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The Effectiveness of Short-Term Literacy
Skills Intervention on Children at Risk of
Reading and Writing Difficulties
in Tanzania

A Study of Grade One Children
with Dynamic Assessment Approach



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THE EFFECTIVENESS OF SHORT-TERM LITERACY SKILLS
INTERVENTION ON CHILDREN AT RISK OF READING
AND WRITING DIFFICULTIES IN TANZANIA

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Abstract

The aim of the study was to create and evaluate an intervention programme for Tanzanian children from a low-income area who are at risk of reading and writing difficulties. The learning difficulties, including reading and writing difficulties, are likely to be behind many of the common school problems in Tanzania, but they are not well understood, and research is needed.

The design of the study included an identification and intervention phase with follow-up. A group based dynamic assessment approach was used in identifying children at risk of difficulties in reading and writing. The same approach was used in the intervention. The study was a randomized experiment with one experimental and two control groups. For the experimental and the control groups, a total of 96 (46 girls and 50 boys) children from grade one were screened out of 301 children from two schools in a low income urban area of Dar-es-Salaam. One third of the children, the experimental group, participated in an intensive training programme in literacy skills for five weeks, six hours per week, aimed at promoting reading and writing ability, while the children in the control groups had a mathematics and art programme. Follow-up was performed five months after the intervention.

The intervention programme and the tests were based on the Zambian BASAT (Basic Skill Assessment Tool, Ketonen & Mulenga, 2003), but the content was drawn from the Kiswahili school curriculum in Tanzania. The main components of the training and testing programme were the same, only differing in content.

The training process was different from traditional training in Tanzanian schools in that principles of teaching and training in dynamic assessment were followed. Feedback was the cornerstone of the training and the focus was on supporting the children in exploring knowledge and strategies in performing the tasks.

The experimental group improved significantly more ($p = .000$) than the control groups during the intervention from pre-test to follow-up (repeated measures ANOVA). No differences between the control groups were noticed. The effect was significant on all the measures: phonological awareness, reading skills, writing skills and overall literacy skills. A transfer effect on school marks in Kiswahili and English was found. Following a discussion of the results, suggestions for further research and adaptation of the programme are presented.

Key words: dynamic assessment, intervention effects, randomized controlled experiment, follow-up, literacy skills, reading and writing skills, reading and writing difficulties, identification, screening, at-risk children, low-income area

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In Vasa, 2nd May 2011

Salvius A. Kumburu

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Abbreviations

BASAT	Basic Skills Assessment Tool
DA	Dynamic Assessment
MoEVT	Ministry of Education and Vocational Training
PEDP	Primary Education Development Programme
SACMEQ	South and Eastern African Consortium for Monitoring Educational Quality
URT	United Republic of Tanzania

1 Introduction

Striking and alarming reports from education statistics and research reveal that an increasing number of children in Tanzania drop out of school, that they fail in examinations or have poor examination results. The repetition rates are high in several grades. There seem to be problems with reading and writing skills in nearly all primary schools. Many kinds of reasons and explanations for the situation can be found, and strategies for improvement of the situation are needed. Being literate can be seen as one of the basic conditions for successful schooling, and for a productive adult life. The aim of this study is to find means of improving the reading and writing skills in children at risk of reading and writing difficulties. The study is an intervention study with randomly selected research groups. The sample of the study is Kiswahili-speaking grade one children from a low socioeconomic urban area of Dar-es-Salaam in Tanzania. The selection of this sample was based on the idea that success in creating and implementing an intervention programme with this kind of sample, with assumed low literacy stimulation, and thus in need of support, would be of value in creating programmes for similar and “better off” samples.

The study comprised two main stages: the identification and intervention stage. In the identification stage a total of 301 children between the ages of 6 and 7 were screened out of 674 children by the dynamic assessment approach for children at risk of reading and writing difficulties. In the intervention stage, the identified children were subjected to a five-week intensive training programme in reading and writing, whereas the control groups had parallel programmes. Very few studies have been performed on reading and writing problems of Tanzanian schoolchildren. Nevertheless, reports document the prevalence of reading and writing problems in nearly all primary schools in Tanzania.

The presentation of the study is organized in the following manner. The introductory part introduces the context and discusses the background and problem area of the study and ends with a description of the aim and motives of the study. Chapter two is a review of the literature with focus on central concepts related to the study, on identification and intervention programmes for children at risk of reading and writing difficulties. In Chapter three, the research method is presented. The chapter includes a description of the procedure used in the dynamic assessment and intervention, the design of the study, instruments, sample, sampling method and data analysis. Chapter four presents the results from the screening phase and from the intervention. Chapter five includes the discussion, which ends with recommendations for improvement of literacy assessment and teaching approaches focusing mainly on the Tanzanian context.

This introductory chapter presents the school system and the educational challenges in Tanzania. The challenges are related to low general performance and low level of literacy skills of the schoolchildren. The situation is described by using national examination results, figures about repetition and drop-out rates, and the few existing studies on the topic. In this study the term “literacy” is used to refer to reading and writing skills. The description given is intended to give the reader a basic understanding of the problems, and of the need for actions to be taken in order to promote reading and writing skills in Tanzania.

1.1 The school system and education in Tanzania

The school system of Tanzania (Figure 1) consists of pre-primary and primary education, secondary education and higher learning (Lindhe, Malmberg & Temu, 2005). (<http://www.sida.se/publications>)

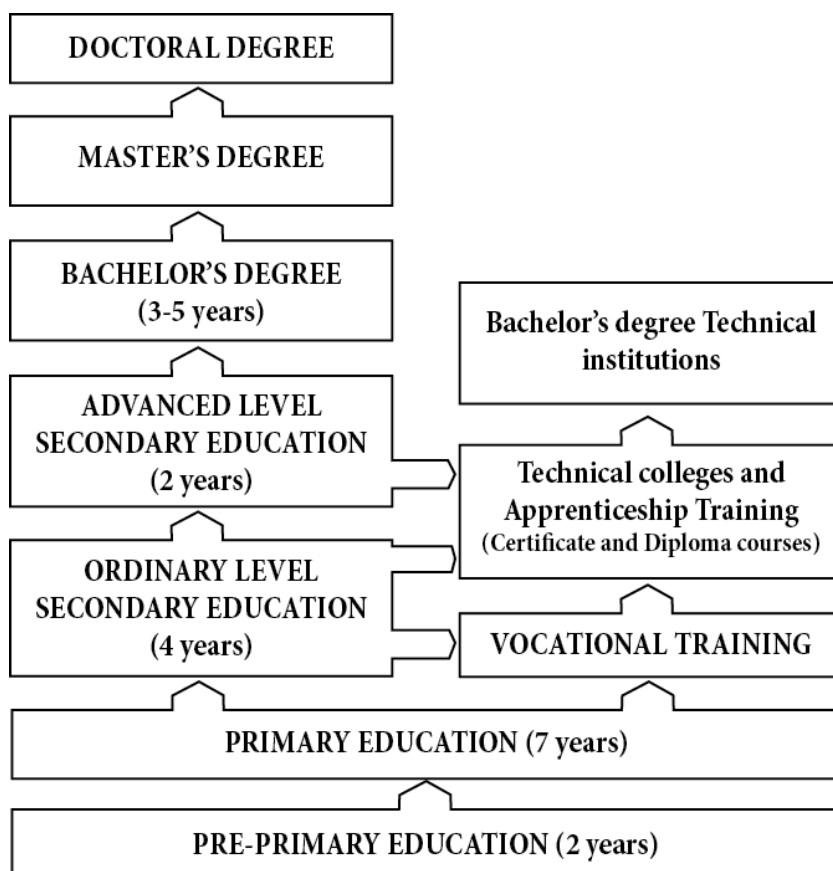


Figure 1. School System of Tanzania

1.1.1 Pre- and primary education

Pre-primary education takes two years and the official entry age is five years. Currently, effort is being made to ensure that every primary school has a pre-primary school (URT, 2002). In 2010, 60% of children enrolled in grade one had pre-primary education (URT, 2010).

Primary education is basic and compulsory education in Tanzania, which means a child registered in grade one must complete seven years of full primary education (Education Policy and Training, 1995). In terms of school enrolment, there has been a significant increase in enrolment in pre-primary as well as in primary education. For example, the enrolment rate in pre-primary rose by 3.3% from 2009 to 2010 (from 896,146 to 925,465 children). In primary school, enrolment increased by 5.8% from 2006 to 2010 (from 7,959,884 pupils to 8,419,305 pupils), (URT, 2010).

Primary education is sub-divided into two levels: lower primary education, which consists of four years of schooling (grade 1-4), and upper primary, which consists of three years of schooling (grades 5-7). Primary education is free, although there are costs for uniforms, books and pens, extra tuition, transport and lunch (Hakielimu, 2007). A child enrolled in the public primary school undertakes two important national examinations: grade IV and grade VII. The grade IV examination is meant for assessing literacy skills, while the grade seven examination is for promotion to secondary education. After seven years of schooling children who do not receive access to government secondary education have the option to enroll for basic technical and vocational education or secondary education in private schools.

There are private primary schools for which parents have to pay fees, which vary considerably, and most of these schools are English-medium schools. Kiswahili is the medium of instruction in all public primary schools. In grades I and II the focus is on reading, writing and arithmetic. In the upper grades the focus shifts to higher order cognitive skills, which involve, for example, writing and creative writing and comprehension. At the end of grade three children are expected to have developed adequate literacy skills to be able to continue with studies in the upper grades (URT, 1995).

1.1.2 Secondary and higher education

Secondary education in Tanzania is divided into two levels: lower or ordinary secondary education and upper or advanced level secondary education. Lower or ordinary level secondary education takes four years and upper or advanced level takes two years. The entry age for lower secondary education is 14 years and for advanced secondary education 17 years.

Secondary education is not free; all public secondary schools parents have to pay Tsh. 20,000 per year for day secondary school and Tsh. 70,000 for secondary boarding schools. In addition, parents have other expenses for examinations, school academic activities, furniture, identification cards, school uniforms, lunch and caution fees. Private secondary schools are even more expensive in terms of tuition fees. According to various reports in Tanzania, the annual school fees in private schools are very high compared to public secondary schools.

The number of government secondary schools has increased significantly in Tanzania. There is at least one secondary school for each ward throughout the country, thus enrolment in government secondary schools increased by 186% from 490,000 students in 2006 to 1,400,000 students in 2010 (URT, 2010). As far as completion rates are concerned, in 2010 the percentage of students who reached ordinary secondary education level was 36.1%, and for advanced secondary education 3.9% (URT, 2010).

After two years of secondary education, students sit for national examinations before they proceed to the third and fourth years of secondary schooling. In the fourth year, students sit for the Certificate of Secondary Education Examination. Students are selected and enrolled in advanced secondary education based on prescribed performance criteria, which take into consideration the performance of the student in the various subject combinations in the certificate of secondary education examinations (URT, 1995).

English is the medium of instruction in all government secondary schools, with the exception of Kiswahili classes. Students who join secondary education have Kiswahili as the medium of instruction in their primary education. English is the third language learned, Kiswahili being the second, while the ethnic language is the first language (Qorro, 2006). The shifting from Kiswahili to English has been claimed to create some problems for students, and English as a language of instruction for secondary education in Tanzania has been discussed (Brocke-Utne, 2002; Brocke-Utne, Desai & Qorro, 2006; Puja, 2003; Rubagumya, 1991; Qorro 2002; Roy-Campell, 1995).

The responsibility for providing higher education for students who successfully complete upper or advanced secondary education or equivalent is vested in public and private universities, higher institutes, and schools that offer higher education and academic studies. There are two categories of university education: the first is universities for teacher training for secondary schools and teacher education colleges. The second category is universities for sciences and other areas. At the time of its independence, Tanzania had only one government university for sciences and other areas, but now has more government

universities and three universities which provide teacher training courses. There are private universities also providing higher education in the country.

1.1.3 Teacher training

Teacher training is provided for pre-school teachers, primary school teachers and for higher education institutions. In Tanzania, there are 33 government teacher training colleges offering training for pre- and primary education teachers. Among these colleges a few offer diploma in education courses for primary as well as teacher training college teachers. The entry qualification is that one has to have the Certificate of Secondary Education Examination and Advanced Certificate with third or fourth division in subjects taught in primary school and in secondary schools respectively. Teachers who graduate in certificate teacher colleges teach in pre- and primary schools. Teachers graduating in diploma teacher colleges usually teach in teacher training colleges. Teachers for lower or ordinary and upper or advanced secondary education are trained in universities.

1.1.4 Education policy

The administration of education is the responsibility of the Ministry of Education and Vocational Training (MoEVT). The national education framework is stipulated in the Education and Training Policy, which was introduced in 1978, amended in 1995, and reviewed in 2010. This policy document is the guiding instrument for all education matters in Tanzania. In this document the government emphasizes basic education (Grade1-7) and adult education as high priorities. Recently, the government recognized secondary education as basic education for social and economic development.

Basic education is indicated as being the top priority in the Primary Education Development Programme (PEDP) in the government's national strategic plan. The central goal of the programme is to provide improved teaching and learning environments by expanding enrolment, the construction of classrooms and increased teacher recruitment and by improving the provision of basic teaching and learning materials. From 2002 to 2006, the investment in primary education was dramatically increased. These consequences are mostly observed in school enrolments; for instance, the number of children enrolled in schools rose from 4 million in 2000 to 8 million in 2005, an increase of 72%. More school buildings were constructed, and the education budget increased by 20% in 2009 (UWEZO, 2010). It is apparent that the improvement has been in terms of quantity and not quality. The core problems, which are poor school performance and low literacy skills, have not been solved. In the following sections the challenges that currently face the education system of Tanzania are described.

1.2 Challenges in the Tanzanian education system

Many challenges and problems are found in the Tanzanian education system. Education statistics and many other sources reveal that a large number of children repeat grades and drop out of school (URT, 2009, 2010; Galabawa & Narman, 2004; Kuleana, 2008; Asa, 2003).

Among the major challenges for the school system are poor quality of educational provision (indicated by low school performance and low level of literacy skills and high repetition rates, e.g. over 40% in grade one in 2010), high drop-out rates (across all grades), shortage of teachers (e.g. the current teacher/pupil ratio is 1:54), lack of teaching and learning materials (e.g. the current pupil/book ratio is 5:1), (URT, 2010) and low teacher work motivation (Davidson, 2007). Low level of performance in examinations, high repetition rates and high drop-out rates are concrete indicators of serious problems in the Tanzanian education system. Also, a large number of children complete primary education without adequate basic literacy skills, which would lay the foundation for a child to listen, speak, read and write in the target language (UWEZO, 2010). In the following sections these problems are presented and discussed further.

1.2.1 Low examination results and high repetition rates

In this section low school performance, using national examinations results, is briefly discussed. Firstly, low school performance and low literacy skills are indicated by the national examination results from grades IV and VII. In the grade IV examination, which essentially measures literacy skills, 12% of pupils failed in 2003, 13% in 2004 and 51% in 2009 (Ministry of Education and Vocational Training, 2009). The grade VII examination, which is the Primary School Leaving Examination (PSLE), follows the same yearly pattern as the grade IV examination. The examination results from 2009 indicated that almost 30% of the candidates failed in Kiswahili. The overall average performance dropped from 2007 (54%) to 2009 (49%), with only 50% of the candidates reaching the pass mark (URT, 2010).

Secondly, as a consequence of low school performance high repetition rates are found (Table 3). Repetition rates were high in 2005. Following a change in policy the repetition rates were rather low in 2009. It is obvious that many children repeat grades I, II, III and IV. Table 2 shows that there are no major gender differences. In the context of Sub-Saharan Africa, repetitions are mostly associated with the home economic situation. Most poor families engage the children, especially boys, in agricultural activities, which affect school attendance, and hence drop-out (see below) rates (Ndaruhutse, 2008).

Table 1. Number of repeaters for 2005-2009

Year	No. of repeaters
2005	439,307
2006	388,323
2007	351,006
2008	319,738
2009	198,812

Source: United Republic of Tanzania, 2009

Table 2. Percentage of repeaters by gender and grade in government and non-government primary schools in the year 2010

Gender	Grade							
	I	II	III	IV	V	VI	VII	Average (%)
Male	44.7	24.5	17.0	13.3	0.4	0.3	0.0	14.3
Female	46.3	23.3	16.6	13.1	0.4	0.3	0.0	14.6

Source: United Republic of Tanzania, 2010

In Tanzania, it used to be obligatory for pupils failing in grade IV examinations to repeat the grade (URT, 1995). However, recently the government of Tanzania has waived this condition and urged school management to allow children failing grade IV examinations to continue with their education in the upper grades on condition that their literacy progress should continuously be checked and monitored as a way of minimizing repetitions in schools (URT, 2009). The question, however, is whether the monitoring of these children is possible given the situation of the education system in Tanzania. In Tanzania, most schools have large classes meaning that planning activities for pupils at an individual level has not always been practicable.

1.2.2 High drop-out rates

The drop-out rates are high (Table 3). A large number of children drop out of school and the completion rates have decreased drastically. The current completion rates do not exceed 60%. (URT, 2010).

Before the PEDP-2001, school fees, mandatory contributions, learning materials and tuition fees in Tanzania were among the obstacles to school attendance. It should be noted that even after the PEDP, truancy is still high (MoEVT, 2010). The data provided (Table 2) is a clear indication that in Tanzania drop-out is serious problem and it has a detrimental effect on educational quality. Due to different reasons, many children fail to learn how to read and write, they become less confident in learning, develop negative self-esteem and start hating schooling and of course, lose school motivation. In many cases the consequence is dropping out of school. The problems of drop-out and the reasons are highlighted in Table 3. The data shows that high drop-out rates are due to truancy (76.8%), followed by a combination of factors, and then lack of basic needs, which accounts for 8% of all the factors indicated in education statistics. High truancy rates are experienced mostly in grades 1-II and IV-V.

Table 3. Pupil drop-out in percentages (%) by reason and grade in government and non-government primary schools in 2010

Reason	Grade							
	I	II	III	IV	V	VI	VII	Average
Truancy	75	79.5	76.2	81	75.9	75.5	73.7	76.8
Pregnancy	0	0	0	0.3	2.2	5	7.5	2.6
Death	7.6	5.7	5.3	4.2	3.5	2.6	2.9	4.1
Lack of basic needs	5.4	4.9	5.7	4.5	4.5	4.1	3.8	7.5
Illness	1.4	1.4	1.8	1.8	2.9	2.3	2.5	2.1
Home engagements	0.3	0.5	0.9	0.4	1.0	1.7	0.8	0.9
Others	10.1	7.9	2.0	7.6	9.9	8.6	8.7	8.9
Grand total	6.8	11.1	13.7	17.8	15.2	19.6	15.8	100

Source: United Republic of Tanzania, (2010)

Some of the reasons related to drop-out are discussed above. There is a need to highlight the significance of the child's home situation as one of the important reasons. In rural areas it is common that children are engaged in food and income generating activities such as farming, looking after cattle or taking care of babies during school hours. As a result, these children do not attend classroom lessons for a longer time. Various media in Tanzania have been trying to reveal the problem of drop-out. One of such reports was from "THIS DAY", a local newspaper (www.thisday.com.tz). The report indicated that about 30% of children in Tanzania are engaged in home activities and about 6% of them are schoolchildren, and this has tremendous effects on school attendance. For example, in 2009 drop-out in primary schools had increased by 20% compared to the previous year. The report further claimed that the school performance and literacy skills of children who drop out are quite poor.

Furthermore, drop-out rates are indirectly attributable to traditional cultures. Traditional practices such as initiations and circumcision have a strong effect on school attendance. In Tanzania, mostly in remote areas, it is common to find children, particularly girls, being forced to participate in traditional ceremonies such as initiations at some point in their lives. Those children are forced out of school for a long time in order to attend traditional rituals related to adulthood such as child rearing and other responsibilities. This period may take three to six months (Tanzania Gender Networking Programme, 2001). The children miss plenty of classrooms lessons and consequently fail to catch up with the school curriculum.

1.2.3 Low level of literacy skills

Only a few studies exist which deal with the problems of literacy skills of Tanzanian schoolchildren. One of the first studies was done by (Alcock, Nokes, Ngowi, Musabi, Mbise, Mandali, Bundy & Baddeley, 2000). The study was done in Bagamoyo, Tanzania, and involved children in grades 2 to 5 aged between 9-14 years old. The children were tested on letter knowledge, oral reading letters and words and sentence reading. All the components of the tests were in the form of Kiswahili language. The study concluded that in spite of Kiswahili being the national language and first language in Tanzania, particularly along the coast, most young children are good in decoding, but poor in comprehension in Kiswahili. Children could very clearly read aloud words, but were poor in understanding the message or the meaning attached to those words or sentences. This is one of the peculiarities in regularly spelled languages such as Kiswahili in which the spoken orthography does not differ significantly from the written. In other words, Kiswahili orthography is regular and this is from grapheme to phoneme, each grapheme corresponding to only one phoneme

except for the few clusters. Children can easily recognize the words in written form (Alcock et al., 2000).

Four years after Alcock and Ngorosho's study, the literacy problems were highlighted in a study carried out by Hakielimu (2008), a non-governmental organization. This organization has for quite a long time been involved in educational matters in Tanzania, and it has, e.g. administered literacy assessment in a sample of primary and secondary schools. A total of 483 grade six pupils (primary school) were tested on their knowledge and skills in writing comprehensive text in Kiswahili, and 559 secondary school students participated in corresponding tests in English. The results indicated that one out of four students could not write a dictated paragraph in Kiswahili or in English. Both primary and secondary school students had many errors in punctuation, capitalization and spacing.

In a recent large study, including 40,000 children, it was found that at grade three, 7 out of 10 children are poor in basic Kiswahili language skills (UWEZO, a non-governmental organization, 2010). The findings further indicated that only 42% of the sample could read a simple story at the level of grade 2. The assessment involved children of between 5-16 years of age from 38 districts in Tanzania. At grade seven, the findings revealed that one out of five children completing primary education could not read a story, which was expected to be mastered at grade 2 level. It is obvious that there is a large risk that these children will remain practically illiterate for the rest of their lives. It is apparent that actions have to be taken during the first grades of schooling in order to prevent the described situation in the future.

Commenting about the situation of education in Tanzania, the South and Eastern African Consortium for Monitoring Educational Quality (SACMEQ) secretariat has urged the Ministry to allocate more resources in ensuring that literacy skills are appropriately taught in schools (SACMEQ, 2004, 2005). The report indicated that Tanzania was among countries with the lowest literacy level in primary schools compared to other SACMEQ countries. The report also indicated that the pupils had difficulty in all areas. Thus, it was recommended that assessment with the purpose of analyzing children's literacy problems should be conducted so as to provide a clear reflection on the child's potential ability to learn (Mrutu, Ponera & Nkumbi, 2005).

It is understood that assessment is a vital vehicle in understanding children's learning progress and challenges underlying the learning process. In Tanzania the typical method of assessment is still one which relies much on a "pen-and paper" approach. In this type of assessment children are given a series of questions to answer on a piece of paper and submit those papers to examiners for

correcting or marking, where the children are rated as pass or fail. In other words, the assessment is meant to find out the amount of knowledge children have acquired in a specified period of time and not the amount of assistance a child needs to accomplish his/her learning potential. (Omari, 1995; Rajani, 2009; Sifuna, 2007). This system of assessment neither helps the child to assess him/herself nor the teachers to determine the amount of help the child requires in a specific area of content. This method of assessment apart from being unable to help children does not provide immediate feedback to the learners which could help them and their teachers to improve teaching and learning approaches. As a result of this, children's performance in school subjects and literacy skills is quite low and unimpressive in nearly all schools in Tanzania.

1.2.4 Reasons for low performance and low literacy skills

The reasons for low school performance and low literacy skills can be traced to many different and largely intervening factors. There are problems which can be directly related to the first learning environment of the children, the home environment. Children's home environment is naturally crucial for literacy development. Children from homes where the literacy development is supported are at an advantage compared to children from homes where no one reads and writes, and where there are no books. Reading parents become models for the children to develop reading writing habits or interests (Morrow, 1990; Lybolt & Gottfried, 2003). Poor literacy stimulation and support in the home environment are among the factors which can hinder an optimal development in general and in literacy skills in particular.

In this study the main focus is, however, on the formal learning environment, the school. In the following paragraphs school-connected reasons for low performance and low literacy skills are discussed. These reasons are connected to the school environment and infrastructure, the teachers and the teaching and assessment methods.

Schools in Tanzania are encountering many kinds of problems. A major one is the large class size. Classrooms designed for 45 pupils accommodate up to 80-120 children (UNESCO 2005; Abagi & Sifuna, 2006). In 2002 the government abolished tuition fees in all government primary schools, and as a consequence enrolment increased in schools. This was naturally an advantage, especially for families with small incomes, but led to overcrowded classrooms, with negative effects on teaching and learning. In many schools the buildings are unfurnished and some are of low quality. There are not enough desks in schools. Currently the pupil/desk ratio is 5:1, which means one desk is occupied by 5 pupils instead

of 3 according to the national standards of 3:1 (Rajani, 2009). As a result children face problems of lack of space for reading and writing.

In 2002 the government introduced capitation grants to primary schools for capacity building. However, the grants are not sufficient to ensure that all schools are properly equipped with essential teaching and learning materials, including materials for children with disabilities. The need to upgrade the school infrastructure, to provide sufficient teaching and learning materials, puts a considerable strain on the available resources (UNESCO 2005; Abagi & Sifuna, 2006). In some places the capitation grants were used for activities other than the improvement of the school learning environment (Rajani, 2009).

Among the learning materials, *books* are essential, and the figures show a shortage. In most school subjects, pupils have to share books in the ratio of 7:1, which means one book is shared by 7 pupils and in some subjects the ratio is even higher (Chonjo, 1994; Rajani, 2009). Children do not then have good possibilities to be actively involved in literacy activities such as reading texts in the class (UNESCO 2005; Abagi & Sifuna, 2006). They also have problems doing their homework.

There is also a *shortage of teachers* in the schools. Despite the fact that teacher recruitment has been strengthened during the last 10 years, there are still problems. The current teacher/pupil ratio is 1:54, the official ratio being 1:40. The background is the massive enrolment in grade one all over the country during the last decade. In 2000, the enrolment was about 4,380 000 pupils, and by 2005 the enrolment had increased by 72%, being about 8,420 000 in 2010 (URT, 2010). *Low motivation* of the teachers is regarded as one of the reasons behind low school performance, as well as low literacy skills (Davidson, 2007). The teachers have not been satisfied with working conditions, their salaries and the workload. There is a shortage of houses for teachers in many schools (Sumra, 2003). The salaries are small, though the government tried to increase teacher salaries in 2009, and emoluments are not paid on time.

Furthermore, low school performance and low skills in Tanzania are regarded as being caused by *poor teaching/ learning and assessment methods*. In most Tanzanian schools literacy skills are taught by the “talk and chalk” method, or lecturing with children copying notes from the blackboard with very little meaningful practice of literacy skills (Omari, 1995; Rajani, 2009; UWEZO, 2010). The teaching is mostly focusing on memorization for passing tests and examinations, not using literacy skills for real life communication of ideas and information. Consequently very little is learned. In many schools pupils receive the same instruction regardless of their level of ability (Rajani, 2009).

The fact that there are *no standardized tests* for assessing literacy skills in schools (Alcock et al., 2000), can also be seen as an issue related to low school performance and low literacy skills in Tanzanian schools. The identification of children with low performance, without reliable tests, is difficult, especially in large classes. Without identification, it is also difficult for teachers to provide appropriate help to needy children. In Tanzania the assessment method mostly used is “pen and paper”, which of course, encourages reproduction rather than construction of knowledge (Omari, 1995; Rajani, 2009). The assessment method focuses on how much the child can remember and reproduce what the teacher taught, instead of focusing on how the child can apply the knowledge and skills in new situations. As a result, children with potential problems in literacy skills are not identified by the teachers and thus they continue experiencing difficulties throughout their school life.

Looking at the problems discussed above, it is evident that the quality of education in Tanzanian schools is an important issue and a challenge for school policy in the country. Arguably, the problems have great impact on school performance and on the learning of literacy skills in schools. As one way of addressing the literacy problems in schools, emphasis is put on improving the method with which literacy skills are introduced to children. An obvious task for the school is to make sure that all children are exposed to activities with written text right from the beginning, and thus to begin mastery of literacy skills as early as possible. In the home parents and caregivers and the community at large have an important role to play in developing the pre-literacy skills of the child. Pre-literacy skills lay the foundation for learning literacy skills at school.

1.3 Aim and motives of the study

The problem that this study is addressing is low school performance and low literacy skills in Tanzanian schoolchildren. The problem, the consequences and the reasons have been discussed in the previous chapter. The goal aimed at in the study is to find a strategy which could promote the development of the children, especially their literacy skills in the early school years. In the light of this background, the basic idea and the aim is to create and evaluate an intervention programme for children who are at risk of reading and writing difficulties.

A group-based dynamic assessment approach was used both in identifying the children at risk of reading and writing difficulties and in the intervention programme. Due to large classes in the schools, traditional individually-oriented approaches were not regarded as being useful in the study.

Several factors motivated me to carry out this study. The first one is connected with my personal experience of and many years of insight into the functioning of the primary school. The second is the lack of action in terms of addressing the poor school performance of most children in Tanzania. The third is my zeal to contribute to the existing knowledge on problems of reading and writing in schools; and the fourth is my idea of contributing to the ongoing debate about the falling standards of education in Tanzania.

In the schools it is common to find children struggling with reading and writing but, no substantial steps are taken to help those children improve their literacy skills and school performance.

Some children supplement their studies by enrolling themselves in commercially-based tuition classes after school hours. However, the majority of children in need of help do not have access to these classes due to their high cost. Many children drop out of school. One of the reasons is probably related to problems with reading and writing. Significant steps need to be taken in order to improve the situation.

Problems of poor school performance and low literacy skills in Tanzania are many, and Tanzanian government has been launching various education programmes. Recent actions have led to massively increased enrolment, which naturally is good for the country in the long run. However, the action has led to problems with an underdeveloped infrastructure and large class sizes in the schools. The teachers have very few practical possibilities to help individual children struggling to learn to read and write.

A study with dynamic assessment approach for assessing and teaching literacy skills to groups of children, appropriate to school context described in this study was considered important. Dynamic assessment is a method that does not just seek correct answers from the children, but rather intends to help children unfold their learning potential and discover their cognitive capabilities.

Because Tanzania has no standardized tool for assessing literacy skills for beginning readers (Alcock et al., 2000), it was important to develop an instrument which could be appropriate for the Tanzanian context. It was regarded that an instrument based on dynamic assessment in groups, could function as a tool in the process of identifying children being at-risk of reading and writing difficulties of primary school. Based on the assessment programs could be created.

2 Literature review

The literature review begins with a description of Kiswahili language, of its status and main features. Kiswahili is the main language of Tanzania, and thus it is the language in which children learn to read and write. The orthography of Kiswahili is also explained with the aim of giving the reader a basis for understanding the work of creating the test instruments and the intervention programme.

After the section about Kiswahili, the review proceeds to discuss issues about reading and writing difficulties, identification of children at risk of these problems, and intervention programmes for improving literacy skills.

2.1 The language context - Kiswahili

The aim of this study is to find an approach to help Tanzanian children improve their literacy skills in the Kiswahili language. Kiswahili is the medium of instruction in government primary schools in Tanzania. This section describes the Kiswahili language and highlights some of the important landmarks of that language. Kiswahili as a language is discussed because the children in focus had Kiswahili as their first language and because the screening and the intervention programmes thus naturally included components from Kiswahili.

Kiswahili belongs to the Bantu languages found along the Southern, Eastern and Central parts of Africa. Kiswahili often acts as a lingua franca in Eastern Africa and Congo (Abdullah, 1996). It is ranked seventh among languages which are commonly spoken in the world (Abdullah, 1996). The development of Kiswahili can be traced through trade contacts between the East African community and people from Arabia and the Persian Gulf in 800 B.C (Nurse & Spear, 1985, cited in Alcock, 2005). Through the trade, Kiswahili received influence and vocabulary from Arabic and Persian languages (Legere, 1992; Alcock, 2005) and the first Kiswahili script was in Arabic (Whiteley, 1993).

Alien rule, the German and the British period in the mid 19th century, was a turning point for Kiswahili language development. Different organizations and missionaries became involved in writing in Kiswahili and about Kiswahili. Steere (1870) cited in Alcock (2005) wrote the first Swahili dictionary. Thus, the first initiative to produce Kiswahili works was the work of missionaries, who wrote books for children attending religious classes on Sundays. A few

examples of such books include *Kusoma kwa watoto, siku ya jumapili* (Alcock, 2005).

The colonial government also became instrumental in the development of written Kiswahili. Under German rule, Kiswahili was the official language for administration and it was taught in schools. The German government wanted literate labour for office work. The British government, which ruled Tanzania after the Germans, also became involved in the expansion of the Kiswahili language. The British government worked closely with missionary groups to make sure that Kiswahili was used in primary schools. They laid the foundation which still exists today in Tanzania, that Kiswahili is the medium of instruction in primary education and it was included in the primary school curriculum as the key language subject. From that time, English was the language of instruction in secondary education and higher learning institutions. It was important and necessary to develop Kiswahili because the colonial government needed inter-territorial people who could work in the government offices and in its affiliated organizations. Religious institutions used Kiswahili in their teachings and it was a means by which the word of God was transmitted to the people. (Abdullah, 1996; Mazrui & Mazrui, 1999). Through these processes Kiswahili grew and expanded in use and usage across communities in the country. Standardization of the Kiswahili language took place during the colonial era through various organs such as the Tabouret-Keller & International Group for the study of language standardization and the vernacularization of literacy, which also added to the promotion of Kiswahili language (Alcock, 2005).

Kiswahili, like any other language, has borrowed extensively from other languages in the world and this has contributed to its growth in terms of vocabulary. Kiswahili has borrowed from English language; for example, the word “motokaa” (motorcar) “mashine” (machines), “benki” (bank), “jells” (jail), “dereva” (driver), and “hoteli” (hotel) (Abdullah, 1996). Kiswahili has also borrowed from Arabic, for example, “kitabu” (book); “biashara” (business), “mtakatifu” (holy person); “nabii” (prophet). From Portuguese came words such as: “mpira”; “bendera”; “mvinyo”, “meza” (table), “leso” (handkerchief). From German there are words such as, “shule” (school) “hela” (coin). (Abdullah, 1996; Batibo, 2000).

In an article about the role of Kiswahili in Tanzania and in East Africa, Abdullah (1996) describes how this language (Kiswahili) gained popularity during the struggle for independence. Tanzania used Kiswahili to unite the people during the struggle for independence. Tanzania was a model in the use of Kiswahili, from where other countries such as Kenya, Uganda, Burundi and Ruanda and some parts of Congo adopted and used it in schools, though vernacular

languages were also taught. Kiswahili had a stronger position in Tanzania than the rest of the East and Central African states because the majority of the people spoke Kiswahili as their first or second language.

Today in Tanzania, Kiswahili is spoken as the first or second language by over 90% of the population, which is about 39 million people. In Congo nearly half (about 66 million) of the people speak Kiswahili (Mazrui, 1995). Among the languages in the Sub-Saharan countries, Kiswahili is ranked second after Hausa, and spoken by 5-10% of the 750 million people (World Bank, 2005). Kiswahili is also largely used in different media, inside and outside Tanzania.

2.1.1 Kiswahili orthography

Kiswahili belongs to the transparent languages. Other transparent languages are Finnish, Dutch, Spanish (Holopainen, Ahonen & Lyytinen, 2000) and Greek (Papadopoulos, Spanoudis, & Kendeou, 2009). Learning to read and write in Kiswahili is easier than in English and French, due to the orthographic correspondence between written and spoken language (Mazrui & Mazrui, 1995). The Kiswahili language like other transparent languages has a consistency between graphemes and phonemes, which means a one-to-one correspondence between spoken and written orthography. However, there are some inconsistencies between graphemes and phonemes in Kiswahili due to orthographic rules related to the grammatical system of the language and dialect differences (Ngorosho, 2011). It takes time for beginning readers to realize that the phonology they are using in their dialects is not legally accepted in standard written Kiswahili (ibid).

In Kiswahili all the letters, vowels and consonants are sounded irrespective of their placement in the word. Kiswahili has 5 vowels (a, e, i, o, u) and 24 consonants (-a, b, ch, d, e, f, g, h, I, j, k, l, m, n, o p, r, s, t, u, v, w, y, z) and open syllables and all the syllables contain a vowel at the end. Each letter stands for only one phoneme and this regularity is explicit in both directions (letter to sound and sound to letter), quite different from English which varies according to environment. There are some cluster letters like 'ng', 'kw', 'mw', 'mf', 'mbw', 'gh,' 'ng', 'vy', 'ch', 'ngw' 'pw' 'fy', 'sh', and 'mb'. The way these cluster letters are applied is very consistent. Reading Kiswahili words poses few challenges due to the fact that the reading follows the way the word is written, i.e. the phoneme-grapheme correspondences are quite regular.

Despite the fact that learning to read and write Kiswahili is easy when compared to other languages such as English and French, research has indicated that children in Tanzania face some difficulties. There are many reasons, but one is probably related to dialects, which tend to interfere with the Kiswahili

orthography (Ngonyani, 1992). Children beginning to learn and use Kiswahili may find it difficult because of the influences of dialect. Studies carried out in Kiswahili language (e.g. Ngorosho, 2011; Alcock & Ngorosho, 2003) indicate a range of problems that children experience in learning to read and write in Kiswahili.

When learning to spell for instance, the children face problems with double letters, such as; “th”, “dh”, “ny”. They also have problems with cluster consonants especially when they start learning to read and write (Alcock & Ngorosho, 2003). Examples of such consonant clusters are ”th”, “dh”, ”sh” and “ch”. The problem is especially noted when the children are required to combine nasals “m” with ”w” as in “mw”, “n” and “d” as in “ndege and “n” with “g” as in “gonga”. In other situations the children drop out the consonants for example, in the word “habari” (news), children spell “abari”, with the “h” is dropped out. There is also a problem in spelling “l” and “r”. In most cases the two letters are used interchangeably, for example the word “kula” (eat) is spelled “kura” (vote). This confusion affects not only the structure of the word but, also the meaning. Further, “z” is confused with “dh” as in “zambi” (sin) for “dhambi” (sin), and “s” for “th”, as in “semanini” (eighty) for “themanini” (eighty).

In order to be able to spell the language, the alphabetic system must be understood. The children need to learn the phonemes, which are the basic units that compose words. In the initial steps in teaching reading and writing, an important step is to introduce the phonemes to the learner. This has been observed in most regular languages such as Finnish, Dutch, German, and Spanish (Holopainen et al., 2000).

2.2 Reading and writing development and difficulties

Reading and writing are fundamental skills in our society today. Learning to read and write and learning literacy skills, particularly oral skills, develops through the interaction between the child and parents, caregivers and other adults in the community. The development of literacy skills is influenced both by biological and environmental factors. When reading and writing difficulties appear, there is usually a need for explanations and identifying the reasons. These explanations are found within the mentioned factors or in a combination of them. Among the environmental factors, the educational environment in the home as well as in the school is of central importance. In the following a description of reading and writing development and of related difficulties are presented. Explanations and reasons for the difficulties especially in the context of Tanzania are also discussed.

The term reading has been defined differently from different perspectives. Reading is described as an active skill-based process of constructing meaning from oral, visual and written text (see general definition for reading in e.g. Wikipedia, 2011). Tunmer and Greaney (2008) perceive reading as the ability to translate or interpret from print into ones' own language from which meaning can be derived. Thus, reading is a meaningful activity if the reader can comprehend what words convey to him/her and it entails the decoding of words and also a process of breaking words into smaller units, i.e. syllables and phonemes (Siegel & Brayne, 2005).

A largely accepted definition and view of what reading is has been presented by Gough and Tunmer (1986) as The Simple View of Reading: "Reading = Decoding x Comprehension". According to this model reading is the product of two separate components, decoding and linguistic comprehension. Reading ability is dependent on both components: good reading requires both of them. If one of them is low or zero, there will be a very low reading ability, or no reading at all. Many researchers have based their descriptions and analysis of reading development and reading difficulties on The Simple View of Reading. Among them are Adams (1990) and Høien and Lundberg (2000).

The ability to read words is essential for reading and comprehending text. Word reading ability distinguishes beginning readers from pre-readers, and skilled readers from disabled readers (Gough, Ehri & Treiman, 1992; Rack, Snowling & Olson, 1992). Words may be read in several ways depending upon readers' knowledge of the writing system and their familiarity with written forms of the words (Ehri, 1995). Readers recognize words that have been read several times before in print, by accessing stored alphabetic representations in their lexical memory, referred to as sight word reading. For words never read before, readers may read them by phonological recoding, or by analogy to familiar words already stored in the memory (Goswami, 1986), or by using context clues to guess the words, or by a combination of these strategies.

The language development and the development of reading and writing skills are related to the basic development pattern of the child. Berninger (2000) describes the normal development of a child as being multilingual. At first children develop aural language: they hear speech. Secondly, oral language develops. The children produce sounds and speech. Thirdly, they learn visual language, through which they receive and process the written form of the language by combining aural and oral language with the visual system. In the fourth phase children learn to produce the visible form of the language manually, that is writing. Writing can thus be regarded as the synthesis of the coordination of aural, oral, speech, visual and manual languages.

In order to become a good and effective reader and to understand what you are reading, you need technical skill (decoding skill). This is, however, not enough. You also need to be fluent in your reading. Although you can decode, your reading might be slow and need much effort. If you do not identify words through the orthographic path, you have to use the phonological path, which makes the process slow and laborious (Høien & Lundberg, 2000). Fluency is thus an important component of effective reading. The third important component is comprehension, which means that you obtain a mental representation of the message in the text. In order to comprehend what you are reading you need (in addition to technical skill and fluency) e.g. a good working memory, large word knowledge, metacognitive knowledge, the skill of making inferences and developed reading strategies. Due to the focus in the present empirical study, the presentation of reading and writing development in this chapter deals more with the technical part of learning to read than with the comprehension part.

2.2.1 Overview of models of reading development

In order to acquire understanding of how reading skill develops in children some central models are presented. Understanding the development of reading is also a prerequisite for understanding the deficits which might occur during the growth of a child. Many theories and models describing the development from different perspectives have been presented over the years. The basis in the definition of reading is in any case that word recognition is the foundation of reading. In order to recognize a word, the reader needs to have access to information stored in the memory. If the processes involved in word recognition do not function well the reader ends up with difficulties which can be of different kinds depending on where in the process the problem lies. In reading a printed text the reader uses visual word recognition.

There are different theoretical frameworks, many of them controversial, presented for visual word recognition. The most influential models seem to be the dual route models (see, e.g. Plaut, 2009). These models give an explanation of the processes when reading aloud, from print to pronunciation (to speech): “Much of the controversy surrounding theories of word reading centers not around how words are recognized and understood but how they are read aloud” (ibid). In languages based on the alphabetic principle researchers have identified a lexical and a non-lexical route. The alphabetic principle means that parts of written forms (letters and multi-letter graphemes) correspond to spoken forms (phonemes). Broadly speaking, when using the lexical route the reader tries to find and identify the word stored in his/her mental dictionary and when using the

non-lexical route translates the graphemes to phonemes and combines them into a word for pronunciation. In short, it can be stated that skilled readers use both routes, the lexical in reading most words (they are known to the reader) and the non-lexical in reading new and unknown words (including non-words). Many of the models for describing the reading process and how to learn reading can be traced to one of the dual route models or to a combination of them. The analytic and synthetic methods of teaching reading can also be traced to the model described.

The development of word reading skills is usually described as successive key processes that emerge, change and develop. Ehri, (2009) describes how word reading develops in different phases or stages according to different researchers in the field. One type of word reading occurs at one stage and mastery is usually expected before entering the next stage. However, mastery is not necessarily a prerequisite for later stages. Ehri (2009) presents an overview and synopsis of theories about sight word reading stages from pre-reading, to early reading, to decoding and to fluent reading. She describes and compares the development based on different stage theories. A short summary of her presentation is given here as an introduction to a larger presentation of some of the models which are chosen as being relevant for the present study.

In this paragraph models cited in Ehri (2009) are shortly summarized. Of the earliest models, Ehri presents those which focus on the development from cue reading to cipher reading (Gough & Hillinger, 1980) and from contextual dependency to visual recognition and to letter-sound analysis (Mason, 1980). Distinct changes in strategies are included in one of the influential models (Marsh, Friedman, Welch & Desberg, 1981). The stages go from rote, linguistic guessing to discrimination, to sequential decoding and finally to hierarchical decoding. Chall (1983) describes five stages from birth to adulthood. The stages proceed from letter and book exposure, to memory and contextual guessing, to decoding and attending to letters and sounds and to fluency and consolidation. Frith (1985) emphasizes the awareness of the relationship between sounds and letters as the basis for the transition between the visual and alphabetic stage. Her model is based on three different word-reading strategies: the logographic, alphabetic and orthographic strategy. Ehri refers to her own models (1998, 1999, 2002) and describes the development from pre-alphabetic, to partial and full alphabetic, and finally to a consolidated alphabetic stage when automaticity is received. The author further presents the model by Stuart and Coltheart (1988), who reject the idea of initial logographic or visual cue stages. Their model can be interpreted as proceeding from a partial to a complete orthographic stage. The last model in

Ehri's presentation is the model of Seymour and Duncan (2001), which is based on Frith's model. From the pre-literacy stage the child proceeds through a dual foundation stage, including both the logographic and the alphabetic path to the orthographic and morphographic stage. Ehri does not mention the model developed by Høien and Lundberg (2000), which is chosen as one of the models to be described in this report. Their model is closely related to Frith's.

2.2.2 Reading development

Many of the reading and writing development models described above are based on similar approaches, but differences in the approaches are also found. Many models are based on a bottom-up approach (e.g. Chall's stage of reading development, 1983), indicating that the development progresses from lower to higher levels. In reading development this means that the progress goes from smaller to larger units, e.g. from letter-sounds towards capturing whole words (learning according to the synthetic method). Other researchers (e.g. Smith, 1978 & Goodman, 1994) have proposed that readers do not focus on every letter or letter-sound when learning to read. These researchers argue that learning to read follows an analytic process. The readers process whole words and focus on the meaning and comprehension when they begin to learn reading. Later on there is progress towards smaller units like syllables and letters. A third approach to reading development, an interactive approach, can be identified in the models by e.g. by Frith (1985) and Adams (1990). In interactive approaches, both bottom-up and top-down processes are acknowledged. The print is seen as the input, while the meaning is seen as the output. Adams (1990) has synthesized a large amount of research and found that the reading process can best be explained by an interactive theory. Letter and word recognition is emphasized over comprehension. Adams has presented her theory as a response to researchers (e.g. Smith, 1978), who claim that readers process whole words when reading.

A description of some models regarded to be of interest for the present study is presented in the following (Chall, 1983; Frith, 1985; Høien & Lundberg, 2000). The models have many central common features, but Chall's model represents rather purely the synthetic view of reading, while Frith's and Høien and Lundberg's model represents the interactive approach.

One of the very influential models over the decades is a model which describes the development of reading in six stages resembling Piaget's stages of cognitive and language development (Chall, 1983). The stages follow a hierarchical progression. The pre-reading stage (stage zero) covers the period from birth to age six and can be described as a preparation stage for reading. Of all the stages, this stage includes the greatest period of time in an individual's development and

covers more changes than the other stages. In interaction with the environment the child proceeds from recognizing sounds to learning the names of objects, etc. The child learns the names of letters and to scribble the names of objects, though they may not be readable. Stage one is called the initial reading stage and it occurs at the age of six to seven. The child learns to connect letters with sounds and to recognize differing sounds in similar words. The child learns about the nature of the alphabetic spelling system. Stage two consolidates what was learned during stage one. Reading fluency is increasing. From this stage on, the child proceeds to learn new information and to construct and reconstruct text in stage five at the age of 18 and above. It is emphasized in this model that successful acquisition at any stage depends on the previously acquired stage. The stages are not discrete but develop as a continuous process, and they may overlap (Chall, 1983).

The model by Frith (1986) consists of three fundamental stages of development of reading skill acquisition: the logographic, alphabetic and orthographic stage. The logographic stage represents the initial step in understanding the features of the language. In this first stage of developing reading skill the child recognizes a word using logs or symbols. The child recognizes words based on “salient graphic features”. The arched M for McDonalds is often given as an example in Frith’s descriptions. The logographic stage can, in fact, be divided into two phases: a pre-literate phase with symbolic scribbling and a more developed phase where there is an association between scribbles and meaning.

In the next stage, the alphabetic stage, the child understands that there is a relationship between letters and sounds. The child combines sounds, and puts them together into words. Each letter and the order of the letters are important. This stage is also the writing stage. Frith emphasizes that teaching is crucial during this phase when the child begins to understand and practice the alphabetic principle.

When reaching the following stage, the orthographic stage, the child combines the first two stages. At this stage the child utilizes logographic and alphabetic knowledge to read words. The alphabetic principle is no longer in the foreground. The child is now recognizing morphemic parts of words and the order of letters. The child does not need to read the word through sound sequences. In the different stages the child builds on and enhances the skills learned earlier. Qualitative improvement of literacy skills occurs when proceeding from one stage to the following.

Høien and Lundberg (2000) describe that their model about the reading development in stages is developed based on Frith's model. They identify a pseudo-reading stage, a logographic-visual stage, an alphabetic-phonological stage and an orthographic-morpheme stage. The authors emphasize that reading is not a naturally developed skill. The reading skill develops from, and is dependent on, the culture. Thus, all children do not pass through the same stages, and not at the same time. The stimulation and teaching before formal schooling as well as in school has influence on the development of reading. The individual variation in reaching or passing through the different stages can be large within a culture and especially between cultures.

The pseudo-reading stage corresponds to the pre-literate phase of the logographic stage in Frith's model. The child identifies and reads logs and symbols in the environment. The authors describe that the children "read" the environment. Slowly, the children learn to recognize words such as daddy, and their own name, although they cannot read the words. They identify the picture or the form of the word.

In the logographic-visual stage, the child starts combining the graphic picture (the logograph) of the word with the name of the word. In the logographic reading strategy, the children associate the special visual picture of the word with the meaning of the word. This strategy functions as long as the number of words of interest is limited. When the number of words increases, the children start guessing. However, if they learn the names of some letters at this stage they have hints for identifying the words, although they do not know the sounds of the letters.

Proceeding from the logographic-visual stage to the alphabetic-phonological stage is an important qualitative step in the reading development process. The child learns to combine the form of the letter (grapheme) with the sound of the letter (phoneme). The child learns to crack the code. In order to identify the grapheme-phoneme correspondence, the child needs to be able to isolate small entities of the language and words. These entities can be the initial sound of the word, the end sound, the syllables, etc. Phonemic awareness (dividing a word into its phonemes) has been found to be important in this stage. Høien and Lundberg (2000) describe, that some researchers are of the opinion that phonemic awareness is a prerequisite for achieving a phonological reading skill, while others find it a result of teaching reading. In any case, according to other researchers, the processes seem to be interactive.

In the following stage, the orthographic-morpheme stage, the child proceeds to a more effective automatic decoding. The word is recognized as an entity, although all the including elements are seen and used. The smallest linguistic unit which carries content or has a grammatical function in a word is called a morpheme. Many words have several morphemes. In the orthographical strategy the reader uses both whole words and morphemes in the decoding process. The decoding and recognition of the word is now a fast process, and when the process has become automatic the reader can concentrate on semantics and syntax for obtaining the meaning of the text.

2.2.3 Writing Development

In order to understand literacy development we need to understand both reading development and writing development. What do we understand by the notion writing and what is the goal with writing? Treiman and Kessler (2009) explain that “the primary goal of writing is to record or communicate concepts in a visual medium” (p. 121). Some features of writing development are discussed in this chapter, mainly following the views and models about how children learn reading as presented above. The presented reading models connect the process of learning to read with the process of learning to write. In this section the writing component is highlighted.

The view of the process leading to learning to write differs between researchers and apparently also between curriculum developers in different countries. In many countries language studies for school beginners start with listening, speaking, reading and writing as integrated activities. In other countries reading is introduced and taught first and writing comes later and separately in the programme. This is the case, e.g. in Tanzania. Referring to Frith’s model (1985) as described above, it is evident that learning to read well presupposes, or at least supports, learning to write and vice versa. An important feature is also that reading and writing competence do not seem to develop at the same rate. According to Frith (ibid), every phase in the development can be seen as divided into two steps, where either the reading- or the writing activity has the leading role in the strategy of the phase. *Reading* (elementary and more developed logographic reading) proceeds to *writing* (logographic writing), which then develops into a higher level of writing (alphabetic writing). This, in turn, proceeds to *reading* (higher logographic level and alphabetic level), which develops and reaches orthographic levels (lower and higher orthographic levels). From this level a progress can again be seen to a higher *writing* level (higher alphabetic and orthographic levels).

Høien and Lundberg (2000) also describe this alternating process between reading and writing in the development. They name the stages as pseudo-writing, logographic-visual writing, alphabetic-phonemic writing and orthographic-morphemic writing in accordance with the reading acquisition stages. They also point out that similar to the case of reading, the child uses the orthographic path when the word is familiar and the phonological path when the word is long, new or complex.

Treiman and Kessler (ibid) in their overview and analysis on writing systems and spelling development, notice that most of the research has examined English language. This is especially true for spelling. Many authors, as discussed in the next chapter, have questioned whether the findings can be generalized to other languages. English has deep (opaque) orthography, while e.g. Spanish and especially Finnish have shallow (transparent) orthographies. In deep orthographies the phonemes do not systematically correspond to the graphemes and thus learning to read and write seems to be a slower and more difficult process than in shallow orthographies. However, many researchers also emphasize that there are many similarities in the learning process and that the problems of reading and writing are not necessarily larger in deep languages than in shallow ones. This topic is further discussed in the next chapter.

2.3 Reading and writing difficulties

This study is focused on children at risk of reading and writing difficulties and on measures for preventing these difficulties. Thus the focus is not on the difficulties as such, but a short presentation is given.

Reading difficulties can be described in many ways and from different perspectives. Typically, they are related to a low level of phonological awareness, word recognition, and rapid naming skills (Boscardin, Muthén, Francis & Baker, 2008; Swanson, Trainin, Necochea & Hammill, 2003). Other indicators of reading difficulties include problems in the decoding of words, breaking words into smaller units, such as syllables and phonemes (Siegel & Brayne, 2005).

Further, reading difficulties is a concept defined as a condition that involves significant impairment of reading accuracy, speed, or comprehension to the extent that the impairment interferes with academic achievement or the activities of daily life. In this definition the emphasis is placed on three key notions: “accuracy”, “speed” and “comprehension”.

The first key notion in the definition, reading accuracy, involves a range of linguistic processes such as the proper decoding of the words in a text, sounding out the words with less energy or resources, and the ability to convey meaning of what is read. Reading accuracy, which seldom is confused with comprehension, refers to reading cleanly without any serious mistakes. Usually a child who reads with accuracy is able to decode words accurately. Thus, it is worth understanding the child's reading accuracy because it is a precursor of good decoding ability. It is well documented that a majority of young children with reading difficulties are classified as such on the basis of a weak word-reading accuracy level rather than comprehension deficits alone (Nation & Snowling, 2004; Shankweiler, Lundquist, Katz, Stuebing, Fletcher, Brady et al., (1999) and that their lags in acquisition are sufficiently evident (Kavale & Reese, 1992).

The second key notion, speed, refers to the process of previewing, scanning and skimming for information (Macmillan Dictionary, 2010), and it is basically determined by the eyes' fixation power (Hallahan & Mock, 2003). Speed is simply measured in terms of how fast the reader can read a certain number of words. Differences in the reading fluency distinguish competent from poor readers (e.g. Stanovich, 1991). A dysfluent reading performance is an outcome of difficulties in word recognition systems, such as phonology and orthography (Breznitz, 2006). The inability to read fluently constitutes a problem for struggling readers, as they tend to read in a labored, disconnected manner with a focus on decoding at the word level that challenges reading comprehension.

From another perspective, LaBerge and Samuels (1974) theorized that reading fluency problems stem from readers' poor decoding skills. When decoding is too slow, a "bottleneck" is created that impedes the flow of thought and hampers comprehension. Poor readers often spend a great deal of their cognitive resources on decoding and have little left for comprehension. Fluent readers, on the other hand, decode words quickly and accurately, thus retaining many resources they can use for comprehension.

Conversely, Schrieber (1980) theorized that reading fluency difficulties stem from the absence of prosodic cues in written language. Schrieber contended that some readers have difficulty transferring from oral language, where prosodic markings are explicit, to written language, where prosodic markings need to be inferred. Readers who fail to generate appropriate prosodic markings do not divide sentences into meaningful phrases and therefore have difficulty comprehending written text, regardless of their ability to decode individual words.

In a study on dyslexic adults, the combination of accuracy and speed of oral text reading were compared in phonological and orthographic processing, verbal

short-term memory and reading habits (Leinonen, Müller, Leppänen, Aro, Ahonen & Lyytinen, 2001). It is evident that advanced orthographic processing skills can help many dyslexic readers to compensate for phonological deficits. A relatively fast reading speed, even with numerous errors, appears to be more rewarding in everyday reading than a slower but more accurate reading style.

The third key notion, comprehension, refers to the ability of the reader to depict meaning from the text (National Research Council, 1998). There is considerable evidence that difficulties in reading comprehension are likely to be accompanied by deficiencies in oral language (Nation & Snowling, 1998; Stothard & Hulme, 1992), background knowledge (Chi & Koeske, 1983), metacognitive awareness (Anderson, 1980; Wong & Wong, 1986), strategy use (Hare & Pulliam, 1980; Kletzein, 1991), and/or memory capacity (Just & Carpenter, 1992; Swanson, Cochran & Ewers, 1990).

One specific subtype of reading and writing difficulties is a disorder named dyslexia. According to the International Dyslexia Association, IDEA (2002), dyslexia is a specific learning disability that is neurological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.

The study in this report deals with reading and writing difficulties in general and not specifically with dyslexia or any other subtype of reading and writing difficulties. Thus, further explanation of this or other specific disorders is not included.

2.3.1 Factors behind reading and writing difficulties

There are many explanations for reading and writing difficulties. Some of them are biological and neurologically based and some are related to environmental and educational factors. Over the years many neurologically based theories have been used in the efforts to explain and find reasons for reading and writing difficulties and especially for dyslexia. The role of the different parts and regions of the brain (e.g. Hallahan & Mock, 2003; Wagner, 2008) and the role of the eyes (e.g. Wagner, 2008) have been discussed. Recently, researchers in the field of learning disabilities have proposed that reading and writing difficulties can be explained by using neurological theory (Stein, 2008). The neurocognitive process theory proposes that predictors of reading skills are also important in

explaining reading difficulties and these processes are phonological processing, phonological awareness, rapid naming and the neuropsychological measures of memory-the visual process and cognitive functioning. In short, we can state that some of the factors pertaining to reading difficulties could be explained using cognitive and neuropsychological indices: phonological processing and rapid naming (Frijters, Lovett, Steinbach, Wolf, Sevcik & Morris, 2011).

It is evident that the biological perspective cannot be overlooked when discussing explanations for reading and writing difficulties. However, the major focus in this study is on the environmental and especially the educational perspective. Factors related to the home and the school are thus in focus.

There is a large amount of research, mainly from developed countries, which posits that among factors in the home, the socioeconomic situation has a major impact on the development of the child and thus also on the development of the child's literacy development (e.g. Cameron & Williams, 2005; Sirin, 2005). In most of the studies the education of the parents and the income level of the family have been used as indicators. The amount of research from developing countries, including Africa, is limited. During the last years there has, however, been an increasing interest in the field which can be seen, e.g. in Tanzanian studies. The relation between the home environment and the development of literacy skills in Tanzania has been analyzed and described in recent studies (Ngorosho, 2010; Ngorosho & Lahtinen, 2010; Ngorosho, 2011). These studies were carried out in poor rural areas in eastern Tanzania. The summarized findings (Ngorosho, 2011) show that family's socio-economic situation and literacy support was important. Indicators like parent's education, house wall material, the amount of schoolbooks at home and parental involvement in school homework were found to be significant predictors of reading and writing ability. The results also show that phonological awareness was predicted by the father's education and mother's occupation.

The idea in the actual study is that many children coming from low socio-economic areas do not have a literacy-supporting environment and thus there is a risk that their literacy skills will not develop well without special attention and support. Families and homes in such areas do not have strong possibilities to support their children's literacy development. Studies have indicated that poverty in the families, lack of books in the homes and lack of parental support, are some of the major reasons for delayed literacy development among children (Lyon & Fletcher, 2001). According to several reports it is obvious that most families in Tanzania, due to low income and poverty, do not have the possibility to adequately support the education of their children (e.g. World Bank, 2004; Linderboom, 2005).

In homes where the parents have to struggle for their daily living and food it is likely and understandable that literacy interest and activities are not in the foreground. But the consequences are also obvious. The children do not get models of reading and writing and the home environment is not stimulating and supporting of literacy activities. Further, family structure, especially in developing nations, has been accorded as one of the factors for literacy skills problems (World Bank, 2004; Linderboom, 2005). In single parent families, the parent might not have the possibility to use time for guidance of the children's literacy development. The struggle for the survival of the parent and family takes all the available time and resources. A single parent does not have the possibility to seriously support the education of the child in terms of, e.g. school materials and literacy coaching and interaction with the child. The consequence can be that the child feels isolated, less cared for, and as a result the literacy development can be delayed.

Some of the factors behind children's literacy problems and reading and writing difficulties can be traced to the school as a learning environment, to teacher education and to teaching methods. As pointed out in the previous discussion, language skills are not acquired automatically; the child has to learn them. The school has the responsibility of facilitating the learning of these skills by formal schooling (Westwood, 2008). Basic facilities like classrooms of proper size, enough desks and schoolbooks for the pupils and well educated teachers are prerequisites for a good learning environment. In Tanzania there are problems with all these facilities, as discussed earlier in this chapter. The teaching methods play an important role in the process of learning literacy skills. Teaching methods may promote or hinder skill development. Experiences from the United Kingdom, the USA and Australia (Westwood, 2008) suggest that learning difficulties can even be traced to certain teaching methods. In a study conducted by Hakielimu (2007), it was reported that one of the key factors for low performance and low skills in primary schools in Tanzania is the problem of teaching and learning methods used. In classes children are drilled towards answering examination questions, reciting concepts and copying notes from the chalkboards. The school related reasons for low performance in literacy skills in Tanzania are presented and discussed more in detail above in Chapter 1.2.4.

Studies have also revealed that the cultures of the community mould the language of the child (Lybolt, & Gottfred 2003). Through social interactions the community directs the child's language along paths of the cultural practices of the community and the kind of language used to express those cultural activities in society. It is through such paths that children learn to express and demonstrate their cultural practices and develop their language communicative rules. In these interactions children learn to correct their own errors in the use of different

words for different purposes. These interactions also result in the total growth of the child's own language, experiences and mastery of the language principles even before they enter formal schooling (Morrow, 1990). In some cultures the social interaction and communication are not optimal from the child's language development perspective and thus the language development can be delayed or problematic.

Some definitions and explanations and factors related to reading and writing difficulties have been presented. But to know the definition and the factors responsible for reading and writing problems is not enough. It is important to know how children with reading and writing problems can be identified and helped to overcome the problems. In the following section models and tests for identification are presented and discussed.

2.3.2 Predictors of reading and writing difficulties

Children at risk of developing reading and writing difficulties can be traced by using information about the cognitive functioning of the individual, about the family literacy background, and about the school learning environment (Lyytinen, Erskine, Aro & Richardson, 2007). In the following paragraphs, the focus is on the individual child and language related predictors.

Predicting reading and writing difficulties has been the aim of a large number of studies over many years. There are specific language elements, which researchers have identified for risk perspectives. The most significant elements seem to be phonological awareness and alphabetic knowledge. Phonological awareness includes the letter-sound system of a language, whereas alphabetic knowledge involves the ability to associate sounds of phonemes with letters (e.g. Lyytinen, et al., 2007; Juel, 1988; Moats, 1999; Torgesen, 2000).

Several specific sensitive predictors have been identified: low ability of the child to identify words, including non-words (Stanovich, 1988), phonological processing deficits together with knowledge of the written alphabetic in the cognitive domain (Catts, 1989; Wagner & Torgesen, 1987; Bishop, 2003; Simpson & Everatt, 2005; Spira, Brackens & Fischel, 2005; Siegel, 1989), low letter knowledge (Lyytinen, 2008; Holopainen, Ahonen, & Lyytinen, 2001; Hurford, Potter & Hart, 2002; Wagner, 1988), and slow learning of phonological components especially at pre-school level (Byrne, Fielding-Barnesley & Ashely, 2000).

There is strong evidence that reading and writing difficulties can be predicted by the child's ability to associate sound segments of the language with the written orthography (Adams, 1990; Juel, 1988; Good & Kaminski, 2002; Moats, 1995; Torgesen, 2002; Dunsmuir & Blatchford, 2004; Reid & Crombie, 2009).

Children can also be predicted to have reading and writing difficulties if they seem to fail to relate the sound order in the words, notice the presence of rhyme in words, struggle with spelling, transpose letters in words, omit or substitute words, have poor reading comprehension, and if they have a slow reading speed to the extent that they fail to comprehend the information (Encyclopaedia of Mental Disorders).

Issues like weak cognitive ability, weak working memory, and visual or auditory perception also adversely affect skill acquisition. Moreover, a child's learning attitudes, which encompass motivation, attention span and concentration to task and willingness to cooperate and be open to work with others may account for reading and writing difficulties (Wigfield & Wentzel, 2007).

The second important factor to observe in predicting the future literacy development of a child is the family literacy background. The family literacy background and how it affects literacy acquisition and the difficulties of the child were discussed in previous sections. Parents are the first prominent teachers in the process of language development of the child, and through verbal and non-verbal interaction with the adults in their homes children develop their literacy skills abilities (Gottfred & Lybolt, 2003). A close interaction between the child and the surrounding community is important, because language is founded in the social setting, and because the role of the community and adults is to unfold the child's potential to learn (Vygotsky, 1978).

In addition to risk factors related to the individual and the home, the school environment, including the teaching, is a critical factor. As pointed out in the previous discussion, language skills are not acquired automatically; the child has to learn them. The school has the responsibility of facilitating the learning of these skills during formal schooling (Westwood, 2008). Facilities such as furniture, learning materials and textbooks (e.g. books for the alphabet in grade one) play a significant role in creating conducive learning environment and practice (Lyon & Fletcher, 2001).

The teachers and the teaching methods need to be considered in the process of teaching and learning literacy skills. Not all teaching methods lead to good results (Westwood, 2008). A concrete experience is to be found in Tanzania. Classroom teaching in Tanzania is mainly through cramming, reciting singing and copying notes from chalkboards Hakielimu (2007). For example, letter and sound naming, which is the most important skill in the development of literacy skills, are learned by memorization. Children are given charts of letters to recite and reproduce for the teachers. The curriculum in grade one includes eight lessons of 30 minutes per week of listening, speaking, reading and writing skills. These skills are taught as separate lessons. It is anticipated that teachers who

utilize the time allocated in the timetable effectively in the classroom manage to support the children in making good progress. It is, however, fairly common to meet situations where the time management is not optimal or correct.

Naturally, classroom teachers are expected to be able to identify children with the likelihood of having reading and writing difficulties as early as their entry into grade one. The ideal situation is that these children get attention already in day care centres and pre-schools. However, identification of children at risk is not a simple task; it needs understanding of the methods and techniques required. In the following section some of the strategies for identifying children at risk of having problems are discussed. The aim is to find strategies which could also fit in the context of Tanzania.

2.4 Identification of children at risk of reading and writing difficulties

In this section the identification of children at risk is discussed based on some widely used approaches and models. A sample of tests used in the assessment is also presented.

2.4.1 Models for identification

With the aim of providing a framework for the identification and teaching/training of children at risk of reading and writing difficulties, some basic models are shortly presented in this section. The models chosen are identified as being sensitive to the risk perspective. The first one, the discrepancy model, is a widely used old model for explaining and identifying reading and writing difficulties. More modern models appropriate to the context of this study are the componential model (Joshi & Aaron, 2008), the Response to Intervention (RTI) model (Clay, 1985) and Dynamic Assessment models (Lidz, 1991). Dynamic Assessment is discussed more widely, and under a separate heading, due to the central role it plays in this study.

The discrepancy model, also known as the intelligent quotient (IQ) model, focuses on the cognitive ability of the learner in relation to achievement. The discrepancy model posits that if there is a difference between IQ, anticipated reading ability and actual reading level, the pupil is considered to have reading difficulties. The idea behind this theory is that low IQ leads to poor functioning of various skills, including reading. Advocates of this model are interested in differences between cognitive ability and achievements in the test scores. IQ tests basically measure the intelligence level of the pupil and not his/her potential to learn. The model has been criticized for not being able to fully provide details of the learner's potential to learn (Joshi & Carrecker, 2009).

It is understood that children come to school with different prior knowledge of print, and that some children require extra support to be able to learn successfully. With IQ model testing it is mostly likely that such children may be classified as being at risk because the assessment focuses on their current ability only and not on their potential ability to learn (Vygostky, 1978; Lidz, 1987; Sternberg & Grigorenko, 2001; Grigorenko, 2009). Other researchers have argued that IQ is a well-established measure for identifying reading abilities and is regarded as a good predictor for future academic success, for example, in higher learning opportunities. In summary, it can be noticed that the usefulness of IQ tests in assessing children with delayed language development has been largely debated. Recent advances in the research of reading problems have indicated the benefits of other models. Researchers have recommended other paradigms as the starting point of looking for effective models for identifying and helping children with reading difficulties. The component model and response to intervention models are frequently recommended ones,

The componential model of reading (CMR) aims at finding the reading component that is the source of reading difficulty, and then the instruction is targeted at that component (Aaron, Joshi, Gooden & Bentum, 2008). From a cognitive perspective children can have difficulties in word recognition, comprehension or vocabulary and the instruction should be planned to identify the specific difficulties and to focus the intervention on these components. A central feature of CMR is also the view that problems related to reading difficulties can not only be explained by cognitive theories. Other factors such as psychological and environmental factors should equally be considered.

It has been long conceived that when a child fails to read and write at grade level, the idea has been that there are problems in the cognitive domain. Gough and Tunmer (1986) suggested that reading difficulties can be assessed more analytically by using a componential model of assessment. Cognitively, the assessment should look into the mental processes, e.g. the ability of the child to decode and recognize words and symbols. In the psychological domain the child should be assessed in factors related to motivation, interest and self-control in the learning process.

The living environment of the child is an important domain in the process of reading and writing skills development. All the different components of the living environment are important and should be assessed: the home, classroom, teachers, language of the community, etc. For example, in assessment issues related to the parent's income, literacy level and interest should be considered.

Like the other two reading models, *the response to intervention (TRI)* model (Clay, 1985) sheds light on the identification of children at risk of having

reading and writing difficulties at the early reading stages. As an assessment tool RTI takes a definable number of steps or tiers in the assessment procedures. The steps are as follows: general screening, development or progress monitoring, specific instruction, and finally intensive training or intensive follow-up. The following description can be used to illustrate the point.

First, pupils receive training and assessment for a certain amount of time in different skills, such as letter and letter-sound knowledge, phonological, phonemic awareness, reading and writing skills and memory skills. This stage is called tier I. Lower achievers are identified after the training. In the second stage, which is called tier II, the identified children are provided with intensive training in the identified literacy skills. Then, in tier III pupils who could not benefit from tier II are provided with extra training, which is more intensive in small groups of three to five pupils. The method is widely used and recommended.

The basic idea in RTI is that children's literacy assessment is not a single activity, but rather a series of planned activities that the instructor executes in order to help the children improve their literacy skills (Vellutino, Scanlon, Small & Fanuele, 2006). The children are then assessed in various literacy skills areas, for example in letter-sound knowledge, reading fluency and reading comprehension. All these stages described in the RTI are targeted at enabling the children to fully explore their potential in the identified areas of language skills.

Dynamic assessment is the fourth model chosen for presentation. It is a very essential model in this study as it is used both in the identification and the intervention process, and thus it will be presented and discussed under a separate heading in Section 2.4. In short, it can be said that the model focuses on helping the child uncover his/her potential capabilities for personal development (Feuerstein, 1980; Feuerstein, Rand & Hoffman, 1979). In the following section a presentation of predictors and tests for identification is given.

2.4.2 Tests for identification and assessment

Tests for identification and assessment of children with reading and writing difficulties are presented in this chapter. The presentation includes a sample of tests which have been used in irregular and regular languages for children from four to nine years of age. The selection of these tests is firstly based on the idea that they provide a basis for planning intervention programmes. The tests include the main components known to be important predictors of reading and writing difficulties. These components are also regarded to be of relevance in the present study.

These tests have also been tried out or used in several languages and countries. They seem to have functioned well and are easily adaptable. A sample of widely used tests is presented first. Then the focus is on tests used in the Tanzanian context and in Kiswahili language.

One of the tests used for a wide range of skills is the Woodcock Reading Mastery test (Woodcock, 1987). The test has been widely used in irregular languages. It has been viewed as one of the prominent methods in assessing language skills difficulties in children with age ranging from 4/5 to 9 years old. In the USA and the United Kingdom, where this test has been widely used, it has been administered to children in kindergarten and in grade 1 and 2. The test consists of reading readiness, basic skills and reading comprehension. Reading readiness involves visual and auditory skills and letter identification, whereas basic skills involve word identification and word reading. Reading comprehension involves word and passage comprehension. This test is administered individually.

Another widely used test is the Wide Range Achievement Test (WRAT). About 30 years ago, Jastack and Jastack (1965) designed this test for children aged between 7 and 9 years. The test used measures various literacy skills such as letter knowledge, letter-sound knowledge, reading and comprehension. In its initial stage WRAT was designed to screen at risk children in irregular languages. Like other screening tests for irregular languages, WRAT was most appropriate for children who had a good literacy background. Recently, WRAT has also been used for children with a less good literacy background and in regular languages, as discussed in the following sections.

One test, which is not yet internationally well known or widely used, but developed and used in the African context, is the Zambian BASAT (Basic Skill Assessment Tool), developed in cooperation between researchers in Finland and Zambia (Ketonen & Mulenga, 2003). The tool has been developed for assessing literacy skills and identifying children in need of support for reading difficulties in grades 1 and 2. The test is created on research-based knowledge about important components for reading development and sensitive predictors of reading and writing difficulties. It includes the assessment of letter and letter-sound knowledge, phonological tasks, word and sentence reading and word and sentence writing, digit span and reading comprehension. The instrument is also a practical guidance tool for special education teachers in identifying and supporting children in the at-risk zone.

Taking the perspective of the actual study, it is observed that there is a scarcity of tests developed for use in regular languages and also of tests developed for use in developing countries. This is also the situation regarding Kiswahili and

Tanzania. In some languages and countries the problem has been solved by adopting tests used in irregular languages with some modifications. This procedure has been fruitful in several regular languages such as Finnish and Dutch (Holopainen et al., 2001), and in Italian language (Cossu, Shankweiler, Liberman, Katz & Tola, 1988).

In the following, some studies from Tanzania are presented. Since 2000 there has been some interest in research in literacy skills and in developing instruments for studying this area. However, the number of studies is not large. During the last five years some effort to improve the situation can be noticed.

The above-described Wide Range Achievement Test (WRAT) has also been used for literacy screening in Kiswahili language in Tanzania with rural children in grades 1-2 (Alcock et al., 2000). The test consisted of oral letter and word reading and was administered at individual and at group level.

In the beginning of the 2000s, a group of researchers (Steinberg, Grigorenko, Ngorosho, Tantufye, Mbise, Nokes, Jukes & Bundy, 2001) designed a test to assess the cognitive ability of children in less developed countries. The study used a dynamic assessment approach in which children were pre-tested, then training in the identified problematic areas before being given another test. The participants were Kiswahili-speaking children from Bagamoyo in Tanzania, 9 to 11 years old. The test battery was large and included phonological tasks and reading and writing measures. The children were also tested on their ability to understand and follow instructions in problem solving activities. All the components were administered at individual level.

Since 2005, there has been an effort to promote reading and writing skills and to prevent reading and writing difficulties in Tanzania by initiating research in these topics. Several of the studies are presented and summarized by Ngorosho (2011). The studies have been undertaken in rural areas in Bagamoyo District in the eastern part of Tanzania. The test battery included different components of phonological awareness and reading and writing skills.

In one of the recent Tanzanian studies, a group-based screening instrument for identification of children at risk of reading and writing difficulties in grade one has been developed (Kalanje, 2011). The screening test included word knowledge, letter knowledge and phonological awareness. The instrument was validated by an individual test, a follow-up and school marks.

To sum up, it is evident that identification of children at risk of reading and writing difficulties requires appropriate tests as well as knowledge about and understanding of the nature and type of problems which the children at risk have.

Various tests have been highlighted. It can be stated that most of the tests have been carried out at individual level. The large classes in Tanzanian schools call for group approaches in the testing procedure. Most of the earlier tests have been constructed and used in irregular languages. There is an apparent need for tests in Kiswahili. Moreover, the awareness of large variation, and low level of literacy stimulation in the homes of many children, calls for an approach where this situation could be taken into consideration.

2.5 Dynamic Assessment

The concept of dynamic assessment responds to the idea of Vygotsky as early as the 1930s (Kozulin & Garb, 2001). Vygotsky believed that the normal learning of a student is a socially meaningful cooperative activity (Kozulin & Garb, 2001). Since then, several approaches/methods have been developed, mostly for face- to-face classroom situations, and usually for elementary grades, though a few of these methods have been proven to work differently in different situations. The basic principle in the dynamic assessment approach is that every individual can learn, given appropriate instruction, and that people differ significantly in the way they learn and benefit from the instruction. With appropriate instruction in the classroom, differences in performance can be minimized (Vygotsky, 1978). Unlike static tests, the dynamic assessment approach allows the instructor and the learner to evaluate the learning process. Of priority is the ability of the learner to evaluate his/her learning and suggest the amount and level of assistance he/she needs in a particular content area (Neo, 2005). The assessment procedures in DA provide chances for the instructor to give and for the learner to receive feedback based on the performance (Swanson, 2001).

Dynamic assessment is an interactive method of teaching and assessment, which involves collaborative work between the instructor and the learner. The instructor uses much effort to help the learner learn independently. The learner, on the other hand, utilizes the assistance provided to unfold his/her learning potential. This method of assessment has evolved from the idea that children's ability to benefit from instruction in the classroom differs significantly because they come to school with a different literacy knowledge background. If instruction is to be of benefit to the learner, then understanding the learning potential of the learner is of paramount importance (Feuerstein, Rand & Hoffman, 1979). The role of the instructor or teacher is first to harmonize the knowledge base of the learners in such a way that their learning pace does not differ significantly. Harmonization is done by providing training with mediation

so that children who lag behind their peers in learning can improve their ability to learn, and hence decrease their likelihood of being at risk of reading and writing failure (Vygotsky, 1978).

Recently, researchers in the field of special education have acknowledged the contribution of DA in school assessment and teaching. DA is a method of teaching as well as of assessment. In other words, DA is a tool for teaching and learning pursuits (Kozulin & Garb, 2002). DA has recently gained more influence in educational assessment and teaching than the IQ or traditional method of assessment for a number of reasons: DA provides wider information about the learning ability of the pupil and it focuses on helping individual pupils uncover their learning potential by providing stimuli to activate deep thinking. It also focuses more on the learning process rather than the learning outcomes. Further, DA induces a sense of transfer effect. It emphasizes teaching and learning which results in a permanent effect.

Furthermore, DA helps the teachers reveal what the learners are able to do on their own, and what learners are able to do when assisted. The difference between the performance a pupil exhibits when working alone and—what is shown after teacher support is of great interest to the teacher and to the pupil (Sternberg & Grigorenko, 2001). Through teacher mediation the pupils are helped to explore strategies and techniques to uncover their potential to learn (Hasson & Joffe, 2007). The mediation process, which is at the core of DA (Feuerstein, Rand & Hoffman, 1979), uses a test-mediate-retest format in determining the amount of change the child has acquired in the learning process. The role of the instructor is to identify the pupils' problems during the pre-test and provide the necessary mediation during the learning phase. The post-test is administered to measure the amount of improvement the child has undergone.

In assessing and predicting children's capabilities DA seems to have some advantages compared to traditional assessment. In a carefully performed meta-analysis, Caffrey (2006) showed that after traditional achievement tests had been entered in the multiple regression, DA accounted for additional variance in phonemic awareness (9%) and reading achievement (21%) in kindergarten, grade 2 and grade 5 (based on Byrne et al., 2000). Similarly, Caffrey (based on Spector's study, 1992) found that DA contributed between 12% and 14% on phonological awareness measures and 21% on a word reading measure, and on an additional 13% in higher-level verbal measures, such as reading sentences and writing (based on Reising's study, 1993). Likewise, additional effects were noticed in several general cognitive domains. Despite the positive effects, Caffrey (2006) points out that "DA may not be a substitute for traditional assessment. Rather, it may provide valuable information over and above that".

Currently, there is much interest in dynamic assessment and this has been growing, with more researchers publishing on dynamic assessment (e.g. Caffrey, Fuchs & Fuchs, 2008; Sternberg & Grigorenko, 2002; Lussier, & Swanson & 2002; Toglia, 2005). In their studies, Grigorenko and Sternberg (1998) and Swanson (2001) provide a comprehensive review of dynamic assessment.

In a summarizing overview of studies on DA, Caffrey, Fuchs and Fuchs (2008) notice that DA has been described as assessment of learning potential, as mediated learning, as testing the limits, as mediated assessment and as assisted learning and transfer by graduated prompts. These approaches are distinguished from one another by purpose and procedures. In this section I briefly describe these approaches and some perspectives of DA.

Different approaches

The first approach is that of test-train-test developed by Budoff (1994). In this approach children are pre-tested and post-tested. The idea is to find out whether or not the given instruction had an effect. As a priority this approach aims at identifying obstacles hindering effective learning and providing assistance to overcome them. In this approach, children are first pre-tested before being provided with intensive training in the identified language items or components. After a couple of training months the children are re-tested. The difference in performance between pre-test and post-test can indicate the amount of improvement the child has made in the learning of the language skills. Further intervention programmes can be instituted for those children who still demonstrate problems in learning the language skills.

The second approach is the Mediated Learning Experiences (MLE) (Feuerstein, Rand, Hoffman & Miller, 1980). MLE emphasizes mediation in the teaching and learning process. To mediate is simply to “bridge”. The teacher or instructor acts as a bridge in the learning process by creating an environment, which helps the learner to learn effectively and the learning content be understood. In essence, mediation is provided during the assessment as well as in the teaching process, and is intended to shed light on the problems and help the learner overcome them (Lantholf & Poehner, 2008; Lids, 1991).

The MLE approach emphasizes that effective learning is a result of reciprocal interaction between the instructor and the learner. In the mediation process the instructor places himself/herself between the stimulus and the learning experience and also between the learning experience and the response. Feuerstein (1980) demonstrates this process in the theory which is represented as S-H-O-H-R, whereby S represents the stimulus, H represents the learner

(human), and O is the learning experience (Organism). Before conducting the mediation process the learner is tested to gauge his/her potential ability. The mediation, which follows immediately after the pre-testing, aims at removing the hardships which the learner experiences in the learning process. After this mediation, the learner is expected to have benefited from the mediation. To be able to determine the amount of benefit obtained, another test or assessment is administered (post-test). The difference in attainment between the pre-test and post-test can be used to judge the amount of change the learner has undergone (Feuerstein, Falik, Rand & Feuerstein, 2006; Lanthorf & Poehner, 2006). The main focus of dynamic assessment is not only on what the learners can accomplish on their own but also how much they can change and perform better than before (Lidz, 1991).

The third approach is known as testing the limits assessment (Jitendra & Kameenui, 1993). This approach is based on the idea that the ability of an individual to process information lies within him/herself and is affected by intellectual and personality factors. Most practitioners of this model incorporate the testing or intervention procedures directly into the testing situation. In other words, this model suggests that identification and intervention can be conducted concurrently. The basic idea is that children assumed to have reading difficulties can be identified and an intervention process can take place. Through Jitendra's and Kameenui's, (1993) ideas we understand that the growth of cognitive ability of the child originates in interaction which is interpersonal and later becomes internalized and part of the learner's inner cognitive process. In the school context, the child's interaction with the teacher has a great impact on the child. The goal of the instructor is to enhance the cognitive growth of the child. This can only be achieved if the instructor understands that the child's cognitive ability is lucid and that with proper and close supervision the child can exhibit change in cognitive functioning. The goal is also to ensure that the child acquires competences that would help him/her not just remember what the teacher has taught but also move further to applying the knowledge acquired, in new situations.

Different perspectives

Within dynamic assessment approaches there are different views about how cognitive growth can be enhanced. The process can be analyzed from different perspectives. In the following the social constructivism perspective and the social-interactionist's view, the zone of proximal development, and scaffolding or guided participation are presented.

The central idea in the social constructivism and social interactionist perspective is that an individual constructs knowledge when he/she interacts with the

community around or when placed in groups. In groups children share experiences and sharpen their understanding of the world around them and gain more exposure to things they had not been exposed to before and become more knowledgeable. The interaction could take the face of cooperative or collaborative interaction (Strijbos & Mathews, 2001; Kozulin & Garb, 2001; Neo, 2005). In other words, it can be deduced that knowledge is socially constructed. Through adequate and collegial assistance an individual can perform much more than he/she could do on his /her own. A child is believed to have the capacity to solve a problem up to a certain level without the help of another person. When helped, his/ her ability to solve harder problems increases (Haywood, 2001). For example, in the pre-test children show their prior knowledge about a certain phenomenon. When the instructor administers teaching and mediation, he/she creates a condition which enhances the child's ability to understand and solve problems independently. Thus, in the post-testing the child is likely to be able to solve the same problem him/herself.

The zone of proximal development is the difference between what a learner can do without help and what he or she can do with help (Haywood & Lidz, 2007). It is based on Vygotsky's idea that there is a gain value obtained after the child is assisted in the learning process. The zone of proximal development is closely connected to the processes. The scaffolding or guided participation perspective rests on the idea that through adequate assistance the child is able to unfold his/her learning capacities. The basic idea is that for a child to unfold his/her capacity his/her participation in a learning situation or environment should be organized (Lidz, 1991). Learning by stages is the focus of this aspect. A child benefits more when he/she interacts with the learning environment, which is systematized in such way that learning is according to stages. And in most cases the instructional materials are arranged in such a way they develop in complexity as the child proceeds on the learning ladder. Thus, the DA approach emphasizes systematic organization of the learning content, but flexible responding to the learners' needs.

2.6 Intervention programmes

The ability of a child to read and write is built on the foundation of the child's literacy skill development in the home and pre-school (Poskiparta, Niemi & Vauras, 1997). Different children acquire literacy skills differently and at a different pace (Vellutino, 1996) due to a variety of individual and environmental factors. We know that children failing to acquire early reading skills are at risk of becoming poor readers in higher grades (e.g. Juel, 1988; White, 1979;

Torgesen & Rashotte, 1997). In order to prevent negative development, measures need to be taken. Intervention in the early stage of reading and writing development has proved to be successful and of benefit to the child's further development of literacy skills.

The present study is an intervention study, and in planning it there was a need to create an effective programme for promoting literacy skills in children at risk of reading and writing difficulties. Thus, it was regarded necessary to scrutinize earlier intervention programmes which have proved to be effective.

There are plenty of intervention programmes that have proven to be effective and useful in preventing reading and writing difficulties in young children. The programmes have focused on phonological awareness, phoneme awareness, alphabetic knowledge and also more directly on reading and writing skills.

Over the years interest in the effect of reading interventions has been very strong. Thus, there are also many meta-analyses of research in the field to be found, as well as overviews and summaries of the studies. A short review of the conclusions made by the authors is presented in the following.

In a recent study Gustafson, Fälth, Svensson, Tjus and Heimann (2011) state that there is "firm evidence that educational interventions focusing on developing phonological skills and linking phonological units of language (phonemes, word segments, and words) to the corresponding written units can improve the word decoding and reading skills of children with reading disabilities". They cite and base their conclusion on several important studies in the field (Ehri, Nunes & Stahl, 2009; Elbro & Petersen, 2004; Hatcher, Hulme, & Ellis, 1994; Tijms & Hoeks, 2005; Torgesen et al., 2001; Wise, Ring & Olson, 1999). Gustafson and his colleagues compared a bottom-up programme aimed at improving word decoding skills and phonological abilities, a top-down one focusing on word and sentence levels, and a combination of the two. The combined programme was the most effective, although all the programmes had significant effects on the reading skills.

The researchers emphasized the need for dynamic rather than static approaches in educational interventions. Referring to Grigorenko (2009), the authors state that educational interventions should be seen as ongoing processes where assessment can assist intervention, and vice versa.

It seems that the effects of training in the smallest group sizes and of the training provided in kindergarten or during the first school years are effective. However, analyses of individual differences in the growth of phonological awareness indicate that some children do not benefit from such an intervention. There are studies (Andreassen, Knivsberg & Niemi, 2006; Gustafson et al., 2011)

reporting that a subgroup of poor readers seems to be treatment-resistant. In a longitudinal Swedish intervention study (Gustafson et al., 2011) poor readers received phonological awareness intervention over one year. It was shown that there was progress in phonological awareness, but the intervention did not improve reading skills. However, a re-analysis of the results revealed important individual differences; for the improved readers, both orthographic and phonological word decoding predicted text reading performance. For the resistant readers, only orthographic decoding skills predicted text reading before, during and after the intervention, in spite of a steady increase in phonological awareness (ibid). The results indicate that a training programme focusing on phonological awareness is only moderately successful for children who have received formal reading instruction in school for several years and still have not achieved satisfactory reading skills. These results might support the expressed view of Stanovich (1986) that lower level deficits in poor readers are difficult to treat at a relatively late age.

Both short time and long time interventions seem to be effective. One characteristic of the used training procedure is the brief period of training. Some studies also suggest that long and elaborate training may not be necessary to bring about improvements in reading skills (Ecalte, Magnan, Bouchafa & Gombert, 2008; Lyytinen et al., 2007; Hintikka, Aro & Lyytinen, 2005; Agnew, Dorn Eden, 2004; Kujala, Karma, Ceponiene, Beliz, Turkkila, Tervaniemi & Näätänen, 2001, Törmänen, 2010). From an applied perspective, this aspect of the training is very important. It is clear that the aim of any treatment that is administered is to bring about a lasting improvement.

It was also of interest to describe some of the intervention programmes that have been proven to work well in kindergarten and in grade one, and thus a literature search was carried out in ERIC, and PsychINFO data bases. In doing this search, the following key words and combinations of them were used: early intervention, intervention, effects, phonological awareness, reading and writing, kindergarten, grade one. The search process resulted in 224 articles about intervention studies on the topic. The studies were reviewed and a sample was chosen based on the idea of relevance for the actual study. The consequence was that the focus was placed on risk groups and short term preventive programmes, including several literacy components regarded to be critical in the process of promoting literacy skills. Specific remedial programmes were thus omitted, as well as programmes with very specific aims. The aim was also to focus on rather short programmes, preferably not lasting longer than three months, because the idea was to find programmes which could help children at risk to catch up with the main group in a short time. However, some longer programmes including

components or procedures regarded to be of interest were also chosen for closer analysis.

The literature search and the selection process resulted in a sample of 13 intervention studies for presentation and analysis. Based on the search, most of the studies on intervention programmes in the field were performed in developed countries. In Tanzania, which is the context of this study, there are hardly any targeted and evaluated intervention programmes focusing on promoting young children's literacy skills.

Some of the programmes found trained specific single literacy components, but most of them include multiple components regarded to be of importance in preventing reading and writing difficulties. The inclusion of a large coverage of components known as predictors of difficulties is recommended, e.g. by Tunmer and Greavey (2008). The lengths of the programmes vary from a few weeks to one year. The intensity naturally also varies. There are group-based programmes including small groups of children, and there are individual programmes used in case studies on a few children. In some of the studies the content is described in detail, while the description in others is on a very general level.

In the presentation the focus is on programmes mainly targeting basic skills like listening and speaking and phonological awareness. Thereafter, programmes mainly aiming at more directly promoting reading and writing skills are described. However, a clear distinction cannot be made, because many programmes include several of the components which are of central importance for promoting literacy skills in children at risk. The programmes are shortly summarized in the table and described in the following. The programmes are listed according to length.

Table 4. Early intervention programmes for promoting early literacy skills in children aged 4/5-9 year.

<i>Author Aim</i>	<i>Length Age group Approach</i>	<i>Main content</i>	<i>Test measures</i>	<i>Outcomes</i>
<i>Lo, Wang & Haskell (2009)</i> Promote early literacy skills of urban-at risk children	5-14 weeks 3 days/week 30 min <i>Kindergarten</i> urban at-risk Small groups	Scott For- esman’s Early Reading Inter- vention (ERI)	-phoneme segmentation fluency -nonsense word fluency	The ERI programme was effective. Gaps between study groups decreased.
<i>Leafstedt, Richards & Gerber (2004)</i> Improving phonological awareness, reading and vocabulary	10 weeks 2 days/week 15 min <i>Kindergarten</i> low income limited literacy re- sources Small group (3-5)	Developmental model: Early PA: rhyme and onset -Late PA: -Segmentation and blending	-phonological awareness -word and pseudoword reading -fluency -vocabulary	Significant improve- ment in word reading Direct instruction is effective across ability levels, but responses differ based on initial differences.
<i>Gyovai, Cartledge, Kourea, Yurick & Gibson (2009)</i> Improving literacy & reading skills	7-15 weeks, 2-4 days/week 20 min <i>Kindergarten and grade one</i> low SES back-ground	Early reading intervention (ERI) -Phonological awareness and phonics in- structional programme	-phoneme segmentation fluency -nonsense word fluency (DIBELS)	All students improved in phoneme segmenta- tion and number of correct letter-sounds
<i>Hatcher, Hulme, Miles, Carroll, Hatcher, Gibbs, Smith, Bowyer-Crane & Snowling (2009)</i> Improvement in letter-sound identification	8 weeks 2 days/week 30 min <i>Grade one</i> Experimental	-letter identi- fication -blend syllab- les - letter-sound identification	letter-sound identification	Significant improve- ment in letter-sound identification
<i>Siegel and Brayne (2005)</i> Improve language skills	8 weeks once a week 30 min <i>Grade one</i> Individual	-letter-sound knowledge -syllable counting -word reading -sentence reading -writing	-letter identi- fication -syllable counting -reading sight words -reading short sentences	Significant improve- ment of language skills

<i>Author</i> Aim	Length <i>Age group</i> Approach	Main content	Test measures	Outcomes
<i>Torgesen (2002)</i> Phonological awareness and reading skills	8 weeks 5 days/week 50 min <i>8-10 years</i> Small groups	-word attack -letter identification	-phonemic decoding, -text reading accuracy -reading comprehension	Significant progress in phonemic decoding, text reading accuracy and in reading comprehension.
<i>Walter et al. (2010)</i> Enhancing reading skills	10 weeks 4 days/week 20 min <i>Kindergarten</i> at-risk children Small group	-phonemic awareness	-DIBELS	Early reading skills significantly improved, e.g. fluency of phoneme segmentation, nonsense word and word use.
<i>Kairaluoma, Ahonen, Aro & Holopainen (2007)</i> Enhancing reading fluency	3 months <i>7 years</i> Case study: 2 children	-syllables as reading units, -word reading - text reading	-letter knowledge - reading skills -syllable segmentation of words	fluency at syllable level
<i>Elbro & Petersen, (2004)</i> Help improve phoneme awareness	17 weeks 30 min daily <i>Kindergarten</i> Trained in regular classroom	-phoneme awareness -single speech sounds	-pre-reading abilities -phonological awareness -basic language abilities	-letter knowledge, phoneme deletion and identification -no transfer effect on language abilities
<i>Schneider, Roth, & Ennemoser, (2000)</i> Improving reading and writing spelling skills	5 months 10-15 min/day <i>Kindergarten</i> -at-risk of dyslexia	Three programmes: -letter-sound training -phonological awareness training -combined	-phoneme awareness -rhyming -verbal memory -processing speed -early literacy	Phonological awareness combined with letter-sound knowledge yielded the strongest effect in reading and spelling in grades one and two.

<i>Author</i> Aim	Length <i>Age group</i> Approach	Main content	Test measures	Outcomes
<i>Bowyer-Crane, Snowling, Duff, Fielsend, Carroll, Miles, Gotz, & Hulme (2008)</i> Promoting phonological awareness and oral language skills	20 weeks training daily <i>Grade one</i> Small group and individual approach alternating a) phonology with reading group (P-R) b) oral language group (OL)	Phonol- Reading: -letter-sound -phonological awareness -reading books -sight word recognition Oral language -vocabulary -comprehension -inference generation and narrative skills	Measures of - literacy -language -phonological awareness -phoneme awareness	P-R: Literacy and phonol. measures, decoding ability OL: Literacy and grammatical skills. Both programmes were effective for different skills. Still support needed.
<i>Scanlon, Vellutino, Small, Fa-nuele & Sweeney (2005)</i> To promote phonological awareness and reading skills	8 months <i>Kindergarten:</i> -twice per week -30 min -small group <i>Grade one:</i> -daily -30 min -one-to-one tutoring	Kindergarten: -emergent literacy skills Grade one: 2 programmes a) phonological awareness, b) reading	WRMT-R -basic skills -word identification -word attack	Kindergarten programme effective. The phonological awareness programme compared to reading programme was more effective in reducing resisters to treatment
<i>Santa & Hoiem (1999)</i> Improving reading, writing, phonological skills	8 months <i>Grade one</i> One-to-one tutoring	-story reading -writing and -phonological skills	-spelling performance -word recognition -non-word reading -reading comprehension	Significant improvement in all variables assessed. The balanced approach is regarded as the explanation.
<i>Gunn, Biglan, Smolkowski, & Ary (2000)</i> Improving literacy skills	-Kindergarten -Individual	-Phoneme and code-based instruction	-phonemic -decoding skills	Kindergarten phonemic and decoding skills were enhanced.

To sum up, it is possible to achieve effective improvements using both short-term and long-term interventions. Leafstedt, Rickards and Gerber's (2004) study shows the positive effects of an explicit phonological awareness instruction programme on kindergarten children from low income homes. The programme was based on a developmental model of phonological awareness and on the Core Intervention Model, which is grounded in direct instruction theory. The teaching material is supposed to be appropriate for the level of every student. The training included rhyme and onset in the early phases and segmentation and blending in the later phases. Significant improvement in word reading was found. The authors concluded also that direct instruction is effective across ability levels, but responses differ based on initial differences.

The effects of an early reading intervention programme on the growth rates in the early literacy skills of urban at-risk kindergarten children were studied by Lo, Wang and Haskell (2009). The children participated in an early reading intervention programme (ERI) in small groups over 5-14 weeks. The gaps between the treatment-intensive group and a strategic, treatment-benchmark and a non-treatment-benchmark decreased in phoneme segmentation fluency and nonsense word fluency. The effects of ERI were thus regarded to have been beneficial to the development of early literacy skills.

An intervention study using a multiple-baseline design across students also showed positive results. The research group consisted of kindergarten and grade one students with low SES background (Gyovai, Cartledge, Kourea, Yurick & Gibson, 2009). An early intervention programme including phonological awareness and a phonics instructional programme was conducted over 7-15 weeks. Significant improvement in phoneme segmentation and the number of correct letter-sounds was found.

As an example of a long-term intervention, in Santa and Hoiem's study (1999) the intervention programme Early Steps was evaluated. The group consisted of first graders at serious risk of problems in learning to read. The programme lasted eight months. The focus was on story reading, writing and phonological skills. Significant improvement in spelling, word recognition and passage reading was found. Substantial improvement among high-risk children is explained by the balanced approach of the programme. Another long lasting programme (eight months) for children at risk was comparing two programmes for grade one (Scanlon et al, 2005). Children having had a programme on emergent literacy skills in kindergarten (twice a week for 30 minutes in small groups) were included in a programme focusing either on phonological awareness or on text reading with guidance. The kindergarten programme reduced the number of poor readers and resisters to treatment in grade one,

regardless of the programme the children participated in.. The phonological awareness programme was more effective than the reading programme in reducing the number of resisters to treatment.

Worth mentioning is a computer game “Literate” that has been developed based on the research results of “The Jyväskylä Longitudinal Study of Dyslexia in Finland”. “Literate” is based on Finnish methods of literacy teaching and the knowledge that difficulty with learning letter-sound relations has a negative impact on learning, irrespective of any heterogeneous influences that may have been exerted during the course of the child’s preceding development (Lyytinen et. al., 2006). The computer game is based on a simple concept of a ‘catching game’ that drills children in the translating of sounds to letters in both directions, to aid both spelling and reading. In relating phonemes to graphemes, the child is presented via headphones with a sound (a phoneme or larger unit of sound such as a syllable or word) and asked to catch with the mouse the corresponding falling ball target. According to Hintikka et al. (2005) and Lyytinen et al. (2007), letter knowledge increased in children with initially poor pre-reading skills. More remarkably, these results were achieved after only a short period of playing the game, such that at- risk children playing the game advanced from being behind to eventually match the performance of their non-game-playing, non-risk peers.

The analyses reveal that the described intervention programmes are effective for improving various early literacy skill components for the prevention of reading and writing failure for children at risk in kindergarten and grade one.

2.6.1 Creating intervention programmes

In the following paragraphs some of these conditions are discussed in the context of serving as guidelines when designing an intervention programme which aims at preventing reading and writing problems. These conditions include sample characteristics, explicitness and intensity of the programme, design of the intervention, time conditions and contextual variables. The situation regarding intervention programmes in Tanzania is also discussed.

The first condition is the sample characteristics. How similar or different are the participants of the intervention? Issues like gender, parity, social background, disabilities, language exposure before schooling and individual history should be taken in to account.

The second condition is the content to be included in the intervention programme. Effective programmes should be based on balanced language components including receptive and reproductive skills (Tunmer & Greavey, 2008). In other words, the intervention programme should integrate language

segments such as letter knowledge, phoneme awareness, alphabetic knowledge and phonics on the one hand, and reading and writing on the other. In addition, the content should constitute basic literacy skills and higher cognitive skills of the language (Dunsmuir & Blatchford, 2004). The literature review reveals that many reading intervention programmes involve multiple treatment components such as phonological awareness components, word reading, spelling, and reading. The inclusion of multiple components for assessing reading and writing is recommended because the predictors for reading and writing difficulties are varied; therefore, by including multiple components wide coverage of the predictors to be included is assured (Tunmer & Greavey, 2008). In addition, the content of the programme should reflect the difficulty being assessed.

The third condition is the explicitness and intensity of the programme. For example, children at risk of reading difficulties usually have problems with letter-sound knowledge and thus they require explicit instruction in these skills including alphabetic principles.

The fourth important condition to consider is time. Tunmer and Greavey (2008) argue that reading intervention should have a clear time schedule for the classroom lessons. And the overall duration of the intervention should be sufficient to produce effects. On the other hand, there is evidence that also rather short interventions can be effective. It is also important to consider whether the effect can be generalized and whether it is lasting.

There is also a sixth component which should be taken care of, especially in experimental studies. It is the component of the experimenter, which is crucial because the experimenter can have an effect on the outcome. Having different experimenters testing different groups should be avoided. The recommendation is that a single tester should test the different groups (Tunmer & Greavey, 2008; Vaughn, Linan-Thompson, Kouzekanani, Bryant, Dickson & Blozis, 2003).

In addition, one of the important issues to consider about intervention programmes is context sensitivity. The situation in Tanzania is such that not much has been done on intervention strategies for reading and writing problems. There are experiences of remedial programmes involving pull-out strategy and remedial classes after school hours organized in some schools, but no systematic evaluated intervention programmes are to be found. The common “intervention” for children with poor school achievement is retention or repeating the class. Pupils performing below their peers are made to repeat the same level or class with the aim of having more practice and training. However, it is evident that not all pupils who repeat the class perform better after the repetition period. Official reports indicate that there are pupils who fail to perform at the required standard in spite of the retention period (URT, 2008)

3 Method

3.1 Aim of the study

Based on the introductory presentation describing the challenging situation regarding low school achievement in general and problems with low literacy skills in primary schools in Tanzania, this study aims to find means to improve the situation. Thus, the aim is to try to find means of improving the reading and writing ability of children at risk of developing reading and writing difficulties. The study is an intervention study with randomly-selected research groups. The sample of the study consists of Kiswahili-speaking grade one children from a low socioeconomic urban area of Dar-es-Salaam in Tanzania. The selection of this sample was based on the idea that success in creating and implementing an intervention programme with this kind of sample, with children who are assumed to have a low level of literacy stimulation, and thus in need of support, would be of value in creating programmes for similar and “better off” samples. In order to give the reader an understanding of the situation and the circumstances, a rather detailed description of the context from where the sample of the study is taken is presented.

3.2 Context of the study

This section presents the geographic, demographic and socioeconomic context of the study. Special focus is on data showing that the study was performed in a low socioeconomic area. The situation in the educational field and problems in the schools are described. The study was conducted in Dar-es-Salaam in Tanzania. Dar-es-Salaam is the largest city and the economic centre of Tanzania. It is situated on the Indian Ocean and has the largest harbour in Tanzania. Dar-es-Salaam is also the former capital city of the United Republic of Tanzania. Even though the capital now is Dodoma, Dar-es-Salaam has remained the central point of all the government bureaucracies and a capital for the Dar-es-Salaam region.

3.2.1 Geographic, demographic and socioeconomic context

Dar-es-Salaam is a large city with four million people (UNGLASS Country Progress Report, 2010) and a continuously fast-growing population. In 1867, Dar-es-Salaam had only 3,500 people. One hundred years later, in 1967, the population was almost 273,000. The 2002 census indicated a population of 2.5

million people (Dar-es-Salaam city council, 2004) and a population density of 1793 inhabitants per square kilometer (National Bureau of Statistics-NBS, 2003).

The rapid growth of the city is reflected in the birth rate. In 2002, the birth rate was 4.3 and the number of people per household 4.1 (Census, 2002). The projected population growth for the year 2010 was 3.2 (NBS, 2003) and the population is projected to be 3.5 million people by 2025, with a birth rate of 0.3%. There are many reasons behind the rapid growth of the city. People have migrated from other parts of Tanzania and from other countries for various reasons such as employment, business, education, residence and other social affairs such as marriages, transition, mobility, recreation and security. Statistics from the World Health Organization (WHO), World UN- Habitant (2004) and United Nation Development Programme (UNDP) have documented that Dar-es-Salaam is one of the fastest growing cities in the world, ranking third in Africa and ninth in the world. The growth does not, however, go hand in hand with the growth of the economy.

This study was conducted in Kinondoni, which is one of the three municipalities in the Dar-es-Salaam region, the others being Ilala and Temeke. Kinondoni municipality lies in the North-East of Dar-es-Salaam. A presentation of the area is given in Figure 2. To the East is the Indian Ocean, and to the South is Ilala municipality, while to the North is Bagamoyo district, to the South-East Kibaha district and to the South-West Kisarawe district. The size of Kinondoni municipality is 531km² (square kilometres), covering both rural and urban areas.

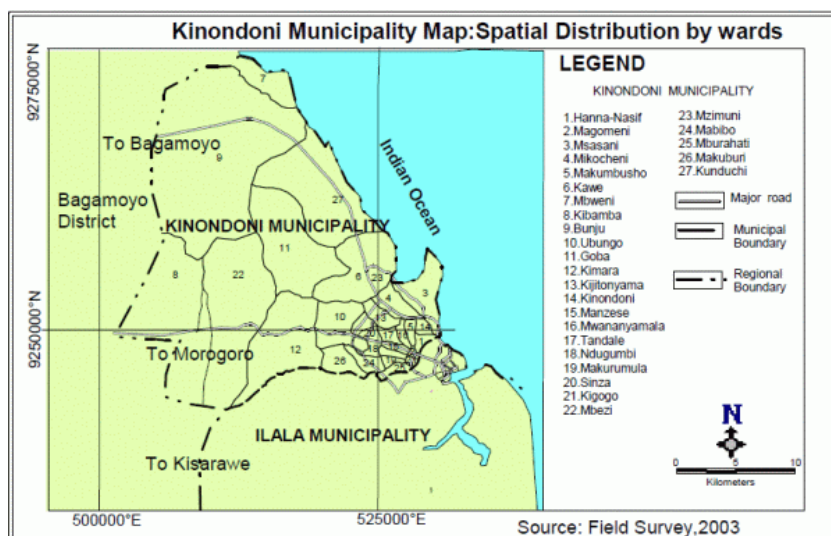


Figure 2. Geographical location of Kinondoni Municipality. Source: Field Survey 2003. (downloaded from www.google.com).

The administrative structure of Dar-es-Salaam is presented in Figure 3, focusing on Kinondoni Municipality. The municipalities consist of a number of divisions, and each division has a number of wards. The wards are further divided into sub-wards comprising villages in rural areas and “mitaa” or streets in urban areas. Wards and sub-wards are political and administrative areas. The villages and streets are then divided into hamlets (“vitongoji” in Kiswahili), the smallest administrative units according to the Local Government Act No. 8 of 1982.

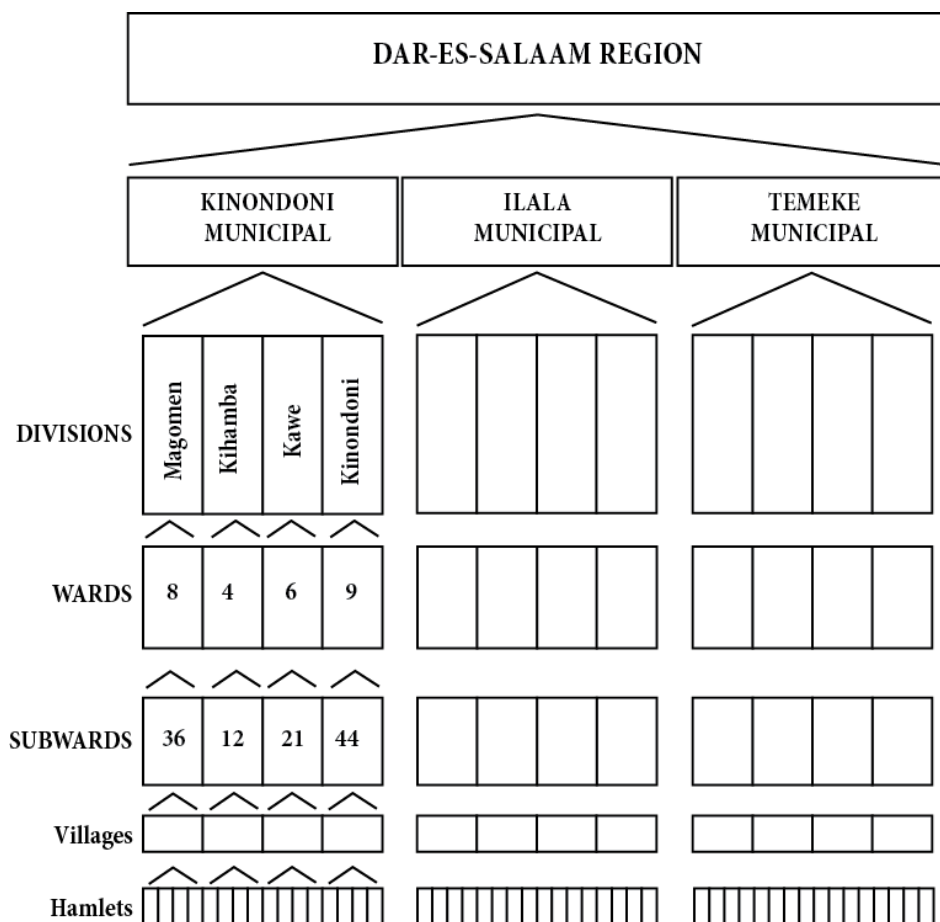


Figure 3. Administrative structure of Dar-es-Salaam region

Specific demographic data for the municipalities in Dar-es-Salaam is presented in Table 5. Kinondoni municipality is divided into 4 divisions, which include 27 wards. One of them is Manzese, where this study was conducted. There are 14 villages and 113 “Mitaa” in Kinondoni municipality. The villages are further divided into 14 hamlets (Vitongoji). (URT, 2002).

Among the 27 wards in Kinondoni, there were four wards with a population above 66 800 persons according to the Field Survey of 2003. One of these was Manzese, the ward chosen for the study. Manzese was also one of the wards in Kinondoni municipality which filled the criterion of urban wards with large population records (Mlozi, 2008; Mwamfupe & Fute, 2005; Mnenwa & Maliti, 2005).

Table 5. Demographic information of municipalities of Dar-es-Salaam

Municipality	Division	Ward	Sub ward	Villages	Hamlets	Popula- tion (2002 census) (.000)	Projected pop- ulation	
							2010 (.000)	2025 (.000)
Kinondoni	4	27	113	14	14	1.1	1.1	1.3
Ilala	3	22	65	9	37	.638	.722	.783
Temeke	4	24	97	15	62	.772	.871	.929

Source: URT Census 2002 and National Bureau of Statistics (NBS), 2003

Kinondoni was chosen as the study is based on the fact that it was then regarded as one of the municipalities with the lowest socioeconomic status in Dar-es-Salaam. The following paragraphs reveal the basis for the choice.

Different parameters are used to define the socioeconomic status of a community. In Tanzania, poverty is defined as “a state of deprivation, prohibitive of a decent human life” (URT, 1999). Tanzania uses two kinds of poverty criteria in defining socioeconomic status of the people: the food poverty line and basic needs poverty line (URT, 2003). The food poverty line refers to the cost for a packet of food to provide 2,200 calories per day required for a normal human diet, and the basic needs poverty line refers to the income needed for basic non-food items (URT, 2003). According to the report from the Household Budget Survey 2000/1, Tanzania had 19% of its people living below the food poverty line, while 36% were found to be living below the basic needs poverty line (URT, 2003). These figures reflect people’s income level and life in regions, districts and municipalities all over the country.

In this study household survey data, poverty data, etc. are used to describe the socioeconomic status of the study area, Kinondoni. Of the three municipalities in

Dar-es-Salaam, Kinondoni was ranked as having the lowest economic status. The figures are based on the 2002 population census and income household survey data (URT, 2002). About 18% of the people in Kinondoni lived below the basic poverty line, the corresponding figures for Temeke and Ilala are 13% and 7.5% (Poverty and Human Development Report 2005). The report cited provides key information about poverty levels and trends in Tanzania in relation to the millennium goals, the Poverty Reduction Strategy, and the National Strategy for Growth and Reduction of Poverty (NSGRP).

In terms of people's income, the major means of income of most people in Kinondoni is through self-employment in the informal sector. The people in Kinondoni earn their living through shops, guest houses selling local beer, food, fruits, bars, music shops, agricultural produce like vegetables fruits, corns, and fish and livestock. About 95% of the total population in the municipality is engaged in those activities and only 5% are engaged in the public sector. People employed in both the private and public sectors account for only 33.1% of the population (URT, 2003).

Population density, wealth and quality of housing are other criteria used for determining the socio economic status of a place. The denser the area, the more critical is the provision of basic services (URT, 2002). Of the three municipalities, Kinondoni had the highest population (Table 5) and the highest birth rate (4.3%). The birth rate in Ilala was 4.2%, and in Temeke 4.0% (URT, 2002). The economic status of a place is also determined by the kind of houses people live in. The presence of wooden houses is an indicator of poor socioeconomic condition (URT, 2002). Manzese in Kinondoni, where the study was carried out, had big percentage of houses made of wood, and plastered with mud compared to other places in the urban areas in Dar-es-Salaam (Mbonile & Kivelia, 2008)

3.2.2 School context

The school context of the study is described in this chapter. The status of primary education in Kinondoni is presented: the schools, enrolment rates and the school infrastructure. It is important to have a clear picture of the school enrolment and facilities because they have a direct impact on teaching and learning quality. In 2009, Kinondoni municipality had 137 public and 81 private primary schools, and in addition 124 public pre-primary schools (Kinondoni municipality, 2010). The enrolment in public schools was close to 23,500 pupils, with 49% boys and 51% girls. The enrolment has been constantly growing during the last 10 years and in 2010 the enrolment was 99%.

Two schools from Manzese ward were selected for the study. Manzese is located 10 kilometers from the city center in an unplanned area of the Dar-es-Salaam city. At the time of the study, Manzese ward had four public primary schools, of which Manzese and Ukombozi were selected. The selection of these schools was done for two reasons: firstly, the two schools are situated in the area of Kinondoni, with the lowest income level in 2007 (according to the Poverty Alleviation Strategy Report), thus representing a low socioeconomic area (Kinondini District, 2007; Mtani, 2002; USAID/ Tanzania, 2008). Secondly, these schools were the only ones which were situated close to each other, which was a prerequisite for successful practical arrangements of the study. The researcher, having the responsibility for the intervention process, had to move from one school to another within a short time between the lessons.

As presented in earlier sections, the general situation in the country is that many schools have enrolled large numbers of children during implementation of the Primary Education Development Programme (PEDP). As a consequence, there are large classes and a shortage of facilities (URT, 2004; Hakielimu, 2005). The quality of teaching and learning, including the learning of literacy skills, has deteriorated drastically (Rajani and Sumra, 2003; Galabawa, 2004; Abagi and Sifuna, 2006; Carlitz, 2009).

In the selected schools, there were 674 children enrolled in grade one, with more boys than girls in Manzese, with the situation being the opposite in Ukombozi (Table 6). About 99% of the school-aged children belonging to the area of these schools were enrolled at the time of the study. In Tanzania, most children are enrolled in schools near to their place of residence (URT, 2002), although this is not always the case. In Dar-es-Salaam city centre for instance, children are forced to move far away from their homes for schooling due to the large population and scarcity of classrooms and sometimes have to search for quality schools (Rugemarila, 2002; Sumra, 2004). But for Manzese and Ukombozi primary schools about 96% of children enrolled in grade one in January 2008 came from the nearby area. Only 4% of the pupils were from outside Manzese ward.

Table 6. School enrolment, Manzese and Ukombozi

School	Grade one enrolment			Total enrolment
	Girls	Boys	Total	I-VII
Manzese	172	186	358	2029
Ukombozi	169	147	316	2032
Total	341	333	674	4061

Source: Kinondoni Municipal Education Office, 2008

The situation with large classes and shortage of facilities in the country was also experienced in schools in Kinondoni in general and in the study schools. The availability and quality of school buildings and teaching material were issues of concern and so also were the availability of qualified teachers. Other issues of concern were clean water and toilets. When pupils sometimes have to line up for a single toilet or leave school and travel for a number of kilometers searching for water to drink, they waste plenty of time and they may not return to class on time.

The problems with facilities in the schools in Kinondoni at the time of the study were obvious. Kinondoni municipality experienced, according to data from 2010, an acute shortage of most of the essential facilities that are needed for a good teaching and learning environment (Table 7). There was a shortage of e.g. classrooms (36%), of latrines for girls (80%) and boys (79%) and of desks (60%), as well as of teacher houses (96%). Desks are important when learning to read and write. The pupil/desk ratio was 6:1 for Manzese and Ukombozi primary schools. For instance, Manzese had a shortage of 20 classrooms. The condition of teacher houses in Kinondoni is alarming. Decent residence for teachers is an important condition for effective teaching and learning. There was a deficit of clean water in 74% of the schools. There was also an alarming shortage of books. In Manzese and Ukombozi the pupil book ratio was 5:1. This figure included elementary books for literacy learning such as Kiswahili letter alphabets. (Kinondoni Municipal Education Office, 2010).

The shortage of desks and substandard furniture of the classrooms may make parents reluctant to allow their children to go to school. Also, when the schools are located far from their homes, the children have to walk long distances. School attendance and hence the learning spirit of the pupils is likely to be affected.

Table 7. School infrastructure, Kinondoni

Type of item	Requirement	Available	% in terms of deficit
Classrooms	2970	1904	36
Teachers houses	4266	160	96
Latrines. boys	3248	675	79
Latrines: girls	3980	777	80
Desks	64032	25632	60
Water tanks	3380	72	74

Source: Kinondoni Municipal Education Office, 2010

The school inspector's annual report from 2008 reveals an overall school attendance of 75%, indicating high drop-out rates. The transition rates were also low. The two schools showed that the percentage of children entering secondary education after the Primary School Leaving Examination (PSLE) in 2008 was only 36% for Manzese and 34% for Ukombozi. There was also an alarming situation with the grade four examination results. Only about 60% passed the exams, even though the criteria set by the Ministry of Education and Vocational Training seem low. A candidate has to obtain 15% in each tested subject to be considered to have reached the pass mark. The subjects examined were Mathematics, English Kiswahili, Geography, Science and History (URT, 2008).

The inspectorate also delivers a summary report using the following criteria: academic performance, infrastructure, and availability of teaching and learning materials, enrolment and access, equity, leadership and school playgrounds. According to this report, Manzese and Ukombozi were rated as having an average performance of only 50%.

From the above it can be summarized that the context of the study is two schools situated in a low socioeconomic area outside the centre of Dar-es-Salaam. The schools have large classes and many problems with different kinds of facilities. The following chapter brings us to a description of the empirical study undertaken in the described context.

3.3 Research design

The aim of the study was to create and evaluate an intervention programme for children who are at risk of reading and writing difficulties. The research design of the study is presented in this chapter. The impact of an intensive reading and

writing programme was studied in a randomized experiment by analyzing differences in performance changes between experimental and control groups. The study included pre-tests, post-tests and follow-up tests for all the research groups. The design of the study is presented in Table 8.

The study included two major phases: the identification phase and intervention phase (Figure 4). The identification phase involved screening and identifying children at risk of developing reading and writing difficulties. A total of 301 grade one children participated in this phase. Phase two was the intervention phase. The experimental group participated in an intensive literacy training programme, while the control groups had parallel mathematics and arts programmes. Both the identification and intervention processes were based on dynamic assessment with a group approach. The main interest in the study was the effect of the created intervention programme on phonological awareness (including letter knowledge, letter-sound knowledge and phonological tasks), reading (including word and sentence reading) and writing (including word and sentence writing). Transfer effects on achievement in school subjects were also analyzed.

Table 8. Design of the study

Research groups	Pre- test	Intervention	Post-test	Follow-up
Experimental	R01	X1	01	01
Control 1	R01	X2	01	01
Control 2	R01	X3	01	01

R= random assignment to three groups; 01= pre-test and the same post-test and follow-up test; X1= intervention reading and writing programme; X2 and X3= parallel programme (math for control 1, and art work for control 2)

The whole research process is described in Figure 4 and in detail in the following sections. The first phase was the identification phase, which began with a fast check of the children's (N = 301) literacy skills (one day), followed by teaching sessions (three days) and ending with an assessment (two days) of the skills. Based on this assessment the at-risk group (N = 96) was chosen. For this group the received assessment scores were inserted as pre-test scores for the intervention phase. The intervention, which included teaching and mediation, lasted five weeks. After that a post-test was performed (two days). Five months later there was a follow-up (two days).

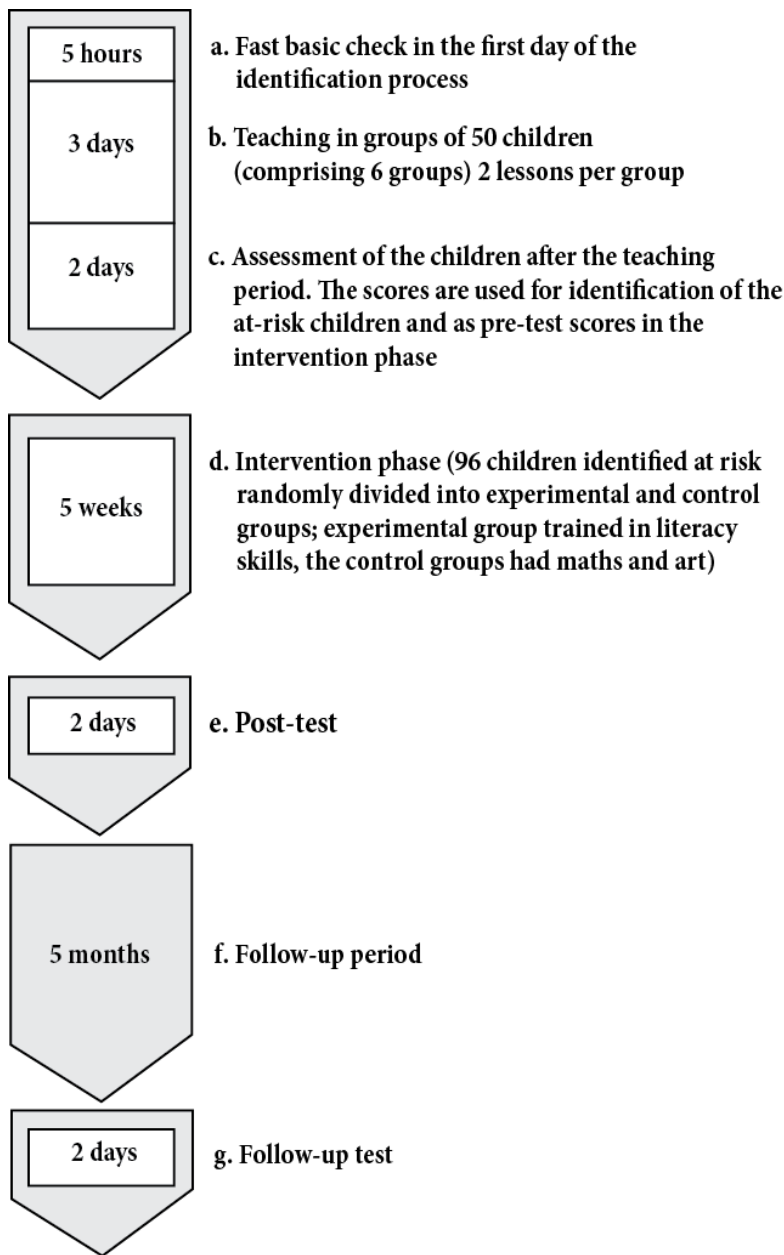


Figure 4. Identification and intervention model

3.4 The identification phase

The identification of the pupils of the target group for the intervention is presented in this chapter. The participants, methods and procedures are described, as well as the analysis and finally the identified sample. The method used was dynamic assessment.

3.4.1 Participants

The participants in this study were grade one pupils from Manzese and Ukombozi primary schools from Kinondoni municipality in Dar-es-Salaam, Tanzania. The selection process leading to identification of the children at risk of reading and writing difficulties and the creation of the experimental and the control groups is described in Figure 5.

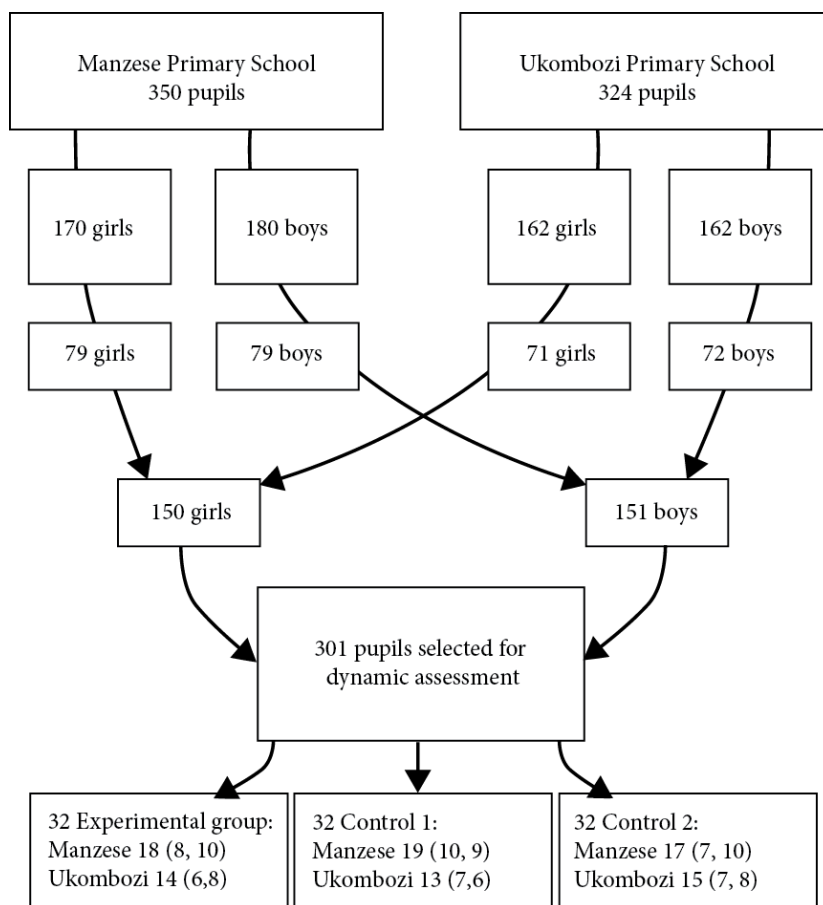


Figure 5. Selection and identification process

The schools had 674 grade one pupils, out of which a stratified sample of 300 children based on school and gender was created. One extra child slipped into the group and increased the number to 301. Due to the difference in size of the schools five percent more children were selected from Manzese than from Ukombozi. The randomization process was conducted in the following way: pieces of paper were prepared and put in 4 boxes, 2 in each school, one for the girls and the other for the boys. A random sample was taken based on the four groups (79 girls and 79 boys in Manzese, and 71 girls and 72 boys in Ukombozi). Each pupil was asked to take one paper. 300 had been marked “NDIYO” (YES) and 374 “HAPANA” (NO). The “NDIYO” papers indicated that the pupil had been selected to participate in the study, and “HAPANA” meant the opposite.

After taking the paper the pupil opened it and showed it to the instructor, who then told him/her where to sit. The pupils with “NDIYO” papers were asked to remain in the room and the others were assigned activities in their classes. A check-list for identification of the selected children was used. The randomly selected group included 150 girls and 151 boys, 158 pupils from Manzese and 143 pupils from Ukombozi (Figure5). The 301 selected children participated in the identification process, where dynamic assessment with a group approach was used. As a result of the process, which is described below, 96 children were identified to be at risk of reading and writing difficulties. These 96 children were then randomized to experimental and control groups.

3.4.2 Approach and instrument

Dynamic assessment based on the principles of Feuerstein (pre-test, mediation, post-test) was used in the identification process (Feuerstein, 1980; Feuerstein, Rand & Hoffman, 1979). A group approach was developed and every lesson included mediation in the teaching process. The reason for choosing dynamic assessment instead of a traditional assessment approach was to minimize the risk of identifying children with a background of low level of literacy stimulation.

Most schools in Tanzania have large class sizes. As described in the sections above, this is also the situation in the studied area, Kinondoni. Approaches focusing on individual children are thus problematic to apply. In the dynamic assessment the content and the principles from the Basic Skill Assessment Tool (BASAT) was used. BASAT was developed by Ketonen and Mulenga (2003) for assessing literacy skills in grade one and two in Zambia. It has been used for identification of children at risk of difficulties in literacy skills and as a basis for intervention.

BASAT is based on components which according to central research in the field are strong predictors of reading and writing difficulties. The components in the test are alphabetic knowledge, phonological processing, digit span, reading ability and comprehension and writing ability. The reliability of the tool was analyzed in a study with 557 children (Matafali, 2010). The reliability (Cronbach's alpha) was high for almost all components (alphabetic knowledge .91, phonological processing .76, reading ability .95, reading comprehension .86 and writing ability .94). For digit span the reliability score was lower (.57). BASAT has also successfully been used in another study (Mubanga, 2010) in Zambia in grade three (N = 106). In both studies the test was adapted to local regular languages.

In the present study the test battery consisted of seven of the original components from BASAT. The components were letter knowledge, letter-sound knowledge, phonological tasks (initial sound identification, syllable counting, phoneme blending), word and sentence reading and word and sentence writing. Omitted components were reading comprehension due to insufficient reading ability for the task and digit span due to the complexity of the task, as assessed by the teachers of the children. The children had only been three weeks in school at the time of the assessment. A Kiswahili version of BASAT was created based on the content from the grade one Kiswahili curriculum in Tanzanian primary schools (URT, 2005). The instrument was thus built on the principles of BASAT but contextualized to Tanzania and Kiswahili.

The created instrument was tested by teachers teaching literacy skills in classes from two primary schools in Dar-es-Salaam for content and context appropriateness and adaptability for grade one Kiswahili-speaking children. The given comments were noted. After this procedure the instrument was regarded as being appropriate for the context of the study.

The scales, tasks and scoring are presented in Table 9. A detailed description of the instrument and the assessment procedures is presented below.

Table 9. Scales components in the assessment

Scales components used in the programme	Testing	Maximum score
Letter knowledge	Naming letters	24 points
Letter-sound knowledge	Producing a word from sounds	24 points
Phonological tasks	Identifying the initial sound in a word	2 points
	Blending phonemes	2 points
	Counting syllables in a word	2 points
Word reading	Reading two-word syllables, three-word syllables and five-word syllables	8 points
Sentence reading	Reading a two-word sentence, three-word sentence, four-word sentence and five-word sentence	8 points
Word writing	Writing a two-word syllable, three-word syllable and five-word syllable	8 points
Sentence writing	Writing a two-word sentence, three-word sentence, four-word sentence and five-word sentence	8 points

3.4.3 Procedures

Basic check

The identification phase commenced by organizing all the 301 children in lines of girls and boys for individual fast basic checking of their knowledge of some elementary literacy skills in their first day of the programme. The names of the children had not yet been recorded at the time this basic check was performed. The idea was to get a rough picture of the children’s literacy skill level as a basis for planning and starting the teaching sessions. Four teachers assisted the researcher in organizing the children in lines for checking the skills. The researcher showed five letters on templates and three words on Manila papers individually to the children, alternating between girls and boys. Fast answers and fast reading was required. One of the teachers stood nearby and counted and

recorded the number of identified letters and read words for every child. The exercise took about one minute per child, all in all five 5 hours during the first day of the identification phase. Based on the checking it was found nearly 60% could not name any of five letters shown and only a few could name the related letter-sound. Over 90% could not fast read any of the five two-syllable words shown.

Teaching/mediation

After the basic check the teaching/mediation phase of the dynamic assessment process began by first organizing the children into groups. The 301 children were divided into six groups of 50 children. A map of the classroom is presented in Figure 6. Three groups were trained in Manzese primary school and the other three groups in the nearby Ukombozi primary school. The first day of the project started with general instruction about the project and detailed instruction about the process to each group of 50 children in the classroom at the disposal of the project. After the instruction, pupils were told to disperse into small groups of 12-14 pupils, making sure that each group included girls and boys. For easy management of the groups, every group was identified by a name that they had chosen, for example “Tembo” (elephant), “Simba” (lion), “Chui” (leopard), and “Farasi” (horse).

The programme was performed in terms of lessons. One lesson consisted of, e.g. 5 letters, 5 letter-sounds, 3 initial sounds, 2 phoneme blending and syllable counting items and 3 words and sentences for reading and writing divided in 3-4 sets of items and lasted for 40 minutes. Every group participated in two lessons. The lessons were organized during three days. The dynamic teaching/mediation was carried out in the following way: the instructor first checked the prior knowledge of the first set of items, by asking the children to identify and name, e.g. some letters from the templates and read some words. Following this, the instructor taught the whole group of 50 children on the content of the first set of items. Then the instructor moved to the first small group to mediate when needed. Before the instructor moved to the next small group for mediation, he gave a task of the following set of items to the group left to do work on their own. Thus, the children had a meaningful activity to perform while the instructor focused on the following group. The time spent on teaching one set of items for the whole group of 50 was about 10 minutes, with an approximately 2-3 minutes of mediation for each small group.

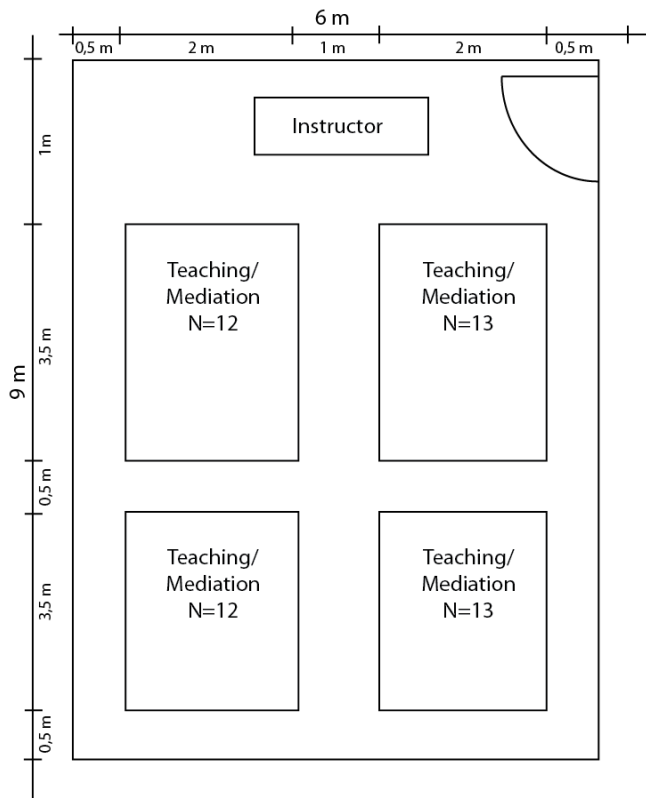


Figure 6. Map of the dynamic assessment classroom with 50 children

Assessment

The assessment was administered over two days after the training in the following manner: the testing was performed in the class with 50 children organized in small groups of 14-15 children. The testing session consisted of oral tests and written tests. Oral tests were performed in small groups of 15 children during one lesson (45 minutes). Written tests were performed in large groups of 50 children (10 minutes).

The organization was as follows: Instruction was given to the whole group of 50 children. The first group of 15 children was called based on a check list and asked to remain in the classroom for individual testing. The other children went out waiting for their turn. After the first group had been tested the following group was called and the assessment went on. After finishing the individual assessment of the children in the three groups of 15 children, the whole class of 50 children was assessed on word and sentence writing. The writing was assessed in groups by dictation. Extra desks were added in the classroom in order to provide enough space for the children to do the tests independently. A

detailed description of the procedure and the time schedule is presented in Appendix 2.

The testing procedure started with the oral tests (letter knowledge, letter-sound correspondence and phonological tasks and reading). In the individual oral testing the child in focus was standing close to the assessor, who by using small letter- and word templates (and hiding them from the other children with the hand) asked the child to identify a range of letters, to count syllables, read words, etc. In the oral tests the child gave the answer using a low voice. Even if the other children happened to hear the answer, they could not see the letter or word which the assessor was pointing and thus they could not know what was asked. Care was taken so that the testing was really individual and that the answer of one child could not influence the testing of the other children. After having tested one child on one component the assessor moved to the next child in the group until all the 15 children were assessed. Then the assessor proceeded with the next component.

Four teachers were present in the class for overseeing and collecting scripts in the writing assessment. The scoring of the items was one for correct answer and zero for incorrect answer in all the scales. When necessary a pupil was given half a minute to try before scoring. Presented below is the description of the scales.

Letter knowledge. The child was shown the 24 Kiswahili letters with upper case on a small template and asked to name them. The assessor pointed to all the letters randomly. The scoring was one point for every correctly named letter and the maximum score was 24 points. A check list was used to record the performance of each pupil. The internal consistency reliability of this scale was $r = .875$ (Cronbach's alpha).

Letter-sound. Letter-sound correspondence was tested in connection with letter knowledge. After naming the letters the children were asked to produce the sound of the letter. The scoring followed the procedure for letter knowledge. The internal consistency reliability of this measure was $r = .819$ (Cronbach's alpha).

Phonological tasks. Phonological tasks comprised three subtests: *initial sound identification*, *syllable counting* and *phoneme blending*. In assessing identification of *initial sound*, the instructor said a word twice and asked the child to give the initial sound of the word. A maximum of 2 points were given. *Syllable counting* was tested by a simple counting of the number of syllables of a given word. A maximum of 2 points was granted for this item. *Phoneme blending* required the pupil to combine sounds heard from the instructor to form a word. The instructor sounded out phonemes while the pupils listened and

produced words immediately from the sounds heard. A maximum of 2 points was given. The testing time for the three phonological tasks was 15 minutes. The maximum score was 6 points. The internal consistency reliability of this measure was $r = .703$ (Cronbach's alpha).

Word reading. Eight words of different length were presented to each child. The child was asked to read two words of each of the following categories: two-syllable word, three-syllable word, and so on up to five-syllable word. The following words are examples from the words used: *mama* (two-syllable), *maua* (three-syllable) and *barabarani* (five-syllable). The maximum score was 8. The reading time for this component was 7-8 minutes. The internal consistency reliability of this measure was $r = .709$ (Cronbach's alpha).

Sentence reading. The sentence reading test comprised 8 sentences (4 short and 4 long sentences) and the testing time was 7-8 minutes. The total score for the scale was 8. In assessing sentence reading the procedure was the same as it was in reading words. The internal consistency reliability of this measure was $r = .706$ (Cronbach's alpha).

Word writing. Word writing was tested by dictation in large groups of 50 children. The words were of different length from two-syllable words to five-syllable words. During the assessment the pupils were placed far apart from each other. Some extra desks were requested to enable each pupil to sit while writing. The time spent on this task was 5-6 minutes. The maximum score was 8. The internal consistency reliability of this measure was $r = .712$ (Cronbach's alpha).

Sentence writing. The pupils were asked to write eight sentences of increasing difficulty: from two-word to five-word sentences. In this test, as in word reading, the pupils remained in their large groups. The time spent on the task was 10 minutes. The maximum score was 8 points. The internal consistency reliability of this measure was $r = .717$ (Cronbach's alpha).

Outcomes

The dynamic assessment yielded considerable improvement compared to the initial basic fast check in that all children could name at least six letters and 24% could name 20 letters. Before the teaching/mediation process, in the fast basic check most children had very elementary literacy skills. The checking revealed that 60% could not name any of five letters shown and only a few could name the related letter-sound. Letter-sound identification was still difficult for most of the children. Word reading had improved, in that 15% could read at least one word and 37% could read at least five words, while in the basic check less than 10% could read one word. It can be concluded that two sessions of intensive

teaching/mediation yielded positive outcomes. It can be assumed that at least some of the children with very low literacy skills learned some literacy basics during the dynamic assessment and that they thus were not wrongly regarded as being at-risk.

3.4.4 Identification of children at-risk

A sum score was counted based on the seven scales. The distribution is presented in Figure 7. The scores varied between 0 and 86. The mean score was 50.38 and the standard deviation 12.84.

In order to identify the group of at-risk children a sum score was counted from the recordings in the different scales of the assessment battery in the post-assessment. Based on the distribution of the sum score, a cut-off point was set below a peak and corresponding to the mean, with the consequence of obtaining a 32% risk sample (96 children out of the 301, Table 10, Figure 7). The children in this group were regarded as still having difficulties in the various literacy skills tested and were chosen to form the risk group to be included in the intervention process.

A comparison between the at-risk group and the not at-risk group is presented in Table 10. The risk group scored significantly lower than the rest of the group on all measures. For example, the children in the risk group could on average name only half as many letters as the other children. The variation in both groups was large. It was evident that the knowledge of letters and letter-sound correspondence affected the reading and writing components, and thus they were critical factors affecting the distribution of the sum score and the cut-off point. The risk group can be regarded to be large compared to risk groups in other studies. However, considering the context of the sample and the risk of drop-outs during the intervention phase, a large risk sample was regarded to be important. The difference in the mean scores of the scales is significant. Differences are noted especially in letter knowledge and in the total score. The standard deviations are overall rather small, but larger in the non-risk group than in the at-risk group.

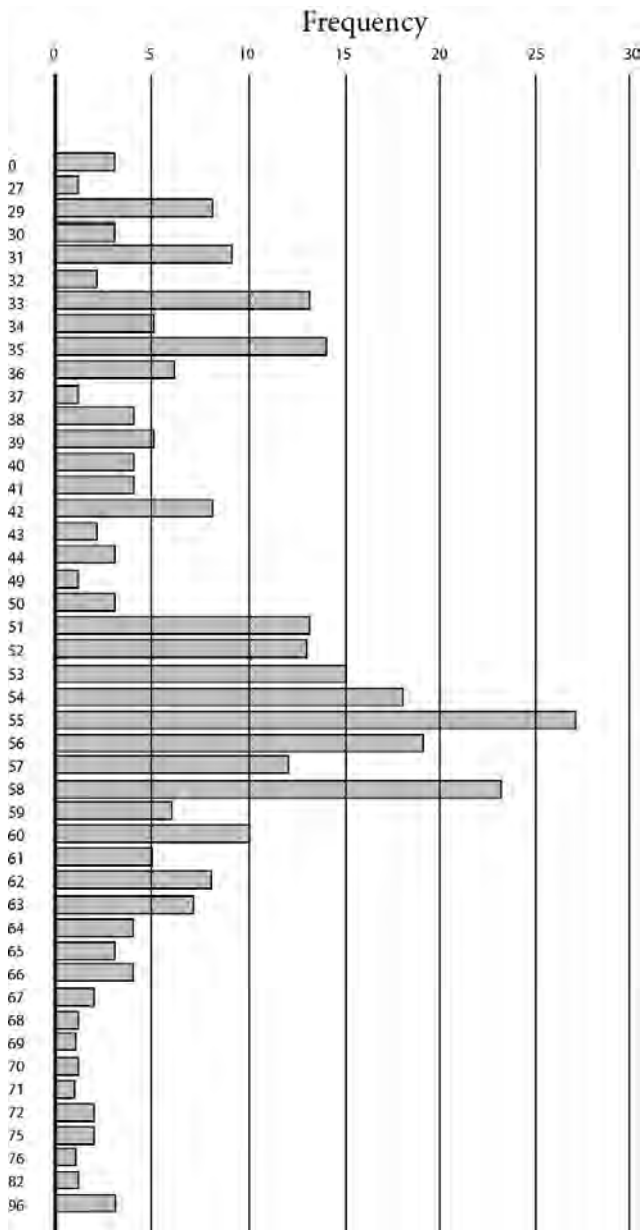


Figure 7. Distribution of dynamic assessment scores

Table 10. Mean and standard deviation of the at-risk and not-at risk children in assessment

Scale	At-risk (96)		Not at-risk (250)	
	Mean	SD	Mean	SD
Letter knowledge	10.00	2.81	20.72	4.08
Letter-sound knowledge	8.50	2.69	11.77	4.59
Phonological tasks	3.10	0.89	5.63	0.52
Word Reading	3.57	0.95	5.75	1.37
Sentence reading	3.32	0.94	5.17	1.31
Word writing	3.13	0.86	4.74	1.37
Sentence writing	2.83	0.83	4.04	1.75
Total	34.46	7.69	57.83	6.32

3.5 The intervention phase

3.5.1 The research group

Based on the identification phase and the 32% cut-off point of the sum score of the scales included in the reading and writing test, 96 children (46 girls, 50 boys) were regarded as being at risk of reading and writing difficulties. They were randomly assigned into one experimental group and two control groups.

The experimental group participated in an intensive intervention programme in reading and writing skills, while control group one had mathematics and control group two art work. The programme lasted for five weeks. There were no noticeable differences in participation rates between the groups.

A description of the research groups is presented in Table 11. In analyzing group differences Chi-square test was used. Significant differences are indicated. The majority, close to 70% of the children, were seven years old and 25% had reached the age of eight years. There were more children in the younger group in the experimental compared to the control groups ($p = .054$). No significant gender differences were found. However, the sample included more boys (52 %) than girls (48%).

Close to 80% of the families consisted of 3-6 persons, while 17% included 7-11 persons. Three families had up to 17 persons. No significant differences between the research groups were found. Almost 90% of the children lived with their father and mother and there were no differences between the groups. The experimental group had significantly more books compared to the control groups ($p = .02$). In 72% of the children's homes, no books were available and in 28% there were a few books. Almost 90% of the children spoke Kiswahili at home all the time and 10% sometimes. It can be summarized that the comparison of the research groups according to home environment revealed some differences in favour of the experimental group in family status, and the amount of persons and books in the homes, but not in the use of the language.

Of the children, 90% had attended nursery school. About 90% of the children had high school attendance rates (87-99 days), whereas 17% of the children had rather low rates (30-60 days). No significant differences between the research groups were noticed in these variables.

Table 11. Description of the research groups

Variable	Level	Experimental N= 32	Control 1 N= 32	Control 2 N=32	N=96
		%	%	%	%
Age 1)	6 years	-	3.0	6.3	3.0
	7 years	84.4	62.5	59.4	69.0
	8 years	12.5	28.0	34.4	25.0
	9 years	3.0	6.3	-	3.0
Gender	male	56.3	47.9	53.0	52.0
	female	43.8	53.0	47.9	47.9
Attended nursery school	yes	90.6	84.4	93.8	90.0
Repeated grade one	yes	9.4	21.9	3.0	12.0
Person in the home	3-6	75.0	84.4	78.0	79.0
	7-10	15.3	15.3	18.8	17.0
	11-17	9.4		3.0	4.0
School attendance	30-60 days	18.8	18.8	12.5	17.0
	61-86 days	28.0	25.0	18.8	24.0
	87-99 days	53.0	56.3	68.8	59.0
Books at home 2)	a few	43.8	28.0	12.5	28.0
	none	56.3	71.9	87.5	72.0
Family status	father and mother	90.6	87.5	87.5	89.0
	single parent	9.4	12.5	9.4	10.0
	guardian			3.0	1.0
Speaking Kiswahili at home	yes	87.5	90.6	87.5	89.0
	sometimes	12.5	9.4	9.4	10.0
	no			3.0	1.0
Performance in other subjects	very good	6.3	3.0		3.0
	good	47.9	53.0	40.0	47.0
	poor	47.9	43.8	59.4	50.0
Using vocabulary according to age level	yes	25.0	12.5	9.4	16.0
	sometimes	47.9	68.8	71.9	63.0
	no	28.0	18.8	18.8	22.0

1) Age groups combined: 6-7 and 8-9. $\chi^2 = 3.710, p = .05$

2) $\chi^2 = 5.80, p = .02$

3.5.2 Dynamic intervention

During the training sessions the experimental group was divided into two groups. One group had 18 children (8 girls, 10 boys) and was placed in Manzese. The second group had 14 children (6 girls, 8 boys) and was placed in Ukombozi. It was the same for the control groups. Control group one had 19 children (10 girls, 9 boys) placed in Manzese, while control group two had 13 pupils (7 girls, 6 boys) placed in Ukombozi. For control group two, 17 pupils (10 girls, 7 boys) were placed in Manzese, and 15 pupils (8 girls, 7 boys) in Ukombozi.

The intervention programme was based on the findings from the screening phase. Pupils identified as having reading and writing difficulties had problems in nearly all the components tested: letter knowledge, letter-sound knowledge, phonological tasks, word reading, sentence reading, as well as word writing and sentence writing. A dynamic assessment approach was used in the training of the experimental group, based on Feuerstein's 1980 and Feuerstein, Rand & Hoffman's 1979 dynamic assessment model. The programme was similar to the programme in the identification phase. Pupils in the experimental group participated in 23 training lessons during five weeks. Each lesson lasted for 35-40 minutes. While the experimental group was training reading and writing skills, the control groups had Mathematics and Art in a separate room. But their performance was not included in the final analysis. Each lesson in the control group lasted for 35-40 minutes. The mediation method was not used in training the control groups. Upon completion of the intervention, a post-test was administered to all groups. The same tests used during the pre-test were also used in the post-tests and follow-up testing; they only differed in content. One important thing to note was that the schools had routines of tests and examinations monthly and after each term. The results were important to the programme because they were used for measuring validity and for analyzing the transfer effect on school marks of the programme.

Setup of the training classroom

It was important to have a clear set up in the classroom for the training sessions. Figure 8 illustrates the set-up of the training classroom for the experimental group. One intervention class had 18 pupils and the other 14. Within one classroom, small groups of 5-6 pupils were formed (see sketch map). The intervention programme did not interfere with the school timetable and was given the required time by the school administration.

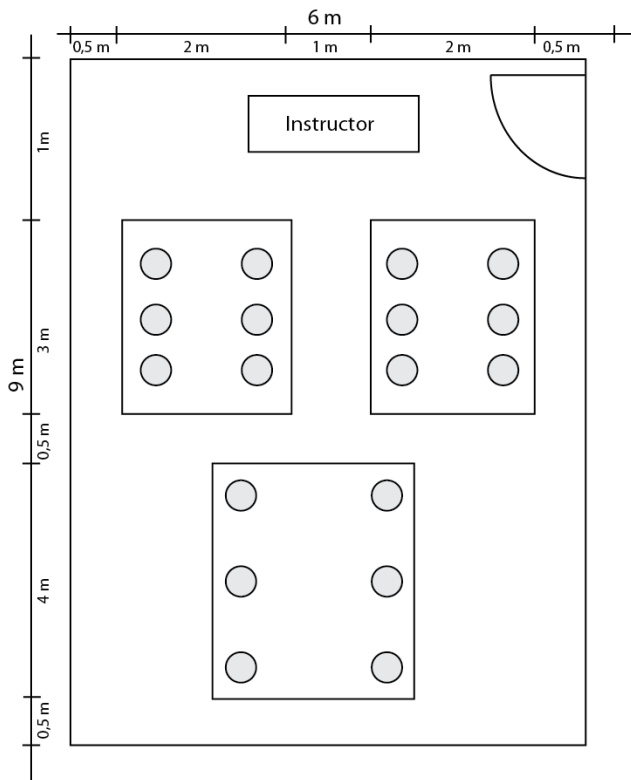


Figure 8. Sketch map of the intervention classroom set up

Key: Groups ◊ ◊ ◊
 ◊ ◊ ◊

3.5.3 Content of the programme and training procedures

The content in the intervention programme can be traced to the stage models of literacy acquisition in beginning readers (Frith, 1986; Høien & Lundberg, 2000) and is based on the alphabetic principle. The programme focused on the phonological-alphabetic and orthographic stages of reading acquisition, combining training in phonological awareness with training of word and sentence reading and writing. Earlier studies have revealed that programmes combining teaching in phonological awareness with reading instruction are effective (e.g. Hatcher et al., 1994; Hatcher, Hulme & Snowling, 2004).

The programme included phonological awareness and reading and writing training according to the content in BASAT (Ketonen & Mulenga, 2003). Letter and letter-sound knowledge and phonological tasks were central components of the programme. These components are known to be strong predictors of reading

ability (Wagner, 1988; Share, Jorm, Maclean, & Matthews 1984; Bradley & Bryant 1985; Lundberg, Olofsson & Wall 1980). The other components were basic word and sentence reading and writing skills. These were also regarded to be predictors of later literacy skills. Word reading skill is an important predictor of later writing skill (Bradley & Bryant 1985; Lundberg, Olofsson & Wall 1980).

In the reading process, word decoding skill is an important element and it is an essential component in learning to read in any language and particularly in regularly spelled languages (Holopainen, 2002; Lyytinen, Aro, Holopainen, Leiwo, Lyytinen & Tolvanen, 2003). It is well known (e.g. Aro, 2004) that word reading is crucial for reading comprehension.

The training procedures used in the intervention phases were very similar to those used in the dynamic identification phase, which is based on Feuerstein's (1980) model of dynamic approach at group level. In the intervention phase the training utilized three steps in every lesson: firstly, checking the prior knowledge of the pupils. Secondly, teaching with mediation, and, thirdly, post-assessment or end of lesson assessment. In the first step the pupils were required to apply their tacit knowledge to perform the given task. The second step was training with mediation. Mediation was used in the training to assist pupils in developing critical thinking and explore knowledge on their own. During the mediation process, the instructor applied various stimulating techniques such as cues, prompts and leading questions, demonstration and praise to enhance the thinking of the pupils.

The third step was aimed at providing feedback and reflection on the extent to which the pupils had benefited from the mediation. The training began with the most common letters, and sight words. The training of the letters involved visual representations in which letters were made from hard paper. Other supporting materials for the training included materials used in teaching beginning readers in primary schools in Tanzania are, e.g. class readers, letter templates, letter books and alphabet wall charts. Words were trained by combining syllables and the syllables were made from hard paper. Children placed the syllables together to form words of different length. The letters and words were taught systematically, making sure that the children mastered the easy ones before they learned the difficult ones, e.g. L, R, S, CH, and W. The words were also trained in the same way: children started with short words in terms of the number of syllables, e.g. ma, mama, and barabarani, etc. One lesson comprised e.g. 5 letters, 5 letter-sounds, 3 initial sounds, 3 syllable counting, 3 phoneme blending and 3 words and sentence reading and writing, which took 40 minutes.

All the 23 lessons were utilized effectively, training the literacy skills. Letter-sound correspondence was a difficult component for many children and was given much time in the training. The phonological tasks, which involved initial sound identification, syllable counting and phoneme blending, were given much time in the training. The chosen words were commonly used words. In training reading and writing the children were asked to read the given words and then to write them. In reading the focus was on decoding. In writing the idea was that the child should present in written form the words heard by dictation. Spelling skills were not the focus of the training. Presented below is a detailed description of the content and the way the dynamic lesson was conducted.

Letter knowledge: A large Manila paper with all 24 letters of the alphabet with upper case was attached on the blackboard. Training of letter knowledge was performed in the following way: first, the teacher checked the knowledge of the children by pointing randomly at the letters and asking for the name of the letters. The teacher alternated between directing the question to the whole class and individual children. After this checking, the teacher went on to the teaching/mediation phase. The teacher presented a sample of letters, the names and the form; first, the most common and easy letters and later on the more difficult and less common ones. The focus was also on particular letters which seemed to be problematic in the assessment phase, for example b, d, r, l, j, g, s, ch, w and y.

The teacher presented the letters and the whole group learned the names of the shown letters in chorus. The teacher pointed at the letters randomly and asked both the whole class and individual children to produce the names. Then the teacher moved into the small groups to mediate both the groups and the individuals. Before moving into the small groups the teacher gave tasks for the groups to do on their own; meanwhile he focused on the children in one group at a time. In the mediation process the teacher asked questions such as: “*Tell me the name of this letter*”. In the small groups the instructor asked the pupils to find the letters in the template and name them without singing.

If the children proceeded well they were given further exercises such as separating the letters into upper and lower case and separating them into vowels and consonants. Different kinds of stimulation to enhance thinking skills were used, e.g. increasing the time for answering and changing the number of questions, and giving clues, cues and praise after a correct answer. Besides mediating in the small groups, the teacher checked the tasks which the children had been given to do on their own. The checking was an evaluation and a feedback of what the children had learned during the lesson. The teacher used the information in planning the following lessons. Letter knowledge is a central

predictor of reading ability (e.g. Adams, 1990; Lyytinen, Erskine, Tolvanen, Torppa, Poikkeus & Lyytinen, 2006).

Letter-sound knowledge: The training of letter-sound correspondence followed the procedure described above. The following questions were directed to both to the whole class and to the individual pupils aiming at checking their knowledge. “Which letter goes with the following sound?”, and “Which sound goes with this letter?” In teaching and mediation the instructions focused much on correcting pronunciation of Kiswahili letter names and sounds because there is a tendency to add a vowel, e.g. “be” for “b”, “me” for “m”, “ke” for “k”, and so on. After the teaching the instructor checked the achieved knowledge by questions to the whole group and to individual pupils. Letter-sound correspondence is a central component of word recognition in general (Moats, 1999; Torgesen, 2002; Juel 1988) and also transparent languages, e.g. in Finnish (Lyytinen, Erskine, Tolvanen, Torppa, Poikkeus & Lyytinen, 2006).

Phonological tasks: The training of phonological skills included three components: initial sound identification, syllable counting and phoneme blending. After asking the pupils in groups and individually to listen carefully to some words repeated twice, they were asked to identify the *initial sound*, e.g. *redio (radio)*, “r”; *mvulana (boy)*, “m”. Initial sound is an example of one of the important components of phonological skills pointed out by many authors (e.g. Kaminski & Good, 1996). In syllable counting the pupils were asked to listen to one, two, three and four-syllable words and to count the syllables. The counting of syllables was by clapping, e.g. “ma”, one clap; “mama” two claps; and “shuleni” 3 claps. When focusing on individual pupils, the task was to mention the number of syllables in the word instead of clapping, which was used in focusing on the whole class. Syllable identification is an example of one of the important components of phonological skills pointed out by several authors (e.g. Mann & Liberman, 1982). Phoneme blending required the pupil to combine sounds heard from the instructor to form a word. The instructor sounded out phonemes and the pupils produced words immediately from the sounds heard, e.g. /k-/a/-k-/a/= “kaka”= brother, /m-/k-/a/-/t/e/ = “mkate”. The following kinds of questions were asked: “What word can you make of the following sounds: m/-/o/, /t-/o/; /mt-/ /i/”. “Please combine the following sounds /p-///p-/ /k-/ /t-/ /mb-/z/-/ with (o, i, u, e). What words do you get?”

Phoneme blending skill has been considered as one of the major components of phonological skill training (O’Connor, Jenkins, & Slocum, 1995).

Word reading: The pupils were asked to read words of increasing difficulty. The instructor first asked the groups and individuals to read aloud the printed words. The words were presented in an alternating manner to avoid memorization. In

the teaching and the mediation, the focus was on the correctness of the word reading. If the pupils failed to read the words correctly, the instructor helped them by leading statements such as “How did you pronounce this syllable in the last lesson?” If the word was made up of more than one syllable, the instructor separated the word into syllables and asked the pupils to identify the syllables, and then read the whole word. Word reading skill is an important predictor of writing skill (Berninger et al. 2002; Frith, 1986; Gough & Tunmer, 2008; Chall, 1983; Høien & Lundberg, 2000).

Sentence reading: The training of sentence reading was done as described above. After the instructor had distributed printed sentences to every group, they were asked to read aloud. The instructions were directed to both the groups and to individuals. The pupils read sentences of varying length, e.g. short: *mama anakula* (mother is eating), and long: *mama na baba wanakula* (mother and father are eating). Sentence reading is an important component in comprehension and in developing writing skill (Berninger et al. 2002).

Word writing: Word writing was based on dictation. The instructor started with two-syllable, then proceeded to three-syllable and up to five-syllable words. In the teaching and mediation the focus was on the correctness of writing. Attentive listening was required both of the whole class and of individuals. Also in the teaching/mediation, a part-whole technique was used in developing word writing skill, i.e. a word was presented first in syllables and then as a whole. Word writing skill is an important component in enhancing literacy skills (Berninger et al. 2002)

Sentence writing: Sentence writing was based on dictation and taught in the same way as word writing. The longest sentence included five words. The sentences were presented in an increasing length, e.g. a sentence with two words (e.g. *Mama anakula*) and three words (e.g. *mama anakula chakula*). Questions such as “how many words are there in sentence number one?” were directed to both the groups and to individual pupils

3.5.4 Post-assessment and follow-up

The post-assessment was performed during two days after finishing the training period of 23 days. The follow-up was performed after five weeks. In the post- and in the follow-up assessment the tests measured the same constructs as the tests in the pre-assessment, but with different content. In this phase there was no teaching or mediation. Pupils were required to perform the tasks, applying the knowledge and strategies learned during the training phase. The desks were placed so that there was enough space between the pupils during the assessment. The instructions for each test were given in large groups, but the tests were

individual. The procedures in administering the assessment were the same in all the groups (experimental and control groups). The description regarding each measure, e.g., time, amount of content, scoring system and the reliability of the scale are as indicated in the assessment procedure in the identification phase.

3.5.5 Data analysis

The analysis included descriptive statistics of all the variables, inter-correlations between the dependent variables in the pre-, post-and follow-up tests, and a principal component analysis with oblimin rotation as a basis for checking the internal consistency of the test battery (letter knowledge, letter-sound knowledge, phonological tasks, word reading and writing and sentence reading and writing) and for creating summary variables. Cronbach's alpha was used for indicating the reliability of the tests.

The main analysis for investigating the effect of intervention was repeated measures Anova. Mauchly's Test of Sphericity was used for checking violation of sphericity. If so, Greenhouse-Geisser corrections were used. The dependent variables used in the analysis were summary variables: phonological awareness, reading skills, writing skills and overall literacy skills. The school subjects Kiswahili and English were also used as dependent variables in the analysis due to the interest in analyzing whether there was a transfer effect of the intervention on the children's achievement in school. School marks given in regular assessments by the ordinary teachers were used. The independent variable in the analysis was group (experimental, control 1 and control 2). In addition, the effect of gender and school was controlled.

4 Results

4.1 Basic results related to the instrument

4.1.1 Reliability

The basic description of the test, including the reliability, is based on the results from the pre-test and presented in Table 12. Data of importance in analyzing the instrument is also given for the post- and follow-up test.

The scales included different amounts of items. Letter knowledge and letter-sound knowledge had 24 items, phonological awareness 6 items and all the other scales 8 items. The scoring of items followed the normal procedure (one for a correct and zero for an incorrect answer). The maximum score of the scales is thus equal to the number of items in the scale. The total maximum score is 86.

The scale mean for letter knowledge and letter-sound knowledge was on a 40% level of the maximum score (maximum score was 24 points). Most children managed to identify 8-10 letters and letter-sounds. The standard deviations indicate low dispersion of the scores in these scales. The performance was below the 50% level of the maximum score in most of the other scales. Sentence writing was found to be the most difficult task.

The reliability of all the scales in terms of Cronbach's alpha was satisfactory (.703-.875), showing good internal consistency. In all the scales the inter-correlations of the items were statistically significant ($p = < .05$). The reliability of the whole test was satisfactory based on Cronbach's alpha .780.

Table 12. Means, standard deviations and reliability of the scales and of the total test

Scale	Scale items, nr & max. score	Med	Mode	Mean	Standard deviation	Cronbach's alpha
Letter knowledge	24	10	8	9.81	0.84	.875
Letter-sound knowledge	24	8	8	8.69	0.75	.819
Phonological tasks	6	3	3	3.10	0.82	.703
Word reading	8	4	4	3.57	0.95	.709
Sentence reading	8	3	3	3.33	0.94	.706
Word writing	8	3	3	3.13	0.86	.712
Sentence writing	8	3	3	2.83	0.83	.717
Total test	86			34.46	7.69	.780

4.1.2 Creating summary variables

In order to obtain a basis for creating summary variables, and to analyze the inner dimensions of the test, a principal component analysis with Oblimin rotation of the seven scales was performed (Table 13 and 14). Two factors, explaining 75% of the total variance were found. The first factor included the reading and writing scales and explained 57% of the variance. The second factor explained 18% and included letter knowledge, letter-sound knowledge and phonological tasks. The factors correlate highly.

Table 13. Total variance explained, eigenvalues

Factors	Eigenvalue	% Variance	Cumulative
1	3.98	56.81	56.81
2	1.25	17.86	74.67
3	.644	9.21	83.87
4	.379	5.42	89.29
5	.377	5.38	94.67
6	.235	3.35	98.02
7	.138	1.98	100.00

Table 14: Pattern matrix and the structure matrix coefficients

Item	Pattern Coefficients		Structure Coefficients		Communalities
	Component 1	Component 2	Component 1	Components 2	
Sentence writing	.936	-.110	.933	.439	.746
Word writing	.925		.919	.456	.716
Sentence reading	.898		.885	.317	.546
Word reading	.545	.439	.745	.688	.708
Letter-sound		.865	.423	.863	.846
Letter knowledge		.846	.352	.845	.871
Phonological awareness		.744	.329	.739	.793

Based on the second component, a summary variable named phonological awareness was created. Reading and writing skills loaded highly on the first component and seemed to measure the same construct. The decision was, however, to create separate summary variables; one for reading and one for writing. The reason is based on the Tanzanian teaching curriculum. In the teaching curriculum in Tanzania, reading skills and writing skills are taught separately and thus it was regarded to be of interest to have these components separated in further analysis and in the presentation of the results in this study. Thus, three summary variables were created; phonological awareness, reading skills and writing skills. In addition a total summary variable was created and named overall literacy skills.

The inter-correlations of the seven scales and of the summary variables in the pre-test are presented in Table 15. The correlations between all the scales are significant ($p = < .01$). The inter-correlations for the phonological awareness scales (letter and letter-sound knowledge and phonological tasks) varied from .42 to .66 and the scales correlated significantly with sum score .60 to .91. Letter knowledge showed the strongest relationship with the sum score.

The correlation between the two scales measuring reading ability (word and sentence reading) was .68 and the correlation between these scales and their sum score was .87 for both scales. The correlation between the scales measuring writing skills (word and sentence writing) were even stronger (.77) than the former ones. The correlation with the sum score was .94.

Table 15. Inter-correlations of the scales and the summary variables in pre-test

Scale	1	2	3	4	5	6	7	8	9
1 preletkno									
2 pesoun	.661**								
3 prepho	.466**	.419**							
4 sumprePA	.909**	.896**	.603**						
5 preworid	.555**	.473**	.491**	.594**					
6 preserid	.411**	.388**	.289**	.447**	.680**				
7 sumpre Read	.528**	.471	.426**	.568**	.918**	.915**			
8 preworite	.388**	.395**	.313**	.442**	.620**	.838**	.795**		
9 preserite	.344**	.217*	.281**	.327**	.551**	.695**	.679**	.766**	
10 sumpre Write	.390**	.327**	.316**	.410**	.624**	.817**	.785**	.942**	.937**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

SumprePA= Summary of the phonological Awareness-related items at pre-test

SumpreRead=Summary of the Reading scales at pre-test

SumpreWrite=Summary of the Writing-related scales in the pre-test

Basic data about the summary variables are presented in the following. Inter correlations and the reliability of the summary variables, are shown in Table 16. The three summary variables in the pre-test correlated significantly ($P < .01$) ranging from .41 to .80. Cronbach's alpha varied from .76 to .87.

Table 16. Means, standard deviations, inter-correlations and reliability of the summary variables

Summary variable	Scales	Mean	SD	Cronbach's alpha	Summary variable	Correlations of summary variables	
sumprePA	3	21.60	5.60	.76	sumprePA		
sumpreRead	2	6.90	1.73	.81	sumpreRead	.568**	
sumpreWrite	2	5.96	1.60	.87	sumpreWrite	.410**	.795**

** Correlation is significant at the 0.01 level (2-tailed).

SumprePA = summary variable for pre-test phonological awareness,

sumpreRead = summary variable for pre-test reading:

sumpreWrite = summary variable for pre-test writing

Note: PA (letter knowledge, letter-sound knowledge and phonological tasks);

Read (word reading and sentence reading);

Write (word writing and sentence writing)

4.1.3 Inter-correlations in pre-, post- and follow-up tests

Inter-correlations of the scales and between the scales and the summary variables in the pre-test are presented above (Table 15). In this section the focus is firstly on the correlations in the post- test and in the follow-up test. Secondly the correlations between pre-, post- and follow-up measurements are analyzed based on the summary variables. The pattern of inter-correlations in the post- and follow-up tests is very similar to the pattern in the pre-test (Table 17 and 18). Most correlations are statistically significant ($P < .01$).

Regarding phonological awareness the inter-correlations of the three scales and the summary scale in the post-, and follow-up tests were high and statistically significant ($P < .01$). The inter-correlations of the scales varied between .36 and .64 in post-test and between .52 and .81 in the follow-up test.

In reading skills the pattern is similar to that of phonological awareness. The correlation between word- and sentence reading was .53 in the post-test and .50 in the follow-up. Between the scales and the summary variable the relationship was even stronger at both testing occasions ($r = .86 - .88$). Writing skills also

followed the described pattern. The correlation between writing words and sentences was .46 in the post- test and even higher, .60 in the follow-up. The correlations with the summary variable varied between .85 and .87 in the post-test and between .89 and .90 in the follow-up.

Table 17. Inter-correlations in post-test

	1	2	3	4	5	6	7	8	9
1.Post letter knowledge									
2.Post letter-sound knowledge	.643								
3.Post phon.tasks	.362	.384							
4.sumpostPA	.878	.924	.489						
5.Post word reading	.420	.475	.498	.527					
6.Post sentence reading	.521	.531	.382	.585	.533				
7.SumpostRead	.536	.573	.504	.633	.881	.870			
8.Post word writing	.458	.461	.369	.514	.523	.612	.647		
9.Post sentence writing	.278	.311	.274	.328	.334	.632	.548	.462	
10 SumpostWrite	.433	.455	.377	.498	.504	.727	.700	.865	.845

The correlations **.278** and **.274** are significant at the 0.05 level (2-tailed). All the other correlations are significant at the 0.01 level (2-tailed).

SumpostPA = Summary of the phonological awareness items at post-test
 SumpostRead = Summary of the reading items at post-test,
 SumpostWrite = Summary of the writing items at post-test

Table 18. Inter-correlations in the follow-up

Scale	1	2	3	4	5	6	7	8	9
1.Follow-up letter knowledge									
2.Follow-up letter-sound	.805								
3.Follow-up phonological tasks	.520	.536							
4.SumfolPA	.943	.951	.618						
5.Follow-up word reading	.363	.469	.569	.469					
6.Follow-up sentence reading	.314	.456	.385	.421	.494				
7.sumfolRead	.391	.535	.550	.514	.858	.871			
8.Follow-up word writing	.226	.310	.194	.287	.418	.550	.562		
9.Follow-up sentence writing	.296	.450	.360	.408	.504	.758	.733	.596	
10 SumfolWrite	.291	.422	.306	.386	.514	.727	.721	.902	.884

The correlation **.194** is not significant and **.226** is significant at the 0.05 level (2-tailed). All the other correlations are significant at the 0.01 level.

SumFolPA = Summary of the phonological awareness items at follow-up

SumFolRead = Summary of the reading items at follow-up

SumFolWrite = Summary of the writing items at follow-up.

Based on the analyses above it could be expected that the inter-correlations of the summary variables from the different measurement occasions should be high. This is also the situation (Table 19). All the inter-correlations are significant ($p < .01$). The inter-correlations between phonological awareness and reading and writing scales in the pre-test ranged from .41 to .79 and in the post-test from .102 to .70. In the follow-up the correlations were between .53 and .76.

Analysing the differences in the inter-correlation pattern between the pre-, post- and follow-up measures gives the following picture. In phonological awareness the correlation between pre- and post-test was .59 and between post-test and follow-up the correlation was even higher .79. For reading skills the comparable figures are .63 and .66 and for writing skills the figures are .10 and .72. All the correlations are significant ($< .01$), which is the case also for the correlations between the pre-tests and the post-tests.

Table 19. Inter-correlations between the summary variables in the pre-, post- and follow-up measurements

	1	2	3	4	5	6	7	8
1.sumprePA								
2.sumpreRead	.568**							
3.sumpreWrite	.410**	.785**						
4.sumpostPA	.479**	.087	.100					
5.sumpostRead	.247*	.384**	.402**	.633**				
6.sumpostWrite	.102	.259*	.529**	.498**	.700**			
7.sumfolPA	.408**	.207	.280*	.817**	.518**	.381**		
8.sumfolRead	.203	.505**	.585**	.437**	.786**	.665**	.514**	
9.sumfolWrite	.092	.355**	.561**	.348**	.633**	.758**	.386**	.721**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

4.2 Main results

This section presents the main results of the study. Firstly, a basic description of the results in the pre- post- and follow-up tests for the experimental and the control groups is presented for all the scales. Secondly, results from repeated measures ANOVA are presented for the three summary variables phonological awareness, reading and writing and for overall literacy skills. In addition, results for school achievement are presented with the aim of showing transfer effect. The estimated average change was analysed from pre- to post-test and from post-test to follow-up test. The overall effect of the intervention is viewed in terms of the change of the means of the three groups over the testing periods.

4.2.1 Basic description of the results in pre-, post- and follow-up tests

The basic description of the results in pre-, post- and follow-up tests is presented in Table 20. In the pre-test the average performance level was rather low, varying from 35 to 50% of the maximum score. The groups received on average about 10 points out of 24 in letter knowledge and letter-sound knowledge, and 3 points out of 6 in phonological tasks. In word and sentence reading and writing the scores were about 3 out of 8. Sentence writing was the most difficult task for the first graders in the pre-test. The post-test and the follow-up show increase of the scores in all scales. Ceiling effect can be noticed especially in the phonological awareness measures (letter and letter-sound knowledge and phonological tasks) in the post-test and the follow-up of the experiment group.

Table 20. Group means and standard deviations

Scales	Exp. group N=29-32		Control 1 N=25-32		Control 2 N=26-32		Total group	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
LeKn max 24								
Pre-test	10.25	2.14	9.50	3.59	9.69	2.65	9.81	2.84
Post-test	20.14	3.62	16.32	3.25	14.15	3.53	17.00	4.27
Follow-up	22.38	2.46	18.40	4.16	15.45	5.04	18.88	4.91
LeSnd max 24								
Pre-test	9.44	2.40	8.09	2.86	8.53	2.87	8.69	2.75
Post-test	19.21	5.61	12.88	2.89	11.69	3.28	14.73	5.32
Follow-up	21.88	3.21	15.76	4.45	14.00	4.44	17.44	5.30
Phonol max 6								
Pre-test	3.13	0.56	2.97	1.09	3.22	0.94	3.10	0.89
Post-test	5.93	0.26	4.88	0.97	4.77	0.82	5.23	0.90
Follow-up	5.94	0.25	5.12	0.88	4.79	1.11	5.31	0.95
WoR max 8								
Pre-test	3.63	0.66	3.50	1.19	3.59	0.95	3.57	0.95
Post-test	7.14	1.06	5.48	1.76	5.12	1.14	5.96	1.60
Follow-up	8.00	0.00	5.72	2.01	5.93	2.12	6.64	1.93
SentR max 8								
Pre-test	3.38	.049	3.22	1.16	3.38	1.04	3.32	0.94
Post-test	7.10	1.01	5.28	1.40	5.00	1.23	5.85	1.54
Follow-up	7.88	0.49	5.80	1.76	5.55	2.44	6.49	2.02
WoWr max 8								
Pre-test	3.34	0.48	2.97	1.06	3.06	0.91	3.13	0.86
Post-test	7.59	0.83	5.56	1.53	5.50	1.27	6.28	1.57
Follow-up	7.84	0.63	5.76	2.31	5.59	2.08	6.48	2.05
SentWr max 8								
Pre-test	2.97	0.60	2.66	1.04	2.88	0.79	2.83	0.83
Post-test	7.10	1.01	5.44	1.58	5.54	1.17	6.08	1.47
Follow-up	7.63	0.79	5.32	1.65	5.59	2.10	6.27	1.89
Summaries								
Pre-test	36.13	5.14	32.91	9.56	34.34	7.62	34.46	7.69
Post-test	74.04	9.98	55.84	7.39	51.77	6.15	60.95	12.70
Follow-up	81.53	5.56	61.88	9.30	56.90	12.71	67.51	14.52

LeKn = Letter knowledge

LeSnd = Letter-sound knowledge

Phonol =Phonological tasks

WoR = Word reading

SentR = Sentence reading

WoR = Word writing

SentWr = Sentence writing

4.2.2 Intervention effects

The analysis of intervention effects is based on the results from repeated measures analysis ANOVA as explained in the Methods chapter. The dependent variables are the summary variables phonological awareness, reading skills, writing skills and overall literacy skills. In addition, intervention effects on school marks in Kiswahili and English are analyzed as a means of studying transfer effect from intervention on areas related to but not included in the intervention programme.

Before presenting the effect of the intervention programme on the different outcome variables, the *effect of gender and school* is presented using the variable overall literacy skills. Gender effect is presented in Table 21 and Figure 9. No significant gender effect was found in any of the test occasions. Mauchly's Test of Sphericity indicated that the sphericity assumption does not hold ($p = .000$), but because the factor had only two levels, sphericity assumed results of within subjects can be used. Both girls and boys made significant progress during the programme period (from pre-test to follow-up) as indicated by the significant overall within subjects effect of time ($F(2/136) = 389.38, p = .000, \eta^2 = .85$). No gender differences in the development of overall literacy skills were noticed during the programme (gender x time effect; $F(2/136) = 1.89, p > .05$).

Table 21. Effect of gender on overall literacy skills

Gender	Time	N	Mean	SD	95% Confidence Interval	
					Lower Bound	Upper Bound
Male	Pre-test	33	35.06	4.26	33.45	36.68
	Post-test	33	62.06	11.97	57.47	66.65
	Follow-up test	33	71.42	11.32	67.02	75.83
Female	Pre-test	37	37.16	4.21	35.64	38.69
	Post-test	37	61.65	14.22	57.32	65.98
	Follow-up test	37	68.57	13.77	64.41	72.73
All	Pre-test	70	36.16	4.70		
	Post-test	70	61.84	13.11		
	Follow-up test	70	69.91	12.67		

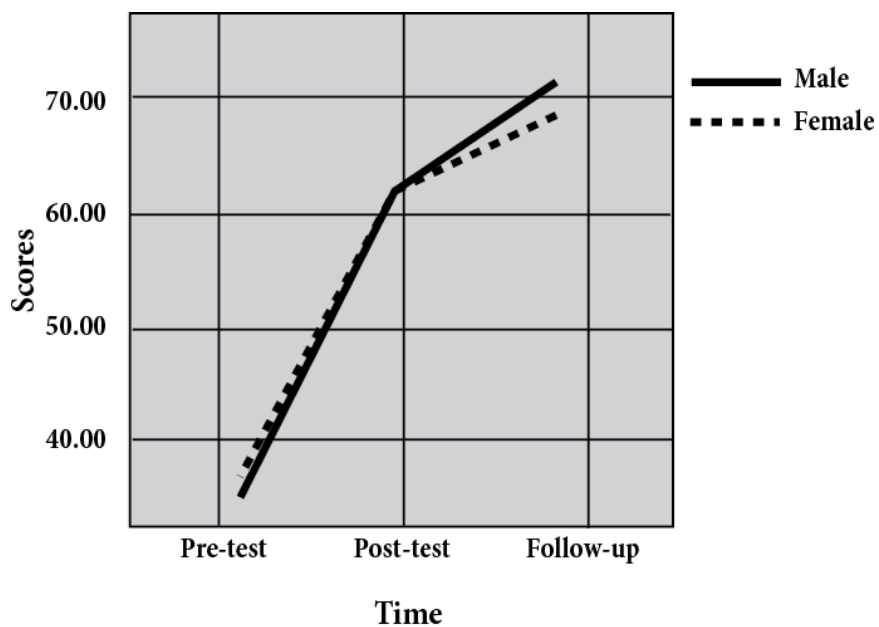


Figure 9. Effect of gender on overall literacy skills

Because the children were from two schools, there was a need to check *school effect* (Table 22 and Figure 10). No significant differences between the school groups were found in any of the test occasions. Mauchly's Test of Sphericity indicated that the variance did not meet the sphericity condition ($p = .000$), but due to the two-level factor, sphericity assumed results of within subjects can be used. The children in both schools (Manzese and Ukombozi) made significant progress during the programme period (from pre-test to follow-up) as indicated by the significant overall within subjects effect of time ($F(2/136) = 379.26, p = .000, \eta^2 = .85$). No school based differences in the development were found (gender x time effect; $F(2/136) = 0.75, p = >.05$).

Table 22. Effect of school on overall literacy skills

School	Time	N	Mean	SD	95% Confidence Interval	
					Lower Bound	Upper Bound
Manzese	Pre-test	37	36.59	4.92	35.95	37.92
	Post-test	37	63.65	15.35	59.24	67.84
	Follow-up	37	70.57	14.90	66.28	74.69
Ukombozi	Pre-test	33	35.67	4.47	34.21	37.36
	Post-test	33	59.82	9.56	55.17	64.28
	Follow-up	33	69.18	9.75	64.58	73.48
All	Pre-test	70	36.16	4.70		
	Post-test	70	61.84	13.11		
	Follow-up	70	69.91	12.67		

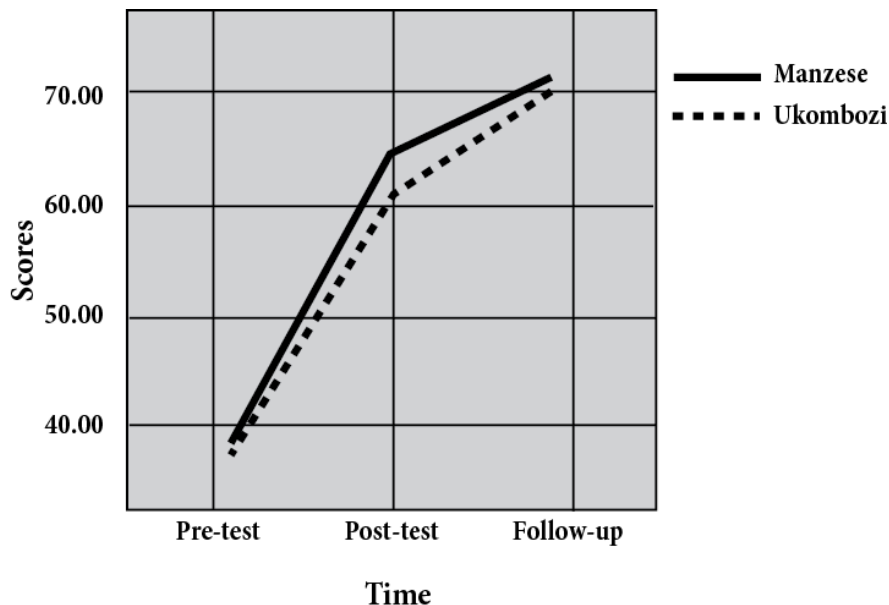


Figure 10. Effect of school on overall literacy skills

Intervention effect on phonological awareness

The first analysis of the effect of the intervention programme on the different outcome variables focused on the effect of the programme on phonological awareness. The summary variable phonological awareness included letter knowledge, letter-sound knowledge and phonological tasks. The findings are presented in Table 23. No significant differences were found between any groups in the pre-test. In the post- and follow-up test the differences were significant between the experimental group and the control groups, but not between the control groups. Mauchly's Test of Sphericity indicated that the sphericity assumption holds ($p = .705$) and thus sphericity assumed results within subject tests were used. All the research groups made significant progress during the programme period (from pre-test to follow-up) as indicated by the significant overall within subjects effect of time ($F(2/134) = 403.76, p = .000, \eta^2 = .86$). The effect of intervention was significant as indicated by the interaction effect of group and time ($F(4/134) = 24.87, p = .000, \eta^2 = .43$). Figure 11 also shows that the experimental group improved significantly more than the control groups during the intervention. The difference between the experiment group and the control groups is between one and two standard deviations in the post-test and in the follow-up.

Table 23. Intervention effect on phonological awareness

Group	Time	N	Mean	SD	95% Confidence Interval	
					Lower Bound	Upper Bound
Experimental	Pre-test	28	23.29	4.13	21.75	24.82
	Post-test	28	45.14	8.40	42.59	47.69
	Follow-up	28	51.11	4.58	48.58	53.64
Control 1	Pre-test	19	22.16	4.32	20.30	24.02
	Post-test	19	35.16	5.50	32.06	38.26
	Follow-up	19	40.42	8.16	37.35	43.49
Control 2	Pre-test	23	22.48	3.76	20.79	24.17
	Post-test	23	30.61	5.29	27.79	33.42
	Follow-up	23	35.78	7.54	32.99	38.58
All	Pre-test	70	22.71	4.04		
	Post-test	70	37.66	9.24		
	Follow-up	70	43.17	9.46		

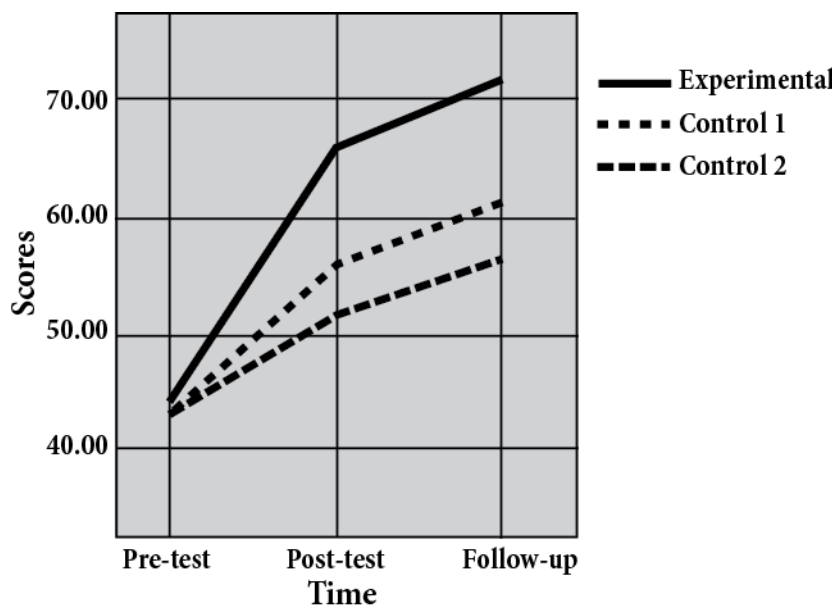


Figure 11. Intervention effect on phonological awareness

Intervention effect on reading skills

The second analysis focused on the effect of the intervention on reading skills, based on the summary variable of word and sentence reading (Table 24). Mauchly's Test of Sphericity indicated that the sphericity assumption does not hold ($p = .005$), and thus Greenhouse-Geisser correction was used. No significant differences were found between any groups in the pre-test. In the post- and follow-up test the differences were significant between the experimental group and the control groups, but not between the control groups. All the research groups made significant progress during the programme period (from pre-test to follow-up) as indicated by significant overall within subjects effect of time ($F(1.74/118.56) = 420.25, p = .000, \eta^2 = .86$). The effect of intervention was also highly significant, as indicated by the interaction effect of group and time ($F(3.49/118.56) = 31.43, p = .000, \eta^2 = .48$). Figure 12 also shows that the experimental group improved significantly more than the control groups during the intervention.

Table 24. Intervention effect on reading skills

Group	Time	N	Mean	SD	95% Confidence Interval	
					Lower Bound	Upper Bound
Experi- mental	Pre-test	28	7.03	0.94	6.61	7.46
	Post-test	28	14.24	1.81	13.49	14.99
	Follow-up	28	15.86	0.52	15.03	16.69
Control 1	Pre-test	19	7.00	1.41	6.47	7.53
	Post-test	19	10.42	2.55	9.49	11.35
	Follow-up	19	11.95	2.97	10.93	12.97
Control 2	Pre-test	23	7.48	1.63	7.00	7.96
	Post-test	23	10.00	1.81	9.16	10.84
	Follow-up	23	12.04	2.80	11.11	12.97
All	Pre-test	71	7.17	1.16		
	Post-test	71	11.85	2.84		
	Follow-up	71	13.58	2.92		

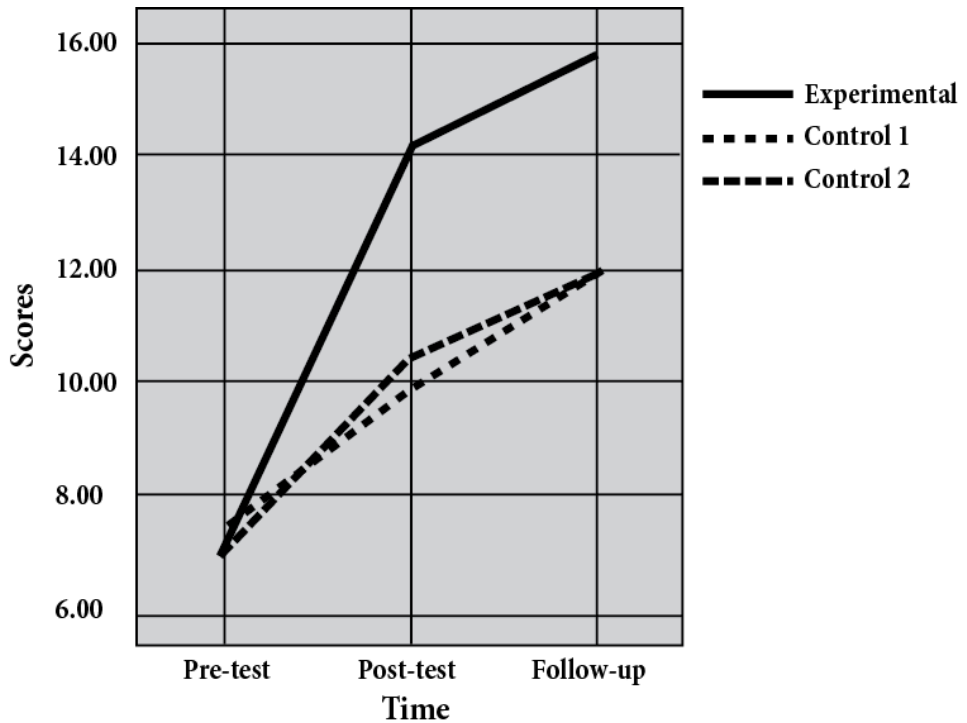


Figure 12. Intervention effect on reading skills

Intervention effect on writing skills

The third analysis focused on the effect of the intervention on writing skills based on the summary variable, which included word and sentence writing (Table 25). Also in this case the Greenhouse-Geisser correction was used (sphericity condition not met, $p = .020$). The pattern was similar to the pattern described above for reading, with significant differences between the experimental group and the control groups, but not between the control groups in the post- and follow-up test. All the research groups made significant progress during the programme period (from pre-test to follow-up) as indicated by the significant overall within subjects effect of time ($F(1.80/122.05) = 521.89, p = .000, \eta^2 = .89$). The effect of intervention (group x time) was also significant ($F(3.60/122.05) = 21.43, p = .000, \eta^2 = .39$). Figure 13 also shows that the experimental group improved significantly more than the control groups during the intervention.

Table 25. Intervention effect on writing skills

Group	Time	N	Mean	SD	95% Confidence Interval	
					Lower Bound	Upper Bound
Experimental	Pre-test	29	6.45	0.63	6.10	6.799
	Post-test	29	14.69	1.44	13.96	15.42
	Follow-up	29	15.52	0.87	14.63	16.40
Control 1	Pre-test	19	6.05	1.55	5.62	6.49
	Post-test	19	10.79	2.92	9.88	11.70
	Follow-up	19	12.00	3.40	10.91	13.09
Control 2	Pre-test	23	6.30	0.56	5.91	6.70
	Post-test	23	10.91	1.59	10.09	11.74
	Follow-up	23	11.39	2.68	10.40	12.38
All	Pre-test	71	6.30	0.95		
	Post-test	71	12.42	2.72		
	Follow-up	71	13.24	3.04		

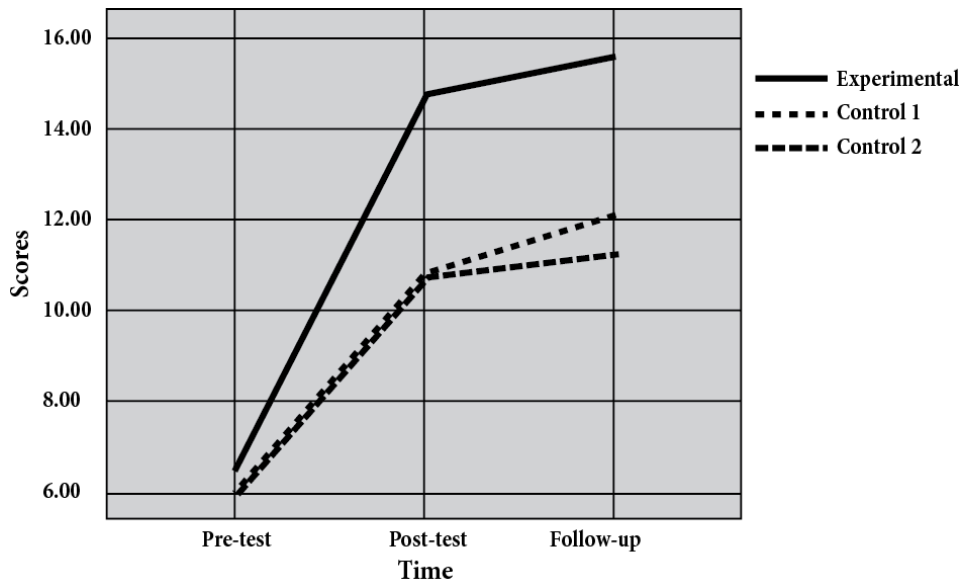


Figure 13. Intervention effect on writing skills

Intervention effect on overall literacy skills

The effect of the intervention on the overall literacy skills based on a summarized variable of phonological awareness, reading skills and writing skills is presented in Table 26 and Figure 14. All groups made significant improvement during the programme. Mauchly's Test of Sphericity indicated that the sphericity assumption holds ($p = .555$), and thus sphericity assumed results of within subject tests were used. The overall effect of the programme from pre-test to follow-up was significant, ($F (2/134) = 814.76, p = .000, \eta^2 = .92$). The effect of intervention was also significant, as indicated by the interaction effect of group and time ($F (4/134) = 47.51, p = .000, \eta^2 = .59$). The experimental group outperformed the control groups.

Table 26. Intervention effect on overall literacy skills

Group	Time	N	Mean	SD	95% Confidence Interval	
					Lower Bound	Upper Bound
Experimental	Pre-test	28	36.71	5.15	34.93	38.50
	Post-test	28	74.04	9.98	70.88	77.19
	Follow-up	28	82.46	4.68	79.76	85.17
Control 1	Pre-test	19	35.21	4.38	33.05	37.37
	Post-test	19	56.37	7.70	52.54	60.19
	Follow-up	19	64.37	8.64	61.09	67.65
Control 2	Pre-test	23	36.26	4.44	34.30	38.23
	Post-test	23	51.52	6.47	48.04	543.00
	Follow-up	23	59.22	8.27	56.24	62.20
All	Pre-test	70	36.16	4.70		
	Post-test	70	61.84	13.11		
	follow-up	70	69.91	12.66		

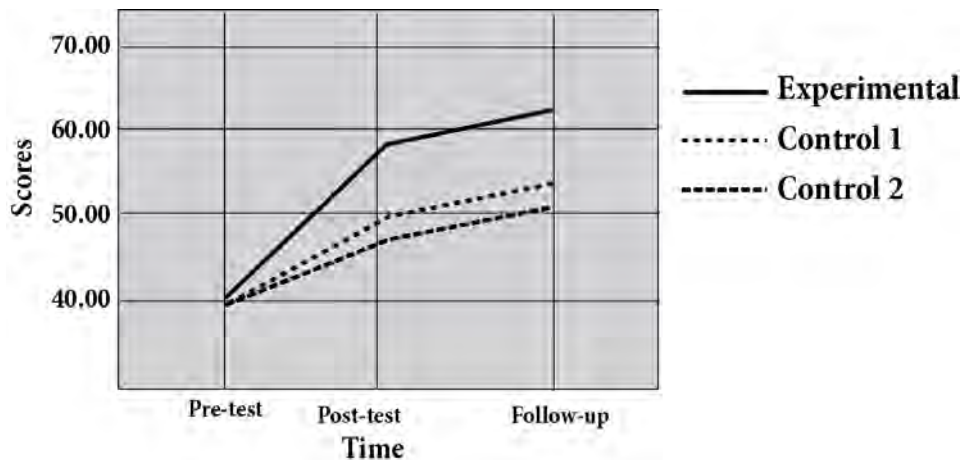


Figure 14. Intervention effect on overall literacy skills

4.2.3 Transfer effects on school achievement

The results presented above include the effects on phonological awareness and on reading and writing skills measured by tests. The intervention programme (described in Chapter 3) included components considered important for reading and writing development. The tests and the intervention programme focused on the same components, and both were carried out by the researcher. The important question asked was whether there was an effect of the intervention programme on other skills or areas than those specifically related to the programme and evaluated by the researcher. The evaluation of the children's school achievement by persons not involved in the intervention project was considered important. The school teachers filled this requirement. School marks were given to all children in the classes as part of the regular normal yearly assessment procedure. School marks in Kiswahili and in other school subjects were chosen as relevant and purposeful measures of transition effects and used as indicators.

The first school marks were given in March, in the middle of the first school term. At this time the intervention had not started and the marks are thus regarded as pre-test scores. The second marks were given in June, at the end of term one, parallel to the post-test of the intervention. The third time for giving school marks was in November, at the end of the second term of the school year. This was the time when also the follow-up test was administered. In the analysis and presentation of the results the school marks are treated like the other measures from the pre-, post- and follow-up testing occasions.

Repeated measures ANOVA was carried out to find out whether there was any transfer effect of the intervention programme on school marks in Kiswahili (Table 27, and Figure 15). Also in this case the Greenhouse-Geisser correction was used (sphericity condition not met $p = .085$).

All the research groups made significant progress during the programme period (from pre-test to follow-up), as indicated by the statistically significant overall within subjects effect of time ($F(1.89/156.85) = 193.94, p = .000, \eta^2 = .70$). The effect of intervention was also significant, as indicated by the interaction effect of group and time ($F(3.78/156.85) = 9.37, p = .000$). The η^2 was .18. The conclusion is that there was a transfer effect from the intervention on the achievement in the school subject, Kiswahili.

Table 27. Intervention effects on school achievement in Kiswahili

Group	Time	N	Mean	SD	95% Confidence Interval	
					Lower Bound	Upper Bound
Experimental	Pre-test	32	40.19	11.99	35.50	44,88
	Post-test	32	68.56	11.35	63.39	73.74
	Follow-up	32	82.66	11.36	76.92	88.39
Control 1	Pre-test	26	38.58	13.39	33.38	43.78
	Post-test	26	53.85	17.30	48.11	59.59
	Follow-up	26	65.00	18.97	58.64	71.37
Control 2	Pre-test	28	39.43	14.69	34.42	44.44
	Post-test	28	51.86	15.51	46.33	57.39
	Follow-up	28	61.61	18.36	55.48	6774
All	Pre-test	70	39.45	13.20		
	Post-test	70	58.67	16.45		
	Follow-up	70	70.47	18.73		

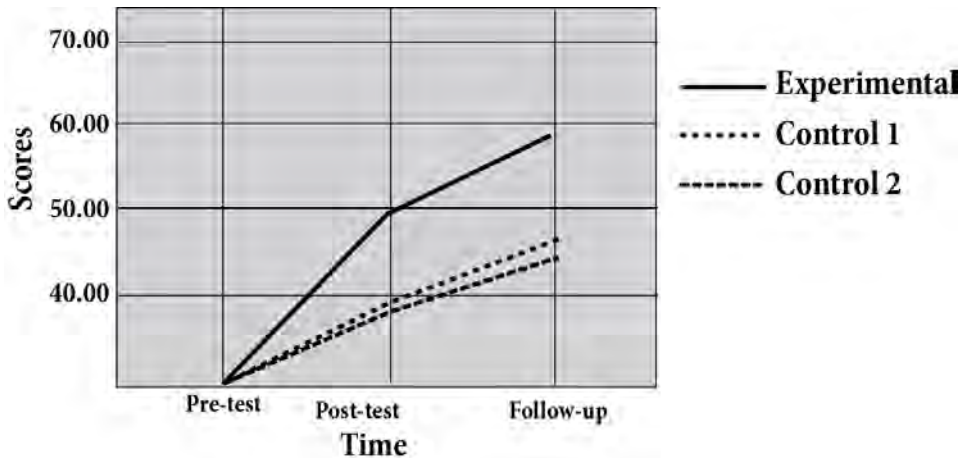


Figure 15. Transfer effect on Kiswahili

It is also of interest to find out whether there is a transfer effect from the intervention programme on school subjects other than Kiswahili. However, no school marks for the other subjects (English, Mathematics and Science) are available from the time when the intervention started (the pre-test time). From the time of the post-test and follow-up school marks are available. In the following an analysis of the school marks in English is presented. The school achievement in English can be estimated to be at least partly related to reading and writing skills, and thus it is of interest to find out possible effects on the school marks in English. The difference between the research groups (one way ANOVA) was significant in the post-test ($F(2/90) = 8.23, p = .000$), indicating effect of the intervention (Table 28 and Figure 16). The difference was significant between the experimental and the control groups (Tukey HSD), $p = .021 - .000$, but not between the control groups. In the follow-up the group difference was also significant ($F(2/88) = 10.56, p = .000$) and the differences between the groups followed the same pattern as in the post-test.

Table 28. Transfer effect on school achievement in English

Group	Time	N	Mean	SD	95% Confidence Interval	
					Lower Bound	Upper Bound
Experimental	Post-test	32	54.06	22.48	45.96	62.17
	Follow-up	32	73.13	15.01	64.71	78.54
Control 1	Post-test	31	36.87	28.00	27.60	47.14
	Follow-up	31	52.58	26.42	42.89	62.27
Control 2	Post-test	26	28.83	24.59	19.65	38.02
	Follow-up	26	46.25	28.86	35.06	57.44
All	Post-test	89	40.19	27.01		
	Follow-up	89	57.86	26.35		

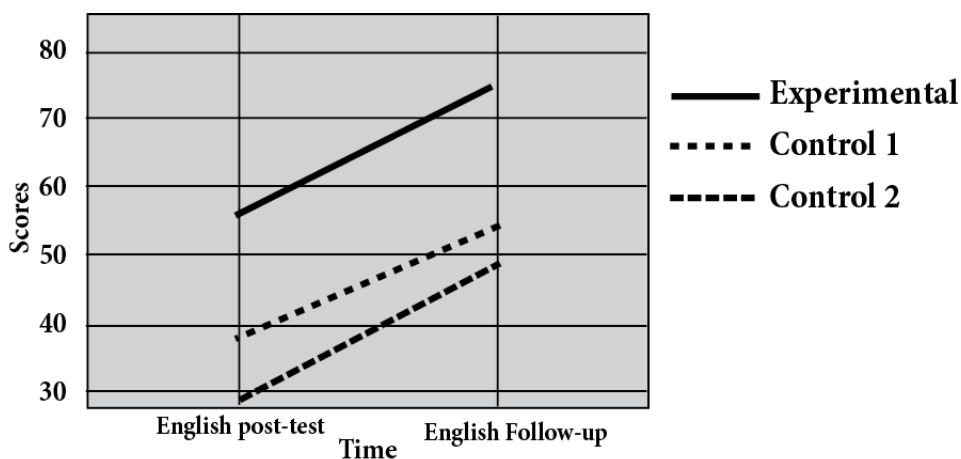


Figure 16. Transfer effect on school achievement in English

Summary

This chapter presented results from the basic and main analyses in terms of scale and test reliability and correlations, and of intervention effects on phonological awareness, reading and writing skills. In addition, the transfer effect on school achievement was presented. The results indicated good reliability of the test and high inter-correlations of the scales within the pre-, post- and follow-up tests. The correlations between the testing occasions were also high. The intervention effect was strong on all the output variables. No gender or school effect was noticed. A transfer effect on school achievement measured by school marks was noticed on the school subjects Kiswahili and English.

5 Discussion

5.1 Introduction

The aim of this study was to create and evaluate an intervention programme for children at risk of reading and writing difficulties. The focus was on grade one children in a developing country, Tanzania, in a low socio-economic area of Dar-es-Salaam. The study is an experimental one with randomized research groups: one experimental group and two control groups. The Dynamic Assessment (DA) approach, applied in groups, was used both in the identification of the at-risk group and in the intervention process.

The introductory part of the study gives a description of the context of the study aiming at assisting the reader in understanding both the conditions of the study and the prerequisites for school work and learning in the area of study. Analyses of earlier research about reading and writing difficulties and intervention programmes indicate a limited number of relevant studies from developing countries in general, including Tanzania. Thus, most of the presented research in the field originates from developed countries, where the contextual factors differ from those in this study. Many of the features in the outcomes of this study are also revealed in the presented studies. The main findings of this study indicate that an intensive short-term literacy skills intervention programme can be effective in the context of a developing country. The programme was created for at-risk children, and it was based on dynamic assessment and applied in large groups.

The discussion focuses on circumstances related to the context and the research groups affecting the design, choice of methods and practical realization of the study and thus the outcomes. The main outcomes are compared to findings in earlier studies.

In the choice of research sample, the first criterion was that it should represent a low social status area in an urban setting, thus including children with a background of low literacy skills stimulation. The chosen area, Manzese in Dar-es-Salaam, fulfilled the criteria according to all the analyzed, commonly used indicators, e.g. food poverty line and the basic needs poverty line (URT, 2002). The consequences and problems of the low income area including high degree of crowdedness were also reflected in the schools of the area. The choice of the area was based on the obvious need for supporting programmes, and for helping

actions. The idea was that if a positive effect of the created programme could be demonstrated in this kind of context and research group, it should be possible to receive at least correspondingly positive effects in contexts with better conditions.

The second criterion was that the final sample should consist of children at risk of reading and writing difficulties. It was regarded likely that a large proportion of the children in the chosen context had low literacy stimulation in their home environment. Instead of using traditional static assessment measures in the screening for selecting the at-risk children to be included in the intervention phase, dynamic assessment was used. A dynamic assessment approach with mediation was considered to be a way of compensating for the low literacy stimulation the children had received before entering school. The idea was to avoid identifying children with a background of merely low literacy stimulation, while the aim was to identify those at risk of reading and writing difficulties. Choosing the risk sample after the dynamic assessment was regarded as giving the children at least a chance of learning basic elementary literacy skills before taking the decision on which children should be assigned to the at-risk group

5.2 The identification phase

As a basis for discussing the outcome of the identification phase, important steps of the process are summarized in the following. The challenging process of carrying out dynamic assessment in large classes with a group approach, including individual scoring, needs explanation and comments related to the unique arrangement.

A total of 301 children from seven classes in grade one were randomly selected from 674 children in two government primary schools in the chosen low socio-economic urban area participated in the identification phase. The schools in which this study was conducted had large classes and very limited resources. The number of children in the research classes varied in one school from 85 to 100, and in the second from 112 to 120.

In the identification phase, a fast basic check was performed during the first day to obtain a general picture of the literacy status of the children before teaching/mediation. After the basic check there followed two lessons of teaching with mediation arranged over three days, and after that followed two hours of post-assessment during the two following days. The whole identification process was performed in six days.

The identification phase commenced by organizing all the children in lines for individual fast basic checking of their knowledge of some elementary literacy skills. Based on the checking it was found about 60% could not name any of five letters shown on a piece of paper, and none could name the related letter-sound. Over 90% could not read any of the five two-syllable words shown.

The described arrangement went well and was effective concerning the use of personal resources and time. However, it should be noted that the approach requires good and systematic planning and a teacher who is well acquainted with the school context and teaching in large classes, as well as with the use of dynamic assessment. The arrangement also requires support from a person who can guide children to the right classroom in time for the assessment.

The teaching/mediation yielded considerable improvement compared to the initial basic fast check, in that all children could name at least six letters and 24% could name 20 letters in the assessment. Letter-sound identification was still difficult for most of the children. Word reading improved, in that 15% could read at least one word and 37% could read at least five words.

The at-risk group

In order to identify the group of at-risk children a sum score was counted from the recordings in the different scales of the assessment battery. Based on the distribution of the sum score, a cut-off point was set below a peak and corresponding to the mean, with the consequence of getting a 32% risk sample (96 children out of the 301).

The children in this group were regarded as still having difficulties in the various literacy skills tested and were chosen to form the at-risk group to be included in the intervention process. Analysis confirmed that the at-risk group scored significantly lower than the rest of the group on all measures. For example, the children in the at-risk group could, on average, name only half as many letters as the others. In phonological tasks, which included initial sound identification, syllable counting and phoneme blending, the at-risk group performed on average at a 50% level of the average of the not at-risk group. The pattern was similar in word and sentence reading and writing. On average, the at-risk group performed below half (34.46) of the maximum score (maximum score 86) in the summary variable overall literacy skills, and the variation in both groups was large. It was evident that the knowledge of letters and letter-sound correspondence affected the reading and writing components, and thus they were critical factors affecting the distribution of the sum score and the cut-off point. The at-risk group can be

regarded to be large compared to risk groups in other studies. However, considering the context of the sample and the risk of drop-outs during the intervention phase, a large risk sample was thought to be important.

No significant gender differences were noticed in the screening sample. This is in accordance with findings from other recent literacy skill studies in Tanzania (Ngorosho, 2011; Kalanje, 2011), but different from a large Tanzanian survey and a number of studies showing that girls outperform boys on literacy skill measures (e.g. Mead, 2006).

The instrument

The instrument used in the identification was a modification and adaptation of the Basic Skill Assessment Tool (BASAT) developed by Ketonen and Mulenga (2003), and largely used in Zambia. The components in the original test were alphabetic knowledge, phonological processing, digit span, reading ability and comprehension and writing ability. The reliability of the original test was analysed in a study based on a sample of 557 children (Matafali, 2010). The reliability (Cronbach's alpha) was high for almost all components. BASAT has also been used successfully in another study (Mubanga, 2010) in Zambia in grade three (N = 106). In both studies the test was adapted to local regular languages.

The components chosen from the original instrument were letter knowledge, letter-sound knowledge, phonological tasks, word and sentence reading and writing. These components were regarded to be appropriate for school beginners in grade one in the Tanzanian school. The letters and words which composed the content of the assessment were drawn from the school curriculum for Kiswahili teaching in primary schools (Jamhuri ya Muungano wa Tanzania, 2005) and thus content validity was ensured.

The analysis of reliability (Cronbach's alpha) of the instrument in this study was based on the 96 children chosen for the intervention phase. The reliability of the scales was as follows: *phonological awareness* .76 (summary of letter knowledge, letter-sound knowledge and phonological tasks), *reading* .81 (word and sentence reading), and *writing* .87 (word and sentence writing). The reliability scores were on average slightly lower than the scores in Matafali's study based on a larger sample (557 children). The comparable reliability scores (Cronbach's alpha) in Matafali's study were .91 for alphabetic knowledge, .76, for phonological processing, .95 for reading ability and .94 for writing ability.

The theoretical basis of the instrument can be traced to literacy skill components which have been identified to be sensitive in a risk perspective and to be strong predictors of reading and writing difficulties. Many researchers in the field have identified the same kinds of predictors and sensitive literacy components: phonological processing deficits, together with low alphabetic knowledge (e.g. Catts, 1989; Wagner & Torgesen, 1987; Bishop, 2003; Simpson, & Everatt, 2005; Spira, Brackens & Fischel, 2005; Siegel, 1989), and low letter knowledge (Lyytinen, 2008; Holopainen et al., 2001; Gallagher, Frith & Snowling, 2000; Wagner, 1988).

The same kind of literacy components have also been studied in Tanzania. Steinberg and Grigorenko (2001) designed a test to assess the cognitive ability of children in less developed countries. The test included central components of literacy skills. The study used an individually based dynamic assessment approach. Since 2005, several studies have been initiated and performed in Tanzania aiming at promoting reading and writing skills and preventing reading and writing difficulties. Some of the studies are presented and summarized by Ngorosho (2011). The test batteries in these studies included components of phonological awareness and reading and writing ability. In one of the recent Tanzanian studies, a group-based screening instrument was developed and validated with the aim of identifying children at risk of reading and writing difficulties in grade one (Kalanje, 2011). The screening test included word knowledge, letter knowledge and phonological awareness.

Dynamic assessment approach

The approach in the identification was dynamic assessment (Feuerstein, 1980; Feuerstein, Rand & Hoffman, 1979) and followed the Feuerstein model (test-mediation-test). This approach and model was chosen based on the advantages compared to traditional approaches and models, especially in studying children at risk. The main idea of dynamic assessment is to help the child to uncover his/her potential capabilities for personal development. It has also been indicated to be one of the most effective approaches in assessing the literacy capabilities of children from a disadvantaged population (e.g. Kozulin & Garb, 2001; Garb, in press). In a summarizing overview of studies on dynamic assessment, Caffrey, Fuchs and Fuchs (2008) notice that DA has been used for many different purposes, among them for assessment of learning potential, and for mediated and assisted learning. In assessing and predicting children's capabilities DA has many advantages compared to traditional assessment. In a carefully performed meta-analysis, Caffrey (2006) showed that after traditional achievement tests had been entered in multiple regression, DA accounted for additional variance in phonemic awareness (9%) and reading achievement (21%) in kindergarten,

grade 2 and grade 5 (based on Byrne et al., 2000). Similarly, Caffrey (based on Spector's study, 1992) found that DA contributed between 12% and 14% on phonological awareness measures and 21% on a word reading measure, and an additional 13% in higher-level verbal measures, such as reading sentences and writing (based on Reising's study, 1993). Likewise, additional effects were noticed on several general cognitive domains.

Despite the positive effects, Caffrey (2006) points out that "DA may not be a substitute for traditional assessment. Rather, it may provide valuable information over and above that". DA is a procedure which combines instruction and testing. An individual is given a set of tasks to be done with instructions (Sternberg & Grigorenko, 2001). This is one of the uniquenesses of DA when compared to traditional or static testing, where the testee is given a set of tests with very minimal or sometimes no feedback. DA strategy is performed in various ways: the testing is either preceded by instruction or followed by instruction. In the present study instruction preceded assessment in the identification and in the intervention phase. Both group-based and individually-based approaches of assessment and teaching/mediation were used in the identification and in the intervention.

It should be noticed that there are several studies on using dynamic assessment for identifying children with literacy skill problems in South Africa, as indicated in a meta-analysis ((Murphy & Maree, 2006) and by Lussier and Swanson 2002. The meta-analysis involved 22 studies conducted in South Africa between 1961 and 2001.

5.3 The intervention phase

The children identified as being at risk of reading and writing difficulties in the screening phase were included in the randomized experiment. In the experimental group the intervention consisted of training literacy skills according to the principles of dynamic assessment, but with a group approach. The control groups had mathematics vs. arts. The assessment of all the groups in the post- and follow-up testing periods followed the dynamic assessment procedure from the end of the identification phase discussed above. It should also be noted that the assessment at the end of the identification phase served as pre-test for the intervention.

Structure and content of the programme

The intervention programme can be classified as a short and intensive programme. It was carried out during five weeks, five days a week, in 40 minute lessons supplementary to the ordinary school programme. The intervention was performed in groups of 32, further divided into six to eight in the mediation parts of the sessions. The same instructor (the researcher) carried out the teaching/mediation in all the groups according to an alternating timetable. The reasons for alternating were ethical and motivational. The instruction in the control groups used traditional methods, and not DA approach. The arrangement of the teaching was the same in all groups.

The intervention programme included, as in the identification phase, training in phonological awareness (including letter-sound knowledge, letter-sound correspondence, initial sound identification, phoneme blending and syllable counting) in word and sentence reading and sentence writing. The content was based on the main components included in BASAT (Ketonen and Mulenga, 2003) and on components included in earlier studies about language elements sensitive to a risk perspective (Snowling, Burns & Griffin 1998; Adams, 1990, Bradley and Bryant, 1994; Siegel & Brayne, 2005; Torgesen, 2006; Holopainen, et al., 2000; Goswami, 2001; Schneider, Roth & Ennmoser, 2000; Hatcher et al., 1994). These studies have identified phonological awareness, phoneme awareness, and alphabetic knowledge and decoding as important elements from a risk perspective. In addition, the current school curriculum for teaching Kiswahili language in primary schools in Tanzania was used in choosing context- and level appropriate language and text components (URT, 2005). Many researchers (e.g. Hatcher et al., 1994) have emphasized that a programme combining phonological awareness and reading skills is more effective in improving reading skills for 7-year old children with delayed language development than programmes involving only one component.

Outcomes of the intervention programme

The main data analysis was performed with repeated measures ANOVA. Mauchly's Test of Sphericity was used for testing sphericity assumption. In all cases in which the sphericity did not hold, the equality of variances was corrected by Greenhouse-Geisser criterion. The effect of the created short-term intensive intervention programme applied in groups was strongly positive. Significant effects were found in all the studied literacy skill components. The experimental group outperformed the control groups on all measures. Transfer effects on achievement in school subjects were found.

Several earlier studies indicate the effects of group interventions compared to interventions applying an individual approach, probably mainly due to the fact that they seem to be more intensively organized and use explicit instruction (Elbaum, Vaughn, Huges & Moody, 1999; Swanson, Hoskyn & Lee, 1999; Knight, Day & Patten-Terry, 2009; Al-Otaiba & Torgesen, 2007). These studies used a small group approach including three to five children. The group size in the presented study was much larger.

Some observations of interest in the present study can be noted. In the pre-assessment, the standard deviations were on the same level in all the research groups. In the post-assessment, the standard deviation had increased to almost the double in the experimental group, whereas it had remained on the same level in the control groups. However, figures for the follow-up show a change of the picture; a decrease of the standard deviation in the experimental group and an increase in the control groups. The finding exposes that the children benefit from the intervention differently. After the intervention, the standard deviation decreases, and the development seems to level out. However, a warning about the interpretation is needed, due to ceiling effect in the post-and follow-up assessment of the experimental group, especially regarding phonological awareness. The increase of the standard deviation in the control groups can be interpreted as being related to normal process of development and maturity during the follow-up.

The unique features of the programme in this study were that it used a dynamic assessment approach and was carried out in groups. Most training programmes following the principles of dynamic assessment are individual. The findings of this study are in line with the results from many other studies (Hatcher et al., 2009; Siegel & Brayne, 2005; Torgesen et al., 2002; Lo, Wang & Haskell, 2009), indicating the effect of short-term intervention programmes including training of phonological awareness, phoneme awareness, word and sentence reading and writing in kindergarten and grade one children. The effects of DA used in South African studies have been presented in a large meta-analysis (Murphy & Maree, 2006).

The programme in the present study combined training in phonological awareness and reading skills, which is also seen as strength of the programme. Several researchers have emphasized that programmes combining training of phonological awareness and reading skills are more effective than those involving only one component in improving reading skills for at-risk children in kindergarten and grade one (Schneider, Roth & Ennmoser, 2000) and in 7-year-old children with delayed language development (Hatcher et al, 1994). Strong evidence of combining the training of word decoding skills and phonological

abilities with the training of words and sentences is also shown in a recent study by Gustafson, Fälth, Svensson, Tjms and Heimann (2011). The authors also state that there is “firm evidence that educational interventions focusing on developing phonological skills and linking phonological units of language (phonemes, word segments, and words) to the corresponding written units can improve the word decoding and reading skills of children with reading disabilities”. They cite and base their conclusion on several important studies in the field (Ehri, Nunes & Stahl, 2001; Elbro & Petersen, 2004; Hatcher et al., 1994; Tjms & Hoeks, 2005; Torgesen et al., 2001; Wise, Ring, & Olson, 1999). The researchers (Gustafson et al, 2011) also emphasize the need for dynamic rather than static approaches in educational interventions. Referring to Grigorenko (2009), they state that educational interventions should be seen as ongoing processes where assessment can assist intervention, and vice versa.

It can be summarized that throughout the years, interest in the effect of reading interventions in kindergarten and early grades in school has been very strong. The effects of most programmes, including programmes based on the dynamic assessment approach, have been successful and significant. The present study differs from most of the earlier ones regarding the arrangement and realization. The group size, although small in a Tanzanian context, was large compared to the size used in most studies based on small group design. The training was intensive and daily and lasted five weeks, which is a rather short time compared to most intervention programmes aiming at promoting literacy skills. However, it was a long-lasting programme compared to most of the earlier dynamic assessment programmes. In addition, the design was a theory-based randomized experiment fulfilled in the challenging context of Tanzanian schools with large class sizes and few resources. The conclusion regarding the approach is that it functioned well in this study and that it can be transferred to other school contexts. However, teachers with knowledge on dynamic assessment are needed. In addition, the teaching should be carefully planned and organized.

5.4 Methodological reflections

Methodologically, the study represents an improvement compared to many studies in the field in several aspects. A serious attempt was made to avoid choosing a “false at-risk sample” (children with merely no or low level of exposure to literacy-related activities when entering grade one). The groups were randomly selected and significant differences between the groups in terms of background features were found. The control groups were subjected to systematic activities as a way of motivating them to participate while the experimental group was training in literacy skills. No differences in attendance frequency were noticed between the groups. During the assessment, records of the children’s progress and attendance were kept using checklists, and both the experimental and the control groups received the same attention from the instructor. In the pre-testing, as well as in the post-testing and the follow-up, the organization of the testing environment was the same, i.e. children were assessed in groups and the arrangement of the seating plan was the same every time.

Noteworthy and a limitation in the study is that no parallel instrument and no co-assessors were used. These kinds of limitations have also been noticed to be frequent in other dynamic assessment studies (see Caffrey, 2006). However, school marks given by the ordinary class teachers can be regarded as parallel measures, although they were mainly included in the study for analyzing possible transfer effects.

Another issue worth noting is that the specific kinds of reading and writing problems which the children had were not identified. No diagnostic tools were available. In relation to the aim of the study and in connection with the concern about all children with reading and writing difficulties, specific information about the difficulties was not regarded as a primary concern. However, from a research point of view and in further studies this kind of information would be of interest and value.

The fact that the experimental group was trained in literacy skills and the control groups in mathematics and arts was an issue of discussion. It was obvious that teachers, parents and children would have liked all children to be trained in literacy like the experimental group. Teachers, parents and children were informed that if the programme would prove to be successful the procedures of the project would be adopted in all classes. Detailed explanations which indicated that the aim of the study was to help all children improve their literacy capability were presented. Based on the positive outcomes of the project, the teachers in grade one adopted the approach the following year.

Further, the assessment material was carefully selected to include authentic materials found in the school learning environment. Components from the school curriculum for teaching Kiswahili in primary schools in Tanzania were included. The content also consisted of materials used in teaching beginning readers in primary schools in Tanzania, e.g. class readers, letter templates, letter books, alphabet wall charts. Components which have been used in studies for at-risk children by many researchers were used (e.g. Ngorosho, 2011; Alcock, 2005; Alcock et al., 2000; Alcock & Ngorosho, 2003; Alcock & Ngorosho, 2004; Ngorosho, 2011; Ketonen & Mulenga, 2003; and Kalanie, 2011).

BASAT (Ketonen & Mulenga, 2003) was adopted in this study in the creation and development of the assessment tests and the intervention programme. BASAT has been widely used in schools for children with literacy problems and proved to be effective. There are positive experiences of using BASAT in African countries, e.g. in Zambia. Reports from several studies indicate that BASAT has had positive outcomes in grades one and two for children with linguistic problems and it proved to be successful in identifying children with linguistic problems (Matafwali, 2010; Mubanga, 2010).

As indicated above, dynamic assessment was the principal method of training and assessment in this study. The basic idea in the use of DA in the identification and intervention was that the children in question were likely to have a background of low literacy stimulation, and therefore with traditional methods of assessment many children would be regarded as being at risk of difficulties. By using dynamic assessment we expected to obtain a sample of “true positives”, i.e. children who were really at risk of reading and writing difficulties and thus in need of intervention and support. The mediation within the teaching process during two lessons was the core of the identification phase before assessment. Pupils’ learning was mediated so as to enhance thinking and promote learning enthusiasm. A comparison of the assessment results with the basic fast check results received before the teaching/mediation revealed a strong improvement in literacy skills. In the future the interest will be to analyze specifically the outcomes of short teaching/mediation sessions, e.g. of two-hour sessions as used in this study.

The cut-off point for the at-risk sample was set at 32%, which can be regarded as a high percentage when compared to other studies. However, many beginning readers in the described context could be regarded to be at risk of difficulties. The number of children also needed to be large in order to secure large enough research groups during the intervention in case of drop-outs.

Based on the figures from the post-test some children seem to have dropped out during the programme. At post-test, four children from the experimental group, eight from control 1 and seven from control 2, were absent from school and thus they did not participate in the test. In the follow-up none from the experimental group, but eight from control 1 and five from control 2 were absent. Specific analysis revealed that many of the children who did not participate in the post- and follow-up test were absent due to illness (four from experimental group, and three from controls 1 and 2 in the post-test). Some of the children had recently been transferred to other schools (it was the end of the term), but they had participated in the programme during most of the training sessions. It can be speculated that the larger number of absent children from the control groups compared to the experimental group can be related to differences in interest and motivation of the parents to bring the children to school at the end of the term. One can ask whether the literacy skill training programme was a higher motive for attendance than the other programmes. However, no systematic reasons for drop-outs were found. The conclusion is that the absence of some children at post-test (17 children, 17.7%) and at follow-up (10 children, 10.4%) is not regarded to affect the main results and conclusions of the study. It can be summarized that most of the children participated in the tests (81% - 100%).

As a way of addressing ethical issues, prior explanations to the research group on the process of the assessment were provided. Consent of the parents of the children who participated in the programmes was given. Decisions and suggestions provided by the research community regarding the research undertakings were treated with discretion.

5.5 Significance of the study and recommendations

Dynamic assessment as an educational tool has not been fully understood in a Tanzanian context. It therefore assumes that the novelty of the concept and more of the practice requires deliberate efforts to let it gain impetus in the school system as an alternative method of teaching and assessment. Most of the children included in this study were assumed to have low literacy stimulation. This assumption became the backbone of the research process, and indeed it had some educational implication for the school curriculum and teaching. The need to have a flexible and unbiased method of assessment in the educational practices in the 21st century should be accentuated following the idea generated in this study. It is therefore recommended that further studies on DA approaches

should be conducted to further explore the advantages of DA following the results shown in this study.

Dynamic assessment is more than a tool for assessment. It also empowers the learner (Sternberg & Grigorenko, 2002; Murphy, 2002; Lussier and Swanson 2002). Therefore, it is recommended that schools in Tanzania could find these results challenging and function as a starting point towards a more transparent way of teaching and assessment.

Taking a broader perspective, problems of low literacy skills are related to the whole education policy and leadership of a country (policy documents, leaders, curriculum developers, teacher education, teachers, trainers and politicians not understanding what learning is and what literacy learning entails). In this study, the focus has been on supporting one of the core groups in the system, teachers, by enriching their arsenal of methods with a new tool. Based on the findings, teachers are expected to be motivated to try and adopt the method of dynamic assessment in their teaching. The approach is expected to be of benefit for beginning readers in the Tanzanian context with the large number of children in the classes.

Problems of reading and writing difficulties in primary schools are frequent, but they have not been adequately addressed by education planners. It is therefore hoped this study can make a contribution to helping education development planners in Tanzania. The government of Tanzania has used much resource on school buildings, desks, books and training of teachers, but the teaching and learning has not been improved (Hakielimu, 2007). It is now regarded to be an important issue for the government to use resources for quality assurance. Resources should be directed to the classroom teaching and learning process, and to the teaching and learning of literacy skills.

It is hoped that curriculum developers too will find the methods used in this study worth including in the teaching and learning curriculum in primary schools with similar conditions in the country. In Tanzania, the school curriculum is centrally administered, and as in any other country, political leaders play a significant role in making decisions on matters pertaining to national interests. It is hoped that political leaders will find the material from this study important enough to be included in the national priorities when working on the process aiming at improving the quality of learning in schools.

It is recognized that at the heart of success in learning is the teacher and the teaching process. Teacher training colleges and institutions play a significant role in the preparation of teachers and the teaching methods in Tanzania. This study has suggested a new approach to teaching literacy skills in schools. The

study has tried to show stage by stage how dynamic assessment and a dynamic teaching approach can be carried out in a classroom situation and yield substantive results in the context of Tanzania. It is hoped that teacher trainers in colleges will find the suggestions put in the recommendations worth incorporating into teacher training programmes.

Dynamic assessment is a novel concept in the Tanzanian education system. The contribution of this study might be new practical experiences in this respect.

It is hoped that the findings of this study might provide deep insight into this method of assessment and teaching, not only to teachers and teacher trainers, but also to persons interested in educational matters, including non-governmental organizations. In other words, the study has challenged the traditional methods of assessment and teaching in schools and urges further research to be done in this area.

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Appendix 1.

The Kiswahili Training and Assessment Components

The created Kiswahili training and assessment instrument with testing components in the pre-, post- and follow-up.

TEST I (Pre-test)

Test 1 comprised of 7 components and every component consisted of items: 24 items for letter knowledge; 24 items for letter sound knowledge; 6 items for phonological tasks; 16 items for reading and writing words and 16 items for reading and writing sentences (in the pre-, post- and follow-up). Each component measured a specific skill and was a measure in the testing process and a factor in the final analysis.

Test 1: Letter naming (Kutamka herufi)

a b c h d e f g h i j k l m n o p r s t v u w y z

Test II: Letter- sound association (Kuhusianisha sauti na herufi)

a b c h d e f g h i j k l m n o p r s t v u w y

Test III: Phonological Tasks (Stadi za kifonolojia)

Initial sound identification (Kutambua sauti ya mwanzo katika neon)

- (i) Dada
- (ii) Bakuli

Phoneme blending (Kuunda neno toka kwenye fonimu)

- (i) /m-/a/ /m-/a/ =.....
- (ii) /m-/k-/a/ /t-/e/ =.....

Syllable counting (Kutambua silabi kartika neno)

- (i) Baba.....
- (ii) Darasa.....

Test IV: Word reading. (Kusoma manenoyenye ongezeko la silabi)

- | | |
|----------------|----------------|
| (1) kaka | (5) dada |
| (2) chakula | (6) shuleni |
| (3) Barabara | (7) milangoni |
| (4) karakarani | (8) barabarani |

Test V: sentence read (Kusoma sentensi zenye ongezeko la maneno)

- | | |
|--------|------------------------------------|
| (i) | Juma anasoma |
| (ii) | Juma anasoma kitabu |
| (iii) | Juma anasoma kitabu chake |
| (iv) | Juma anasoma kitabu chake darasani |
| (v) | Amina anacheza |
| (vi) | Amina anacheza mpira |
| (vii) | Amina anacheza mpira vizuri |
| (viii) | Amina anacheza mpira wake vizuri |

Test VI: Word writing (Kuandika maneno yenye ongezeko la silabi)

- | | |
|----------------|----------------|
| (1) kaka | (5) dada |
| (2) chakula | (6) shuleni |
| (3) Barabara | (7) milangoni |
| (4) karakarani | (8) barabarani |

Test VII: Sentence writing (Kuandika sentensi zenye ongezeko la maneno)

- | | |
|-------|------------------------------------|
| (i) | Juma anasoma |
| (ii) | Juma anasoma kitabu |
| (iii) | Juma anasoma kitabu chake |
| (iv) | Juma anasoma kitabu chake darasani |
| (v) | Amina anacheza |
| (vi) | Amina anacheza mpira |

TEST II (Post-test)

Test 1. Letter naming (Kutamka jina la herufi)

a b c h d e f g h i j k l m n o p r s t u v w y z

Test 2 letter-sound association (Kuhusianisha sauti na herufi)

a b c h d e f g h i j k l m n o p r s t u v w y z

Test 3 Phonological tasks (Stadi za kifonolojia)

(i) syllable counting (Kutambua silabi katika neno)

(a) Mghahawa.....

(b) maporomoko.....

(ii) Initial sound identification (Kutambua sauti ya mwanzo katika neno)

(a) shangazi.....

(b) zeze.....

(iii) Phoneme blending (Kuunda neno toka kwenye fonimu)

(a) /m/-/b/-/w/-/a/=

(b) /ch-/a/ /k-/u//l-/a/ =.....

Test 4 word reading. (Kusoma maneno yenye ongezeko la silabi)

- | | |
|--------------|---------------|
| (1) mbwa | (5) samaki |
| (2) Baba | (6) mama |
| (3) Barua | (7) bustani |
| (4) kanisani | (8) bustanini |

Test 5 Sentence read (Kusoma sentensi zenye ongezeko la maneno)

- i. Baba analima
- ii Baba na mama wanalima
- iii Baba na mama wanalima shambani
- IV Mbwa anamfukuza sungura
- V Hamis anafagia darasa
- VI Shule yetu ina maua mazuri
- VII Juma anasoma
- VIII Rafiki yangu ameniandikia barua

Test 6 Word write (Kuandika maneno yenye ongezeko la silabi)

- | | |
|--------------|---------------|
| (1) mbwa | (5) samaki |
| (2) Baba | (6) mama |
| (3) Barua | (7) bustani |
| (4) kanisani | (8) bustanini |

.....

Test 7 sentence writing (Kuandika sentensi zenye ongezeko la maneno)

- i. Baba analima
- ii Baba na mama wanalima
- iii Baba na mama wanalima shambani
- IV Mbwa anamfukuza sungura
- V Hamis anafagia darasa
- VI Shule yetu ina maua mazuri
- VII Juma anasoma
- VIII Rafiki yangu anakuja leo

TEST III (FOLLOW-UP TEST)

Test 1 Letter naming (Kutamka herufi)

a b c h d e f g h i j k l m n o p r s t u v w y z

Test 2 letter-sound association (Kuhusianisha sauti na herufi)

a b c h d e f g h i j k l m n o p r s t u v w y z

Test 3 Phonological tasks (Stadi za kifonolojia)

(i) syllable counting (kutambua silabi)

- (a) kujifunza.....
- (b) dhahabu.....

4. (ii) Initial sound identification (Kutambua sauti ya mwanzo katika neno)

- (a) limau
- (b) kiti.....

4. (iii) Phoneme blending (Kuunda neno toka kwenye fonimu)

- (a) /ny/-/u/-/m/-/b/-/a/-/n/-/i/=.....
- (b) /k/-/i/-/k/-/o/-/m/-/b/-/e/=.....

Test 4 word read (Kusoma maneno yenye ongezeko la silabi)

- (a) embe
- (b) chungwa
- (c) mashindano
- (d) Sherekea
- (e) madarasani
- (f) Thamani
- (g) gharama
- (h) hospitalini

Test 5 Sentence read (Kusoma sentensi zenye ongezeko la maneno)

- (i) Mwalimu anafundisha
- (ii) Mwalimu anafundisha wanafunzi
- (iii) Baba na mama wanalima
- (iv) Baba na mama wanalima shambani
 - (i) mtoto analia
 - (ii) sisi tunapenda michezo
 - (iii) Mzee Juma ameketi sebuleni
 - (iv) Mzee Juma ameketi sebuleni kwake.

Test 6 Word write (Kuandika maneno yenye ongezeko la silabi)

- (a) embe
- (b) chungwa
- (c) mashindano
- (d) Sherekea
- (e) Mawasiliano
- (f) Thamani
- (g) gharama
- (h) hospitalini

Test 7 sentence writing (Kuandika sentensi zenye ongezeko la maneno)

- (i) Mwalimu anafundisha
- (ii) Mwalimu anafundisha wanafunzi
- (iii) Baba na mama wanalima
- (IV) Baba na mama wanalima shambani
- (V) mtoto analia
- (VI) sisi tunapenda michezo
- (VII) Mzee Juma ameketi sebuleni
- (VIII) Mzee Juma ameketi sebuleni kwake.

Appendix 2. Grouping in the post-assessment in the identification phase.

Group	small-group	Component tested	Time (minutes)	Total time (minutes)
1 (50 children)	1 (15-16 children)	ORAL SKILLS		45
		-Letter knowledge	10	
		-Letter-sound knowledge	10	
		-Phonological tasks	10	
		-Word reading -sentence reading	15	
	2 (15-16 children)	-Letter knowledge	10	45
		-Letter-sound knowledge	10	
		-Phonological tasks	10	
		-Word reading -sentence reading	15	
	3 (15-16 children)	-Letter knowledge	10	45
		-Letter-sound knowledge	10	
		-Phonological tasks	10	
		-Word reading -sentence reading	15	
Whole group	50	2. WRITING SKILLS -Word writing -Sentence writing	10	145

This study focuses on promoting literacy skills in grade one in primary schools in Tanzania. The situation of the schools in the country and the problems and challenges they face are many. The schools have high dropout rates and high failure rates in national examinations, accentuated by poor examination results and by high repetition rates in several grades. The situation calls for new paradigms of teaching and learning strategies in primary education in Tanzania. Many kinds of reasons and explanations for the situation can be found. In essence, there seem to be problems with reading and writing ability in nearly all primary schools. It should therefore be of the highest priority to find strategies to improve the situation.

The overall aim of this study was to help Tanzanian schoolchildren improve their literacy skills. Being literate is seen as one of the basic conditions for successful schooling, and for a good adult life. Specifically, the aim was to create and evaluate an intensive short-term intervention program for children at risk of reading and writing difficulties in grade one. The study was a randomized controlled experiment. The focus was on children from a low socioeconomic status area in Dar-es-Salaam. Dynamic assessment was used both in the identification of children at risk and in the intervention program. Dynamic assessment as a tool for teaching and assessment is novel in the Tanzanian school context.

The effects of the five week program were very positive. The experimental group improved significantly more than the control groups in phonological awareness, and in reading and writing skills. The effect was seen also five months after the intervention. A transfer effect on school achievement in Kiswahili and English was noticed.

Implementation of short-term intensive literacy skills intervention programs with dynamic assessment at group level is suggested as a strategy to improve the described school situation. The focus on identification and prevention of reading and writing problems at the earliest stage of schooling is seen as a valuable solution in the goal of raising low levels of school performance and literacy skills in Tanzania.

