum are not aligned to the school curriculum. The PTTC principals interviewed in this study pointed out that the PTE trainees train in subjects they themselves had not studied including music, art and craft and Physical Education.

#### Assessment

Assessment in PTE is heavily examination oriented. A mid-course examination administered at the end of the first year and which is set by a committee of lecturers from all the colleges, determines whether one proceeds to the second year, re-sits the subjects failed, repeats the year or is discontinued. Students also sit a final examination at the end of their second year. The examination is administered by Kenya National Examinations Council (KNEC). To be awarded the certificate, students must pass in at least eight of the 10 subjects on the curriculum and pass in teaching practice. This emphasis on examinations has a backwash effect on teaching and learning in the colleges.

### 3.5 Characteristics of Teacher Trainers

Academic qualifications for teacher trainers range from diploma in teaching to post-graduate masters degrees. One of the colleges in fact had a PhD holder on its staff. However, few of the trainers have primary education teaching experience. A Key issue with regard to public PTTCs is that TSC posts trainers to the colleges with principals having little say on who gets posted to their colleges. According to one of the principals, some of the trainers including some secondary school principals have been posted to the colleges on disciplinary grounds, thus making colleges dumping grounds. Indeed, one of the colleges studied had three such trainers on its staff. Such practices also lead to over staffing in some of the colleges. One of those studied was over staffed by 19 trainers. On the other hand, high staff turnover is a serious issue in private PTTCs. Since TSC jobs are preferred, those who join private colleges work as they await opportunities to join TSC.

### 3.6 Characteristics of Teacher Trainees and Training Colleges

Teacher trainees comprised the key respondents in this study. The questionnaires were filled by all available second year trainees in the four colleges studied. Emerging patterns of trainee characteristics and college status captured below are a pointer to the profile of PTE trainees in Kenya.

## Academic qualifications

Majority of trainees (over 70% by the estimate of one of the principals) have C+ and above in the KCSE. Since the minimum entry qualification for universities is C+, most of the trainees qualify to enter universities or other post secondary training programmes. They ended up enrolling in PTTCs because their parents and/or guardians could not afford the high fees charged for other training programmes and private universities or for privately sponsored courses in public universities.

## Age, gender and teaching experience of trainees

The data of trainee respondents in Tables 2 and 3 suggests that there are more women teacher trainees than men and that the majority of students (72.13%) are between the ages of 21 and 25 years. A relatively big proportion (30.64%) of the sample had taught before joining PTTC, with 26.79% having taught for between one and two years. Interestingly, 249 or 19.61% of the trainees had taught at lower primary level before joining PTTCs. This suggests that practical teaching experience is another source of knowledge for these trainees.

**Table 2 : Teacher Trainees Respondents by Institution and Gender**

Institution's name	No of Trainees		No of Trainees		
	Male	%	Female	%	
College 1	328	72	21.95	256	78.05
College 2	417	127	30.46	290	69.54
College 3	280	129	46.07	151	53.03
College 4	274	118	43.07	156	56.93
TOTAL	1,299	446	34.33	853	65.67

**Table 3: Age of Teacher Trainee Respondents**

Age Range	Frequency	%
Unknown	15	1.15
20 or less	124	9.55
21 to 25	937	72.13
26 to 30	186	14.32
31 to 35	27	2.08
Total	1299	100

## Teacher Trainees' interest in teaching as a career

Teaching in primary schools is not the first career choice for the trainee teachers. Although only 22.57% of the trainees agreed or strongly agreed with the statement that 'they would rather be

training for another career' evidence from PTTC principals interviews and the FGDs indicate otherwise. One principal estimated that only less than 10% of the trainees join teaching out of love for teaching while another principal indicated that the students lacked energy and excitement for teaching. In addition, in the FGDs, many trainees indicated that they had applied for other training opportunities and only applied for the PTE programme when they failed to get admission into the other programmes.

## Infrastructure

The general environment and the infrastructure in public PTTCs do not engender pride and positive images about becoming a teacher and teaching. The institutions are old - established in the pre-independence era - with old and not so well maintained buildings. According to one of the principals, the dormitory facilities are poorer than those in secondary schools from which the trainees have come.

## Resources

The colleges are underfunded with students' fees, which are minimal, being the main income source for most colleges. Students pay only a total of KES 800 per year for tuition (they also pay for boarding facilities and other levies) which is grossly inadequate to sustain resource rooms. There exists a cost sharing arrangement and students are expected to buy their own learning materials such as textbooks which are too expensive for the students to afford. Consequently, teaching-learning materials are scarce in the colleges and students have to depend entirely on trainers' notes. Occasionally, colleges receive government grants for specific projects such as buying a college bus. However, in most colleges, the buses are in a dilapidated condition.

## 3.7 Summary of Key Points

The key issues about PTE emerging from the study are:

1. There is a well established PTE programme. However, policy initiatives targeting raising the quality of teachers have focused on entry qualifications and level of training but little on the quality of the training itself;
2. The curriculum emphasises subject specialization rather than specialization by level – lower, middle and upper primary;
3. Teacher trainers are untrained and have little knowledge and experience of primary education;
4. Assignment of teacher trainers to PTTCs is not based on their competence; and
5. Trainees have appropriate academic qualifications but many of them are not interested in teaching as a career; and PTTCs have poor infrastructure and have to contend with scarcity of teaching-learning resources.

## Chapter 4 Primary Teacher Education and School Reading and Mathematics Curricula

### 4.1 Introduction

The purpose of initial training is to equip those entering the teaching force with the knowledge and skills needed to be able to generally perform the duties of a successful teacher and to teach effectively in particular. It is therefore critically important that the initial training curriculum lays emphasis on the competences required to teach the school curriculum effectively.

### 4.2 Relations between the Primary Teacher Education and School Reading and Mathematics Curricula

Data for this chapter was collected through an analysis of the 2004 Primary Teacher Education (PTE) syllabus for English and mathematics (RoK, 2004a & b), available PTE English textbooks, and college and KNEC English examination papers as well as the 2002 school English and mathematics syllabuses (RoK, 2002) and English language textbooks - both the pupils' books and the teachers' guides. The analysis focused on understanding the continuities and gaps between the PTE reading and mathematics curricula and the lower primary reading and mathematics curricula as well as the teacher competences that are required to teach them effectively.

#### 4.2.1 The PTE and School Reading Curricula

The English syllabus is organized around topics. The topics for teaching reading methods in lower primary for example include pre-reading skills, reading readiness, and the teaching methods 'look and say' and 'phonics'.

There is inadequate focus on reading in the English PTE syllabus. Reading is treated only as a topic in the English and Kiswahili language PTE curricula. Further, as Commeyras and Inyega (2007) have noted, the PTE English curriculum is too general and wide to provide guidance for teaching reading pedagogy effectively. For example, topics in the English syllabus include the study of literature, aspects of drama and library science skills all of which take away time and focus from reading development which should be at the centre of primary education generally but lower primary in particular.

The PTE syllabus puts more emphasis on trainees acquiring knowledge about language rather than pedagogy. In terms of time allocation, teaching methods for lower and upper primary are allocated 70 hours (35 hours each) or only 27.6% of the 254 hours available for English. This allotted time has not been broken down further; hence it is difficult to estimate how much time is recommended to be spent on the lower primary reading methodology. In addition, only one of the five general objectives for English focuses on pedagogy.

The curriculum is learner-centred and the syllabus suggests a whole range of active learning approaches in teaching-learning reading. However, the focus is on the teacher trainee acquiring theoretical knowledge on specific methods and not on knowledge based on the practical use of the methods. For example, on the "Look and Say" method, it is stated that trainees will acquire

knowledge of: (i) the purpose of “look and say”, (ii) the value and limitations of the method, and (iii) “look and say” activities. For “phonics” as a method, the objectives stipulate that trainees are expected to acquire: (i) the principles of the phonics method, (ii) the advantages, and disadvantages of the phonics method, (iii) phonics skills assumed to be covered in Mother Tongue Reading and (iv) additional sound/letter relationships to be taught in English.

Internal learning assessments both in the PTE textbooks and in college, and national examinations also focus on theoretical knowledge acquisition. For example, two questions in one of PTTCs’ 2010 mock examination were: (i) State two pre-reading skills, and (ii) Using appropriate examples, describe the procedure of teaching reading in upper primary. Teaching in the colleges is, to a good extent, driven by the needs of the KNEC examination. According to the teacher trainers interviewed in this study, ensuring that trainees pass the final examination is all important. Consequently, it is safe to conclude that much of the teaching in the PTTC will focus on theoretical knowledge about teaching which is not useful in helping lower primary school children learn reading.

By contrast the school curriculum is organized around content themes such as “greetings and requests” in Standard 1, “greetings and polite language” in Standard 2 and “home and classroom”, and “school and school activities” in Standard 3. This suggests an emphasis on reading for meaning. Indeed, the general objective for reading is that the learner should acquire “reading skills to be able to read and understand instructions, to read for information and for pleasure, and to develop vocabulary and sentence structures” (RoK, 2002a p.4). The implication is that the teacher for reading should help learners not only to know how to read but also to be able to read with understanding, to get information from what they read and to derive enjoyment from their reading. Analysis of Standards 1 to 3 textbooks also revealed that pupils are expected to read fairly long comprehension passages in the first two grades. These expectations of the primary school reading curriculum call for a much more varied approach to teaching reading than the narrow one provided by the PTE curriculum.

#### 4.2.2 The PTE and School Mathematics Curricula

The PTE mathematics curriculum content is organized around topics and does not differentiate between lower and upper primary segments. The decision on what is appropriate content, and teaching and learning methods for lower and for upper primary is left entirely to the mathematics teacher trainers, yet the overwhelming majority of them have no training or experience in teaching primary mathematics.

The mathematics syllabus has substantial focus on pedagogy. In Year One, in addition to making provision for mathematics methods topics specifically, the syllabus integrates pedagogy with some lower primary mathematics topics. However, in Year Two, the syllabus focuses wholly on mathematics content knowledge. The stated aim for this relatively heavy focus on non-primary mathematics is ‘broadening the understanding of mathematics and increasing opportunities for further studies by the learner’ (RoK, 2004b p.2). This is clearly in contradiction with research on the kind of content knowledge that a primary teacher, for example needs. Following on to

Shulman (1987), deepening trainees’ conceptual understanding of the topics which are taught at primary level is thought to be more important than taking trainees further into more advanced mathematics or reinforcing and repeating the senior secondary curriculum.

The PTE mathematics syllabus has a superficial focus on practical teaching despite its claims to lay considerable emphasis on teaching methods. For example, only two of the nine identified general objectives for the syllabus focus on practical teaching. Further, the specific objectives for each topic overwhelmingly focus on trainees’ ability to ‘identify’. Mere identification of teaching approaches indicates an emphasis on theoretical knowledge i.e. knowledge about teaching approaches rather than knowing when and how to use the different approaches to help students learn mathematics which is best developed through practical use of the methods with actual learners.

Teaching methods / approaches are presented as activities that should be carried out while teaching different concepts and /or operations; and as procedures referred to in the syllabus as ‘development stages’ for teaching different concepts and / or operations. The objectives pay little attention to understanding and practice of the activities. However, knowing the activities and the development stages will not translate into trainees’ abilities to meaningfully engage the primary school learners in the activities in ways that will lead to effective learning of mathematics.

Appropriate use of teaching learning resources is considered particularly important in teaching young children mathematics because of the abstract nature of mathematical concepts. Further, it is argued that young children learn more effectively through activities in which they manipulate objects. The PTE mathematics curriculum places considerable emphasis on teaching learning resources. This is evident from both the general and specific objectives a substantial number of which focus on teaching learning resources. However, the syllabus is not clear on how the trainee will develop the understanding of how the teaching resources enhance learning or the practical knowledge required to use teaching resources to aid learning at different levels of primary school.

The PTE mathematics curriculum is not sufficiently aligned to the school mathematics curriculum. The syllabus does not provide for the study of primary curriculum and materials, and the actual primary school curriculum and learners.

In contrast, the primary school curriculum is organized by class – Standards 1 to 8 with separate sections for each topic at each level. Further, whereas the PTE syllabus focuses more on developing a theoretical knowledge of practical approaches to teaching mathematics and of making and using teaching / learning resources, the primary mathematics has a high expectation that mathematical concepts and skills will be developed practically using teacher made and locally available teaching and learning materials.

### 4.3 Summary of Key Points

#### Reading curriculum

1. Despite the importance of reading, it receives inadequate focus in the English PTE syllabus.
2. The time available for teaching English is not put to the best use with regard to the trainees' later teaching needs;
3. There is a heavy emphasis on theoretical knowledge in the syllabus, textbooks and examination questions about teaching rather than on pedagogical knowledge;
4. The PTE curriculum adopts a topic by topic approach whereas the primary school reading curriculum adopts a thematic approach; and
5. While the PTE curriculum focuses chiefly on early reading as decoding, the lower primary reading curriculum focuses on understanding as learners read fairly long comprehension passages.

#### Mathematics curriculum

1. The curriculum fails to differentiate lower and upper primary segments of primary education while the primary school curriculum does;
2. There is a relatively heavy emphasis on advanced mathematics which does not enhance trainee teachers' deepening understanding of the primary mathematics that they will teach on graduation;
3. Although the curriculum has substantial focus on pedagogy, emphasis is on theoretical knowledge of primary mathematics pedagogy and teaching learning resources whereas the primary school curriculum has expectations that mathematical concepts and procedures will be developed practically with appropriate use of teaching-learning resources; and
4. The PTE curriculum is not sufficiently aligned to the primary mathematics curriculum.

The above shortcomings of the PTE reading and mathematics curricula have serious implications on how trainees are trained to teach reading and mathematics on a day by day, lesson by lesson basis in the PTTCs and on trainees' understanding of teaching and learning lower primary reading and mathematics.

### 5.1 Introduction

Researchers at the Centre of Education in the US have drawn attention to the complexity of learning to read particularly for those doing so in a second language and emphasized the importance of trainee teachers acquiring a solid theoretical foundation of reading and the range of pedagogical approaches to reading. They suggest that these understandings and skills are to be acquired through the trainees' practical engagement in real classrooms and reflection (Centre for Education, 2010). On the other hand, research on teaching has revealed that good teaching is the result of the teacher integrating different types of knowledge to create teaching scenarios that make what they teach comprehensible to their students. According to Shulman (1987) the ingredients of knowledge that combined result in good teaching are: knowledge about the subject matter (content knowledge), knowledge of how to engage with learners and manage classrooms (pedagogical knowledge) and knowledge of how to represent and formulate content knowledge in ways that make it understandable to the students (pedagogical content knowledge). In this chapter, we explore the knowledge about reading, the pedagogical knowledge and practice that lower primary trainee teachers in Kenya acquire from their training and how they transfer these into teaching scenarios in the classrooms as NQTs.

### 5.2 Teacher Trainers' Preparedness, Knowledge and Practices

Teacher trainees' knowledge and understanding of teaching reading in the lower primary is to a good extent informed by teacher educators' own knowledge, understandings and practices.

#### 5.2.1 Teacher Trainers' Preparedness to Teach the Teaching of Reading in Lower Primary School

Teacher trainers had little (if any) training or experience of teaching in primary schools. All but one of the eight teacher trainers observed and interviewed were trained to teach English and one other subject in secondary schools. Four of the trainers had in fact started their teaching careers in secondary schools. Three of the teacher trainers joined PTE immediately on graduating from the universities with B.Ed (Secondary) degrees. Only one of the teacher trainers had prior training and experience of primary education, having trained and worked as a primary school teacher before being deployed to a PTTC.

Further, there are no induction programmes for teacher trainers. None of the colleges we worked in had an induction programme for new teacher trainers and there were no opportunities to attend CPDs that would enhance their understanding and practice. Consequently, newly recruited teacher trainers experienced a wide knowledge gap between what they knew about teaching in secondary school and what they were required to teach in PTTCs as recounted to us by one such trainer:

*When you first come to this college, it's a shock. In fact, for the first one year you don't know what you are doing. You go to class and teach your lesson but as you walk out you are asking yourself, did I teach the right thing?*

Consequently, teacher trainers develop their expertise in teaching reading by learning on the job, through reading, trying different approaches, and informally from colleagues they found teaching reading in the respective colleges.

### 5.2.2 Teacher Trainers' Knowledge and Understanding of Learning to Teach Reading

Teacher trainers understood reading to mean decoding and getting word level meanings. This is how one teacher trainer defined reading:

*Reading is that ability to look at a word, make it out, understand what the word means and comprehend - to look at a word, understand it and therefore comprehend it - that is what it is.*

Compared to meanings of reading found in the literature on early reading, teacher trainers' understanding was limited. The National Reading Panel in the USA, for example, identifies early reading components as phonemic awareness, phonics, fluency, vocabulary and text comprehension (Chabott, 2006).

The teacher trainers had limited knowledge of how to help learners with reading difficulties learn to read. After observing a lesson in which the teacher trainer used simulation to teach reading using a game and some 'students' were not able to read some of the words, we asked the teacher trainer what is to be done in such a case. He explained:

*If a learner is not able to use any of the skills learnt to read the word .... You just teach; they will understand as they continue reading.*

Another teacher trainer explained that lower primary teachers of reading:

*Need to understand that reading requires a lot of imitation and repetition and therefore they should emphasize on the words they teach. They should drill the learners to understand a word before they introduce sentences.*

While drilling might have a place in teaching and learning of English as a second language in Africa, research has shown that in lower primary it often deteriorates into mindless chanting (Bunyi, 2001).

The trainers had inadequate understanding of how oral and reading skills in the first language transfer to English despite the currently held view that knowledge of the mother tongue is beneficial in learning to read in a second language (in this case English) (Cummins, 1981). The primary school syllabus takes cognizance of this fact and stipulates that teachers should use mother tongue skills to teach oral and reading skills in English. However, rather than view the mother tongues as resources in teaching reading in English teacher trainers interviewed viewed them as obstacles as they talked of 'mother tongue interference' as a big problem in lower primary school children learning to read in English.

### 5.2.3 Teacher Trainers' Instructional Practices

According to the US Centre for Education (2010), successful reading teacher trainers model the pedagogic strategies they are teaching their trainees to use, and provide opportunities for extensive and guided practice with students in their classrooms. Teacher trainers can also simulate or use recorded scenarios of primary lessons as the basis for reflection and discussion.

Teacher trainers used a combination of methods – demonstration of how to teach reading, whole class teaching using question and answer as well as lecturing. A few teacher educators simulated early reading lessons with the trainees acting as lower primary school students or with a trainee role-playing the lower primary reading teacher. In all cases, the trainers took a dominant position in the class. They stood in front of the class with the trainees seated in rows facing the front.

The trainers considered their teaching to be learner-centred. A teacher trainer explained what they do just before teaching practice thus:

*We do a lot of interactions and questioning. You call someone to the front and tell him, "Do this the way you would do it in the classroom situation." We have a lot of reading sessions before teaching practice whereby you talk; they talk and dramatize something that you see they are not doing well. You do it yourself and then they will see what you are doing.*

However, from the lesson observations, it appeared that the teacher trainers' view of learner-centredness amounted to getting learners engage in physical activities using TLMs. Trainees' participation in the lessons was in answering mostly recall questions, demonstrating what they had either been shown or been told how to do and writing down notes. Trainees were not engaged in serious reflection and discussion about what they were learning and neither were they being challenged to think and demonstrate how they would use different methods to respond to particular needs in their future classes. It was apparent that trainees were learning to use set methods and procedures and that in turn, they are likely to have difficulties helping different learners in their future classes learn to read.

Some teacher trainers demonstrated awareness of the importance of the phonics method for the trainees in helping lower primary students learn to read as is evident below:

*The thing that will really help them (lower primary students) to read is if they know the sounds of English or the sound of whatever language... that they are reading; that will help them to know how to read, so you (the teacher of reading) have to start with the sounds. Let them know the sounds.*

However, the trainers taught the ‘look and say’ method of teaching early grade reading using activities such as matching words with the corresponding object, identification of words on a flash card and playing games. This suggests their inadequate knowledge and understanding of the phonic method which reading experts recommend especially for struggling readers (Slavin, Davis and Madden, 2009). Further, the lessons taught did not go beyond word level reading. This leaves trainees ill-prepared to teach reading skills such as fluency and text level understanding which seem to be the focus in the primary school textbooks.

In addition, teacher educators combined teaching of methods and teaching a rigid four-stage reading lesson structure. The implication here is that learning to teach reading is the same as learning set activities and procedures.

### 5.3 Teacher Trainees’ Learning to Teach Reading

Focused group discussions were conducted to gain Insights into trainees’ knowledge and understanding of reading. The FGDs focused on the trainees’ understanding of what teaching reading in the lower primary means, knowledge about the primary school curriculum, pedagogical knowledge, their feelings about their preparedness to teach reading in the lower primary, and the challenges they expected to encounter when they started teaching.

#### 5.3.1 Teacher Trainees’ Knowledge and Understanding

**Knowledge and understanding of what reading is** - Teacher trainees’ understanding of reading in the lower primary was not different from that of their trainers. Some trainees thought that reading had to do with pronouncing words while others said it has to do with word recognition; yet other trainees associated reading with vocabulary building. However, a few did say that reading has something to do with understanding or getting the meaning of words.

**Knowledge and understanding of the lower primary school reading curriculum** - The teacher trainees had limited knowledge and understanding of the lower primary reading curriculum. The trainees’ interaction with the school curriculum and materials was chiefly in preparation for teaching practice during which time one concentrated only on the particular class and topics he/she had been assigned to teach during the three weeks of TP.

**Trainees’ pedagogical knowledge** – The trainees’ pedagogical knowledge with regard to teaching reading in the lower primary was also constrained. This is because, in the entire 2 year programme, at best, trainees get only three weeks of practical teaching of reading in lower primary. This means that on the whole, the opportunity to practice what trainees have learnt theoretically in college is very much limited and the development of their pedagogical skills constrained.

#### 5.3.2 Teacher Trainees’ Sense of Preparedness to Teach Reading in the Lower Primary

The trainees were very confident about their preparedness to teach reading in the lower primary. In the questionnaires, 90% of the trainees rated their confidence as high or very high. Similarly, 87% of the trainees rated their ability to teach lower primary reading as high or very high. They were confident in their ability to use the ‘look and say’ method, how to structure a reading lesson and in the use of TLMs. However, as discussed in the foregoing sections, the trainees had learnt techniques to use in reading lessons but had not grasped why the techniques would work. They seemed to have simplistic faith in the mere use of TLMs. A trainee expressed the opinion, “With the use of teaching aids, the learning is simplified; it’s easy to understand”. Clearly, the trainees had not addressed themselves to how TLMs ought to be used in ways that are effective in helping learners learn to read considering the learner, environmental and other learning factors. This faith in TLMs is consistent with what was found in the PTE curriculum analyses data sets and the teacher trainer interviews and classroom observation data sets.

#### 5.3.3 Teacher Trainees’ Anticipated Challenges

Understanding trainees’ anticipated challenges is helpful in identifying their knowledge gaps to be addressed by the curriculum and PTE instructional practices.

The trainees identified using the phonics method to teach reading as a challenge. A trainee expressed his reservations regarding the use of the phonics method thus:

*The method I feel comfortable teaching in is the “look and say” because you know even when you go with those sounds, even you sometimes it will give you a problem. Even though you are a teacher you will have some problems. That is why you find some like me are comfortably using look and say.*

The trainees also identified multilingualism of the learners as another challenge in their teaching reading in English. A trainee from the Coast Province said, ‘the major challenge we have is mother tongue influence for the learning, even of the pronunciation of words and articulation of words’. Another trainee put it thus, ‘It’s a challenge because they are used to speaking mother tongue and to make them understand English is a challenge’.

From the questionnaire data, it emerged that the topics trainees find most challenging to teach were: finding meaning from a word’s place in the sentence (43% of the respondents), recognizing different parts of a word (41% of the respondents), understanding the overall meaning of a story, poem or other piece of writing (40% of the respondents).

The data sets from the teacher training indicated that these were areas that trainees received little assistance with in the PTTCs.

## 5.4 Linking Knowledge to Practice: Insights from Newly Qualified Teachers

From the interviews, it emerged that the NQTs' knowledge, understanding, and practice about teaching reading in the lower primary were mostly derived from their training. Indeed, the head teachers informed us that they did not have induction programmes for the NQTs since they were trained and it was therefore assumed that they were competent.

### 5.4.1 The NQTs' Knowledge, Understanding and Instructional Practices

Knowledge and understanding of what reading is - For most NQTs', understanding of reading had not changed. They continued to associate reading only with decoding, vocabulary development, sentence building, and word level understanding as the quotes below illustrate:

*It's making a pupil know more words in English.*

*Reading is to help a child connect one word to another to make a sentence.*

However, in practice, in the reading lessons, the NQTs were working with fairly long texts and their lesson objectives focused on text level comprehension. The NQTs' fixation on definitions of reading learnt in the colleges despite the fact that reading in their practice referred to reading of fairly long stories was indicative of the unreflective approach to practice learnt in their training.

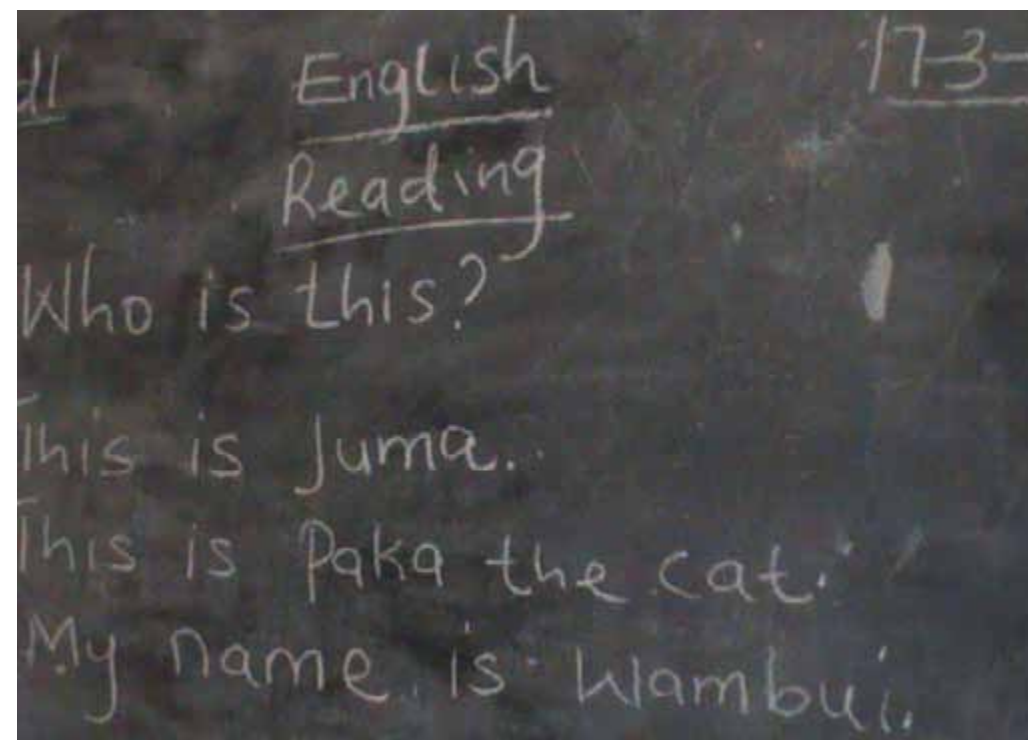
**NQTs' pedagogical knowledge** - The trainees displayed inadequate understanding of the methods they were using. NQTs' had the reading passage read over and over again – by the teacher, by the teacher with the students reading sentences after the teacher, by groups of students and by individual students. However, most NQTs' were unable to explain why they had chosen this approach, only saying that it helps students learn to read or that it helps them to understand as the following excerpt illustrates:

*Reading once they may not comprehend the passage, even twice they may not but the more they read, the more they understand because you realize as they are reading some of them would get lost and because they are children, we realize that they also learn through repetition, keep on asking them to repeat because they learn by repeating*

The idea of children learning to read through repetition was also mentioned by a teacher trainer in one of the interviews. What the NQT was not clear about from the above quote is how merely reading a piece of text over and over again translates into understanding.

However, a few NQTs' did talk of what they were learning practically as they tried to overcome the challenges that they faced. One such challenge had to do with the large class sizes. One NQT explained how she was using mixed ability grouping, with designated group leaders who could read well and were willing to help the non-readers.

**NQTs' knowledge and understanding of TLMs** – Though the NQTs talked about the importance of TLMs and particularly concrete objects and went to great lengths to have and use TLMs in the lessons we observed, it seemed to us that enthusiasm about TLMs was waning among some NQTs. In some of the classrooms we visited, there were no signs of TLMs and when we enquired from the NQTs, we received hard-to-believe answers such as they had taken them home for safekeeping.



*NQTs' use of the black board to teach reading*

**NQTs' instructional practices** - Observations of NQTs teaching reading in lower primary classes revealed that the NQTs were not making instructional decisions on the basis of their particular learners and the circumstances around them. The NQTs, observed generally, kept to the highly structured approach to teaching reading that they had learnt in college and which was reinforced in the teacher's guides on which virtually all of them seemed to depend. They had the reading passage read over and over again.

From the interviews and observations, it emerged that most NQTs had the knowledge of how to conduct reading lessons in lower primary classes and applied the methods they had learnt in college in teaching lower primary classes. However, most of the NQTs seemed to be at a loss about how to help students with reading difficulties. Asked what they do with students who cannot read, they told us they call the students back to school in the afternoon and continue to teach them using the same methods as they used in the lessons. This of course had not succeeded in helping the children learn to read.

A few NQTs were exercising flexibility and making instructional decisions on the basis of classroom realities with regard to use of code-switching despite the stringent rule against it in the PTTCs. A few NQTs confessed that they code-switched and argued that it was sometimes necessary to do so for the students to understand.

#### 5.4.5 Challenges Faced by NQTs

Most NQTs did not readily own up to facing challenges. However, when asked to reflect on their training and their teaching of reading in the lower primary and to say what needed improvement in the teaching of reading methods in the PTTCs, the NQTs indicated that the teaching of phonics was one area that needed improvement as the following excerpt illustrate:

*I think they should also emphasize more on the sounds. I somehow can remember being taught the vowels and the sounds but I would not do it very well if I am taken to class 2 or class 1.*

Through practice, some NQTs had realised the importance of phonics in helping lower primary students to become independent. The NQTs felt that better knowledge of the phonics method would make them more effective in helping students who were having reading difficulties.

*I can say emphasis (in PTTCs) should be put on phonetics so that I can become more effective; how I can teach this phonetics and help the children to read by themselves.*

From the questionnaire data, it emerged that like the trainees, NQTs find the topic: finding meaning from a word's place in the sentence (56.5% of the respondents) very difficult or difficult to teach. The other topic that NQTs find relatively challenging to teach is: understanding the overall meaning of a story, poem or other piece of writing (40% of the respondents). This is not surprising given that these areas are not given much emphasis in their training and yet these are very important components of the reading skill.

### 5.5 Summary of Key Points

The following key points emerge from the foregoing discussion on teacher trainees and NQTs' learning to teach reading:

#### Teacher trainers

1. On starting to teach in the PTE programme, teacher trainers have no training or experience in primary education. They receive no induction and have little professional development opportunities. Therefore, their knowledge and understanding of teaching reading is constrained;
2. Teacher trainers' instructional practices put emphasis on trainees' acquisition of theoretical knowledge about reading lesson structure, teaching methods and TLMs rather than on the practical use of the methods they are learning and of TLMs;
3. The teacher trainers had limited knowledge of how to help learners with reading difficulties learn to read; and
4. Teacher trainers worked hard to teach learner-centred teaching in various ways but fell short of engaging the trainees in reflection on how the activities they engaged them in would help learners learn to read.

#### Teacher trainees

1. Trainees' knowledge and understanding of reading mirrors that of their trainers;
2. They have limited knowledge of the lower primary reading curriculum as the primary school syllabus is not a key focus in the reading methods classes;
3. Trainees' knowledge and understanding of teaching reading at the lower primary is based on their acquisition of theoretical knowledge about teaching methods, reading lesson structure and use of TLMs which gives them what appears to be false confidence and belief about their capability to teach reading; and
4. The anticipated challenges of the trainees include use of the phonics method and making meaning out of written texts. These were also the areas that received little attention in PTE reading lessons.

#### NQTs

1. NQTs receive no induction on starting teaching and their understanding of reading and teaching to read continues to mirror that of trainees and trainers;
2. They have technical knowledge of how to teach reading, and they teach reading the same way they were taught in college – use the 'look and say' method with use of TLMs and get children to read the relevant text over and over again;
3. A few NQTs start to learn from practice and vary their teaching strategies depending on prevailing circumstances in the class; and
4. NQTs face the challenge of helping students having reading difficulties learn how to read and making meaning out of written text.

## Chapter 6 Learning to Teach Mathematics

### 6.1 Introduction

The research literature on mathematics teacher preparation for lower primary teaching emphasizes the need for teachers to have knowledge of mathematics, knowledge of how it should be represented in teaching and knowledge of pedagogical procedures (Fennema and Franke, 1998). The literature also suggests that when trainee teachers are exposed to and understand curricula materials, including textbooks, they become more effective in teaching school mathematics (Ma, 1999). The kind of knowledge that teachers need to teach effectively attracts keen research interest. Teacher preparation programmes have content subject knowledge as an important component of their curricular.

A recent study in Kenya by the African Population and Health Research Centre (APHRC) assessed primary school teachers in mathematics subject knowledge. The report indicates that primary teachers scored poorly in the mathematics they teach and recommended that greater emphasis be paid on strengthening teachers' mathematics subject knowledge (APHRC, 2010). However, there is research evidence that having subject knowledge does not translate into effective teaching of the subject (Ball, 2000). According to the research literature, knowledge of mathematics is important in as far as it enables teachers to develop deep conceptual and structural understanding of mathematics such that they can teach it meaningfully.

This chapter seeks to uncover the process of learning to become a primary mathematics teacher – from college to early years in school, focusing on what training focuses on, and how it is understood and transformed into practice at classroom level. The chapter also explores the knowledge, understandings and instructional practices of teacher trainers, trainees and NQTs. It is expected that this will help us understand why many Kenyan children in lower primary fail to grasp basic knowledge of mathematics which is an important precursor to improving primary teachers' effectiveness in teaching mathematics for understanding.

### 6.2 Teacher Trainers' Preparedness, Knowledge, and Instructional Practices

Trainees' knowledge and instructional practices are, to a good extent, influenced by the knowledge and practices of their trainers. Consequently, understanding the knowledge and instructional practices of trainers provides useful insights into the knowledge, understanding and expected practices.

#### 6.2.1 Teacher Trainers' Preparedness to Teach PTE Mathematics

Teacher trainers are ill-prepared to teach PTE mathematics. First, they lack training and/or experience in teaching mathematics at the primary school level prior to joining PTTCs. Seven of the eight teacher trainers in the study were Bachelor of Education degree holders trained to teach mathematics and one other secondary school subject while one had a masters degree in mathematics education. They had all come to PTTCs directly from the universities or from

secondary schools. Secondly, there were no induction programmes in the colleges studied and no professional development programmes for teacher trainers. Consequently, in the words of one of the trainers, they found teaching how to teach lower primary mathematics to be ‘very hard’. A teacher trainer explained:

*When I was first posted here is when I realised that some things that we think are obvious, are not always obvious because I remember when I was very new somebody had to show me how to demonstrate multiplication of zero multiplied by four (0 X 4).*

Teacher trainers faced serious challenges when they first started teaching in the PTTCs. The challenges they faced revolved around teaching methodology at two levels – PTE methodology that is, how to teach teacher trainees how to teach mathematics, and methodology for primary school mathematics. Lack of knowledge of primary school curriculum and primary schools generally did not help matters. One teacher trainer recounted to us the difficulties she faced as the following excerpt illustrates:

*You know in high school, we teach the content, we teach the children how to calculate but here in college, I discovered you need to teach people how to go and teach and I had never been exposed to the primary school curriculum before. In fact, when I came here first I didn't know anything about primary school and then I was supposed to teach them [trainees] to go and teach there [primary schools]*

In the absence of formal induction programme in the colleges, teacher trainers learnt how to teach PTE mathematics virtually on their own through books found in the college libraries of which there were very few and which one trainer described as ‘very old’, and loose arrangements with colleagues in which new teacher trainers received tips on how to teach. One teacher educator explained:

*When I joined this college, the former principal of this college, who was extremely good in methodology and content, taught me a lot...he used to tell me... do your teachings like this.*

The implication here is that trainers did not engage in learning that would enhance their conceptual understanding of lower primary mathematics and/or the teaching methods they were learning.

### 6.2.2 Teacher Trainers' Knowledge and Understanding about Learning to Teach Mathematics

Teacher trainers lacked sufficient knowledge and understanding of how trainee teachers learn to teach lower primary mathematics. Learning from colleagues informally comprised of advice on what to do rather than a discursive, practice and reflective process to deepen teacher trainers' understanding of learning to teach mathematics. It is such weak theoretical and practical

knowledge base that such teacher educators were drawing from in their lessons. The implication of this is that trainees were probably not developing strong pedagogical knowledge for teaching mathematics in the lower primary.

Teacher trainers' knowledge and understanding of teaching lower primary mathematics was inadequate. The trainers' notions of a good lower primary mathematics teacher were not linked to the cognitive demands of teaching (i.e. teachers' knowledge, ability to assess pupils' understanding, reflection, etc). Trainers gave examples of qualities of a good lower primary mathematics teacher such as helping students pass exams and affective qualities such as being caring and loving. One trainer included ‘good grooming’ as part of the qualities of a good lower primary mathematics teacher and argued that this would make students like the teacher and thus develop positive attitudes towards mathematics.

### 6.2.3 Teacher Trainers' Instructional Practices

Teacher trainers used various methods in teaching how to teach lower primary mathematics including lecturing to the whole class with students taking notes, question and answer, and simulation in which a group of students pretended to be lower primary children and another student pretended to be their teacher; and demonstration of how to teach different concepts with TLMs. Generally, teacher educators were keen to mark out the steps or stages a teacher should use in teaching different concepts and operations and the fact that trainees should use TLMs. The problem with these methods is that they do not give children the opportunity to explore mathematical concepts and thus deepen understanding.



Teacher trainees learn methods for teaching mathematics

In addition, teacher trainers seemed to have a theoretical knowledge of the importance of TLMs. They expressed the view that mathematical concepts are abstract and therefore teachers need to use TLMs especially real objects to engage learners in activities. A teacher trainer explained:

*We should try to engage learners in activities so that they can realize it by themselves.*

However, the teacher trainers seemed not to have grasped exactly how use of TLMs helped students internalize concepts. It was as if using TLMs would work like magic the outcome of students 'realizing it by themselves'. Many teacher trainers also mentioned motivational attributes of TLMs, pointing out that they help make the lesson interesting to young learners all of which, though reasonable justifications, do not focus specifically on how using TLMs helped learners move from the concrete to abstract mathematical concepts. Further, there was no discussion about appropriate use of TLMs or even which ones were good for what concepts and/or operations. In the case of teaching 'place value' for instance, in their demonstrations, teacher trainers used sticks, counters, place value tins, number line and the abacus. However, there was no discussion as to the circumstances in which it might be better to use one TLM rather than another one.

In virtually all the lessons observed, teacher trainers used TLMs to demonstrate the use of TLMs in teaching particular concepts. They also got trainees to simulate lessons taught using TLMs. However, interestingly, the teacher trainers were not convinced that primary school teachers made use of TLMs. One teacher trainer explained that older teachers often mocked NQTs for using TLMs by saying things like, 'you will draw those charts and you will get tired of drawing', and telling NQTs that the charts will not improve students' mean grade or examination grades. Another teacher trainer estimated that NQTs give up using TLMs within a year of their starting to teach. However, the teacher trainers continued to emphasize the use of TLMs rather than use their knowledge of what actually happens in schools to engage trainees on the anticipated challenges.

Teacher trainers demonstrated use TLMs mechanically and often did not use them in ways that could deepen conceptual understanding of mathematics. For example, the only lesson we observed the teacher trainer use ICT, the structure of the lesson remained the same as in the other lessons. The trainer used the power point to provide definitions, summarize key points, list TLMs and activities that should be used and gave questions. This was interspersed with demonstrations by the teacher and also the trainees. Consequently, use of ICT did not refocus the lesson from one in which theoretical knowledge is the key focus to one where trainees' understanding of how TLMs can deepen learners' understanding of mathematical concepts and procedures.

## 6.3 Learning to Teach Lower Primary Mathematics

Focus group discussions were conducted to gain insights into the knowledge and understanding the trainees were acquiring in the PTTCs about teaching mathematics in lower primary.

### 6.3.1 Teacher Trainees' Knowledge and Understanding of Teaching Primary Mathematics

The investigation focused on trainees' knowledge of the primary mathematics curriculum, lower primary mathematics, pedagogy and TLMs.

Knowledge and understanding of the lower primary mathematics curriculum – The trainees' Knowledge about lower primary mathematics curriculum was limited. Studying the primary school mathematics syllabus did not seem to be an important part of the training in the PTTCs. Virtually all teacher trainers confessed they did not use the primary school curriculum documents in their lessons and explained that the trainees were expected to familiarize themselves with the syllabus as they made their schemes of work in preparation for TP. Even then, there were limitations in the extent to which the trainees interacted with the lower primary syllabus as one of the trainees explained:

*We don't normally get well acquainted with the syllabus because you only teach in lower primary once [i.e. during teaching practice]. In the three weeks [of teaching practice], you are given specific topics to teach and you concentrate only on these topics so you are not able to look at other things.*

In addition, there were too few of these materials in the college libraries.

**Knowledge and conceptual understanding of lower primary mathematics concepts** - The trainees demonstrated inadequate conceptual understanding of basic mathematical concepts such as fractions. Asked which is bigger between  $\frac{3}{4}$  and  $\frac{3}{5}$ , the majority got it right but offered technical explanations such as with reference to the lowest common denominator. Such an explanation would not advance the conceptual understanding of lower primary children.

**Knowledge and understanding of pedagogy** - The trainees claimed that they had learnt methods such as discussion, demonstration, dramatization / role play, practical approaches and activities, and even field trips. Knowledge of different methods of teaching mathematics gave the trainees considerable satisfaction. They understood teaching mathematics to mean teaching rigid procedures of solving mathematics problems. From the questionnaire data trainees rated teaching steps in mathematics highly as a strategy for conceptual understanding. Eighty six percent of the trainees strongly agreed or agreed with the statement that "to teach learners how to remember important steps is the best way to help children understand basic concepts in mathematics". This reveals the superficial nature of the trainee's understanding of how conceptual understanding develops, and reflects the emphasis that tutors in general placed on 'steps' and 'procedures' in mathematics lessons.

The trainees seemed to have the knowledge that learner involvement in learning mathematics is important. In the FGDs, they talked of having learnt the value of involving learners, of active learning and learner participation from which learners 'get the concepts very well' unlike in teacher-centred lessons in which learners tend "not go get everything because the lesson tends to

bore”. All the same, the trainees seemed to value learner involvement for motivational rather than conceptual development purposes.

On the other hand, a few trainees demonstrated the precursors of reflective thinking about teaching. For example, in an attempt to explain what the mathematics teacher should know in teaching lower primary, one trainee stated:

*It is good for the teacher to think from a child’s perspective such that whenever a child gives a wrong answer, the teacher can be able to think how the child could have thought so that he has given that answer.*

The above excerpt suggests that the trainee has some awareness of the need to think through what is happening in the classroom. Teachers’ identification of the thinking behind learners’ outputs is essential in making decisions about how to represent concepts in ways that will help the learner understand.

**Knowledge and understanding of TLMs** – Virtually all the trainees in the FGDs indicated that they had learnt about different teaching aids for teaching mathematics in the lower primary and how to use them. They mentioned teaching aids such as counters, strings, concrete objects or realia, flash cards, the abacus, and place value tins. However, the trainees seemed to have acquired only theoretical knowledge about TLMs. Asked to explain how TLMs enhance conceptual understanding of mathematics, a trainee gave the following answer :

*Normally, teaching aids help in understanding more. When you use teaching aids, the children are able to understand more easily than if it is theory.*



Teacher Trainees learn to use mathematics Teaching Learning Materials

### 6.3.2 Teacher Trainees’ Sense of Preparedness to Teach Reading in the Lower Primary

The trainees were optimistic about their capability to teach lower primary mathematics. In the questionnaires, trainees rated their capability to teach lower primary mathematics very highly - 89.60% and 93.59% rated their confidence as very high and high respectively.

The trainees attributed their confidence in their preparedness to having learnt how to structure mathematics lessons. Trainees who had had some prior teaching experience before joining the TTC were most satisfied with the training. One of them stated:

*I am now glad that I know the stages to follow when teaching contents in maths. I now understand how the various steps of the lesson structure should follow from the start to the end.*

The trainees’ confidence is understandable since in the textbooks and in the PTTC lessons, teaching mathematics in the lower primary was presented as unproblematic – as only comprising of following well laid out lesson procedures and steps, and engaging learners in various activities using a variety of TLMs . In the lessons we observed, whether or not these procedures work all the time with all the students was not discussed and neither was what to do when the procedures did not work with some students.

### 6.3.3 Teacher Trainees’ Anticipated Challenges

Asked about the challenges they expected to face as teachers of mathematics in the lower primary, the trainees identified general issues such as pupils’ attitudes towards mathematics, their own lack of knowledge of local languages in areas where local languages were the mandated languages of instruction, how to maintain class control, and lack of teaching-learning resources. Their own pedagogical knowledge and practice did not come up. The overconfidence could be attributed to the trainees’ lack of appreciation of the complexity of mathematical concepts to a lower primary child as well as their lack of a practical understanding of teaching and of lower primary classes.

On the other hand, from the questionnaire data, it emerged that the topics many trainees find relatively difficult to teach included: solving word problems (40.4%), comparing fractions (32.4%), and estimating and measuring (32.2%) recognition of fractions (29.3%), and subtraction of two or three digit numbers involving borrowing (29%). These topics require that the teacher has good understanding and knowledge of the different ways in which students could be assisted to develop deep understanding. It requires a consideration of how to make these topics clearer using different approaches.

## 6.4 Linking Knowledge to Practice: Insights from Newly Qualified Teachers' Teaching Practices

From both the interviews and the questionnaire data, it appeared that the Newly Qualified Teachers' (NQTs) knowledge base was largely from PTE. In the questionnaires, 63% of the NQTs indicated that they had developed their best understanding of teaching primary school mathematics in PTTCs compared to 26% who attributed their knowledge to working with others in schools. However, there is need to be cautious about the 26% who indicated that they learnt from other teachers in the schools. Elsewhere in our data from teacher trainers and even from trainees, experienced teachers were not seen as progressive with regard to their teaching methodology. Therefore, there is need to be cautious about their being models to be emulated in the schools.

### 6.4.1 The NQTs' Knowledge, Understanding and Instructional Practices

**NQTs knowledge and understanding about teaching lower primary mathematics** – From the interviews, it emerged that the NQTs had only a theoretical knowledge of teaching mathematics in lower primary. Although they were proud of their ability to teach mathematics 'systematically', they were not able to explain how teaching mathematics 'systematically' was helping their students learn. For example, on asking and probing an NQT to explain to us the importance of the systematic steps he was observed using, he only made vague statements:

*The systematic steps are very useful. They are very useful because they help the children to retain much what you have taught; when you take them through those steps at least they can remain with something concrete in their minds.*

Many of the NQTs observed had inadequate understanding of the teaching-learning methods they were using. For example, in one of the lessons we observed, an NQT organized the children in groups and had the children sit and work in groups. The NQT's explanation as to why she found it useful to organize students in groups for mathematics was:

*We encourage group work; because it also helps them ... you know small children have a tendency of being possessive of their things. Right from home, they are like this thing is mine this thing is mine but when it comes to class you teach them how to share. You realized that in every table, I gave one textbook so that they share, although I also have a number of text books in the cupboard. So the reason of keeping them in group is to teach them how to share and; also to teach them how to work together as a team.*

The explanation given had nothing to say about how putting students in groups helps them learn mathematics. The explanation also suggests lack of understanding of group work method. In fact, keeping books in the cupboard instead of giving them to the pupils seems unjustifiable.

NQTs didn't seem to know how to help weak students. Virtually all of them said that their strategy was to give them extra tuition after school. But when we probed further and asked the

NQTs to tell us how they taught those learners they gave extra teaching in the afternoon, they indicated they followed the same methods they had used in the class. These would be the same methods that had not succeeded in helping the students learn. The consequence was that when the students did not learn, the NQTs attributed it to the students' lack of interest or their limited intellectual capacities and labeled them slow learners.

### 6.4.2 The NQTs' Instructional Practices

The NQTs' instructional practices closely mirrored what was taught in the teaching methodology lessons in PTTCs. They adopted a highly structured approach to teaching mathematics. The four step lesson procedure – introduction, development, pupils working on assigned sums individually in writing and review was predominant. In the introduction, NQTs asked questions on the previous lesson. In some cases, they reviewed what was taught previously by writing on the chalkboard an operation based on a concept that was covered in the previous lesson and solved it through question and answer. During the second stage called 'lesson development', the NQTs taught the new concept. In the third stage, the students worked on assigned exercises individually in writing with the teacher going round the room marking. Finally, the NQTs worked out some of the items in the assigned exercise on the blackboard or got some students to do so.

Throughout, the NQTs made strenuous efforts to engage students in activities usually involving manipulation of some TLMs such as pebbles, seeds and bottle tops, sticks, or the teacher or a student working a sum on the chalkboard while asking questions about what she/he was doing. However, NQTs did not use the TLMs judiciously to help students learn mathematics. In some cases, use of TLMs seemed to be an end in itself rather than a means to an end. For example, even when some learners could add correctly without using TLMs, the NQTs insisted on the learners using counters for educationally unsound reasons such as the need to wait until the whole class could use counters. Further, NQTs moved quickly from use of concrete materials to abstract ideas, not giving time for learners to make the connection between the manipulation of TLMs and the concepts they were learning.



Children sit in rows facing blackboard and teacher

The same use of practices learnt without adequate understanding in college was found to apply to the use of TLMs. NQTs repeatedly told us that TLMs are useful in enabling the teacher present concepts in a comprehensible form for the child as in the following excerpt:

*In math, it becomes very easy for the pupils when we use teaching aids such as counters in addition and subtraction, a 'shop' while teaching about money, and also if it is measurements in standard two and three the use of measuring sticks. So these materials help the children to understand. If we teach orally without using the materials, they tend to forget (An NQT).*

From the above statements the NQTs are reinforcing the notion that linking mathematical concepts to concrete materials aids understanding but they don't tell us why or how that is so. Further, the interest in TLMs was waning among NQTs. There were no TLMs in some of the classes we visited. Although there could be many reasons for this, it could also be the case that, because of the way they used them, NQTs did not find that TLMs enhanced the students' understanding of mathematics and therefore did not value them much.

### 6.4.3 Challenges Faced by NQTs

As noted in the FGDs with trainees, NQTs were very confident of their ability to teach primary level mathematics, and felt the training received had prepared them well to promote effective learning of the subject. In the survey, NQTs responded to questions on topics that they have found difficult or easy to teach. Just like in the case of the trainees, the topics that NQTs identified as the most challenging were: subtraction of two or three digit numbers involving renaming, estimating and measuring of length, volume and weight' and solving word problems. A possible explanation as to why there is not much difference in the topics that trainees and NQTs find difficult to teach could be because the training does not expose prospective teachers to practical teaching and reflection on teaching primary mathematics topics. NQTs feel less confident handling the same topics they anticipated having problems with as trainees once they start teaching in real classrooms.

## 6.5 Summary of Key Points

The following key points emerge from the foregoing discussion on teacher trainees and NQTs' learning to teach lower primary mathematics:

### Teacher trainers

1. The trainers have no training in primary mathematics and experience a wide knowledge and practice gap between their secondary mathematics and PTE mathematics knowledge;
2. Learning to teach lower primary mathematics informally from colleagues, teacher trainers develop theoretical rather than practical knowledge of teaching mathematics; and
3. Teacher trainers adopted a rigid approach to teaching mathematics emphasizing technical and mechanical knowledge and understanding rather than conceptual knowledge and understanding.

### Trainees

1. Trainees lack knowledge of lower primary mathematics curriculum and the practical difficulties of teaching mathematics;
2. Trainees have a shallow understanding of teaching mathematics in the lower primary and do not acquire adequate pedagogical knowledge about teaching mathematics. This is due to the fact that teacher trainers emphasise theoretical knowledge instead of practical knowledge acquired through practice and reflection on practice;
3. Trainees associate teaching mathematics in the lower primary with unreflective conduct of activities using various TLMs. They learn to associate rigidly structured lessons with good teaching;
4. Some trainees have started to understand that teaching is not a technical endeavor but one where teachers need to assess the students' understanding and the context of learning before making instructional decisions;
5. While the trainees get the answers to lower primary mathematics problems right, they lack the deep conceptual understanding of mathematics which is critical in developing the ability to represent concepts in different ways (Shulman's 1987 pedagogical content knowledge) to enhance students' meaningful learning of mathematics; and
6. The trainees are overconfident about their ability to teach lower primary mathematics based on their perception of teaching as the application of set methods and lesson procedures, and the manipulation of TLMs learnt in their training.

### NQTs

1. NQTs continue to hold onto the theoretical knowledge about teaching and TLMs learnt in PTTCs;
2. The NQTs' instructional practices mirrored what they had learnt at the PTTCs. Frustrated when the methods do not work, they blamed the learners; and
3. NQTs have a shallow understanding of TLMs and do not know how to use them effectively. Due to their lack of understanding and competence in using TLMs, and the examination oriented nature of the primary school curriculum, NQTs soon abandon use of TLMs in favour of traditional methods of teaching even as they continue to claim that theirs is learner-centred teaching.

## Chapter 7 Continuing Professional Development

### 7.1 Introduction

Continuing professional development has been recognized as part of a 'continuum of teacher learning' for some time (Fullan, 1982). This chapter gives an overview of Continuing Professional Development (CPD) in Kenya with a focus on CPD programmes, targeting lower primary reading and mathematics teachers. The knowledge, understanding and instructional practices of reading and mathematics CPD programme teachers are analysed to uncover the benefits such CPD programmes appear to offer for the teaching of early reading and mathematics.

### 7.2 Continuing Professional Development Structure and Policy Environment

The importance of continuing teacher training and development was recognized as a major need at independence in 1963 when the Kenya Government inherited over 8,000 untrained primary school teachers. As a result, among the recommendations by the first post-independence education commission – the Kenya Education Commission of 1964 - was the in-service training of both the untrained and trained teachers (RoK, 1964).

Government pronouncements in policy documents have continued to underline the importance of CPD for trained teachers. However, little has been achieved in this area. The Sessional Paper No. 1 of 2005 acknowledges the fact that there has been little INSET (In-service Education and Training) with the result that few teachers have had opportunities to participate in INSET activities (RoK, 2005). The Sessional Paper emphasises the need for a dynamic, responsive and well-coordinated system of in-service training as a pre-requisite for the success of the free primary education (FPE) initiative and the achievement of Education for All (EFA) goals.

Over the years, there have been attempts to institutionalise CPD. One such effort is the establishment of the inspectorate division now the Directorate of Quality Assurance and Standards (previously known as the Inspectorate in the MOE). One of the two key functions of the directorate is to provide advisory services to schools on how best to improve teaching through Quality Assurance Standards Officers (QASOs) (MOE, 2005b). Unfortunately, QASOs also have a teacher evaluation role which they are more associated with. Also, the effectiveness of QASOs is constrained due to shortages of officers, lack of transparency and openness in hiring and promotion practices, budgetary and competence related impediments (Elimu Yetu Coalition, 2003). Consequently, QASOs have not had much impact on changing practice at classroom and school levels.

Another effort in the institutionalisation of CPD was the establishment of Teacher Advisory Centres (TACs) in the early 1970s and the hiring of TAC tutors appointed from experienced primary school teachers. The TACs were charged with the responsibilities of assisting teachers to develop materials and deal with pedagogical and classroom management issues; organise and coordinate seminars, workshops and refresher courses for teachers on curriculum changes and pedagogy; and induct new teachers. However, shortage of education field officers such as

QASOs which leads to TAC tutors being assigned administrative and quality assurance duties at the expense of teacher development work; inadequate financial resources for INSET training workshops and transport; poor physical infrastructure including roads, in many areas as well as TAC tutors' lack of appropriate competence limit the overall effectiveness of TACs.

More recently, efforts to strengthen CPD in Kenya have included the establishment of an INSET section in the MOE in 1999 and identification of INSET for primary teachers as one of the 23 investment programmes in the Kenya Education Sector Support Programme 1 (KESSP 1) 2005–2010 (MOE, 2005b). This was done because it was found necessary to co-ordinate in-service programmes provided by the MOE itself, through donor support and/or implemented projects, NGOs, and religious organizations so as to ensure proper utilization of resources and avoid duplication in teacher capacity development for effectiveness (MOE, 2005b).

Although Kenya has an elaborate CPD infrastructure, there is no coherent policy on CPD and no national CPD programme. Indeed, of the little CPD there is in the country, the majority consists of small usually one-shot projects provided by a variety of local and international NGOs, and development partners with or without the collaboration of the MOE. More often than not, the focus of such projects is usually dictated by the area of interest to the particular NGO. As a result, there has been little CPD focus on key curriculum areas such as lower primary reading and mathematics

## 7.3 Reading and Mathematics Continuing Professional Development Programmes

The researchers identified four on-going and/or recently concluded INSET programmes on reading and mathematics: Early Grade Reading (EGR), Reading to Learn (RTL), Strengthening of Teaching Mathematics and Science in Education (SMASE) for primary school teachers and School-based Teacher Development (SbTD).

### 7.3.1 Early Grade Reading (EGR)

The innovativeness of the short-lived (less than a year) EGR intervention in Kenya was its exemplification of the phonics approach to teaching early reading which is something that the PTE and the school curriculum recommend but don't delve into. Funded by USAID and implemented by the Aga Khan Foundation and Research Triangle Institute (RTI) the intervention was implemented starting February 2008 on an experimental basis in 20 primary schools in Malindi District of the Coast Province. Twenty control schools were also selected for monitoring of impact purposes. Standards 1 and 2 teachers were trained on how to use ready-made highly structured English and Kiswahili reading lessons. A post-intervention assessment showed substantial improvements in reading scores in both the experimental and control schools. Perhaps due to this lack of differentiation between experimental and control schools with regard to improvements, the programme was abandoned.

### 7.3.2 Reading to Learn (RTL)

The RTL intervention focuses on training lower primary teachers in reading and mathematics. The Aga Khan Foundation in collaboration with the MOE was implementing the intervention on a pilot basis in 64 schools in the educationally marginalized Kwale and Kinango districts of Coast Province. The RTL programme adopts a whole language approach to teaching reading in the lower primary classes. Instead of starting from the sound as in the phonics approach or from the word as in the 'look and say' approach taught in the PTE programme, the RTL approach starts from the whole text in the form of a story, and moves to the sentence, the word and finally the sound. At the start of the intervention, teachers were trained for three days for reading and three days for mathematics. RTL teachers write the stories they use in class themselves. Therefore, a key focus of the training is on how to write the stories and how to use the stories in teaching. The TAC teacher educators and RTL project workers provide professional support to the teachers in their schools. The programme had just started. However, the teachers observed and interviewed were very enthusiastic about the approach and felt that it enabled them to help the children learn to read faster.

### 7.3.3 Strengthening of Teaching Mathematics and Science in Education (SMASE) for Primary School Teachers

Implemented by the MOE and Japanese International Cooperation Agency (JICA) nationally, SMASSE for primary school teachers CPD programme focuses on improving the teaching of mathematics and science in the primary schools generally. The programme started in April 2010 with the training of trainers drawn from PTTC science and mathematics teacher trainers. The actual training of teachers started with the training of Standard 6 mathematics and science teachers in the August 2010 school holidays.

### 7.3.4 School-based Teacher Development (SbTD) programme

The SbTD programme introduced the reflective model of teacher education in Kenya. Implemented on a national scale, the SbTD programme was launched in 2001 through the collaboration of the MOE and the Department for International Development (DFID). The aim of the first phase of the programme was to strengthen the teaching of mathematics, English and Science in the primary schools generally. The target of the SbTD programme was to train one teacher for each of the subjects from every school in the country using the cascade mode of training. The trained teachers were referred to as the Key Resource Teachers (KRTs) for their respective subjects. The programme adopted a distance learning model which means that the teachers undertook their studies for the programme while they were still teaching their classes. The advantage of this approach was that teachers could immediately put into practice what they were learning in the safety of their own classrooms. Four distance learning modules were developed comprising of a core module – Principles of Primary Practice (MOE, 2001a) - and modules for English, mathematics and science.

The KRTs were expected to train the other teachers in their schools, working through the relevant subject panels. However, the extent to which this actually happened is doubtful. Many of the KRTs we talked to indicated that they had done little in the way of training other teachers in their schools. Further, in many schools we visited, the head teachers did not seem to be clear as to which teachers had received KRT training especially in cases where the head teacher had joined the school after the completion of Phase One of the programme in 2004. In cases where KRT teachers had been transferred and had thus been replaced, the head teachers did not seem to know whether or not the new teachers had received KRT training while in their previous schools.

The researchers observed lessons and/or conducted interviews with experienced teachers who had participated in three CPD programmes – SbTD, EGR and RTL. The EGR intervention was abandoned after the pilot phase whereas the pilot phase of the RTL programme had just started. Consequently, discussion of CPD and the development of reading and mathematics is based on observations and interviews based on the SbTD programme KRTs.

Overall, KRTs provided the best examples of observed good practices in the teaching of both reading and mathematics in lower primary classes.

## 7.4 The School-based Teacher Development and the Development of Reading Skills

Although School-based Teacher Development (SbTD) programme focused on the teaching of English generally, it had a strong reading component and a specific focus on teaching reading in the lower primary. The discussion of the knowledge, understanding, and instructional practices of SbTD KRTs, focuses on their (i) knowledge and understanding of reading, and pedagogy and, (ii) instructional practices. However, our KRT sample was only five teachers and as such, what is reported below should be taken with some caution. All the same, we believe that the knowledge, understanding and practices of the five teachers is indicative of what the SbTD training had tried to achieve and how it had changed the practice of some of the teachers trained.

### 7.4.1 Key Resource Teachers' (KRTs) Knowledge and Understanding

**Knowledge and understanding of reading** – The KRTs' knowledge and understanding of reading in the lower primary was broader and deeper than that of the PTE trainers, trainees, and NQTs. While the KRTs gave accounts of how they taught sounds, words, sentences and reading for understanding, just like some NQTs, they also talked about what helped children to read fluently, the importance of developing reading speed, and extensive reading for pleasure. Talking about the reading practices of her Standard 2 class, a KRT explained, 'We have a library and so they read. They finish one book and they come for another one. I tell them to tell me the story and they like that' (KRT from Central Province).

**Knowledge and understanding of pedagogy** – The KRTs seemed to have good knowledge and understanding of both the 'look and say' and the 'phonics' methods. For example, a KRT explained why the 'phonics' method is more effective in helping children learn to read as follows:

*Because if... if I have not taught the word "cow" and I am using 'look and say' [method], the child cannot read the word but if I had taught sounds, the child can read; but even if I have taught the word in class by 'look and say' [method], and they memorize, they may not be able to read*

The suggestion here is that the 'phonics' method, unlike the 'look and say' method, gives children the tools for reading unfamiliar words and therefore helps them become independent readers. The view that the 'phonics' method is useful in helping learners to become independent readers is also supported by reading researchers such as Stanovich (1986).

### 7.4.2 Key Resource Teachers' Instructional Practices

**Use of reflective teaching approach** - Although the KRTs did not talk about reflecting on their practice specifically, aspects of reflection were evident in their practice. Talking of children and learning, a KRT from Central Province told us that the purpose of SbTD was to improve teaching of reading in primary schools and went on to say, 'Sometimes you teach and children do not understand and then maybe you say that it is the children who are not performing when it is you'. In the words 'when it is you', the KRT is hinting at the possibility that children's failure to learn could actually be due to the teacher's teaching and therefore the need for the teacher to think about what she/he is doing. The KRTs constantly talked about trying different approaches, again suggesting that they evaluated their practice regularly and sought to come up with the best ways of helping lower primary school students learn to read.

**Use of a combination of methods and strategies** – The KRTs used a combination of the 'look and say' and the 'phonics' methods. They organized the students in groups and spent more time working with phonics with non-readers. A KRT explained, 'If it's a child who cannot do anything, who has just come, you go back to sounds (KRT from Central Province)'. These teachers provided ample opportunities for the children to practice reading and got children to read library books. They used different strategies to ensure that children were engaged in what they were learning. In whole class reading activities, for example, we observed a KRT get the children to touch the words to ensure that all the children had their attention on the words they were reading. In other cases, KRTs had each child read at least a sentence of the text being read to ensure that all the children in the class got a chance to read and the teacher monitored progress of each child and planned future activities appropriately. A KRT explained her actions thus:

*I wanted to make sure that every child in the class knows how to read. If groups are allowed or the whole class reads together, we may not know the pupils who do not know how to read. But reading alone, I have always known the pupils to help.*

The KRTs described the process of getting all the children in their very large classes (over 60 in some cases) to read as being ‘very hard’ and ‘not easy’. A KRT described the process that she had gone through from Standard 1 with her Standard 3 class in which virtually all (except the recently admitted) could read.

The KRTs used the group teaching method regularly and effectively. They generally used mixed ability grouping but also used a mixture of mixed ability and ability grouping for different purposes. For example, a KRT explained the grouping in her class as follows:

*Today, I had mixed ability groups but one group was made up of special cases (i.e. the poor readers). When they are in mixed ability group, the good ones will help the poor ones when they are working.*

Here, the teacher is referring to the case when the non-readers are separated from the others so that she can help them while the rest are in mixed ability groups with carefully selected group leaders who are themselves fluent readers and therefore can help the others with words they find difficult to read.



Teaching learning materials

The KRTs code-switched into and out of Kiswahili in teaching reading. One KRT told us that when she was using the ‘phonics’ method to teach reading in English, she benefited from the fact that the class had learnt about sounds in Kiswahili thus: “We learn Kiswahili as mother tongue here. Now it (Kiswahili which is a syllabic language) also helped us so much when joining the vowels, like “t” and “ta”.” Asked about her code switching behavior, a KRT in a school in Central Province explained:

*In my own understanding, you cannot stick to one language. You have to explain in Kiswahili. If a child cannot speak English, let the child speak Kiswahili, then you tell the child you are supposed to say this in English.... Otherwise in this early stage, you cannot stick to English alone.*

**Use of TLMs** – The KRTs effectively used a variety of TLMs such as flash cards, charts and concrete objects. The KRTs seemed confident in their ability to teach reading in the lower primary using various TLMs. Unlike, the NQTs, who seemed to feel compelled to use TLMs in every lesson, the KRTs used TLMs when they felt they would add value to what they were teaching. We asked one KRT who taught reading comprehension in a Standard 3 class why she had not used TLMs in her lesson. Her response was that she found the pictures in the pupils’ textbook sufficient for the lesson and explained that she made and used charts but that she used them only when she thought they were necessary.

Our interview data suggests that the KRTs’ instructional practice had benefitted from several sources including the PTE programme, the SbTD CPD and from learning from their own practice. All the KRTs concurred that they learnt group work methodology from the SbTD programme. A KTR in a school in Central Province explained how she had learnt to break down long passages so as to focus on segment by segment thus:

*I find it just helpful, not necessarily getting it from elsewhere. It all depends. It all depends with what you are teaching and the people you are teaching.*

The implication here is that as the KRTs searched for the best ways to help children learn to read, they tried different methods. However, the decision on what to do was based on the content of what they were teaching and the environmental factors in the classrooms, including the children themselves. From the foregoing, it is clear that the KRTs were drawing on their knowledge of the content and their pedagogical knowledge to make instructional decisions.

## 7.5 The School-based Teacher Development and the Development of Mathematics Skills

An analysis of the SbTD mathematics module revealed that the curriculum related closely to the primary school mathematics curriculum and classrooms. The curriculum also put emphasis on developing the teacher’s understanding of mathematics, how children learn mathematics, and how to help children learn mathematics. This was evident from topics such as ‘The nature of

mathematical concepts' within which the question, 'What is mathematics?' is addressed and 'Children as learners of mathematics'. Discussion in this section focuses on the knowledge and understanding, and the instructional practices of the five KRTs observed teaching and subsequently interviewed. The section also focuses on the sources of the KRTs' knowledge. Although we recognize that the KRTs sample was very small, we believe that their knowledge and practices provide some insights into the teaching of mathematics.

### 7.5.1 Key Resource Teachers' Knowledge and Understanding

**KRTs' knowledge and understanding of pedagogy** – The KRTs seemed to have good understanding of what lower primary children need to learn mathematics and taught for understanding. One KRT explained:

*You give the child enough time, enough practical work, enough resources to go through the subject.*

The KRTs also appreciated the challenge young children face in learning mathematics. A KRT explained how she has to teach the same concept several times to ensure all children learn because 'it is not a one time thing'. This underscores the importance of the teacher being patient with the students and therefore giving them many opportunities to learn mathematics.

### 7.5.2 Key Resource Teachers' Instructional Practices

The KRTs taught the class as a whole, in groups and as individuals. They taught the class as a whole mostly at the beginning of the lessons when they were introducing new concepts. They then got the students to work in groups. Usually, they had mixed ability groups with the weak students in a separate group. The KRTs strove to ensure that each child learnt. A particularly good KRT explained her practice thus:

*I introduced the lesson step by step and then I gave an exercise. Then I went round marking the pupils' books and I also helped those who were a bit left behind because some could get, they only needed a little assistance and I gave them. I also gave the quicker ones textbooks so that they would be able to continue. I have to make sure that everybody is occupied doing something that is why I was issuing textbooks and cards while I concentrated on marking and assisting the weaker pupils.*

The KRTs used grouping to monitor how well the children were learning. Explaining the value of group work, a KRT said:

*This group work helps so much because if you go to this group you understand how the group is and you understand the ones who are weak. When you are marking, the few questions you have given, it will help you to know the ones who are weak and then after that you will be able to help them.*



Key Resource Teachers(KRTs) organise children in groups

The KRTs were able to make and/or collect TLMs and use them judiciously. A KRT explained how she collected old calendars to make her own TLMs. Another KRT explained why she gave different TLMs to different children thus:

*Some of them have gone through private nursery schools ....They know how to open textbook, they know how to use the textbooks ...that is why I gave them textbooks. You noted I did not give everybody ...I know the groups that use the textbook and those that use cards. If you noted, the cards had simpler sums. So those who were coming up I gave them the cards so that they could be able to join the textbook group so that by the end of the year all of them will be using the textbooks. You don't just give them textbooks just because it is written for class one. Some of them don't know how to use them; some have not gone through nursery school so you teach them from opening the page, how to turn the papers, slowly by slowly.*

## 7.6 Sources of the Key Resource Teachers' Knowledge

Our interview data reveals that the Key Resource Teachers (KRTs) had developed their pedagogical knowledge from several sources, including the PTE programme, the SbTD programme and from their practical practice. A KRT said, 'The teacher has to be creative. You have to imagine how your lesson will be'. However, she was categorical about the source of her knowledge about TLMs, 'I can confidently say that although I was exposed to the use of resource materials during my P1 training, it was so theoretical. I frankly learnt how to use resource materials effectively during the SbTD training'.

## Chapter 8 Key Issues for Policy and Practice

From the observations and interviews with KRTs, we formed the opinion that a considerable number of KRTs had internalized the reflective teaching model that is emphasized in the SbTD programme; and developed skills and understandings about reading and mathematics and the capacity to translate these into classroom practices that positively impacted on students' learning to read and do mathematics. It was apparent that the very good KRTs were operating at pedagogical content knowledge level (Shulman, 1986).

### 7.7 Summary of Key Points

1. There is no national CPD policy or programme;
2. There are a few CPD programmes focusing on reading and mathematics primary teachers;
3. There is little CPD for key primary curriculum areas such as reading and mathematics;
4. CPD can make a difference to students' learning if it focuses on developing teachers' conceptual understanding of content and pedagogy; and
5. The KRTs were more effective in teaching reading and mathematics in lower primary classes. Their instructional decisions seemed to be informed by considerations of the learning needs of the different learners in their classes.

### 8.1 Introduction

This research on Teacher Preparation and Continuing Professional Development in Kenya was set up to fill the gap in knowledge about how the initial and continuing education of teachers impacts on the practice of teachers. The study focused on the preparation that teachers who teach reading in English and mathematics in the lower primary receive and the support experienced teachers receive through CPD programmes. A central issue in the research was whether the process of learning to teach reading and mathematics at lower primary level develops in the teacher the different types of knowledge essential for effective teaching – knowledge about the subject matter (content knowledge), knowledge about how to engage with the learner (pedagogic knowledge) and knowledge about how to represent and formulate content knowledge in ways that make it comprehensible to the learner (pedagogical content knowledge). The research, therefore, investigated the different kinds of knowledge that teachers at various stages of preparation – trainees, newly qualified and experienced teachers who have received CPD support - have and their understandings of how this can be applied to construct classroom practice. However, the research first addressed the issues of teacher supply and training in Kenya as well as the issues of teacher education policy and curriculum generally and that of reading and mathematics in lower primary in particular.

### 8.2 Key Findings

This study has come up with important findings for teacher education in Kenya generally and for teacher education for reading and mathematics for lower primary teachers in particular. The key findings of the study are:

1. Kenya has made tremendous progress and virtually wiped out untrained teachers from the public education sector;
2. There has been no serious effort to interrogate the concept of quality teachers and how the curriculum and structure of Primary Teacher Education (PTE) can be changed to enhance the quality of training the trainees receive and therefore the quality of teachers and teaching in the country. Rather, raising teacher grades and entry requirements for the PTE programme have been the two main teacher quality improvement strategies adopted;
3. Teacher education policies have not focused attention on ensuring that primary school teacher trainees acquire the knowledge, pedagogical skills and pedagogical content knowledge that they will need to help lower primary school learn to read and understand basic mathematics – the two areas that are considered critical for further learning and for living;
4. The PTE curriculum design and implementation is not in consonance with the progressive teacher as a reflective practitioner teacher education model suggested in various ways in the teacher education policy statements, goals and objectives;
5. The PTE formal and co-curriculum is overloaded leaving little time for focus on development of the knowledge, understandings and skills that trainee teachers will need to help primary school learners learn;

6. The PTE curriculum and practice focus more on theoretical knowledge about teaching i.e how to structure reading and mathematics lessons, teaching-learning activities and the use of teaching learning materials - and less on understandings and skills for teaching;
7. There are gaps between the PTE and the primary school reading and mathematics curricula;
8. There is inadequate focus on teacher training for reading and mathematics in the lower primary classes;
9. There are no training or induction programmes for Primary Teacher Training College (PTTC) teacher educators. This coupled with lack of materials on training teachers leads to teacher trainers' inadequate knowledge, understanding and pedagogical knowledge for teaching reading and mathematics to those who will teach young children.
10. In reading lessons, focus is on the 'look and say' method with little focus on the 'phonics' method and yet the latter gives learners the necessary independence to read on their own;
11. In both reading and mathematics lessons, teacher educators focused more on theoretical knowledge about teaching such as how to structure lessons, what teaching-learning activities to use, and the use of teaching-learning materials – and less on understanding and pedagogical knowledge;
12. The trainees are overconfident about their preparedness to teach reading and mathematics in the lower primary. Their confidence is based on theoretical knowledge about teaching methods and procedures for reading and mathematics in the lower primary and about the use of teaching learning materials (TLMs);
13. For most Newly Qualified Teachers (NQTs), their understanding of reading as trainees had not changed despite the reality in their classrooms;
14. In both reading and mathematics, NQTs adopted a highly structured approach in their teaching. However, they were not able to explain how teaching reading and mathematics following a rigid structure was helping their students learn or why and how TLMs aid understanding;
15. The NQTs didn't seem to know how to help weak students learn to read or do basic mathematics. Their chosen strategy was to give weak students extra tuition after school during which time they followed the same methods they had used in the class. When the methods did not work, they blamed the children or their social economic background;
16. There seems to be a theoretical recognition of the importance of continuing professional development (CPD), however, little has been done to institutionalize and improve the quality of CPD programmes in Kenya;
17. There has been little CPD focus on key curriculum areas such as early reading and mathematics despite the importance of these subjects;
18. The nationally implemented school-based teacher development (SbTD) CPD programme that introduced the concept of reflective teaching in Kenya seems to have had positive impacts on the teaching of some of the teachers trained;
19. The SbTD trained Key Resource Teachers (KRTs) had a broader and deeper knowledge and understanding of reading and mathematics for lower primary learners;
20. The KRTs taught for understanding and used different languages (English, Kiswahili and the mother tongue) to enhance understanding by all learners;
21. The KRTs were more aware of the importance of time on task and gave learners ample opportunities and time to practice and learn mathematics, for example;

22. The KRTs were more aware than NQTs and trainees of the enormity of the challenge of getting all the children to learn to read and understand basic mathematical concepts;
23. The KRTs used different strategies to help each student, even in large classes, learn reading and mathematics. They taught the class as a whole, in groups and individuals and even used peer teaching strategies; and
24. Like the NQTs and the trainees, the KRTs talked of the importance of TLMs. However, unlike the NQTs, they used TLMs judiciously;

### 8.3 Recommendations

On the basis of the foregoing findings from this research on teacher preparation and continuing professional development in Kenya, we make the following policy and practice recommendations:

#### Policy on Teacher Education

1. There is an urgent need for teacher quality and teacher education policy dialogue with a view to the development of a comprehensive research-based policy on teacher education generally and on teacher education for teachers of reading and mathematics in the lower primary;
2. Teacher education curriculum policy should be reviewed to focus on teacher education models that have been shown to produce effective teachers generally and effective reading and mathematics teachers for the lower primary in particular. The curriculum should focus on equipping trainees with content knowledge, pedagogical knowledge and pedagogical content knowledge; and
3. A policy on CPD should be articulated urgently as a first step to institutionalizing CPD as a strategy for improving the quality of teaching and education in Kenya. In this regard, it is necessary that further critical analysis of the CPD programmes discussed in this report – School-based Teacher Development (SbTD), Early Grade Reading (EGR), Reading-to-Learn (RTL) and Strengthening of Teaching of Mathematics and Science in Secondary Education (SMASSE) – is carried out to inform a government driven and sustained reading and mathematics CPD programme for lower primary teachers.

#### Initial Teacher Education

1. The PTE programme should be restructured to provide more opportunities for trainees to practice teaching and thereby learn through integration of theory and practice;
2. The PTE curriculum should offer a specialization in lower primary teaching;
3. A programme for training and/or inducting PTE teacher educators should be developed and implemented;
4. Teacher educators already in the colleges should be availed of CPD opportunities to enhance their knowledge, understanding and practice of teaching those who are going to teach young children; and

5. For the quality of training for teachers to improve, it is imperative that teacher education is funded appropriately.

### **The Teacher Education Curriculum and Practice**

1. The teacher education curriculum should be reviewed to entrench the reflective teacher practitioner model envisaged in policy statements on TE and in the goals and objectives of the curriculum;
2. The curriculum should be reviewed to de-emphasise acquisition of theoretical knowledge about teaching reading and mathematics and to emphasise understandings and skills for teaching reading and mathematics;
3. Because of the extreme importance of early reading and mathematics, the teacher education curriculum should put particular emphasis on these two areas of TE and the primary school;
4. The TE reading and mathematics curricula for lower primary should be reviewed to enhance the link with the lower primary school reading and mathematics curricula;
5. The teacher education curriculum for reading in the lower primary should be strengthened to include particular emphasis on the phonics approach which has been shown to be effective in helping struggling readers decode print and thereby become independent readers; and
6. The practice in TE should mirror the practices expected of trainee teachers once they graduate. This means that teacher trainers should practice what they teach.

### **In Schools**

Becoming a competent teacher should be viewed as a process rather than a training event. Induction programmes for NQTs should, therefore, be put in place in schools as the first stage of continuing professional development for teachers.

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