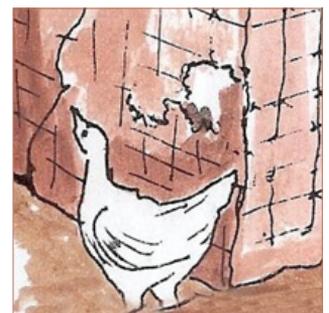
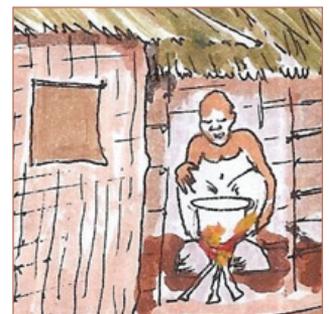


Literacy Skills of Kiswahili Speaking Children in Rural Tanzania

The role of home environment





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IN RURAL TANZANIA

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Damaris Ngorosho

Åbo Akademi University, Vasa
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Abstract

This thesis investigated the role of home environment in literacy skills (phonological awareness, and reading and writing ability) of Kiswahili speaking primary school children in a rural area in Tanzania. The thesis has *three specific aims*: *Firstly* as a basis for the whole study, to analyze the reading and writing ability of Kiswahili speaking children from a rural context of Tanzania. *Secondly*, to identify indicators that could best describe the home living environment (social and physical environments) and home literacy environment in a rural setting in Tanzania. *Thirdly*, to identify home environment variables, which significantly relate to and predict children's phonological awareness, and reading and writing ability in the Tanzanian rural context.

Data were collected in five studies and reported in six articles. Tasks to measure phonological awareness and reading and writing ability were administered to samples of children from grades 2 to 6 during school activities. Parents responded to questionnaire-based interviews about the home environment.

The results revealed that in the process of learning to spell by writing words, children make errors (e.g. confusion between, omission and addition of letters) that are phonologically equivalent to errors made in English, although Kiswahili is a consistently spelled language. Learning accurate writing in Kiswahili requires acquisition of linguistic knowledge about dialects, phonology, orthography and grammar which seems to be needed also for learning inconsistent languages.

Five key variables (fathers' and mothers' education, house wall material, light source, and the number of books for school subjects in the homes) were found and regarded as significant indicators of home environment in rural eastern Tanzania. The home environment was not significantly related to reading and writing when a summary index of socioeconomic status was used in the analyses in a large study. However, when the home environment variables were separately used in other studies, parents' education and occupation, housing variables and literacy facilities showed significant relationship with phonological awareness, and reading and writing ability. Measures of home environment should be culturally valid for the area under study. It is obvious that there is a need in Tanzania for early screening and support of children with potential reading and writing difficulties. Strengthening the plans for improving the home literacy environment is suggested.

Key words: Home environment; literacy skills; phonological awareness, reading and writing ability; Kiswahili; consistent orthography; Tanzania.

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December, 20th 2011.

Damaris L. Ngorosho

Contents

List of Abbreviations	11
List of original articles	12
1 Introduction	13
1.1 The context of the study	15
1.1.1 Primary education in Tanzania	15
1.1.2 Kiswahili language	18
1.2 Home environment	21
1.2.1 Measures of home environment	23
1.3 Literacy skills	26
1.4 Home environment and acquisition of literacy skills	29
1.5 Organization of the thesis	31
2 Aim of the thesis	32
3 Implementation and method	33
3.1 Initial stages of the study	33
3.2 The basis for the studies	34
3.3 Study participants	36
3.4 Data collection and instruments	36
3.4.1 Phonological awareness tasks	37
3.4.2 Reading tests	37
3.4.3 Writing tests	37
3.4.4 Questionnaire-based interview	37
3.5 Ethical considerations	38
4 Description of the articles	39
5 Summary of the results	46
5.1 Writing problems identified in Kiswahili beginning readers	46
5.2 Key indicators of the home environment in a rural setting in Tanzania	47
5.3 The role of home environment in the development of literacy skills	48
6 Discussion	51
6.1 Children’s development of literacy skills in Kiswahili	51
6.2 Identification of valid home environment variables	54
6.3 Home environment and literacy skills	55
6.4 Methodological considerations	58

6.5 Conclusions and recommendations for further research	60
Summary of the study	63
Sammanfattning	68
References	72

Articles

List of Abbreviations

The following abbreviations are used in the study.

ADEM	Agency for the Development of Educational Management
COBET	Complementary Basic Education in Tanzania
DEPT	Doctoral Education Project in Tanzania
DfID	Department for International Development
ICT	Information and Communication Technology
ISC	Index of Status Characteristics
ISP	Index of Social Position
MoEC	Ministry of Education and Culture
MoEVT	Ministry of Education and Vocational Training
NBS	National Bureau of Statistics
NCES	National Centre for Educational Statistics
PEDP	Primary Education Development Plan
PSLE	Primary School Leaving Examinations
SCH	Social Class Hierarchy
UNESCO	United Nations Educational, Scientific and Cultural Organization
URT	United Republic of Tanzania

List of original articles

The thesis is based on the following articles:

- I Alcock, K. & Ngorosho, D. (2003). Learning to spell a regularly spelled language is not a trivial task – patterns of errors in Kiswahili. *Reading and Writing: An Interdisciplinary Journal*, 16, 635-666.
- II Alcock, K. & Ngorosho, D. (2007). Learning to spell and learning phonology: the spelling of consonant clusters in Kiswahili. *Reading and Writing: An Interdisciplinary Journal*, 20, 643-670.
- III Bhargava, A., Jukes, M., Ngorosho, D., Kihamia, C. & Bundy, D. (2005). Modelling the effects of health status and educational infrastructure on the cognitive development of Tanzanian schoolchildren. *American Journal of Human Biology*, 17, 280-292.
- IV Ngorosho, D. (2010). Key indicators of home environment for educational research in rural communities in Tanzania. *Child Indicators Research*, 3, 327-348. doi:10.1007/s 12187 009-9061-7.
- V Ngorosho, D. (2010). Reading and writing ability in relation to home environment: A study in primary education in rural Tanzania. *Child Indicators Research*. doi: 10.1007/s 12187-010-9089-8.
- VI Ngorosho, D. & Lahtinen, U. (2010). The role of home environment in phonological awareness and reading and writing ability in Tanzanian primary schoolchildren. *Education Inquiry*, 1(3), 215-238.

1 Introduction

Literacy skills among primary schoolchildren are the central theme in the present thesis with a focus on the role of the home environment. The home environment is regarded as a setting which contains social and cultural knowledge and skills that are important for children's growth and development in literacy skills (Lanter, 2006). The social knowledge and skills provide children with education and life skills that enable them to interact actively with other people in the community. The cultural knowledge and skills provide children with language, technology and strategies which enable them to participate functionally in social experiences and activities (Miller, 2002).

Children develop language and learn important information about language through active participation and interaction with other people in and around the home environment. For example, children naturally learn sounds and sound structure and how to organize speech sounds according to the pattern characteristic of their native language as a predisposition to acquiring spoken language (Gillon, 2004; Lundberg, 2009). The patterns of sound structure enable children to form words and understand how to use them. The knowledge that words are constructed from sounds facilitates the development of phonological awareness which is a pre-condition for reading acquisition in an alphabetic language system (Adams, 1990; Anthony & Lonigan, 2004). Phonological awareness comprises a variety of sub-skills which reflect the access and understanding of the sound structure of a spoken language. That is, the awareness that oral language can be broken down into individual words and, in turn, the words can also be broken into individual sounds (phonemes) (Snowling, 2001). Reading in a language which is made up of alphabetic letters involves two things: first, to relate the sounds of the language to printed letters, and second, to understand the meaning of individual words and printed text (Stone, Silliman, Ehren & Apel, 2004). Just as reading requires knowledge about sounds, so does writing (Juel, 1994; Lundberg, Olofsson & Wall, 1980). Specifically, learning to write requires the ability to translate units of sounds into units of print (Whitehurst & Lonigan, 1998). Thus, the home environment provides the earliest important knowledge and skills for the development of phonological awareness and reading and writing skills.

Children further develop the ability to read and write as a result of exposure to literacy facilities and practice, especially where the environment is supportive of these abilities. For example, the availability of reading materials and parental involvement in the child's reading and writing activities at home has a motivating effect on reading and writing ability (Sénéchal & LeFevre, 2002). Various studies have shown that most children who are successful in reading and writing come from families with a literacy-rich environment (Aulls & Sollars, 2003; Teale & Sulzby, 1986; Whitehurst & Lonigan, 1998). Moreover,

a literate home environment also includes parents who value reading, because by so doing, children get the impression that reading is an important activity. In addition to having a home with reading materials and where parents are involved in reading, parents create a literate home environment when they encourage their children to write regularly (Colker, 2009).

Most previous studies were carried out in developed societies. Knowledge and understanding of the role of the home literacy environment in children's development of language and literacy skills in developing societies is scarce. Moreover, it is known that factors considered relevant to define home environment in developed countries might not necessarily be valid for developing countries (Kanyongo, Certo & Launcelot, 2006; Lockheed, Fuller & Nyirongo, 1989; Moore, 2003). The present thesis includes a discussion about how socioeconomic status is defined in Tanzania, a country where development has not yet come so far as, for example, in the USA, Finland or Sweden. The issues which are important in order to understand how the African home environment affects the development of a child are not the same as those from which the social structure in a different society are constructed. This is why it is important to analyze which factors explain reading and writing ability in African society, and start to build from these and a psychologically based description and classification of the African home environment. The African country chosen to be in focus in this study is Tanzania.

The purpose of this thesis is to contribute to our knowledge and understanding about children's literacy skills and to the role of the home environment in the development of these skills by studying the topic in a developing country using a transparent language. The context is rural Tanzania and the language is Kiswahili. The thesis is based on and includes five separate studies, published in six articles. The articles are summarized in Chapter four and included in the appendix.

In this thesis the notion literacy skills is used to cover the components of reading and writing ability¹, as well as phonological awareness. Phonological awareness is regarded as a precondition for learning to read. We know that there are problems with reading and writing in the primary schools in Tanzania.

Children lack adequate reading and writing skills which eventually contribute to low achievement among these children on completion of primary education which lasts for seven years. Early screening of children at risk of becoming poor readers is expected to help in proposing activities and support for teachers and

¹ In earlier reading and writing research there is variability in the use of the notions ability and skill. Ability refers basically to biologically affected readiness, whereas skill refers to something that can be acquired through practice. However, many studies which apply similar tests to those in this study use the notion ability. In this study it was decided to use the notion ability, although the tests measure components which can be learned with moderate effort.

their children in the classes. Early screening also produces valuable information about children's literacy skills to be used in the process of developing strategies and plans for education, inclusive education, and special education.

In this chapter four issues are discussed: firstly, the context of the study by focusing on the primary education, and problems related to the provision of primary education in Tanzania. The structure and origin of Kiswahili, as well as studies that have been conducted on Kiswahili are presented in the first section. Secondly, the conceptualization of the home environment as a social setting and measures that have been proposed to study the home environment in developed countries are summarized. Further, different measures thought valid for research in a rural setting in Tanzania are presented. Research findings concerning development of literacy skills are reviewed in section three; and finally a summary of findings concerning the role of home environment in the development of literacy skills is presented.

1.1 The context of the study

The present study was conducted in rural Bagamoyo District, which is situated in the coastal area of eastern Tanzania. The population of Bagamoyo District is estimated to be 277,673 people, with about 82% living in the rural areas (National Bureau of Statistics, NBS, 2010). Diverse ethnic groups including the Zaramo, Kwere, Doe, Zigua and the Swahili, inhabit the study area (NBS, 2010). Kiswahili is spoken widely throughout the study area even within families whose mother tongue is not Kiswahili. The study involved families that speak Kiswahili as the main language for communication in the home. Thus, all the children who were involved in the study spoke Kiswahili as their first language.

The economic situation of the people in rural areas in Tanzania in general, and thus also in Bagamoyo District, is weak (NBS, 2002). The main economic activities in rural areas in Bagamoyo District include subsistence agriculture - cultivating rice, maize and cassava, fishing in the Indian Ocean or the Ruvu River and its tributaries, and mariculture (for example sea weed farming and prawn farming), trade and commerce (Sosovele, 2009). About 76% of the population participate in agriculture and about 24% are employed in the public and private sectors. In this regard, people are mostly engaged in agricultural activities which have no regular payment. Other activities in the informal sector include retail shops, and selling charcoal, coconuts and fruits. Thus, a general understanding of the social and economic status of the people in the rural area, and the amount of income a household can generate, is expected to mainly depend on the quantity of land, and to a very low extent on monthly-paid jobs.

1.1.1 Primary education in Tanzania

In addition to the home environment, school is an important learning environment for the child. The early years of education, especially primary

education, are crucial for the development of literacy skills. Primary education in Tanzania constitutes two years of pre-primary and seven years of primary education. Pre-primary education serves children from the age of five to six years (United Republic of Tanzania, URT, 1995). However, some parents send their children to pre-primary schools at an age earlier than five so that they will spend more than two years in pre-primary schools before they enrol in a primary school at the age of seven (Mtahabwa & Rao, 2010). Kiswahili is the language of instruction in public primary schools and it is also taught as a subject at all levels of education (URT, 1995). The primary level of education is considered to be the main delivery system for the basic education of children outside the home (URT, 1995). In the first two years of primary education, great attention is directed to language and reading and writing skills. For the upper grades, language and reading and writing ability are further developed during Kiswahili lessons through story-telling, reading, comprehension, dictation, letter writing, essay writing, plays and games, and so forth (URT, 2005).

One of the major objectives of primary education in Tanzania is to enable every child to acquire and develop tools of communication, as well as to acquire the basic learning tools of literacy skills (URT, 1995, 2005). The ultimate goal of primary education is to make sure that every child acquires relevant and adequate language and literacy skills that will enable him or her to obtain information and knowledge from various sources including printed and electronic materials. In order to realize the intended objective of primary education of enabling all children to acquire adequate literacy skills, and from the fact that learning has become more dependent on information obtained from print, the government of the United Republic of Tanzania embarked on a huge programme of educational development, the Primary Education Development Plan (PEDP) (URT, 2001). The plan covers the provision of primary education, as well as education for out-of-school children and youth (Complimentary Basic Education in Tanzania, COBET). PEDP is being implemented in phases of five years, and the first phase started from 2002 through 2006. Implementation of the second phase covers another five years from 2007 to 2011. The targets of priority investment for PEDP include: *enrolment expansion*, focusing on classroom construction, teacher engagement, and teacher deployment; *quality improvement*, encompassing in-service and pre-service teacher training, and teaching and learning materials provision; and system-wide *management improvement* through a range of capacity building efforts (URT, 2001; 2007).

Despite the government's efforts to improve the quality of primary education, schools are faced with an acute shortage of teaching and learning facilities, large classes, low pass rates, and high dropout rate (Editor, Daily News, 2009; Ministry of Education and Vocational Training, MoEVT, 2009). Efforts for quality education have focused almost exclusively on quantitative but not qualitative inputs. Enrolment in primary schools has increased by 5.8% from 7,956,884 pupils in 2006 to 8,419,305 pupils in 2010 (MoEVT, 2010). The increase indicates that the majority of children are now enrolled in schools at

age seven. The Net Enrolment Ratio for the Coast region where Bagamoyo District is located is 99.4% (MoEVT, 2010). With this trend in enrolment, it is expected that all children aged 7 – 13 can be enrolled by the year 2015. However, classrooms, teaching and learning materials such as books and desks, and teacher recruitment, have not kept up with expansion in enrolment. As a result, there is extreme overcrowding, with class sizes ranging from 88 to 100 children in some schools (Department for International Development, DfID, 2009; Siyame, 2010) and the situation is worse in schools in rural areas compared to those in urban areas (MoEVT, 2008). The desk to pupil ratio in the state primary schools is 1:5 (Mbele, 2008). According to educational statistics, one book is shared between three to eight children, and there are no libraries in the primary schools (MoEVT, 2009). With such a situation in the classrooms, effective learning might not be realized. Teachers cannot cope with large classes, and children are not actively involved in the learning process. The consequence is low achievement, especially in reading and writing skills.

Low achievement in reading and writing among primary school children has been a persistent trend that has raised concern from both the public and the government since the 1980s. Findings from studies about children's performance in the final Primary School Leaving Examinations (PSLE) reveal that the overall pass rates in the PSLE examinations have not been impressive for the past four years. In 2006, the pass rate was 70.5% of all pupils enrolled in grade seven. In 2007, the pass rate dropped by 16.3% from 70.5% to 54.2%. The pass rate dropped further in 2008 to 52.7% and in 2009 the pass rate was 49.4%. According to the Ministry of Education and Vocational Training (2009), the pass rate for the Kiswahili examination which mostly measures the ability to read and write, was 69%. In this regard, about 31% of the pupils completed primary education without adequate literacy skills. The PSLE results showed that the best performance was from urban-based primary schools as compared to rural ones (MoEVT, 2009). When those who fail emerge from school lacking basic reading and writing skills and obtain no other education, they face a lifetime of disadvantage.

The problem of inadequate acquisition of literacy skills is also seen in the grade 4 national examinations. Most of the children who failed in the examinations had reached the end of grade 4 without achieving the requisite literacy and numeracy skills. Mass failures, especially from public schools, were observed in the examinations from 2005 to 2009. In 2005, about 14% of grade 4 children failed the examination. The failure rate increased to 20% for 2006 and close to 23% in 2007 (MoEVT, 2009). Examination results for 2009 showed that Morogoro region had the highest percentage of failures, followed by Kigoma. About one-third of grade 4 pupils in these regions failed. Other regions, Lindi (23.6%), Rukwa (21.3%), Mbeya (21.1) and Shinyanga (20.8%) showed that more than one-fifth of the pupils failed. Examination results for the Coast region showed that about 14% of grade four children failed in 2009. Bagamoyo District is one of the six districts in the Coast region.

The pass rate set by the government for the grade 4 national examination is 15% for each subject. Despite the small pass rate set, many children do not pass. One of the possible reasons might be incompetence in mastering reading and writing skills something that goes un-researched about throughout the four years of early primary education. Children who perform at a level below 15% in the national grade 4 examinations are supposed to repeat the grade, thus going through the same grade twice. There is a big risk of children having to repeat grade 4. Repeating a grade discourages many pupils because they think they will not know how to read and write. And as a result they become truants, which eventually results in dropout.

Dropout is a problem in primary schools, especially in the public primary schools. On average about 30% of children enrolled in school fail to complete seven years of primary education (MoEVT, 2009). About 3.7% of children in each grade dropped out during the 2008 school year. Between 2000 and 2001 the rate was 5.5%.

Low promotion rates in primary schools are seen more in grades 1 and 4. As a result, high repetition rates are expected to occur in similar grades. Promotion rates from grade 1 to grade 2 and from grade 4 to 5 were less than 90% from 2006 to 2008 (MoEVT, 2009). Close to 10% of grade 4 pupils were not promoted to grade 5. This is a significant percentage of pupils who are upgraded from the lower grades into grade 4 with low achievement in literacy skills. However, little is known about the types of reading and writing difficulties the children experience in learning how to read and write. Early identification of problems that children experience, for example the types of errors they make in the effort to learn to read and write correctly, is important in order to improve the pass rates in literacy skills as well as school achievement, thus also improving the promotion rates. Important to note is that promotion rates among grade 5 children went up and were constant from grades 6 to 7. Conversely, the repetition rates increased gradually in grades 1 to 3 and shot up in grade 4 because children who fail the national grade 4 examinations are not promoted to grade 5.

1.1.2 Kiswahili language

Kiswahili is a transparent language with consistent grapheme-phoneme correspondences (Ngugi, Okelo-Odongo & Wagacha, 2005). However, the transcription from phoneme to grapheme is not perfectly consistent due to orthographic rules related to the grammatical system of the language and dialect differences. In Kiswahili, grammatical affixes can be phonologically the same although they are spelt differently. For example, the words *alionunua* (e.g. in mlango alionunua – the door that she/he bought) and *aliyonunua* (e.g. nyumba aliyonunua – the house that she/he bought) are pronounced the same although there is a grammatical difference which is indicated by the agreement of the pronoun marker and should be marked in the spelling.

Further, dialect differences in Kiswahili make phonological distinctions that can be retained in orthography. Beginning learners or young speakers can, however, use their dialect variations before they realize that the dialect form is not legally accepted in standard written Kiswahili. For example, /l/ (as in the word *mbili* – two) is often confused with /r/ (*mbiri*) and /θ/ spelt as /TH/ (in the word *thelathini* – thirty) is pronounced as /t/ (*telatini*) in the Kimwani dialect of Kiswahili spoken in the Quirimbas Islands and northern coastal area of Mozambique (Wikipedia; The free encyclopedia, 2010). Children who are able to write dialect forms of the language are phonologically sensitive; what they lack is orthographic knowledge that they could use to write the formal language correctly.

Various notions are used to describe a language that has transparent orthography. These include symmetrical consistent language, regularly spelled language and regular orthography. In this study, the notions consistent orthography, symmetrically consistent orthography or transparent orthography carry similar meaning and are used to describe Kiswahili language.

The difficulty of learning to read experienced by children learning to read inconsistent orthographies such as English seems not to face children learning to read transparent orthographies like Kiswahili. Lack of difficulty in learning to read in a transparent orthography is due to an almost perfect consistency of the relationship between letter and sound of the alphabetic system (Danielson, 2003).

The sound structure (phonological structure) of Kiswahili makes the language easy to transcribe, and therefore easy to learn to read and write. The alphabet used to write Kiswahili is the same as the Roman alphabet, with letters chosen to represent Kiswahili sounds. According to Guthrie (1948) and Steere (1998), the Kiswahili alphabet has five vowels (*a, e, i, o, and u*), nineteen consonants (*/, c, d, f, g, h, j, k, l, m, n, p, r, s, t, v, w, y, and z*) and nine digraphs (*ch, dh, gh, kh, ng', ny, sh, th, ng*). Almost all the syllables in Kiswahili end with a vowel. Nearly every letter in a word is pronounced and every letter (or letter combination) corresponds to only one Kiswahili sound. Thus, it is possible to read the language using one-to-one simple grapheme-phoneme correspondence, with a few digraphs (Amberber & Collins, 2002; Heine & Nurse, 2000). Although it is easy to decode written words, the writing or spelling of the words is not a straightforward task. It often lacks the complete one-to-one phoneme-grapheme correspondence found in reading (Alcock, 2005). In the following sections the origin and status of Kiswahili are presented in order to give a basis for the study.

Kiswahili is a language of Bantu origin (Batibo, 2000; Leg`ere, 1992; Massamba, 2002). There is, however, a view that the language is linked to other non-African languages. Early reports claim that when Arabs, Portuguese, and Persians came to the coast of East Africa, they communicated and intermarried within the local tribes. They interacted with the natives using a language that

combined both the foreign language and the language of the people of the coast. Thus, Kiswahili borrowed extensively from foreign languages. For example, Arabic contributes 35% to Kiswahili vocabulary (Chiragdin & Mathias, 1997; Musau, 2000). According to Leg`ere (1992), Kiswahili borrowed Arabic words related to religion (e.g. *mtakatifu* - holy person), trade (e.g. *biashara* - business), commerce (e.g. *tisa* – nine) and sailing (*mashua* – boat). In addition, the Persian language contributed words like *serikali* (government), *gereza* (prison) and *pesa* (money). Kiswahili language also took words from the Portuguese like *mpira* (ball), *bendera* (flag), *leso* (handkerchief) and *mvinyo* (wine).

Words from English and German were assimilated into Kiswahili and their pronunciation follows that of the Kiswahili language. The English language contributed words such as *motokaa* (motorcar), *dereva* (driver), *baiskeli* (bicycle), *penseli* (pencil), and *ripoti* (report), while the German language contributed words such as *shule* (school). Although Kiswahili has borrowed extensively from other languages, the structure of the language is Bantu (Leg`ere, 1992; Mazrui, 2007).

Given the fact that only the vocabulary can be associated with the new languages, the syntax or grammar of Kiswahili is Bantu. The main characteristic of Bantu languages is the use of affixes and the arrangement of nouns into classes (Alcock, 2005). There are 14 noun classes in Kiswahili, and prefixes such as m/wa as in mtu/watu (person/persons) are mainly found in noun classes 1 and 2 (Leg`ere, 2002). There are other local languages of Bantu origin in Tanzania, such as Sukuma, Haya, Nyakyusa, Nyamwezi, and Chagga; but only about one million people speak these languages. Kiswahili is a native language for about ten million people, especially people living in the coastal areas of the country. Kiswahili is a second language for most people in the interior areas and especially in mainland Tanzania.

Kiswahili assumes the significant role of a unifying language of the country between different tribes who each have their own tribal language. At the present time, some 90 percent of approximately 41 million Tanzanians speak and understand Kiswahili (Brock-Utne, 2002, 2007; Muzale & Rugemalira, 2008). In 1962, Kiswahili and English were declared official languages in Tanzania. Although English is considered to be an official language, only about 10 percent of the population can speak English (<http://www.nationmaster.com> downloaded 02.09.2010). In this regard, English serves the purpose of providing Tanzanians with the ability to participate in the global economy and culture.

According to the official linguistic policy of Tanzania announced in 1984, Kiswahili is the language of the social and political sphere as well as primary and adult education; whereas English is the language of secondary education, universities, technology and higher courts (Swilla, 2009). Although Kiswahili is the language of instruction in public primary schools, there are situations where local languages are used for teaching in grade one. In some rural areas where literacy among the people is low, Kiswahili is not as widely spoken as in areas

where people are more educated. Thus, Kiswahili in such areas is either the second or third language of the children. Children come to school competent in their mother-tongue but not in Kiswahili (Rubagumya, 1991; Senkoro, 2005).

Lack of competence in Kiswahili in the early grades may have effects on learning to read and write. Children learn better in the language they master. Children, who come to school competent in a language different from the language of instruction, have two tasks. First they must learn the language used for teaching in the class, and second, the content of the subject. Learning a new language entails learning sounds of the language, vocabulary and other linguistic features of the language. Children might show slow learning in reading and writing and eventually in school subjects, especially in the early grades.

Very little research exists about the difficulties children in early primary school grades experience in learning to read and write. Most previous research on Kiswahili has focused on discussion about the language of instruction in secondary schools and higher education (Brock-Utne, 2002; Qorro, 2006). A few studies thus far conducted on Kiswahili in Tanzania focused on performance in Kiswahili as a subject. The studies utilized scores awarded by subject teachers in school examinations and/or pass rates obtained from the Primary School Leaving Examination done towards the end of grade 7 (Bakahwemama, 2009; Hakielimu, 2003). Most of these studies compared children's performance in Kiswahili and English subjects. The findings show that students performed well in Kiswahili compared to English language. Results for the Primary School Leaving Examinations released in December 2009, show that the average pass rate in Kiswahili was about 69% and average pass rate in English about 35% (Kagashe, 2009). Few other studies have examined the influence of local languages on Kiswahili (Batibo, 2000; Mochiwa, 1979) and Kiswahili as vehicle of unity and development (Kishe, 2003). In short, there is very little research explaining the very basic reasons for low achievement in reading, writing and ultimately, in school achievement. Reading and writing skills in Kiswahili language are an essential vehicle and bridge to promote quality education, and hence to reduce both repetition and dropout rates in the primary schools.

1.2 Home environment

This thesis views the home environment as the immediate social environment of the child and thus refers to it as the *ecology of child development*. Bronfenbrenner (1979) defines *ecology* of human development as “the scientific study of the progressive mutual interaction between an active growing human being and the changing properties of the immediate settings in which the developing person lives”. The process of development is affected by relations between the settings and the larger contexts in which the settings are embedded. In this regard, Bronfenbrenner emphasizes that the developing person is not

passive to the environment; rather dynamic and progressively helping to restructure the environment in which she/he lives. The environment, on the other hand, exerts its influence on the developing and growing person through shared interactions between the person and other people, objects, and symbols found in the environment (Sontag, 1996).

Referring to the home environment as a social setting puts the thesis also in the perspective of sociocultural theory. Sociocultural theory emphasizes that human development results from dynamic interaction between a person and the surrounding social and cultural forces. According to Vygotsky (1986), the child's learning is enclosed with social events occurring as the child interacts with people in the environment. The child participates in various social tasks through language (Vygotsky, 1978).

Three main features of the two theories, the ecological theory of human development and sociocultural theory, are important to consider in relation to the development of the child. First, the theories set the child in her/his social setting and emphasize the role of the environment in the child's development. Second, the child's environment is considered relevant to the developmental processes. Third, the theories view the child as an active person who not only influences the environment but is also influenced by the environment. The relationships between the child and the environment are reciprocal.

Based on the main features emanating from the two theories, the thesis regards the home environment as a microsystem (Bronfenbrenner, 1979). According to Bronfenbrenner, a microsystem is a pattern of activities, roles, and interpersonal relations experienced by the developing person in a given setting with particular physical and material characteristics. The microsystem of an individual therefore includes the culture in which that individual is educated and lives in, and the other people with whom the individual interacts (Zastrov & Kirst-Ashman, 2009).

Although it is not possible to ground this thesis on the ecological model, due to the correlational design in most of the included studies, the thesis is to some extent based on and identifies elements from the model. The home living and home literacy environments are identified and related to the development of phonological awareness, and reading and writing ability. In order to fully base the study on the ecological model, and use it in the process of assessing the influence of home environment on the development of phonological awareness and reading and writing ability, the elements process and time would have had to be included. The criteria for the ecological model, the four proposed elements – process, person, context and time (Bronfenbrenner & Morris, 1998; Tudge, Mokrova, Hatfield & Karnik, 2009) are not fulfilled in the study. Nevertheless, the thesis takes advantage of the ecological and developmental model in order to be sensitive to the relevance of different factors for micro- and other higher levels.

However, the goal of the present study is to pave the way for a more ecological classification of learning environments and culturally sensitive analysis of the macro-processes which support and suppress good development through a high literacy rate, with respect to Tanzania.

1.2.1 Measures of home environment

Based on different social structures, it is obvious that measures for studying home environment reflect the society they are intended to measure in their geographical area (Moore, 2003). Measures designed for use in one society may not be valid for studying the home environment in another society due to different conceptualizations and variables used to define the home environment (Kanyongo, et al., 2006; Lockheed, et al., 1989).

A number of measures for home environment have been devised for use in research in developed countries. The measures are, however, mainly based on two interlinked components of the socioeconomic status (SES): class and position. Socioeconomic class refers to social groups that arise from interdependent economic, social and legal relationships among a group of people (Morris, Carletto, Hoddinott & Christiaensen, 2000). On the other hand, socioeconomic position generally refers to the various components of economic and social well-being that differentiate persons of different social classes (Sirin, 2005). Wealth and income are two important dimensions of socioeconomic position. Scales related to socioeconomic status are more adequate for societies where the society is organized more on the basis of social classes. In developing countries, and particularly in Africa, societies are organized more on the basis of ethnic solidarity than on relationships based on social position (Miles & Rochefort, 1991).

Examples of socioeconomic status scales include the Coleman-Rainwater (SCH), which categorizes society into three levels - upper, middle and lower levels, based on the percentage of income, level of education attainment and type of occupation. Hollingshead (ISP) is based on the sum of two components - education and occupation. Occupation is classified into seven categories, ranging from executives, proprietors and major professionals to the lowest rank of unskilled employees. Similarly, education is scaled from levels 1 to 7, with 1 representing the lowest rank and 7 representing the highest level. One of the limitations of Hollingshead (ISP) is lack of validity across cultural settings. The scale was developed for a single community and obtained information on occupations which appeared in that sample (Mueller & Parcel, 1981). Warner's ISC is based on occupation, source of income, house type and dwelling area. Occupation is also classified into seven ranks scored from 1 to 7 (1 representing the highest professionals and proprietors of large business, and 7 representing unskilled workers). Ranking of the other components – source of income, house type, and dwelling area – are consistent with ranking of occupation. Thus, from the outlined scales, the most commonly used components of SES are education,

occupation, and income, while less commonly used, but potentially important, are measures of the dwelling area, including housing and literacy conditions (Daly, Duncan, McDonough & Williams, 2001; Evans, Shaw & Bell, 2000; Van Steensel, 2006).

Although the scales to assess the home environment were designed for use in developed societies, studies conducted in developing countries have also utilized variables related to socioeconomic status (Heyneman, 1976, 1979; Mwaniki, 1973; Puja, 1981). In addition to variables of SES such as education, occupation and income, variables related to the quality of housing conditions have been identified as unique measures for assessing the home environment in developing societies. The uniqueness of measures related to housing conditions in developing countries is related to variations in amenities, whereas in developed countries almost all families live in good houses with good facilities and amenities like piped water and electricity. Study results from developing countries also reveal that housing conditions can be used to describe the socioeconomic status level of a family (Arias & De Vos, 1996; Arimah, 1992; Fiadzo, Houston & Godwin, 2001).

Material possessions (land, TV set, fridge) and social involvement are identified as profiles for SES in developing countries such as India and Zimbabwe (Kanyongo, et al., 2006; Tiwar, Kumar & Kumar, 2004). Thus, measures of home environment seem to reflect the society in which they are designed including social, economic and power relations, and culture (Moore, 2003).

Regarding the home literacy environment, measures have included examining the extent of availability of educational materials in the home, various teaching strategies provided by parents and other people in the home and neighbourhood (Evans, et al., 2000; Neuman, Hood & Neuman, 2009; Sénéchal & LeFevre, 2002). Home literacy environment is expected to vary within and across societies due to differences in social environments. Families from high socioeconomic status are more likely to have richer literacy home environments compared to families from low socioeconomic status.

Various measures of the home environment have been proposed. The measures vary according to variations in the home environments within and across social contexts. Thus, variables which seem to be appropriate for describing the home environment in a certain social context cannot automatically be expected to be suitable for a different setting. In this regard, measures to assess the home environment should feature the social and cultural aspects, and the geographical location of the society under study.

Most of the measures that have so far been used to study the home environment in Tanzania are those developed and designed for use in developed countries (Malmberg & Sumra, 1998 – 2001; Puja, 1981). A few studies have, in addition to these measures, used different variables that seemed a more useful representation of a pupil's home situation. Ellis and Mdoe (2003), for example,

categorized rural families in Tanzania into three levels of socioeconomic status, as follows: High SES is distinguished by owning four acres or above of land; five or more cattle; five to ten goats; parents educated to primary grade 7 or higher; employing nonfamily labour seasonally; owning bicycles or radios; often owning a business, and being sure of getting food all year-round. The middle SES category has less of all these assets, and additionally can be found to resort to selling rather than buying labour due to seasonal food insecurity. The poor people possess little or no land, no cattle or goats, sell their labour to others, have little or no formal education, and have little non-farming self employment (Barrett, Reardon & Webb, 2001).

Other studies conducted in rural areas in Tanzania have used housing facilities such as structural features of the family house and the presence of certain household possessions (Mtana, Muhando & Höjlund, 2004; Somi, 2003). The structural features of the family house included type and quality of construction material, type and source of light and water, and type of cooking fuel. Household possessions included ownership of transport facilities and furniture. The use of such items provides a more useful representation of pupil's home situation in a poor rural setting in a developing country (Lee, Zuze & Ross, 2005).

In the present thesis, the home environment was conceptualized to include the home living environment and home literacy environment. The home living environment was described through family SES, housing conditions and wealth-related possessions, while the home literacy environment was captured by the availability of educational materials and facilities, and parental involvement in school learning. Family socioeconomic status was defined through parents' education and occupation, housing conditions, and wealth-related items such as land, radio and bicycle. Parents' education was determined by the attainment of formal education, that is, the number of years a parent had spent in school or whether the parent had attended post-literacy adult education classes which provided adults who had not had the opportunity to enrol in formal education to receive functional literacy skills. Parents' education was thus categorized into no formal education, primary education, adult education and secondary or post secondary education. The literacy rate in Tanzania is estimated to be 62.2% for women and 77.5% for men (World Fact Book, 2010). Generally, illiteracy and lack of formal education is on the rise in Tanzania. In the 1980s, the level of literacy in the country was estimated at 84% (UNESCO, 2007). At the present time, the literacy rate has dropped to less than 60%, indicating that fewer people can now read and understand written information (UNESCO, 2007).

Housing conditions were determined through the quality of material for construction of wall, roof and floor. Further, the housing variables included domestic facilities such as source of water, light and fuel. Houses in rural areas are constructed using household labour and a mix of purchased goods and

gathered goods (examples of these are corrugated iron sheets and poles and stones, respectively (Morris, 2000; Sender & Smith, 1992).

With regard to wealth, possession of items like land, radio, transport facilities such as a bicycle, and furniture were used to indicate the level of wealth of a family. The findings revealed that on average, the majority (70 percent) of families owned two or less than two acres of land, and a very small proportion of the families (5 percent) had more than five acres of land. Almost 5 percent of the families had no land at all and therefore depended mostly on borrowed land from those families that had at least more than three acres of land.

The home literacy environment was described through the availability of educational materials, including books for school subjects, notebooks for writing school work, writing equipment and parental involvement in children's school learning.

Due to the broader conceptualization of home environment among different societies, and the different ways in which the home environment is measured, findings about the influence of home environment on literacy skills differ across societies. How research about that influence has been carried out has also tended to differ. In this study I give an account of the influence of home environment on literacy skills, particularly phonological awareness and reading and writing ability from studies that were conducted in the rural areas of Bagamoyo District. The findings obtained from the studies are discussed in relation to findings obtained from previous studies carried out in other contexts.

1.3 Literacy skills

As could be expected, the development of literacy skills among children does not begin with formal instruction at school. Rather, children learn how to read and write at home through interactions and exposure to literacy-related materials and facilities found in the home (Evans, et al., 2000; Whitehurst & Lonigan, 1998). Through active interactions, children naturally develop verbal language skills by hearing others speak and also by observing the communication process naturally taking place at home (Chomsky, 1968). Children learn sequences of sounds (phonemes) in their language. Research has shown that phonemic awareness present during preschool is a strong predictor of later reading abilities (Lonigan, Burgess & Anthony, 2000; Olofsson & Lundberg, 1985). Likewise, research in a fully transparent writing system indicates that phoneme letter-awareness knowledge predicts well the reading acquisition at individual level (Lyytinen, Erskine, Kujala, Ojanen & Richardson, 2009).

Children further learn important information about the language when they come into contact with books and other printed materials. For instance, through storybook reading, children learn that print found in the books is meaningful information, which provides the children with new words (Purcell-Gates, 1994; Sulzby, 1991). Storybook reading has also been found to support receptive

language development among children before they enter grade one, and receptive language in turn has a strong link to reading performance at grade three (Sénéchal & LeFevre, 2002). Through exposure to books, children learn vocabulary when they read or a book is read to them. When the child comprehends what he or she is reading, or what is being read, the child becomes motivated by the extraction of meaning from the text. In addition to motivation to reading, vocabulary knowledge enables the child to produce complex syntactic constructions.

The syllabus for teaching Kiswahili in the primary schools in Tanzania emphasizes the teaching of knowledge of the sound structure of Kiswahili language. Teaching of reading in Kiswahili, like in other transparent orthographies, for example Finnish, follows the synthetic method. In a synthetic method, the teaching starts with small units of language (letters, phonemes), and proceeds to syllables and finally words. Teachers use phonemes (/s/, /o/ > so, /m/, /a/ > ma, > soma) to form syllables /so/ and /ma/ which eventually form the words e.g. *soma* (read). Kiswahili has consistent grapheme-phoneme correspondences, and using letters and phonemes to teach reading, is logical. The synthetic method helps the child in learning to write because the phonemes are consistently marked with a corresponding single letter. In Kiswahili, however, there are exceptions, for instance the nine digraphs which are marked with a combination of letters.

When children start school, they learn letter names in Kiswahili which are symmetrically consistent with their written forms. Due to the straightforward letter-sound correspondence, it should be possible for the majority of children learning to read consistent orthography to master reading by the end of grade 1 (Lyytinen, et al., 2009). However, some of the children who might have gone through privately owned child care centres, nursery schools, Montessori/other preschools enter into grade 1 with English instruction on how to read Kiswahili letters (/a/ as /ei/ instead of /a/, /c/ as /sii/ instead of /ch/ which compromises reading acquisition. This situation is chiefly seen in the urban areas. Compared to urban areas, rural areas have less number of privately owned pre-education classes, nursery schools or education centres (Mtahabwa & Rao, 2010). Thus, it is obvious that not many children are enrolled in private pre-education classes in the rural areas in Tanzania. This is also the case in the rural area of Bagamoyo, the area of this study, as explained in the following.

At the time when the children in the different projects in this study were in pre-school age (in the years 1997 – 2008) there were at most only two private pre-primary schools in the study area (Bagamoyo District Education Office, 2010). Due to high fees charged by private schools very few parents could afford to send their children to these schools. Most parents in the area are engaged in non-monthly paid activities such as agriculture, fishing and small business, and thus are poor. On the whole, even currently, only 45% of pre-school aged children in the area are enrolled in pre-school and most of them in state pre-

school classes where letter names are taught in Kiswahili. Thus, the influence of English instruction on reading Kiswahili letters is likely to be minimal among children involved in this study.

When children with English pre-reading influence enter grade 1 in public primary schools, teachers introduce Kiswahili letter names and the emphasis is put on reading the letters with addition of /e/ sound on consonants, for instance, /b/ will be read as /be/, /d/ as /de/, /g/ as /ge/, and so on. These children are expected to learn letter names in Kiswahili during the first year of school. In some cases it can be difficult for the teachers to interfere in the learning process of the letters and correct the pronunciation. As a result, the influence of English letter names has been identified as one of the potential reasons for problems in reading among children in grade 1. So far, there are no reports about the effect of English letter names on Kiswahili in the primary schools in Tanzania. However, we find this situation in e.g. Zambia, where 90% of grade 2 children could read only four or less letter sounds in their native language, Ibibemba language.

Many children at risk of reading problems go unnoticed in the primary school classrooms in Tanzania due to various reasons. Firstly, the size of the classes in primary schools is large. Classroom interactions are limited in large classes, and teachers are not able to provide the adequate individual help and support that children might require for learning reading skills. Secondly, teachers in the primary schools are not competent, they lack appropriate pedagogical skills. The majority of primary school teachers in Tanzania are those who achieved low pass rates (e.g. Division 4) in elementary secondary school examinations (MoEVT, 2010). After completion of a two-year teacher training course, the teachers are pushed to the schools without getting additional skills to boost their competence (Davidson, 2007). In developed countries, teachers are selected from the top performance rates. South Korea recruits primary school teachers from the top 5% of graduates, and they should pass a four-year undergraduate degree from one of only a dozen universities. Singapore and Hong Kong recruit teachers from the top 30% (The Economist, 2007). In general, in best performing education systems, teachers are recruited from the top pass rates of graduates. Tanzania recruits primary school teachers from the bottom third or fourth pass rates of graduates and this is stipulated in job advertisement in getting graduates to join various teachers' colleges for a two-year teacher training course.

To learn how to write words correctly (correct spelling) requires a number of types of information that children need to take into account. Phonology, orthography, dialect and grammar knowledge have been shown to be important in the spelling of transparent and complex, European, languages (Barry & de Bastiani, 1997; Pinheiro, 1995; Treiman, Goswami, Tincoff & Leavers, 1997). Our knowledge of non-European languages and especially consistently-spelled languages is, however, very narrow. Kiswahili is a non-European language with

consistent orthography from grapheme to phoneme; each grapheme maps onto only one phoneme (Alcock, 2005; Legere, 1992). Therefore, findings about learning to read and write in Kiswahili would add to the existing knowledge about orthographies of different origins.

1.4 Home environment and acquisition of literacy skills

Literacy skills developed at home are further developed through formal instruction and training found in the school. At the same time, continued provision of literacy support in the home further promotes what children learn at school (Zuze, 2008). Studies of the child's home learning environment have shown that aspects of the home environment such as socioeconomic status and literacy environment have direct and significant effects on children's language development and acquisition of literacy skills (Aulls & Sollars, 2003; Baker, 2003; Bradley, Corwyn, McAdoo & Coll, 2001; Kim, 2009). However, due to different levels of socioeconomic status, the living and literacy environments vary between cultural contexts, and from one family to another (Foster, Lambert, Abbott-Shim, McCarty & Franze, 2005). In this regard, upon entry into school, children from different home environments possess significantly different knowledge about language and print (Aulls & Sollars, 2003; Burgess, 2002) and these differences often translate into subsequent differences in reading and writing ability (Adams, 1990; Wagner, Torgesen & Rashotte, 1994).

Socioeconomic status captures the aspects of economic, social, cultural and personal factors such as parents' education, and their attitude and motivation toward school learning (Sirin, 2005). Research results show that the most influential of the four interconnected factors of SES are the personal factors and economic factors such as parents' occupation and income (National Centre for Educational Statistics, NCE, 1998; Peters, Seeds, Goldstein & Coleman, 2007). Parents from high SES levels have good education and income and are therefore in a better position to support their children's learning. They provide the children with literacy-related materials such as books and engage in joint literacy activities, for instance shared-book reading, and may assist in school homework. Parents from low socioeconomic statuses lack such support, thus children from poor homes are less likely to have support from their parents.

Scalafani (2004) says that some parents from low income families have more unmanaged stress in their lives, and this stress interferes with their ability and opportunity to interact with their child. It is likely that children from low socioeconomic status, as compared to children from high socioeconomic status, have less literacy experience and interactions. Adams (1990) estimated that a middle class child enters first grade with 1,000 – 1,700 hours of one-to-one picture book reading, whereas a child from a low-income family averages just 25 hours. Thus, differences in reading and writing ability among children are also a function of family socioeconomic status.

As discussed earlier, a literacy-supportive home environment means more than just having books and writing material. The child's participation in literacy and literacy-related activities with parents is seen as important in the preparation of the child for school based formal instruction (Burgess, 2002; De Jong & Leseman, 2001). Studies on parent participation in literacy activities in the form of teaching show that teaching children how to read and write words is related to development in early literacy skills (Sénéchal & LeFevre, 2002). Parents' participation could be in the form of provision of formal instruction and reading with children. The instruction that children receive from parents maps onto skills of reading, that is, phonological awareness (Sénéchal & LeFevre, 2002). Children become aware that words can be split into individual sounds, which are represented by letters/graphemes. The teaching of vocabulary has also been related to reading comprehension (Juel, 1994). Vocabulary knowledge helps children to identify and understand written words faster, and this makes it quicker to acquire reading competence. By being exposed to rich written language through reading words, the child gains experience with sounds and syllables, which is an important step in the acquisition of reading skill.

The finding that parental involvement provides some of the basic groundwork for children's development in literacy skills explains the individual differences in reading and writing among children. Children with stronger literacy-related support at home are more likely to be and remain better readers and writers compared to children from a weakly supported home setting. Juel (1988) points out that the probability that children would remain poor readers at the end of grade four, if they were poor readers at the end of grade, is .88.

Through exposure to books and writing materials in the home, children acquire tools for reading and writing. They learn what alphabetic letters look like and sound like, and that when put together in a certain way they make up words (Bowey, 1995). Books also provide children with vocabulary which has been linked to comprehension (Juel, 1994). Research reveals that children who enter grade one with less phonemic awareness, have not had enough exposure to print (Lundberg, et al., 1980). These children complete grade one with fewer phonemic awareness skills than children who entered grade one with adequate phonemic awareness. It is likely that children who show low achievement in examinations done at the end of grade 4 in Tanzania were poor readers at the end of grade one. Screening children for possible reading problems would have identified these children and thus led to the children receiving intervention or remedial teaching.

In conclusion, a literacy environment forms part of the whole sociocultural environment of the community. The rural community in which the present study was conducted depends mostly on subsistence farming and family-based livelihood activities such as fishing and seaweed farming. The performance of agriculture in Tanzania is poor due to unfavourable weather conditions, low use of improved agricultural technologies (mainly the hand hoe), and poor

marketing system (Ministry of Agriculture, Food Security and Cooperative, 2008). As can be expected, a strong literacy home environment might not be developed in a community that mainly lives by subsistence farming or fishing. Subsistence farming does not lead to important surplus that could be used to purchase reading and writing materials. Fiction and non-fiction Kiswahili books can be found in the bookshops but their price seem too expensive for typical poor family in the poor rural setting to buy. In this regard, activities that support children's reading and writing, for example book projects, school and village libraries, and national book reading day, could be established or strengthened where they already exist. In this way, children would have access to reading and writing facilities and thus improve their literacy skills.

1.5 Organization of the thesis

Summarizing the above, the thesis discusses: 1) the context of the study including the primary education in Tanzania, the structure of Kiswahili language; 2) the home environment and how it is measured in different societies; 3) literacy skills; and 4) the role of home environment in the development of literacy skills.

A study about the influence of children's home environment on phonological awareness and reading and writing skills is important for many reasons. First, it enhances the need for parents and schools to provide more and better literacy resources for children. Secondly, it identifies interactions and activities in the immediate context that the child engages with in the process of learning language and language-related skills. Thirdly, it identifies literacy facilities, practices and experiences available in the home that contribute to the child's development in literacy skills. Further, the study provides information about the conditions of the physical environment that describe the family housing characteristics (Arias & De Vos, 1996) which provide the child with shelter and security (Yoshinori & Suzuki, 1997).

The thesis consists of five studies dealing with children's reading and writing ability in Kiswahili, indicators of home environment in a rural setting in Tanzania, and the role of home environment in the development of phonological awareness and reading and writing ability. The studies have a varied number of participants, ranging from 41 to 680 children and parents from rural areas in Tanzania, which made conceptualization of a rural setting possible.

Section 1 covers the introduction of the thesis. Section 2 states the aim of the study and the research questions. Section 3 gives a description of the articles. Section 4 discusses issues related to research method and implementation of instruments used to collect data for the five studies. In Section 5 the results from the studies are summarised and presented in relation to the research questions. The results are further discussed in a broader perspective in Section 6. Section 7 contains the references and the final section includes the six articles.

2 Aim of the thesis

The present thesis has three main aims:

Firstly, to analyze the literacy skills of Kiswahili speaking children from a rural setting in Tanzania. As described in the introductory part of the thesis in this study, the notion literacy skills is used to cover phonological awareness and reading and writing ability. The literacy skills are described and discussed referring to comparable results from other consistent as well as inconsistent orthographies, e.g. English.

Secondly, to identify indicators that could best describe the home living environment (social and physical environments) and home literacy environment in a rural setting in Tanzania.

Thirdly, to identify home environment variables that significantly relate and predict children's phonological awareness, reading and writing ability in the Tanzanian rural context.

The following questions guided the fulfilment of the aims of the study:

1. What kind of writing problems is identified in Kiswahili beginning readers?
2. What are the key indicators of the home environment that best describe the home living environment and home literacy environment in a rural setting in Tanzania?
3. What home environment variables are related to and predict children's phonological awareness, and reading and writing ability?

3 Implementation and method

The basis for the study, choice of instruments, data collection and analysis, and theoretical framework of this study are presented in this section.

3.1 Initial stages of the study

The study comprises six separate studies which are discussed in the next chapter. The first three studies, Studies I, II, and III were conducted as part of a large study that investigated health and school learning in relation to home environment in rural areas of Bagamoyo District. This study focuses on data related to school learning and the home environment.

School learning was assessed through cognitive, education, and dynamic tests. Ten schools from seven villages were involved in the study. I worked in the study and my duties were to design, develop and administer cognitive, education and dynamic tests, and a parent questionnaire that was used to collect information about the home environment.

The tests and the questionnaire were developed at the planning stage of the study. We started with the cognitive tests, followed by education tests, dynamic tests and finally the questionnaire. The focus of this study is on the education tests which included tests to measure reading and writing ability. These tests are described in more detail in the next section.

For reliability issues, the tests were trialled using children of similar age and grade as those planned to be recruited for the study. Test-retest reliability was conducted at a one week interval. Test-items which were found not reliable, either too difficult or too easy, were deleted from the test battery and substituted with more appropriate items. Reliability for the questionnaire was checked by re-administering the questionnaire to parents at a one week interval. Again, questions that were identified not to yield the expected answer, they were either deleted and a new one was constructed, or a question was re-formulated to capture the expected response.

Before beginning the study, we visited the seven villages and held meetings with village leaders and parents. The aim of the meetings was to introduce the study and specifically explain the goal and importance of the study to education. Meetings were also held in the schools with District education officials, teachers, children and parents to clarify about characteristics of the study sample and sample selection. Parents and children were invited to participate in the study voluntarily. Heads of schools, commonly known as Headteachers in Tanzania, were given information about the plan and daily timetable for study activities. This included also home visits.

3.2 The basis for the studies

The basis for the first two studies, that is Studies I and II, was the need to improve on previous research about acquisition of reading and writing skills in transparent and complex orthographies. The studies examined different aspects of language learning, including the effect of orthography in learning to read, errors children make in writing when spelling words, and type of information required for correct writing in the language.

We have knowledge and understanding about reading acquisition in languages with consistent orthography. Aro (2006) examined the effect of orthography among Finnish children and found that the most important predictor of the development of reading and spelling accuracy was letter knowledge, followed by phoneme identification. Finnish is a consistent orthography with a perfectly symmetrical grapheme-phoneme correspondence system. In Finnish, the number of phonemes is small. According to Lyytinen, Aro, and Holopainen (2004), there are only 21 phonemes (8 vowels, a, e, i, o, u, y, ä, ö; and 13 consonants, d, h, k, l, m, n, p, r, s, t, v, ŋ). All the phonemes are consistently represented by a corresponding single letter grapheme, with the exception of /ŋ/ that is represented by /k/ when short and /ng/ when long (Lyytinen, et al., 2004). It has been reported from a study about learning to spell Portuguese, a consistently spelled language, that children must learn orthographic representations for different grammatical morphemes (Bryant, Nunes & Aidinis, 1999). Research results about Greek, which has a large number of consonant clusters, reveal that at the end of grade one, children could read all words, familiar as well as unfamiliar words (Harris & Giannouli, 1999). More findings are reported from research that compared orthographies in more than ten European writing systems. The findings revealed that almost all children learning to read consistent orthographies are learning to read at a much earlier age than children learning to read inconsistent orthography like English (Seymour, Aro & Erskine, 2003). Thorstad (1999) also concluded from a study about learning to read Italian and English orthographies that Italian children read earlier than those learning to read English.

English is one of the languages with most complex orthography, with inconsistent grapheme-phoneme correspondences, and multi-letter graphemes (Lyytinen, Erskine, Aro & Richardson, 2006). Research shows that learning to read and write words in English language requires knowledge about phonology, grammar, and orthography (Treiman, 1989, 1991).

The fact that European languages have been extensively researched is not related to researchers investigating the European societies where research about literacy development has a long tradition. Rather, it reflects the fact that non-European languages especially African Languages, are largely un-researched (Brock-Utne, 2002). In this regard, information about development in literacy skills is mostly based on research about European languages.

Studies I and II investigated kinds of mistakes that children make in learning how to write Kiswahili words. As mentioned before, Kiswahili is a transparent orthography. Kiswahili has similar features to other transparent languages like Finnish and Italian. Moreover, Kiswahili shares some features with inconsistent orthographies. For example, the type of phonological information that challenges children beginning to write English includes consonant clusters (Treiman & Cassar, 1996). Kiswahili has consonant clusters with unique features such as nasal consonant clusters in which the nasal is always at the initial position of the syllable. The nasals in the consonant clusters can be syllabic or non-syllabic. Basing on these features, the assumption behind this study was that Kiswahili and the other languages, with consistent or inconsistent orthography, have similar features and therefore information required for learning to read and write such languages could also be identified in children learning to read and spell Kiswahili.

The basis for Study IV, V, and VI was related to findings from previous studies from developing countries about valid measures of home environment. Past research from developing countries showed that school-related variables have strong effects on children's learning than do background variables (Heyneman, 1976; Heyneman & Loxley, 1983). The findings contrasts with evidence from developed countries that the family background variables explain a substantial large proportion of achievement in school learning (Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld & York, 1966).

The main finding from Study III showed that there was no association between family SES and reading and writing ability. The finding contradicts with the commonly established result that family SES predicts children's performance in reading and writing ability tests. The possible explanation about this finding was how the SES variables were used in the analysis. An index summary of SES was calculated by summing housing and education variables. To solve the problem related to measurement of SES, home environment variables were entered individually into data analysis procedure in Study IV.

The second issue is related to the association between home environment and children's development in literacy skills. Various aspects of the home environment have been shown to have significant contribution on children's language and development in literacy skills. However, two things deserve a mention in relation to this finding. One, most previous studies were conducted in developed societies, where the concept of the home environment and variables regarded as valid to define the home environment are different from those in developing societies. Housing quality and accessibility of domestic facilities like water and electricity are important aspects of the home environment used to indicate the level of family socioeconomic status in developing countries (Arias & de Vos, 1996; Kanyongo, et al., 2006; Somi, 2003). Unlike in the developed countries where quality of housing conditions and availability of domestic facilities are not thought to determine the family

socioeconomic status. The second issue is related to the amount of research conducted in developing countries and measurement of the home environment. Research from developing countries is scarce, and the few existing studies used measures of home environment that are more conventional for industrialized settings rather than indicators of social class that are more culturally valid for developing countries (Lockheed et al., 1989). Moreover, findings from studies conducted in developing countries (e.g. Tanzania and Zimbabwe) that included a summary index of SES in the analysis showed that SES was not related to children's development in reading and reading-related skills (Alcock, Ngorosho, Deus & Jukes, 2010; Bhargava, Jukes, Ngorosho, Kihamia & Bundy, 2005; Kanyongo, et al., 2006).

Based on previous findings, the goal for the present study was to identify valid indicators of home environment in a rural area in Tanzania and use the prominent variables identified to find out the relationship between home environment and children's development in literacy skills.

3.3 Study participants

The samples of the studies comprised primary schoolchildren from second to sixth grade (age 9 to 18 years) and their parents. However, separate studies involved different grades according to the aim of the study. All the children were drawn from primary schools in the rural areas of Bagamoyo District, and they spoke Kiswahili as their first language. Moreover, Kiswahili was the medium of communication in the home. In this regard, the effect of vernacular languages on Kiswahili which has been reported in previous studies (e.g. Batibo, 2000; Mochiwa, 1979), was minimized.

The parents involved in the study were mainly mothers or female guardians who were involved in an interview that sought information about the home environment.

3.4 Data collection and instruments

Two types of instruments were used in the five studies – tests to measure literacy skills and a questionnaire-based interview to collect information about the home environment. The instruments used to collect data to measure children's development in literacy included phonological awareness tasks, and reading and writing tests. Reading and writing tests were administered first in the case of those children who also participated in the phonological awareness tasks (e.g. in Study VI). All the measures were developed in Kiswahili, which is also the language of instruction in primary schools and the medium of communication among the families involved in the studies. Phonological awareness tasks and reading and writing tests were administered during school time in an empty classroom, which was not being used at the time of testing. The questionnaire-based interview was administered at home.

3.4.1 Phonological awareness tasks

Phonological awareness was assessed through syllable and phoneme awareness tasks. In a synthesis of literature about reading acquisition, Adams (1990) suggests that tasks to measure syllable and phoneme awareness are deletion type (e.g. word deletion), analysis type (e.g. phoneme segmentation), and synthesis type (e.g. blending). In this regard, three tasks, sound deletion (a modification of Rosner's Test of Auditory Analysis Skills [Rosner, 1999]), initial sound identification (a modification of Rosinski's picture word interference [Rosinski, Golinkoff & Kukish, 1975]), and blending were used to assess phonological awareness. The sound deletion and blending tasks were administered individually to children, while the initial sound identification task was administered in a group of 25 children or less.

3.4.2 Reading tests

Reading tests consisted of letter, word reading and sentence reading, and picture-word matching test (Alcock, et al., 2000; Jastak & Jastak, 1965; Jastak & Wilkinson, 1994; Rosinski, et al., 1975). The letter and word reading tests were developed to measure recognition skills for letter and word, respectively. The picture-word matching test also measured word reading skills. The sentence reading test measured comprehension. The reading tests were administered in a group of 30 children or less.

3.4.3 Writing tests

Two kinds of tests were used to measure word writing ability. The first test involved free writing, picture drawing and labelling test that were used to measure children's ability to write words correctly. The children were asked to write a farewell note that was in a form of a continuous text. The children were also asked to draw a farewell picture and to label it. The words were scored as correctly spelt and spelling errors were classified either as one of omission, addition or substitution.

The second test for measuring writing ability was a word dictation. The test required the tester to read aloud a target word, followed by a sentence that contained the target word. The target word was read again, and the children were asked to write it. The children were encouraged to write the target word only and not the whole sentence. Again, the written words were scored as correctly spelt and spelling errors were classified either as one of omission, addition or substitution. The writing tests were administered in a group of 30 children or less.

3.4.4 Questionnaire-based interview

An interview based on a questionnaire was designed and used to collect data about the home living environment and home literacy environment. The home

living environment component featured socioeconomic status, wealth-related items, and housing conditions. The home literacy environment captured the availability of educational materials at home and parental involvement in school learning. Mothers or female guardians were interviewed at home. Fathers or male guardians were allowed to participate in the interview when it was necessary to involve them. For example, fathers/male guardians were involved in matters concerning their education attainment and about the amount of family wealth such as amount of land the family owned.

3.5 Ethical considerations

Concerning ethical considerations, three things were done. Firstly, participants were asked to sign a written consent. The consent included information about the overall purpose of and the design of the study, as well as possible risks and benefits from participating in the study. Kvale (1996) affirms that a written consent is information about the research which is relevant to the participants in order to ensure involvement in the study is voluntary. Children and their parents participated in the studies voluntarily, and after signing written consent forms. Secondly, permission was sought from important officials including leadership at the district, village and school levels. Personnel at these levels of the leadership are the gate-keepers who represent the government and thus have power on all the activities that are done at their level of duty implementation. All the people in the villages were invited through village and ten-cell leaders to attend a meeting in the village at school premises. They were informed about the aims and importance of the study to education and were allowed to ask questions about the study. Parents who had children in the school were asked to allow their child to participate in the study. The decision that only mothers/female guardians would be interviewed about the home environment was introduced after the initial stages of developing the questionnaire. Heads of household were informed about the decision and were asked to sign a written consent form. I decided to ask male heads of households to sign the forms for ethical reasons. Culture and practices from some of the religions give more power to men, and thus are viewed as decision-makers of the family.

4 Description of the articles

This section gives a description of six articles included in the thesis. The studies were conducted in a rural area in Bagamoyo District, which is situated on the eastern coastal area of Tanzania. Children from second to sixth grade and their mothers/female guardians participated in the studies.

Study I: Learning to spell a regularly spelled language is not a trivial task – patterns of errors in Kiswahili. *Reading and Writing: An Interdisciplinary Journal*, 16, 635-666 (2003).

The aim of the study was to investigate the word writing ability of the children in the early grades in the primary schools. The writing ability was measured by counting spelling errors in a free writing and a dictation task.

The study involved 41 children from second to sixth grade, aged 9 to 18 years, and attending public government primary schools, who participated in a free writing task and a word dictation task.

In the free writing task, the children were asked to compose a continuous text and draw farewell pictures and label them. The main goal was to assess children's ability to write words correctly and their creativity in using the words. The children were not supervised, nor were they told to check for spelling errors. The words that were written were scored as correctly spelt or not. The errors identified in the incorrectly spelt words were categorized according to what morpheme they occurred in: root morpheme, or at a morpheme boundary. The type of error, for example what letter was spelled incorrectly, and whether the error was one of omission, addition, or substitution, was also recorded.

In the word dictation task, 50 words included in a context sentence were read to the children, who were then asked to write them. The task instructions were that the children would hear a word, and then a sentence containing the word. The word was read again at the end of the sentence. The children were instructed to listen carefully to the word at the end of the sentence because they were required to write the word they heard at the end. The children were tested in groups of 30 or less.

The results showed that in the free writing task, the children from all grades spelt a total of 789 words, among which 83% of the words were spelt correctly. As expected, children from grades 5 and 6 wrote more correct words than those from the lower grades. Children from grade 4 attempted to write more different words compared to those from other grades. Age and gender did not contribute significantly to the variance of the children's writing ability.

The most common errors observed from the free writing task were confusion between L and R. For example, the word *rafiki* (friend) was spelt as *lafiki*. The L and R substitution errors accounted for about 48% of all the errors made.

In the word dictation task, the common errors were related to digraphs. More than half of the children spelt TH as S and DH as Z, for instance *thubutu* (dare) spelt as *subutu* or *dhubutu*; *dhuluma* (injustice) spelt as *zuluma*. There were errors in other digraphs like SH and CH, for example *chakula* (food) spelt as *shakula*.

The addition of Y or W and omission of H were identified in both the free and structured writing tasks. The addition of Y was found in such words as *kimbia* (run), which was written as *kimbiya*, while W was added to words like *huona* (sees), spelt as *huwona*.

Omission of a nasal consonant cluster occurred mostly when the nasal consonant was not syllabic, for instance *ndani* (inside) spelt as *dani*. The findings on errors of spelling consonant clusters observed in this study prompted further investigation on the errors that children make in spelling consonant clusters in Kiswahili.

Study II: Learning to spell and learning phonology: the spelling of consonant clusters in Kiswahili. *Reading and Writing: An Interdisciplinary Journal*, 20, 643-670 (2007).

Study II was a continuation of Study I. The aim was to investigate children's writing ability in spelling consonant clusters that include nasals in Kiswahili. The study further explored the type of knowledge that helps children learn correct spelling of the consonant clusters. The findings from Study 1 showed that children made spelling errors on clusters that involved consonant nasals. The tendency was that in consonant clusters containing a nasal and another consonant, children misspelled the other consonant. In occasions where spelling errors were found the most likely cause was that children had not learned the orthographic rule used for representing some consonant clusters. Further, the study aimed to compare good and poor spellers, and explore possible reasons for becoming a good speller by counting how many words a child spelt correctly.

The study involved two tests. Test one involved 93 children aged 10 to 15 years and test two 43 children aged 11 to 15 years. All the children had previously participated in Study I.

Test 1 compared words contained medial (*andika* – write) and initial non-syllabic nasal (*mbuzi* - goat) clusters, and initial unstressed, syllabic clusters (*ngamia* – camel). The control words had no nasal consonants. All the words included in the experiments were used in context sentences. Test 2 compared the spelling of initial (*mbu* – mosquito) and medial stressed (*kunoa* – to sharpen)

and non-stressed syllabic clusters (*kunolea* –to use for sharpening). The control words used in test two had no nasals.

The overall results revealed that nasal consonants are harder to spell in clusters than they are singly; longer words were more difficult to spell, and among the non-syllabic nasals in clusters the most difficult were two-syllable words. Difficulties in spelling words correctly were also seen in Study I, which examined the ability to write correct spelling of words. Although Kiswahili is consistent at letter-sound level, the language is not fully transparent in some connections like in consonant clusters. In this regard, phonological information and correct instructions about letter combination are needed. The difference between good and poor spellers was significant for the initial non-syllabic clusters.

Study III: Modelling the effects of health status and educational infrastructure on the cognitive development of Tanzanian schoolchildren. *American Journal of Human Biology*, 17, 280-292 (2005).

The third study included in the thesis made it possible to broaden the picture about the reading and writing skills of schoolchildren in Kiswahili. A large study was conducted in Bagamoyo District to investigate the effect of the treatment of hookworm and schistosomiasis on school learning. Children between 9 and 15 years from grades 2 through grade 5 were recruited for the study, and followed up during three years. The study had an experimental design and it involved two groups: a control group of randomly selected 680 children and an intervention group of about 552 children who were heavily infected with hookworm and schistosomiasis.

Two main activities were carried out – the treatment of hookworm and schistosomiasis, and testing of the children in cognitive and educational tests.

The children's health status and school learning were related to their socioeconomic status. Socioeconomic status was measured through the quality of materials used for construction of the family house, educational equipment such as books, and furniture available in the home. An index of socioeconomic status was calculated by summing the variables. All measures were administered in two rounds – at the first testing, which was the baseline, and at a follow up, 15 months later (the third round). A smaller amount of tests were used in the second round.

School learning was measured by cognitive tests, school examinations, and educational achievement tests. The education achievement tests measured reading, writing and arithmetical skills. Although the study examined the effects of health status among children infected and non-infected with hookworm and schistosomiasis the results included in this thesis deal only with the findings on the 680 non-infected children. The focus is on the findings from the reading and

writing tests and on their relation to the family's socioeconomic status, based on data from the baseline study and the follow up.

Reading was assessed through sentence reading and word writing. Sentence reading was designed to assess the children's speeded comprehension (Alcock, Nokes, Musabi, Mbise, Mandali, Bundy & Baddeley, 2000). The sentences were designed such that half of them were true and the other half were silly. The children were asked to read as many sentences as possible within a set time of five minutes. The word writing test consisted of 50 words that were read aloud for the children to spell. The words were included in context sentences. The total score for the reading and writing tests was 50 marks each.

The mean score for the reading and writing tests among the children was slightly above 50% of the maximum score (50 scores) in all grades. Children's performance in reading and writing tests did not improve during the 15 months of follow up compared to their performance in the first testing – the baseline. Another finding needing special attention is that family socioeconomic status was not a significant predictor of reading and writing scores.

Study IV: Key indicators of home environment for educational research in rural communities in Tanzania. *Child Indicators Research*, 3, 327-348, doi: 10.1007/s 12187 009-9061-7 (2010).

The basis for Study IV was the finding from Study III, described above, that socioeconomic status was not related to children's ability to read and write. In Study III, an index summary of home environment variables was constructed to be used as a SES measure. Referring to Entwisle and Astone (1994), it is likely that some of the important information was concealed. Furthermore, some of the suggested variables that have been traditionally used to define SES, such as parents' education, were not included in the analysis. Study IV intended to overcome the problem of using a summary index of SES, by identifying valid SES measures with the aim of having the possibility to further relate SES to reading and writing ability.

The aim of this study was thus to identify culturally valid indicators that could best describe features of the home environment in a rural setting in Tanzania. The home environment was defined to include the home living environment and home literacy environment.

Three hundred mothers/female guardians and their children in grade three were selected for the study through simple random selection procedure. Interview based on a questionnaire was used to collect information about the home living and home literacy environments. Home living environment was characterized through aspects of socioeconomic status, quality of housing conditions, and wealth-related items. The home literacy environment was characterized through the availability of educational materials at home and parental involvement in the children's school homework. Descriptive statistics were analyzed and

correlation procedures were carried out to identify possible variables to be regarded as key indicators.

Five variables were identified and considered as key indicators that describe home environment in a rural area in Bagamoyo. These are fathers' and mothers' education, quality of house wall material, source of light, and numbers of books for school subjects in the home (other kinds of reading books did not exist in the homes). The identified indicators are regarded as culturally and geographically valid for the home environment in the specific society studied and applicable for assessing such features of home environment which may be associated with factors contributing to child's cognitive development, especially reading acquisition.

Study V: Reading and writing ability in relation to home environment: A study in primary education in rural Tanzania. *Child Indicators Research*, doi: 10.1007/s 12187-010-9089-8 (2010).

This study was part of Study IV, and thus the data also pictures the rural setting in Bagamoyo District. The first part of the study focussed on the identification of key indicators of home environment.

This second part of the study examined how reading and writing ability is related to the home environment of Kiswahili speaking children from a rural (low-income) area in Tanzania. The study also aimed at deepening the picture of the home environment indicators from Study III, by including all the indicators from the home environment instrument instead of using index (summary of measures) for family socioeconomic status.

Three hundred randomly selected children (150 boys and 150 girls) aged between 9 and 12 years and their mothers/female guardians were involved in the study. The basis for conducting the present study was the research findings from earlier studies in the same rural area (Bhargava, et al., 2005; Malmberg & Sumra, 1998 - 2001). In those studies the variables used to define the socioeconomic status did not relate to children's reading and writing and school achievement. The findings contradicted earlier well-established findings that children's socioeconomic status significantly relates to reading and writing ability and also to achievement in school learning (e.g. Jariene & Razmantiene, 2006; Milne & Plourde, 2006).

The findings from the present study indicated significant contribution of the home environment variables to children's reading and writing ability. The socioeconomic status variables used, such as father's education and quality of housing variables, for example wall, were identified as predictors of reading and writing ability. Other variables that significantly predicted reading and writing ability included books for school subjects found at home and parental involvement in children's school homework.

The research findings from the present study disentangled the relationship between socioeconomic status and reading and writing ability in a rural setting in a developing country. The finding depicts the need for further analysis of the importance of home environment variables other than the traditional SES factors, at least in rural east Tanzanian studies. Variables related to the family house have also earlier been shown to explain socioeconomic status in developing countries (Arias & De Vos, 1996; Arimah, 1992; Fiadzo, et al., 2001).

Study VI: The role of home environment in phonological awareness and reading and writing ability in Tanzanian primary schoolchildren. *Education Inquiry*, 1(3), 215-238 (2010).

The starting point for Study VI was the finding from Study V, described above that father's education was a significant predictor of reading and writing ability. Study V did not, however, include the component of phonological awareness. Findings from a previous study in a similar study area showed that fathers' education had a weak relationship with children's performance in phonological awareness and reading and writing ability (Alcock, et al., 2010). A possible reason for this weak association between fathers' education and phonological awareness and reading and writing scores might be a problem with the sample. The sample was randomly selected, and thus distributions of variables such as education and occupation were significantly skewed. The problem of low variance and skewed contributions, for example fathers' education, was resolved through the selection of an equal number of fathers to represent different levels of education.

The purpose of Study VI was to examine the relationship between home environment and children's development in literacy skills. Specifically, the study investigated the role of home environment variables in grade two children's development in phonological awareness and reading and writing ability in rural Tanzania. Further, the study examined the relationship between phonological awareness and reading and writing ability.

The sample consisted of 75 second grade children aged between 8 and 10 years and their mothers/female guardians. The children attended four schools in rural areas of Bagamoyo District. Selection of the children was guided by an equal number of fathers in different levels of education, such as no formal education level, primary education level, and secondary and/or higher level.

Children's phonological awareness was assessed through deletion, sound identification and blending tasks. Reading was measured through letter reading, word reading and picture-word matching tasks. A word writing test measured the children's ability to write by spelling words accurately. A questionnaire was developed and used in an interview with mothers or female guardians to collect information about the home environment. All measures were designed in Kiswahili.

Descriptive data for home environment variables and phonological awareness and reading and writing ability measures were analyzed. The role of home environment in phonological awareness and reading and writing ability was determined through ANOVA and multiple regression analyses.

The descriptive statistics for socioeconomic status variables showed that the mothers' education was skewed. Only 4% of the 75 mothers/female guardians had attained secondary/higher education. The majority (73%) had attained only primary education. More than half of the fathers and mothers participated in activities that were not regularly paid. Most (67%) of the families in the study area lived in houses built with poor construction materials like poles and mud for walls, while about half (53%) lived in homes with floors built with earth or sand. There were no books at all in most of the homes. In almost 65% of the families there were not even books for school subjects, while about 5% of the families had more than three schoolbooks in the home.

In phonological awareness, the mean percentage of the blending task indicated that the majority of children were able to identify only 3 initial sounds correctly, while 17% of the children could not blend any syllables or words correctly. With regard to reading and writing tests, 29% of the children could not write any word accurately. The overall performance in phonological awareness tasks and reading and writing tests indicate that there was little variation in the distribution of scores from the sound deletion task and blending task. About ten percent of children performed at maximum scores (10 scores) in these tasks.

The overall findings on the role of home environment in phonological awareness and reading and writing revealed that fathers' education and mothers' occupation were strong predictors of phonological awareness. Fathers' education was a significant predictor also of reading and writing ability. The contribution of mothers' education was slightly weaker, but anyway mothers' education was also an almost significant predictor.

5 Summary of the results

A summary of results from the studies is presented in relation to research questions.

5.1 Writing problems identified in Kiswahili beginning readers

The findings related to writing problems that children experience in learning to read and write are categorized as those of omission, addition and substitution of letters. Research question one focuses on the findings obtained from Studies I and II.

The most common errors identified were substitution of L for R, and vice versa. The L and R substitution errors accounted for about 48% of all the errors made. Confusion between L and R might be a result of spoken language. The two sounds are commonly used interchangeably in spoken language in many areas of the country. This substitution is tolerated in spoken language and communication is not impaired even when L is pronounced instead of R. In the case of written language, there are instances where the meaning of words changes when the letters are substituted. For example, if L in *kula* (eat) is substituted by R, the result is *kura* (vote). The common part of the word for error to occur was the root morpheme, with substitutions of L or R most likely to occur.

There were also errors of digraphs. More than half of the children spelt the digraphs as single letters, for example TH as S and DH as Z. Other digraphs involved a stop CH as in *chimba* (dig) spelt with a fricative SH (*shimba*). Among the digraphs, TH or DH was more difficult to spell. Errors in digraphs are mainly associated with dialect.

The findings showed that children required grammatical knowledge to determine whether a word should have Y or W at the morpheme boundary. In Kiswahili, Y is inserted before the final vowel of a verb when indicating pronoun marker of the doer of the action. For example, the verb *penda* (to love) becomes *akupendaye* (one who loves you) and not *akupendae*.

An interesting finding involved omission of nasal consonants. The findings on errors of spelling nasal consonant clusters observed in this study prompted further investigation of the errors in Study II.

Word length and position of a nasal in a nasal consonant cluster contributed to difficulty in writing. Shorter words seemed harder to write than long words. Children found three-syllable words containing nasals in the medial cluster easier to write than two-syllable words with nasals in the initial position.

The overall results show that dialect differences make some phonological distinctions that are preserved in the orthography. These distinctions do not

seem to be relevant for children who are beginning to write Kiswahili. For example, in some dialects θ (spelled TH) is pronounced S and δ (spelled DH) is pronounced as Z.

Children identified as better writers improved in writing stressed initial nasals in consonant clusters. However, the improvement was not found in writing easier syllabic initial nasals in a cluster.

The errors identified in Studies I and II are important to consider, due to the fact that similar errors have been identified in children learning to write other languages with consistent orthographies such as Spanish and Portuguese (Ferreiro & Teberosky, 1992) and inconsistent orthographies like English (Treiman, 1993).

5.2 Key indicators of the home environment in a rural setting in Tanzania

Research question two addressed the issue of identifying culturally valid indicators that could best describe features of the home environment in a rural setting in Bagamoyo. A majority of the scales commonly used to study the home environment capture empirical traditions such as socioeconomic status, which notes the correlation of income, education and wealth with social outcomes (e.g. Beegley, 2004; Coleman & Rainwater, 1978; Gilbert, 2002; Thompson & Hickey, 2005; Warner, Meeker & Eels, 1949). A socioeconomic status approach does not necessarily imply a particular theory of social structure such as Marxist theory, which involves a collective group of individuals that share similar economic and social relations relative to each other in society (Elster, 1986). The majority of African countries are poor. However, the people have strong ethnic relations (Konadu, 1999). In this regard, scales designed for developed societies might not work appropriately in developing countries, where the societies are poor and not hierarchically structured as in developed countries. Moore (2003) affirms that culturally valid indicators of the home environment should capture the social and economic situation of the people in their own setting.

The aim of Study IV was thus to identify culturally valid indicators that would be considered to describe the true situation of the home environment and of the families in a rural area in Bagamoyo District. The majority of the people in the rural area depend on small scale agriculture, trade and fishing as their main activities. In this regard, their income is relatively low (NBS, 2004). Study IV revealed similar situations, in that about 60% of the families lived in poor houses made of grass, mud and poles. Because of poverty, parents could not afford to buy books and other reading related materials that could support their children's school learning. No book or reading materials were found in about 57% of families. Lack of educational facilities in many homes could also be explained by the low level of education among the parents. The findings

indicated that only 18% of the fathers and 6% of the mothers had attained secondary education.

From a large variable battery that included parents' education and occupation, wealth-related items (land, radio and bicycle), quality of construction material of the family house, and availability of education materials in the home, five variables were identified and considered as key indicators that describe home environment in a rural area in Bagamoyo. These are fathers' and mothers' education, quality of house wall material, source of light, and books for school subjects in the home (other kinds of reading books did not exist in the homes). The identified indicators are regarded as culturally and geographically valid for the home environment in the specific society studied. The indicators are also culturally applicable for assessing such features of the home environment in rural Bagamoyo, features which may be associated with factors contributing to the child's cognitive development, especially reading acquisition.

5.3 The role of home environment in the development of literacy skills

The explanations and data description presented in this section refer to research results obtained from Studies III, V and VI.

Although there is abundant information from the developed countries about the relationship between home environment and children's development in literacy skills (e.g. Evans, et al., 2000; Jariene & Razmantiene, 2006; Juel, 1988), few studies have investigated the role of home environment on children's development in literacy skills in Tanzania. One existing study (Alcock, et al., 2010) showed weak correlation between fathers' education and phonological awareness and reading and writing skills. In this section findings from Studies III, V and VI that examined the relationship between home environment variables and phonological awareness, and reading and writing ability, are reported.

The descriptive statistics from Study III show that the mean score for the reading and writing tests among the children was slightly above 50% of the maximum score (50 scores) in grades 2 to 5. The children's performance in reading and writing tests did not improve during the 15 months of follow up compared to their performance in the first testing – the baseline. Family socioeconomic status was not a significant predictor ($p < .05$) of reading and writing scores.

The findings from Study V indicated children performed at a level between 50 and 70 percent of the maximum score (50 scores). There was wide score variability in all the tests – letter, word, and sentence reading and word writing. The boys had slightly higher means than the girls in word reading, sentence reading, and word writing, and consequently in the total score, but the

differences are not significant ($F(3,296) = 1.056, p = .368$). The correlations between the reading and writing ability were moderate to high.

The distributions of home environment variables showed that more than half of the houses had low quality material for the wall, roof, and floor. Only 41% of the fathers and 28% of the mothers/female guardians had attained higher education (secondary or higher). Regarding occupation, only 44% of the fathers and 14% of the mothers/female guardians had regularly paid jobs.

Various home environment variables showed a significant contribution to children's reading and writing ability. The socioeconomic status variables used, such as father's education and quality of housing variables, for example wall, were identified as predictors of reading and writing ability. Other variables that significantly predicted reading and writing ability included books for school subjects found at home and parental involvement in children's school homework.

More findings about the role of home environment in literacy skills are presented in Study VI. Descriptive data for home environment variables showed that mothers'/female guardians' education was skewed. Only 4% of the mothers/female guardians had attained secondary/higher education. The majority (73%) had attained only primary education. More than half of the fathers and mothers participated in activities that were not regularly paid, such as agriculture, small trade and fishing. Most of the families in the study area lived in houses built with poor construction materials like poles and mud for walls and earth or sand for the floor. There were no books at all in most of the homes. In almost 65% of the families, there not even books for school subjects, while about 5% of the families had more than three schoolbooks in the home.

In phonological awareness, the mean percentage indicated that the majority of children were able to identify only 3 initial sounds correctly, while 17% of the children could not blend any syllables or words correctly. With regard to reading and writing tests, 4% of the children could read or write none of the letters in Kiswahili. In Tanzania, children begin to learn letter knowledge early when they are enrolled into pre-primary education. However, not all of the children go through this level of education before they enter grade one. Mtahabwa and Rao (2010) found that there are fewer pre-primary classes in the rural areas compared to urban settings. Performance for word writing indicated that 29% of the children could not write any word correctly. Overall performance in phonological awareness tasks and reading and writing tests indicate that there was little variation in the distribution of scores from the sound deletion task and blending task. About 10% of children performed at maximum scores (10 scores) in these tasks.

The findings from Study VI on the role of home environment in phonological awareness and reading and writing revealed that fathers' education and mothers' occupation were strong predictors of phonological awareness. With regard to

reading and writing ability, fathers' and mothers' education were also found to be important. Fathers' education was a significant and mothers' education an almost significant predictor.

The research findings from Studies V and VI disentangled the relationship between socioeconomic status and reading and writing ability in a rural setting in a developing country. Variables related to socioeconomic status, for example parents' education and occupation, and variables that describe family housing conditions, played a significant role in children's development in phonological awareness and reading and writing ability. However, the finding depicts the need for further analysis of the importance of home environment variables other than the traditional SES factors, at least in rural eastern Tanzanian studies. Variables related to the family house have also earlier been shown to explain socioeconomic status in developing countries (Arias & De Vos, 1996; Arimah, 1992; Fiadzo, et al., 2001).

6 Discussion

The aim of this thesis was to investigate children's literacy skills with a focus on home living factors and factors related to literacy facilities and practices in the home. Literacy skills were defined by phonological awareness, and reading and writing ability. The home living environment was defined to include family socioeconomic status, family housing conditions and wealth-related items. The home literacy environment was described by the availability of educational materials in the home and participation of parents in children's school learning.

The thesis addresses three important issues which are important for developing the education in a developing country, in this case rural Tanzania:

- 1) Children's development in literacy skills in Kiswahili, a language with consistent letter-sound orthography.
- 2) Indicators of the home environment in the studied setting.
- 3) Home environment variables that play a role in predicting children's literacy skills.

6.1 Children's development of literacy skills in Kiswahili

One of the aims of the present study was to investigate primary schoolchildren's development in literacy skills. The concept literacy skill was used to cover reading and writing ability components and phonological awareness. Phonological awareness was examined from the fact that knowledge about the sound structure of a language is a basic requirement for reading acquisition (Lundberg, 2009; Whitehurst & Lonigan, 1998). In order for children to develop awareness of sound structure of their language, they must be able to hear, remember and manipulate in mind a variety of sound units within words e.g. syllables, rimes, and phonemes (McGuiness, 2004). Children who have difficulty in acquiring phonological awareness will also have difficulty associating alphabetic symbols and sounds; as a result, they will have difficulty in acquiring orthographic knowledge (Vellutino, Fletcher, Snowling & Scanlon, 2004). In short, learning to read requires sufficient knowledge about the sounds of the language and how the writing system of that language works (McGuiness, 2004).

The constructs of phonological awareness that were assessed included the ability to identify the initial sound of a target word from a list of stimuli words, the ability to synthesize syllables or words to form longer words, and the ability to delete part of a word (phoneme or syllable) to form a new meaningful word. The results from Study VI revealed that the identification of initial sound was the most difficult task compared to the other two tasks. In the initial sound identification task, a set of pictures was used – a target picture and a list of four

other pictures for comparison. The task therefore required three things: firstly, to understand the pictures in terms of their names; secondly, knowledge about the sounds of Kiswahili alphabets; and thirdly, mastery of reading skill. In order to perform the task well, a child was supposed to know how to read and write the names of the pictures. In this regard, children with poor reading and writing ability were likely to perform poorly in the initial sound identification task. The findings indicated that about 45% of the children identified less than four sounds.

According to the Tanzanian primary school syllabus (MoEVT, 2005), by the end of the second year of primary education children are expected to have acquired basic skills in literacy. This was, however, not the case when almost half of the children in grade 2 could identify only three of the ten sounds included in the task. No single and evident explanation for the finding has been found. In countries where children learn English letter names, children are confused over English letter names and letter names of their native language. Once a phoneme-grapheme connection has been mastered, it is very difficult to reverse the learning process and teach something else. However, this is not the situation in Tanzania, at least not in the studied area. In some African countries, like Zambia, the teaching of English letter names has been found to compromise appropriate reading acquisition. The confusion that children experience due to learning two different alphabetic codes, English and Cinyanja, delays the development of their literacy skills (Lyytinen, et al., 2009; Ojanen, 2007).

Study VI also revealed that children scored averagely on the ability to blend a sequence of syllables and words, and the ability to delete phonemes and syllables from the initial, middle or final position words. Both the blending and deletion tasks involve knowledge of the sound structure of the language and listening skills.

Reading ability was measured through letter, word and sentence reading, while writing was assessed by the ability to spell words correctly. The descriptive statistics from Studies V and VI indicated that children's ability to read letters, words and sentences was slightly above 50% of the maximum score. As could be expected, the sentence reading test seemed the most difficult test. The sentence reading task measured comprehension skill, which requires higher cognitive functioning, unlike letter and word reading, which measured recognition skill.

Generally, the findings revealed low achievement in reading and writing ability among children in primary schools in the studied rural area - a result also found by others (e.g. Mtana, et al., 2004). Findings from a recent national survey that included 42,000 primary schoolchildren from 20 districts in Tanzania (Uwezo.net, 2010) support the findings that children perform poorly even when they reach upper grades of primary education. The test results on letter, word and paragraph indicated that one in five primary school leavers (who had completed 7 years in school) could not read grade 2 level Kiswahili. More

results showed that by the time children complete primary school, one out of every five children still could not read a grade 2 level story. It is possible that the children will never learn to read due to poor teaching methods, and despite spending seven years in primary schooling, they are likely to remain illiterate for life.

The spelling errors observed from Study I were mainly confusion between L and R, addition or omission of H, Y and W. According to Ehri (2000), learning to spell letters H, Y or W could be difficult for beginners in spelling less transparent languages, like English. Beginners are usually taught phoneme-grapheme correspondences when they first learn to spell. In English language, the letter names for H, Y or W do not have letter-name corresponding sounds. This is not the case with Kiswahili, in which the relationship between a letter name and its sound is almost perfect. However, children require knowledge about grammar, phonology and orthography to spell words with Y or W.

Although L and R represent different phonemes in Kiswahili, the sounds are commonly used interchangeably in spoken language along the coastal areas of Tanzania, and also in some parts in the countryside. Errors of substitution have been associated with vernacular languages in which L and R are often regarded as the same sounds in spoken language (Massamba, 2002; Mulokozi, 2007). Other dialectal errors were related to the spelling of digraphs. Children wrote TH for S and DH for Z. Research findings from inconsistent orthographies like English indicate that the contrast between L and R is learnt late, and errors associated with dialect features in English language include the substitution of L for R, TH spelt as S, and DH as Z (Grunwell, 1982; Treiman, et al., (1997). Generally, the findings from English and Kiswahili languages reveal that dialect features have influence in both consistent and inconsistent orthographies.

The study results further indicated that children used phonological knowledge to be better spellers, thus differentiating between good spellers and poor spellers. The children regarded as good spellers utilized morphological information to spell words better. The successful children seemed to have spelt L correctly more when the letter was part of a bound morpheme than when it was part of a root morpheme. Grammatical features were again found in the additions of Y or W (11.7% of the errors) and omissions of Y (7.3% of the errors) and W (3.2% of the errors).

In Study II nasal consonants were frequently omitted in consonant clusters compared to other consonants in the cluster. The spelling errors were found in word-medial and word-initial clusters. Similar findings have been reported from English and Dutch languages (Treiman, Zukowski & Richmond-Welty, 1995).

Moreover, the study has shown important similarities between Kiswahili, a consistently-spelt, non European language, and previously studied languages, e.g. English, Dutch and Portuguese in the type of errors made by beginning spellers, and the reasons for those errors. The results from Studies I and II

confirmed that Kiswahili speaking children need the same kind of linguistic knowledge (knowledge about dialectal forms, orthography and grammar) which according to Treiman (1991, 1997) seems to be needed for learning to spell in inconsistent orthographies such as English.

6.2 Identification of valid home environment variables

One of the questions that the present thesis sought to answer was concerned with the identification of key indicators of home environment in rural communities in Tanzania. The idea was to find prominent variables that would reliably describe the situation of the living and literacy environments of a home in a poor rural setting in a developing country. The motive to develop a scale that will include appropriate variables for use in a poor rural setting was derived from findings from previous studies which showed that factors related to family socioeconomic status were not associated to children's development in literacy skills and school achievement (e.g. Alcock, et al., 2010; Bhargava, et al., 2005; Malmberg & Sumra, 1998-2001; Puja, 1981). Most of the previous studies had utilized variables that were developed and designed for the developed countries.

It was expected that the identified key indicators would be valid and appropriate measures for the population in the targeted geographical area. In Study IV five variables were reported as the key indicators for the home environment in rural Bagamoyo District. These are fathers' and mothers' education, quality of house wall material, light source and numbers books for school subjects in the homes. The suggestion was made that the indicators are useful for survey in research, educational, social and political areas. Such surveys need quick instruments to obtain information that could be put into action to improve the targeted situation (Moore, 2003). However, the reservation was made that indicators developed in the Bagamoyo context should not be assumed to apply in other contexts without empirical testing.

Socially and culturally valid indicators of home environment can be used to serve various purposes in education: to provide information on differences in the home (e.g. family socioeconomic status, stimulation for cognitive and literacy development available in the home, etc). The indicators could serve as a monitoring mechanism for tracking the progress of educational plans, and to set goals intended to be met by a specific group of people (Moore, 2003). The indicators could be used to identify home environment conditions for children identified to be at risk with reading problems. Children from less favourable home environments face academic challenges. Poor living conditions and poor literacy home environments inevitably interfere with children's literacy development.

Past research from developed countries showed that background factors, including family socioeconomic status, have strong effects on children's learning (Coleman, et al., 1966; Sirin, 2005; White, 1982). The studies concluded that school-related factors have little relation to children's

achievement. The studies further indicated that the inequalities found in children's homes contribute to variation in achievement scores, with those children coming from low socioeconomic status levels achieving low scores. In contrast, studies conducted in developing countries showed that it is school-related factors that influence children's learning more than family background factors (Heyneman, 1976; Heyneman & Loxley, 1983). The studies from both developed and developing countries utilized measures of home environment that included, among other items, the three traditional indicators of socioeconomic status, namely parental education, occupation and income (Hauser, 1994; Sirin, 2005; White, 1982). In general, factors of the home environment that work well in one society, are not necessarily appropriate for research in another context.

How factors related to socioeconomic status should be used in research has stirred a debate. One of the issues in the debate is whether an index or separate components of SES should be used in a study. An example is given of two different studies in which a summary index of SES was used and where contrasting results were observed. In Study III, Bhargava and colleagues (2005) used a summary index of socioeconomic status to find the relationship between SES and reading and writing ability. The study results showed that SES was not a predictor of reading and writing ability scores. A possible explanation for non-significant findings in Study III may be due to the variables used to define family socio-economic status and how the variables were used in the analyses. By combining the variables and thus forming a summary index of SES, important information which could show significance might have been hidden. However, findings from a study conducted with grade six children in another developing country, Zimbabwe, showed that SES was a significant predictor of reading and writing achievement (Kanyongo, et al., 2006). In this study, home environment variables were combined to be a measure of SES.

Study V of this thesis attempted to avoid the problem of using a summary index of SES by including the variables separately in the analyses. The study findings indicated that variables of family SES such as fathers' education and housing variables were significant predictors of reading and writing ability scores. Additionally, the findings from the study revealed the importance of housing variables, an aspect that has been shown to explain family SES in developing countries (Arias & De Vos, 1996; Fiadzo, et al., 2001). The findings from Study V indicate that, irrespective of the level of development of a society, valid measures of the home environment yield appropriate results. The findings further prove that no matter what variables are used to define the SES, the consequences for literacy development can be seen even when the variables describe the family housing conditions.

6.3 Home environment and literacy skills

This thesis presents important and useful results on the influence of home environment on children's development of literacy skills in a rural area in a

developing country. Literacy skills were defined to include phonological awareness, and reading and writing ability. The influence of home environment on phonological awareness and reading and writing ability is important for understanding and creating knowledge about how the home environment in a low-income area contributes to children's development in these skills. A large part of the contribution of the home environment to the development of phonological awareness and reading and writing ability has been related to literacy practices and experiences at home (Bowey, 1995; Evans, et al., 2000; Foy & Mann, 2003). Most of the studies, however, were carried out in developed societies. The contribution of literacy practices, such as shared-book reading and parental involvement in child's literacy activities, rely much on parents' education and literacy abilities, and positive attitude towards school success (Zuze, 2008).

The involvement of parents in the child's literacy activities has an impact on the development of more advanced reading and written language skills (Evans, et al., 2000; Sénéchal & LeFevre, 2002). Parental involvement and literacy practices available in literate and motivated families are unlikely to be found in homes where the parents' level of education and literacy abilities are low. In addition, development in literacy skills can be enhanced by reading materials available in the home. Naturally, the availability of books and other reading-related materials at home have a motivating effect on reading and writing. Interacting with the books exposes to the child the different letters and how they combine to form a word (if the language in the book is alphabetical). However, the availability of books and reading-related materials in the home again depends on the parents' level of income. Children from low SES home environment may not have such facilities. However, irrespective of parents' socioeconomic situation, a supportive environment at home will certainly and positively influence children's learning (Zuze, 2008). Children develop more literacy skills if they are encouraged to practice what they have learnt in school, and if the value of education is regularly reinforced at home (Entwisle, Alexander & Olson, 1997).

The significant relationship between other features of the home environment, such as housing-related variables and children's development in literacy skills, is important, not only because it adds to knowledge and understanding about the contribution of home environment to the development to literacy skills; the finding should also be seen as a finding specifically related to the rural area, the culture, and the population studied. The finding that the quality of house building materials and type and source of domestic facilities in the home relate significantly to the development of phonological awareness and reading and writing ability, can be considered an important finding to explain the socioeconomic status of a family in rural areas in a developing country (Arias and De Vos, 1996; Arimah, 1992; Fiadzo, et al., 2001). Thus, the contribution of housing-related variables to the development of literacy skills are found because the variables are associated with closer factors such as parents' education and

ownership of things that contain written language, which in fact make the existence of such correlations meaningful. Difficulties in developing meaningful measures that allow for comparisons between different contexts seem to be challenging. The findings from this thesis are encouraging with respect to the possibility of identifying culturally valid indicators for studying the home environment in a rural setting.

This research emphasized the importance of early identification of children's potential for reading difficulties from the fact that home environment plays an important role in enhancing literacy skills (Bowey, 1995; Jariene & Razmantiene, 2006; Shah, 2000). The evidence that home environment enhances literacy skills was based on Studies V and VI. It is well documented that children from a low-SES home environment show lower performance in reading and achievement tests compared to children from a high-SES home environment (Jariene & Razmantiene, 2006; Ransdell & Wengelin, 2003). This was supported in the results of Study VI, in which home environment variables such as parents' education and occupation, and housing variables make a significant contribution to mean differences in phonological awareness and reading and writing scores. Considering children from low-SES home environment as having reading difficulties, however, is not doing justice to them. Children from low-SES home environments may be poor readers due to lack of exposure to reading and writing materials and activities at home, unlike their counterparts from higher SES homes, who are more likely to have exposure that helps them realize their potential to read and write (Ransdell & Wengelin, 2003).

Further, this study emphasized activities like children's book projects and class and school libraries to support literacy-related activities in low-income homes. One research finding shows that there is a lack of books in the home in Tanzania (Alcock, et al., 2010). It was also apparent from Studies IV, V and VI that about 60 to 70 percent of families in the study had no book in the home. Reports about education statistics in Tanzania indicate that there is an acute shortage of books in schools. The pupil: book ratio in the public primary schools is usually high (3 to eight children share one book) with varying ratios across subjects (URT, 2009). The establishment of book projects and strengthening of school libraries is likely to provide children with access to books both at school, and at home by borrowing them from the school library. Thus, books will also be available in the home and children able to continue reading and writing even when they are at home. Expecting parents from a low-income rural area to buy books for their children is not a good idea, and it might not improve literacy conditions in the home. Almost fifty percent of fathers and about 90 percent of mothers in the study area were engaged in non-monthly paid activities such as agriculture, fishing and small business. The majority of people engaged in agriculture in Tanzania are rather poor, and their socioeconomic status cannot be regarded as good (NBS, 2004).

A claim that the impact of school on students' academic learning overshadows the impact of home environment has been reported in studies from developing countries (Heyneman, 1976, 1979; Heyneman & Loxley, 1983). In this thesis, the home environment was not significantly related to reading and writing when a summary index of socioeconomic status was used in the analyses in Study III. Parents' education and occupation, housing and home literacy environment showed significant relationship with phonological awareness and reading and writing ability when the home environment variables were separately used in Studies V and VI. This finding explains the need to develop and use culturally valid measures of home environment developed from and used with the population in a particular geographical area (Moore, 2003).

6.4 Methodological considerations

In the data collection for literacy skills, it was necessary to use tasks that measure phonological awareness and reading and writing skills. Phonological awareness involves understanding that spoken words are built up of individual phonemes. In consistent orthography (e.g. Finnish, Italian and Kiswahili) the phonemes correspond to the same graphemes. Previous research has shown phonological awareness to be strongly related to reading acquisition (Adams, 1990; Bradley & Bryant, 1983; Goswami & Bryant, 1990; Lundberg, Frost & Petersen, 1988). There is also evidence that phonological deficits are critical factors underlying reading problems (Vellutino, et al., 2004). Regarding the fact that spoken language corresponds to written language in consistent orthography, reading problems are thus not independent of writing problems. In this regard, measures used to assess phonological awareness and reading and writing ability in this thesis captured skills related to sound, letter, word, and sentence.

The issue of reliability for the phonological awareness and reading and writing measures was determined by ensuring that each instrument was reliable with the particular study sample. Two indicators of reliability were used: test-retest reliability and internal consistency commonly measured through Cronbach alpha coefficient. The test-retest reliability procedure was performed to check the reliability of reading and writing tests used in Studies I, II and III, while the Cronbach alpha coefficient was used to determine the internal consistency in Studies IV, V and VI.

In achieving content validity, the reading and writing skills covered in the tests are largely representative of the content found in textbooks used for teaching in the second through sixth grade. The letters and words used to develop the tests were those commonly found in the textbooks used for teaching Kiswahili in primary schools (Ministry of Education and Culture, [MoEC], 1995). The words also formed part of the common vocabulary used by children at home. Moreover, I have shared the study results with national and international audience through seminars, workshops and conferences.

The main problem encountered in the data collection procedure involved the testing procedure. The testing exercise involved arrangements with district education officer, heads of primary schools, and class teachers. The class teachers were mostly involved in organizing the testing sessions. They made lists so that each child involved in the study was informed of his or her testing date through a letter sent to the parents two days before the testing day. A problem with a predetermined list was that a child might not be present during the testing session. Absence from the testing session was sometimes due to the child not being present at school on the testing day, or the letter to inform about the testing schedule might have not reached the parents. This was particularly common for those children who lived in more remote areas and far from the school. In order to solve the problem, there was always a reserve list with children who would also be present at school and expect to be tested. The children on the reserve list were informed in advance that they were supposed to be present in case one of the planned children was absent from school.

In collecting data about the home environment, mothers or female guardians were interviewed. Fathers or male guardians were consulted whenever it was necessary to do so. However, in order to successfully perform the interview, some ethical issues had to be solved. Firstly, it was necessary to contact the head of the village to get permission to conduct the study there. This required holding several village meetings to explain the purpose and importance of the study to the community especially in relation to education. Secondly, the male head of the household had to give informed consent for the mother or female guardian to participate in the study. In Tanzania, and especially in the villages, men have power over women, and thus control females in many aspects including decision-making and ownership of family properties (Burge & Haughey, 2002). The informed consent included information about the overall aim of the study and the design and procedure of the interview. In this regard the informed consent provided relevant information about the study to the participants who were expected to participate voluntarily (Silverman, 2006).

The interview procedure involved walking around all the villages and homes. It was necessary to construct a timetable indicating the date and time of home visit for all the participants. The timetable was distributed to the participants through ten-cell leaders (known as *Mabalozi wa nyumba kumi*), who hold the most immediate political administration position introduced in Tanzania in 1965 (Nimtz, 1996; Samoff & O'Barr, 1996). Thus the interviewing procedure required knowledge about the culture of the people, including their customs and traditions.

Bagamoyo is among the poorest districts in Tanzania, with a low literacy rate and a low level of development (Gautum, 2009). About 25% of the parents involved in this study had no formal education. With a high level of poverty and low level of literacy, it is obvious parents are not able to support children's reading and writing skills. The study findings showed that the majority of

parents did not help their children with school homework because they lived in homes where no written materials were available. In this regard, reading activity did not exist either among the children or between parents and the children. The effect of the poor social and economic situation of the people in the study area was reflected in previous studies that were conducted in the same rural area. The research findings indicated that factors related to socioeconomic status were not related to children's performance in phonological awareness and reading and writing ability (Alcock, et al., 2010; Bhargava, et al., 2005). To solve the problem of skewed distributions, the thesis included an equal number of fathers of various levels of education in Study VI. The results showed that fathers' education was strongly related to phonological awareness and reading writing scores.

Although the study showed important findings about the contribution of home environment factors to children's development in literacy skills, the procedure to collect information about the home environment was rather challenging. Information about the home environment was collected through visits that sometimes required long walking distances and within short intervals of time, between 30 and 45 minutes. An alternative approach for collecting information about the home environment could include observation where the researcher would live among the homes. In this regard, the researcher would get deeper understanding of the different aspects of the home environment from different types of families.

6.5 Conclusions and recommendations for further research

This thesis exposes specific features of Kiswahili speaking Tanzanian primary school children's literacy skills, identifies indicators for describing the home environment in a rural area in Tanzania, and analyses the role of the home environment for the development of children's literacy skills in Kiswahili language

The findings reveal that the children's reading and writing ability was on a low level. Almost 30% of the children did not write any of the words in the test instrument correctly, and only 50% of all the children could read the words correctly. Regarding learning to write Kiswahili, the children made similar spelling mistakes to children learning other languages with consistent orthographies. Considerable similarities with inconsistent orthographies were also found. The spelling mistakes were related to omission, addition and substitution of letters from words and consonant clusters. Knowledge about dialects, grammar, phonology and orthography of the language were found to be important prerequisites for good spelling.

Spelling problems do not occur in isolation, and improvements in writing go hand in hand with development of reading skill (Cataldo & Ehri, 1997). Thus, development in one of these skills is likely to interfere with the child's progress in other non-writing skills. Usually children are expected to become fluent

readers during the second and third grades (Meisinger, Bloom & Hynd, 2010) and by fourth grade children shift from learning to read to reading to learn new information (Chall, 1996). Thus, early identification of children with or at risk of developing reading difficulties is important.

According to Lyytinen, et al. (2009), reading difficulties have been identified after been left to develop for years. By the time the reading difficulties are identified the child's development in acquiring the skills necessary to achieve reading are already affected. Furthermore, children with reading difficulties consider themselves failure for not attaining the same skills as classmates in school. Thus, future research is necessary in order to identify sufficiently early children at risk of reading difficulties for whom then training tools to overcome or at least to minimize the consequences of dyslexia can be provided. Such preventive training tools have been developed and used extensively in many countries, among them Sweden and Finland (Lundberg, Olofsson & Wall, 1980; Lyytinen, et al., 2009). A training game, the Graphogame, presented in the study by Lyytinen et al (2009), has also been used in studies with grades 1 to 3 children in Zambia (Matafwali, 2005; Ojanen, 2007).

As regards the home environment, five variables (fathers' and mothers' education, house wall material, light source, and the number of books for school subjects in the home), were identified and regarded as culturally valid indicators of the home environment in the studied area. Several of these indicators, e.g. parents' education, some of the housing variables and books at home proved to serve as significant predictors of children's literacy skills. This finding supports the idea that indicators identified from the studied population and used to measure home environment of that particular population, yield valid findings relevant for the development of that community (Moore, 2003).

The finding about the types of errors beginning-spellers in Kiswahili make in learning to write Kiswahili words adds to the already existing study results from consistent and inconsistent orthographies, many of which are of European origin. For example, in those occasions where spelling errors were found in Kiswahili, the most likely cause is that the child had not learned the orthographic rules related to the spelling of some consonant clusters. The finding supports the contention that in consistently spelt orthographies spelling is different to reading, in that phonological code-breaking is not the only skill needed for successful spelling, while it is sufficient for reading (Cossu, Gugliotta & Marshall, 1995). This study investigated Kiswahili language among Tanzanian children. In order to broaden and deepen the picture about learning to read and write Kiswahili, the research should be extended to include other countries where Kiswahili is used in schools, for example Uganda and Kenya.

The observed low achievement in reading (letter, word and sentence reading) raises concern especially when it is known that the development of fluent reading skills is essential for children's academic success.

The different home environment variables that predicted phonological awareness and reading and writing ability signify the important role that the home environment plays in the development of reading and reading-related skills. The results obtained from this study demonstrated that despite variation in social, physical and linguistic contexts between developed and developing societies, the home environment provides the child with early literacy skills and continues to develop these skills during school learning.

We know that home environment is defined differently in developed and developing societies. The variables identified in this study are considered appropriate for defining the home environment in the rural area in Bagamoyo District. Further research in other areas in Tanzania and also in other developing countries is needed in order to gather larger knowledge about the usefulness of the variables as home environment indicators.

In order to obtain a deeper understanding of the role of the literacy environment in the homes, more field studies and observations are needed. We need more knowledge about what kind of frequent reading and writing supporting activities (e.g. rhymes, jingles and songs) in addition to reading materials, there are to be found in the homes, and how the parents and other family members act as models and support the children in order to inculcate in them a motivation for reading. Observations in real living situations would facilitate our understanding of the relation between the home environment and the development of children's literacy skills.

Finally, it is of concern to examine the relationship between reading and writing ability (in this study measured through spelling skills) in the early stages of development. Previous studies have demonstrated that the two skills are strongly related (Ehri, 1986; Juel, Griffith & Gough, 1986). However, the findings from this study do not give a clear picture as to whether reading provided a foundation for the development of spelling. A future study could focus on the relationship between reading and spelling development during the first 3 years of school. Such a study could include early and systematic screening for risk of reading and writing difficulties and actions to support the development of these skills. The research findings show that preventive and early intervention programmes that include good instruction in developing phonemic awareness, fluency and reading comprehension, increase reading skills in most children (Olofsson & Lundberg, 1983). Further, activities like children's book projects and school library facilities are suggested, aiming at supporting literacy related activities in low capacity homes.

Summary of the study

Introduction

This thesis focuses on literacy skills among Kiswahili speaking primary schoolchildren in rural Tanzania and the role of home environment in the development of these skills. Literacy skills were assessed through phonological awareness and reading and writing ability². A number of research studies in the field of reading and writing acquisition have centred on consistent and inconsistent European orthographies. Although research findings reveal that some of the characteristics could be generalized across these orthographies, further analysis is needed due to variation in the rate of reading and writing acquisition between orthographies. The variation is related to consistency of the grapheme-to-phoneme correspondences of the orthography (Aro, 2006; Seymour, et al., 2003). The focus of this thesis was on Kiswahili, the language the participating children speak as their native language.

Language is first learnt in the home environment. As a concept, the home environment can be defined as a place where one lives with her or his family. However, due to varied levels of social and economic developments among societies, the home environment differs within and between societies and cultures. And thus, the home environment is conceptualized differently among different social contexts (Barnett & Casper, 2001). As a result, variables used to define the home environment in one society might not be valid for another society. As a consequence, diverse indicators contribute to the development of literacy skills among children from different social and cultural contexts (LeFevre, Clarke & Stringer, 2002).

Aim and motives

The overall aim of the study was to investigate the role of home environment in children's literacy skills (phonological awareness, and ability to read and write). In order to achieve the aim, the first task was to identify and analyze writing ability by identifying spelling errors in words and consonant clusters. The second task was to identify indicators that describe the children's living environment and literacy environment. The third and final task was to identify the home environment variables that are related to and predict children's literacy skills.

² In earlier reading and writing research there has been variability in the use of the notions ability and skill. Ability refers basically to biologically affected readiness, whereas skill refers to something that can be acquired through practice. However, many studies which apply similar tests to those ones in this study use the notion ability. In this study it was decided to use the notion ability, although the tests measure components which can be learned with moderate effort.

One basic motive in this study was to broaden our understanding about learning to write in languages with different orthographies, by examining as to whether the findings obtained from research about English can be generalized also to Kiswahili. Research about English orthography indicates that children require a variety of linguistic knowledge. These include phonological, dialects, grammar and orthography knowledge (Treiman, 1991, 1997; Treiman, et al., 1997). The findings are, however, considered specific for languages with inconsistent orthography like English. In English, the relation between phonemes and graphemes is complex, unlike in Kiswahili, where the correspondences are almost direct and guided by simple spelling rules.

Another motive in this study is concerned with the contribution of home environment on children's development in literacy skills. Most of the research findings of this topic are based on studies from developed countries where the conceptualization of the home environment is different from that of the developing countries. Research findings indicate significant relationship between socioeconomic status factors (like parents' education, occupation and income) and children's ability to read and write (Bowey, 1995; Jariene & Razmantiene, 2006; Juel, 1988; Ransdell & Wengelin, 2003). On the contrary, studies from developing countries show that children's ability to read and write is not necessarily related to socioeconomic status (Heyneman, 1976, 1979). It seems that the difference between the results can be traced to differences in the conceptions and measures of socioeconomic status. A number of studies in developing countries have used measures of socioeconomic status (describing home environment) which were designed for use in developed societies. The measures were not adjusted or created for use in developing societies.

The indistinct and partly contradictory findings from earlier research did not thus constitute an adequate ground for understanding the role of the home environment in rural Tanzania or in developing countries generally. Through my knowledge about the living conditions and the life in the area, there was an opportunity to identify and use culturally valid home environment indicators and to study their association with the children's literacy skills. The motive was to find basis for approaches, aiming at meeting the obvious and substantial needs of improving the children's conditions for development and learning in the area of the study.

Methods

The thesis is based on five studies undertaken during the years 2003 – 2009 and reported in the following six articles:

- I Learning to spell a regularly spelled language is not a trivial task – patterns of errors in Kiswahili. *Reading and Writing: An Interdisciplinary Journal*, 16, 635-666 (2003).

- II Learning to spell and learning phonology: the spelling of consonant clusters in Kiswahili. *Reading and Writing: An Interdisciplinary Journal*, 20, 643-670 (2007).
- III Modelling the effects of health status and educational infrastructure on the cognitive development of Tanzanian schoolchildren. *American Journal of Human Biology*, 17, 280-292 (2005).
- IV Key indicators of home environment for educational research in rural communities in Tanzania. *Child Indicators Research*, 3, 327-348. doi:10.1007/s 12187 009-9061-7 (2010).
- V Reading and writing ability in relation to home environment: A study in primary education in rural Tanzania. *Child Indicators Research*. doi: 10.1007/s 12187-010-9089-8 (2010).
- VI The role of home environment in phonological awareness and reading and writing ability in Tanzanian primary schoolchildren. *Education Inquiry*, 1(3), 215-238 (2010).

The study sample consisted of children in grades 2 through grade 6 and their mothers/female guardians from a rural area in Bagamoyo District.

Two types of instruments were used for data collection: tests to assess children's development in phonological awareness and their ability to read and write, and interviews (based on questionnaires) with mothers/female guardians to assess the children's home environment.

Sound deletion, initial sound identification and blending of syllables and words were used to assess children's development in phonological awareness. Letter reading, word reading, sentence reading and picture-matching tests were used to assess reading ability, while writing was assessed through spelling of words. Pupils were tested individually during the sound deletion and blending tasks, and in groups of 25 or less during the initial sound identification task and reading and writing tests. The testing time was between 30 and 40 minutes with each pupil during the individual tasks, and about the same time for each group testing session.

The interview was administered at home, and an inspection of the housing conditions and presence of literacy materials was done after the interview. The information obtained from the interview was used to describe the living environment and literacy environment in the children's homes.

The statistical procedures included ANOVA and multiple regression analysis in addition to descriptive analysis.

Results and concluding remarks

The findings of the study revealed that the children's reading and writing ability was on a low level. Almost 30% of the children did not write any of the words in the test instrument correctly, and only 50% of all the children could read the words correctly. The children had difficulties in identifying letters and in reading words and sentences. With regard to the awareness of sounds and sound structure in the Kiswahili language, the results indicated that grade 2 children had difficulties in identifying initial sounds and also in deleting sounds and syllables from words. The results on writing ability showed that the children made errors of omission, addition and substitution of letters in root morphemes. This finding indicated that in order to write correct spelling, children required knowledge about grammar, phonology, dialects and orthography.

Concerning identification of key indicators that best describe the home living environment and home literacy environment, five variables were identified. These included fathers' and mothers' education, quality of house wall material, light source and books for school subjects in the homes. These indicators have also been identified in other developing societies such as India (Tiwari, et al., 2005), Latin America (Arias & De Vos, 1996), Nigeria (Arimah, 1992) and Ghana (Fiadzo, et al., 2001).

Several home environment variables were considered to relate to and predict children's development in literacy skills. Parents' education, the house wall material, books at home and parental involvement in school homework were significant predictors of reading and writing ability. Fathers' education and mothers' occupation were strong predictors of phonological awareness.

One of the important observations of the study was the almost total lack of books and other reading materials in the homes that could support the children in acquiring reading and writing skills. Activities such as children's book projects and school library facilities are suggested, aiming at supporting literacy related activities in low capacity homes and in the schools. Early and systematic screening of children at risk of reading and writing difficulties and actions to support the development of these children are important. Preventive and early intervention programmes that include good instruction in phonemic awareness, fluency development and reading comprehension increase reading skills in most children (e.g. Olfsson & Lundberg, 1983; Shaywitz, Escobar, Shaywitz, Fletcher & Makuch, 1992).

To create a universal understanding about learning to read and write in languages with different orthographies, we need more research into individual orthographies of different origin and from different social contexts. Previous investigation has mostly been about reading and writing in orthographies from developed countries. Especially important would be studies from Africa, a continent which is becoming a part of the world-wide research community in educational studies. Schools in Africa lack the most basic resources needed for

education such as qualified teachers, facilities and textbooks (Locke & Komenan, 1989). As a result, millions of African children have no adequate access to quality instruction in reading and writing. Thus, examining the differential learning contexts can help illuminate both the more shared and distinctive characteristics of learning to read and write and of reading and writing difficulties.

Sammanfattning

I den här avhandlingen analyseras hemmiljöns betydelse för läs- och skrivutvecklingen hos swahilitalande grundskolbarn i Tanzania. Analyserna av barnens läs- och skrivutveckling innefattar fonologisk medvetenhet och läs- och skrivfärdighet. En del studier tyder på att det finns olikheter inom läs- och skrivutvecklingen beroende på om språket har regelbunden eller oregelbunden ortografi. Swahili är ett språk med regelbunden ortografi. Olikheten i inläringen är relaterad till hur stor överensstämmelsen mellan skrivtecken och språkljud (grafem och fonem) i språket är (Aro, 2006; Seymour et al., 2003). Barn lär sig t.ex. läsa snabbare på språk med regelbundna än med oregelbundna ortografier. Vissa forskningsresultat tyder dock på att det också finns likheter mellan ortografierna. Ytterligare forskning behövs för att utreda läs- och skrivutvecklingen på olika språk. Denna studie fokuserar på läs- och skrivutvecklingen på swahili, det språk som barnen i studien har som sitt hemspråk.

Den första språkinläringen sker i hemmiljön. Hemmiljön kan definieras som den plats där man bor med sin familj. Hemmiljön ser olika ut i olika samhällen och kulturer, men varierar också inom ett och samma samhälle beroende på social och ekonomisk utvecklingsnivå. Följaktligen har begreppet hemmiljö olika innebörd i olika sociala kontexter (Barnett & Casper, 2001). Definitioner som används i ett samhälle är automatiskt inte gångbara och valida i ett annat samhälle. Fördelen är att de faktorer i hemmiljön som är betydelsefulla för barns läs- och skrivutveckling är olika i olika sociala och kulturella kontexter (LeFevre, Clarke & Stringer, 2002).

Syften, forskningsfrågor och motiv

Det generella syftet med studien var att undersöka hemmiljöns betydelse för barns fonologiska medvetenhet och läs- och skrivfärdighet. Studien styrdes av tre forskningsfrågor:

- 1) Vilka typer av skrivsvårigheter kan identifieras hos swahilispråkiga barn i läsinlärningsstadiet genom att identifiera stavfel i ord och konsonantkluster?
- 2) Vilka faktorer beskriver bäst livsmiljön och läs- och skrivmiljön i hemmen i rurala Tanzania?
- 3) Vilka variabler i hemmiljön är relaterade till och predicerar barns fonologiska medvetenhet samt läs- och skrivfärdighet?

Ett av de grundläggande motiven till denna studie var insikten om behovet att bredda vår förståelse av inläring av språk med olika ortografier genom att undersöka huruvida forskningsresultat från engelska språket också kan gälla swahili. Forskning visar att barn behöver mångsidig lingvistisk kunskap för att kunna stava ord rätt på engelska. Barnen behöver kunskap om fonologi, dialektala former, grammatik och ortografi (Treiman, 1991, 1997; Treiman et

al., 1997). Dessa forskningsresultat anses emellertid vara specifika för språk med oregelbunden ortografi, såsom engelska. I denna studie var motivet att undersöka huruvida resultatet gäller också för swahili som har regelbunden ortografi med hög motsvarighet mellan grafem och fonem och enkla stavningsregler.

Ett annat centralt motiv utgår från frågan om hur hemmiljön bidrar till barns läs- och skrivutveckling. De resultat som finns baserar sig på forskning i industriländerna där man uppfattar hemmiljön på ett annat sätt än i utvecklingsländerna. Forskning från industriländerna visar att det finns ett tydligt samband mellan socioekonomisk status (mätt t.ex. med föräldrarnas utbildning, yrke och inkomst) och barns läs- och skrivefärdighet (Bowey, 1995; Jariene & Razmantiene, 2006; Juel, 1988; Ransdell & Wengelin, 2003). Däremot visar studier från utvecklingsländerna att barnens läs- och skrivefärdighet inte nödvändigtvis är relaterad till socioekonomisk status (Heyneman, 1976, 1979). De förstnämnda studierna använde instrument för beskrivning av hemmiljön avsedda för samhällen i industriländerna. Mätinstrumenten var inte skapade eller anpassade för samhällen i utvecklingsländerna. Olikheten i resultaten förefaller att kunna härledas till olikheter i uppfattning om och mätning av socioekonomisk status.

De oklara och delvis motstridiga resultat som noterats i tidigare forskning om hemmiljöns betydelse var problematiska för syftet i denna undersökning. De utgjorde inte en tillfredsställande grund för förståelsen av hemmiljöns roll i rurala Tanzania eller i utvecklingsländerna överlag. Genom att identifiera och använda kulturellt valida indikatorer för beskrivning av hemmiljön i undersökningsområdet var det möjligt att få kunskap om sambandet mellan hemmiljön och barnens läs- och skrivutveckling. Motivet kan givetvis härledas till min mångsidiga kännedom om livsvillkoren, livet och skolan i det undersökta rurala området i Tanzania och till min önskan om att kunna påverka förhållandena och hjälpa barnen i deras utveckling.

Metoder

Avhandlingen grundar sig på fem studier genomförda under åren 2003–2009. Dessa är rapporterade i följande sex artiklar:

- I Learning to spell a regularly spelled language is not a trivial task – patterns of errors in Kiswahili. *Reading and Writing: An Interdisciplinary Journal*, 16, 635–666 (2003).
- II Learning to spell and learning phonology: the spelling of consonant clusters in Kiswahili. *Reading and Writing: An Interdisciplinary Journal*, 20, 643–670 (2007).
- III Modelling the effects of health status and educational infrastructure on the cognitive development of Tanzanian schoolchildren. *American Journal of Human Biology*, 17, 280–292 (2005).

- IV Key indicators of home environment for educational research in rural communities in Tanzania. *Child Indicators Research*, 3, 327-348. doi:10.1007/s 12187 009 - 9061-7 (2010).
- V Reading and writing ability in relation to home environment: A study in primary education in rural Tanzania. *Child Indicators Research*. doi: 10.1007/s 12187-010-9089-8 (2010).
- VI The role of home environment in phonological awareness and reading and writing ability in Tanzanian primary schoolchildren. *Education Inquiry*, 1(3), 215-238 (2010).

Undersökningarna utfördes på landsbygden i distriktet Bagamoyo, som ligger på östkusten norr om Dar es Salaam i Tanzania. Undersökningsgrupperna omfattade barn från årskurserna 2 till 6 och deras mödrar eller kvinnliga vårdnadshavare.

I datainsamlingen användes två typer av instrument. Test användes för bedömning av fonologisk medvetenhet och läs- och skrivfärdighet och intervjuer (baserade på frågeformulär) för beskrivning och analys av hemmiljön. Intervjuerna gjordes i hemmen med mödrarna eller de kvinnliga vårdnadshavarna.

Ljudsubtraktion, identifiering av initialljudet och sammanljudning av stavelser och ord användes för att bedöma barnens utveckling i fonologisk medvetenhet. Läsfärdigheten undersöktes genom bokstavs-, ord- och meningsläsning och genom att kombinera bild och text. Skrivfärdigheten testades med hjälp av stavningstest. Ljudsubtraktion och sammanljudning testades individuellt, och identifieringen av initialljud och läs- och skrivfärdigheten testades i grupper på högst 25. De individuella testen räckte 30-40 minuter per elev och grupptesten tog lika länge.

Intervjuerna genomfördes i hemmen. Observationen och analysen av hemmiljön (bl.a. konstruktionen av huset) och av förekomsten av skriftligt material gjordes efter intervjun.

Resultatbearbetningen omfattade deskriptiva analyser, ANOVA och multipel regressionsanalys.

Resultat och avslutande kommentarer

Resultaten av studien visar att barnens läs- och skrivfärdighet var på en låg nivå. Nästan 30 % av barnen klarade inte av att skriva ett enda testord korrekt, och endast 50 % av barnen läste alla ord korrekt. Barnen hade svårigheter att identifiera bokstäver, läsa ord och meningar. Barnen i årskurs 2 hade problem med ljuden och ljudstrukturerna i swahili; de hade svårigheter att identifiera initialljuden och också i att subtrahera ljud och stavelser från ord. Skrivfärdighetstesten visade på utelämnning, tillägg och omkastning av bokstäver

i rotmorfem. Resultatet visar också att skrivriktighet i swahili förutsätter kunskap om grammatik, fonologi, dialektala variationer och ortografi.

I studien identifierades fem nyckelindikatorer som bäst beskrev livsmiljön och den litterära miljön i hemmen. Dessa inkluderade faderns och moderns utbildning, kvaliteten på husets väggmaterial, belysningskällan och antalet skolböcker i hemmen. Dessa indikatorer har också identifierats i andra utvecklingssamhällen såsom i Indien (Tiwari et al., 2005), Latinamerika (Arias & De Vos, 1996), Nigeria (Arimah, 1992) och Ghana (Fiadzo et al., 2001).

Flera hemmiljövariabler hade samband med och predicerade barnens utveckling i läs- och skrivefärdighet och fonologisk medvetenhet. Föräldrarnas utbildning, husets väggmaterial, skolböckerna i hemmet och föräldrarnas deltagande i barnens skolhemarbete identifierades som signifikanta prediktorer för läs- och skrivefärdigheten. För fonologisk medvetenhet var faderns utbildning och moderns yrke starka prediktorer.

En av de viktiga observationerna i studien är den närmast totala avsaknaden av böcker och annat skriftligt material i hemmen som kunde stöda barnen i läs- och skrivefärdighetsutvecklingen. Utgående från resultaten i studien föreslås t.ex. barnboksprojekt och skolbibliotek för att stöda läs- och skrivrelaterade aktiviteter i hem med svaga resurser och i skolor. Vidare föreslås tidig och systematisk screening av barn med risk för läs- och skrivsvårigheter och åtgärder för att stöda utvecklingen hos dessa barn. Preventiva och tidiga interventionsprogram som innefattar god undervisning i utvecklandet av fonemisk medvetenhet, läsflyt och läsförståelse, ökar läsfärdigheten hos de flesta barn (t.ex. Olofsson & Lundberg, 1983; Shaywitz, Escobar, Shaywitz, Fletcher & Makuch, 1992).

För att utveckla förståelsen av läs- och skrivinläringen på språk med olika ortografier är det nödvändigt att få fram forskning om ortografier som har olika ursprung och representerar olika sociala kontexter. Den existerande forskningen har främst gällt läsning och skrivning på språk med ortografier från industrialiserade länder. Forskning på området behövs också i utvecklingsländerna. Afrika är en kontinent som kommer att vara en del av det världsomspännande forskningssamfundet inom det pedagogiska området. Skolorna i Afrika saknar grundläggande resurser för utbildningen, såsom kvalificerade lärare, utrustning och läroböcker (Locke & Komenan, 1989). Följden är att miljoner afrikanska barn saknar tillgång till god undervisning i läsning och skrivning. Forskning i olika inlärningsmiljöer kan bidra till ökad kunskap om och förståelse av likheter och olikheter i läs- och skrivinläringen och om särdragen gällande läs- och skrivsvårigheter.

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List of original articles

The thesis is based on the following articles:

- I Alcock, K. & Ngorosho, D. (2003). Learning to spell a regularly spelled language is not a trivial task – patterns of errors in Kiswahili. *Reading and Writing: An Interdisciplinary Journal*, 16, 635-666.
- II Alcock, K. & Ngorosho, D. (2007). Learning to spell and learning phonology: the spelling of consonant clusters in Kiswahili. *Reading and Writing: An Interdisciplinary Journal*, 20, 643-670.
- III Bhargava, A., Jukes, M., Ngorosho, D., Kihamia, C. & Bundy, D. (2005). Modelling the effects of health status and educational infrastructure on the cognitive development of Tanzanian schoolchildren. *American Journal of Human Biology*, 17, 280-292.
- IV Ngorosho, D. (2010). Key indicators of home environment for educational research in rural communities in Tanzania. *Child Indicators Research*, 3, 327-348. doi:10.1007/s 12187 009-9061-7.
- V Ngorosho, D. (2010). Reading and writing ability in relation to home environment: A study in primary education in rural Tanzania. *Child Indicators Research*. doi: 10.1007/s 12187-010-9089-8.
- VI Ngorosho, D. & Lahtinen, U. (2010). The role of home environment in phonological awareness and reading and writing ability in Tanzanian primary schoolchildren. *Education Inquiry*, 1(3), 215-238.

The context of this thesis is the primary school in Tanzania. Alarming statistics reveal problems in achievement, promotion and drop-out rates all over the country. The reasons are many and complex and can partly be traced to problems in learning to read and write. Almost one-fifth of the children fail in an examination mostly measuring reading and writing skills at the end of grade four. About twenty percent of the children who complete seven years of primary education cannot read grade two level Kiswahili. Very little research exists about the children's reading and writing difficulties in Tanzania. Also, little is known about the role of the home environment for children's reading and writing development.

The overall aim of the study was to investigate the role of home environment in the development of children's literacy skills. The writing problems and indicators for describing the living and the literacy environment were identified. The relation between home environment and reading and writing development was analyzed.

Children learning to write Kiswahili, which is a consistent language, made similar spelling mistakes as children learning inconsistent languages, e.g. English. A large proportion (about one-third) of the children did not write any of the words in the test instrument correctly. Parents' education, house wall material, light source, and books for school subjects in the home were identified as culturally valid indicators of the home environment. Some of them also served as predictors of children's literacy skills. Strategies promoting children's literacy skills are proposed and concrete suggestions to policy and educational planners are given.

