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Succes or failure? The effect of the language of test on students' academic achievement in rural Senegal

Alexandre Martín-Chazeaud



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**SUCCESS OR FAILURE?
THE EFFECT OF THE LANGUAGE OF
TESTS ON STUDENTS' ACADEMIC
ACHIEVEMENT IN RURAL SENEGAL**

Tesi doctoral presentada per

Alexandre Martín-Chazeaud

Com a requeriment per a l'obtenció del títol de

Doctor per la Universitat de Barcelona

Programa de doctorat: Estudis Lingüístics, Literaris i Culturals

Línia de recerca: Lingüística Aplicada

Departament de Llengües i Literatures Modernes i d'Estudis
Anglesos

Directora: **M. Luz Celaya Villanueva**

Universitat de Barcelona

2017

To all African children, with the purpose of
breaking up the silence of their voices



ACKNOWLEDGEMENTS

First of all, I would like to express my most sincere gratitude to my supervisor, Dr Celaya, who guided me and encouraged me throughout the hard process of the present dissertation. All the valuable advice, persistent support and positive encouragement that she could give me were essential in order to carry out research in Sub-Saharan Africa and write this thesis.

I am particularly indebted to Dr Jarvis and all the members of the committee of the Language Learning Dissertation Grant Programme at *Language Learning* from whom I had the pleasure to be granted with support during the collection of data in Senegal.

I would like to thank Dr Cummins, Dr Brock-Utne and Dr Skattum for their recommendations on some references which have been of inspiration to the present dissertation.

My gratitude to all the staff members of the Master in Applied Linguistics and Language Acquisition in Multilingual Contexts at the University of Barcelona for all I learnt from them.

A special thankfulness addressed to Mr Joseph Thiaw, a close friend, for his precious help despite the difficult circumstances in rural Senegal. He collaborated in the translation of the tests into Sérère, read the tests to participants in the experimental group and he was indispensable when questionnaires were given to parents, since most of them could not communicate in French.

I am also in debt with Mr Alioune Faye. He devoted his time and his experience for the translation of all the tests to Sérère.

I would also like to thank Mr Martín for his advice in the design of the Mathematics tests. His expertise in the pedagogy of this subject was of great value in the final version of each problem-solving-task. Also, together with Mr Planes, they offered their knowledge on statistics which helped in the inferential analysis of the data.

My deepest gratitude to Mrs Clara Forn and all the management team at the Institut Pere Calders. They have given me the chance to travel to Senegal and collect information.

I wish to acknowledge the participation of students, teachers and families at Keur Madiabou, Keur Guirène Sérère, Ndjigane Sérère, Sekhela Diarga, Badoudou and neighbouring villages. I am particularly grateful to directors who allowed me to collect data among the students of their schools.

I would also like to extend my thanks to Mr Tine who helped me in the search of information at the library of the *Université Cheikh Anta Diop* of Dakar and put me in contact with linguists there.

I also owe my appreciation to my family and friends who have always granted me their support all along the writing of thesis when hard moments appeared. My especial thankfulness to my parents and my sister for their patience and their understanding of those periods when I was pressed to meet deadlines.

Finally, my most sincere recognition is for all those children whom I have met during my different sojourns in Senegal. Their enthusiasm towards life and their tenacious smile despite harsh circumstances have granted me the motivation required in order to accomplish the present dissertation.

SUMMARY

In most Sub-Saharan countries, children grow up in a local environment attached to a culture and an identity which are embraced by a local language. However, when they start compulsory school at the age of six, they have to face a curriculum which is taught and assessed from the first year in a European language foreign to them and, in most cases, culturally far from their own reality.

According to Heugh (2006; 2011b), these children must face a *language barrier* in monolingual educational systems in which a second language (L2) is the unique medium of instruction and where their mother tongue (L1) has no place. In such circumstances, learners are deprived from access to an education of quality and, consequently, obtain low results in tests, a fact depicted by Skutnabb-Kangas (2009a: 1) as a “genocide and a crime against humanity”. As a result of school failure and grade repetition, young students feel demotivated and families encourage their children to drop out formal education in order to participate in the economy of the family or in the household at very young ages (Magga, Nicolaisen, Task, Skutnabb-Kangas and Dunbar, 2005; Brock-Utne, 2014). In other words, those educational systems which do not consider the learners’ L1 as a medium of instruction do not represent any longer the means by which knowledge and language are taught for future and personal growth, but instead, the means which generates a vicious circle of failure and socio-linguistic indifference, including poverty and social exclusion (Mohanty, 2009).

This fact is of special interest to the female population living in rural areas of Sub-Saharan countries. Benson (2001a; 2001b) argues that females are considered academically incompetent as compared to males because they obtain low scores in tests and show an inactive presence during lectures, not only due to the fact that they scarcely understand lessons, but also to their hard responsibilities within the household. Benson (2005a) proposes that instruction through the mother tongue can have positive effects on females’ scores at school, a fact which leads to motivation and active participation in the learning process.

Therefore, in such contexts, tests are designed in a European language when only 5% to 10% of the population, generally the high socio-economic class, is

proficient in it (Brock-Utne and Alidou, 2006). According to Shohamy (2006) this circumstance creates an unfair situation known by the researcher as the *power of tests* in which only those students who master the official language can succeed at school. With the purpose of analysing students' academic achievement depending on the language in which they take tests, the present study was carried out in rural Senegal. It gathered data from 149 participants (66 males and 83 females) who attended grade 3 or grade 6. They were given two types of tests: Six multiple-choice questions of social and natural sciences and three mathematical problem-solving tasks, with a different degree of language complexity and context familiarity.

Participants were divided into an experimental group if they were given the tests in their mother tongue (L1 Sérère) and a control group, if they received the tests in the official language of formal education (L2 French). As revealed by the results obtained, L1 Sérère as language of tests benefitted students at both the quantity and the quality of their outcomes, and this was specially true for females. Moreover, the present study gave further evidence to Cummins' theories *Interdependence* and *Threshold Hypotheses* and supported Heugh (2011b), Benson (2013) and Brock-Utne's (2016) idea that school curricula in developing countries should consider the students' L1 as medium of instruction and language of tests at school, at least during six years, with the purpose of developing linguistic and academic skills in the L1 for later transferring them to the European language as L2.

SUMARI

En la majoria de països de l'Àfrica Subsahariana, els infants creixen en un entorn lligat a una identitat i una cultura unides per una llengua. No obstant, quan comencen l'educació obligatòria a l'edat de sis anys, han de fer front a un currículum acadèmic impartit i avaluat en una llengua europea estrangera i, en molts casos, culturalment distant de la seva realitat.

Segons Heugh (2006; 2011b), aquests infants han d'enfrontar-se a una barrera lingüística en un sistema educatiu monolingüe on una segona llengua (L2) es l'únic mitjà d'instrucció i on la seva llengua materna (L1) no hi té lloc. En aquestes circumstàncies, als aprenents se'ls priva d'accés a una educació de qualitat i, consegüentment, obtenen notes baixes en els tests, un fet descrit per en Skutnabb-Kangas (2009a: 1) com un "genocidi i crim contra la humanitat". Com a resultat del fracàs escolar i la repetició, els joves alumnes se senten desmotivats i les famílies els animen a abandonar l'educació formal per participar en l'economia familiar i en les obligacions de la llar a partir d'edats molt joves (Magga, Nicolaisen, Task, Skutnabb-Kangas i Dunbar, 2005; Brock-Utne, 2014). Dit d'una altra manera, aquells sistemes educatius que no consideren la L1 dels alumnes com a mitjà d'instrucció ja no representen els mitjans a través dels quals els coneixements i les llengües s'ensenyen per un futur creixement personal, però en el seu lloc, són els mitjans que generen un cercle viciós de fracàs escolar i indiferència sociolingüística, incloent-hi pobresa i exclusió social (Mohanty, 2009).

Aquest fet és d'especial interès en el cas de la població femenina que viu en zones rurals de l'Àfrica subsahariana. Benson (2001a; 2001b) argumenta que a les noies se les considera acadèmicament incompetents perquè obtenen notes baixes als tests i mostren una presència inactiva durant les classes, no només pel fet que amb prou feines entenen la lliçó, sinó també degut a les seves responsabilitats a la llar. Benson (2005a) proposa que un ensenyament en llengua materna pot tenir efectes positius en el rendiment escolar de les noies, fet que comportaria motivar-les i fer-les participar activament en el procés d'aprenentatge.

Per tant, en aquest tipus de context, els tests són dissenyats en una llengua europea quan només entre el 5% i el 10% de la població, generalment de la classe social

benestant, n'és competent (Brock-Utne i Alidou, 2006). Segons Shohamy (2006) aquesta circumstància crea una situació injusta, coneguda per la investigadora com a *poder dels tests*, pel la qual només els estudiants que dominen la llengua oficial poden atènyer l'èxit acadèmic.

Amb el propòsit d'analitzar l'assoliment acadèmic dels estudiants depenent de la llengua en què reben els tests, aquest estudi va ser dut a terme en el Senegal rural. Es va recollir informació de 149 participants (66 homes i 83 dones) que cursaven grau 3 o grau 6. Se'ls varen donar dos tipus de tests: sis preguntes de resposta múltiple de ciències socials i naturals i tres problemes de matemàtiques, amb diferent nivell de complexitat lingüística i acadèmica i de proximitat del context social. Els participants van ser dividits en un grup experimental si se'ls varen donar els tests en llengua materna (L1 Serer) i en un grup de control si van rebre els tests en la llengua oficial de l'educació formal (L2 Francès).

Tal i com van demostrar els resultats obtinguts, la L1 Serer com a llengua dels tests beneficia els alumnes tant en la quantitat com en la qualitat dels seus assoliments, i aquest fet és especialment rellevant en la població femenina. A més, aquest estudi és una prova de les teories de la *Interdependència* i del *Llindar* suggerides per Cummins, i dona suport a la idea de Heugh (2011b), Benson (2013) i Brock-Utne's (2016) per la qual els currículums educatius en els països en desenvolupament haurien de considerar la L1 dels estudiants com a mitjà d'ensenyament i com a llengua dels tests a les escoles, almenys durant sis anys, amb l'objectiu de millorar les habilitats lingüístiques i acadèmiques en la seva L1 per després transferir-les a la llengua europea com a L2.

LIST OF ACRONYMS

- ANSD:** *Agence Nationale de la Statistique et la Démographie*
- ARED:** Associates in Research and Education for Development
- BFEM:** Brevet de Fin d'Études Moyennes
- BICS:** Basic Interpersonal Communicative Skills
- CALP:** Cognitive/Academic Language Proficiency
- CFE:** *Certificat de Fin d'Études Élémentaires*
- CLIL:** Content Language Integrated Learning
- CONFEMEN:** *Conférence des Ministres de l'Éducation des États et Gouvernements de la Francophonie*
- CRES:** *Consortium pour la Recherche Économique et Sociale*
- ELAN:** *École et Langues Nationales en Afrique*
- IDEA:** Institute for Development in Economics and Administration
- ILWC:** International Language of Wider Communication
- ITM:** Indigenous/Tribal Minority
- L:** *Leçons*
- L1:** First Language or Mother Tongue
- L2:** Second Language or School Language
- L3:** Third Language
- L4:** Fourth Language
- M:** Mathematics
- MLE:** Multilingual Education
- MOI:** Medium of Instruction
- n.d.:** No data
- PAQUET:** *Programme d'Amélioration de la Qualité, de l'Équité et de la Transparence*
- PASEC:** *Programme d'Analyse des Systèmes Éducatifs de la CONFEMEN*
- PEBIMO:** *Projecto de Escolarização Bilingue em Moçambique*
- PEIB:** *Proyecto de Educación Intercultural Bilingüe*
- PDEF:** *Programme Décenal de l'Éducation et de la Formation*
- PRP:** Primary Reading Programme
- Q1:** First quadrant of Cummins' matrix

Q2: Second quadrant of Cummins' matrix

Q3: Third quadrant of Cummins' matrix

SES: Socio-Economic Status

SNERS: *Système National d'Évaluation du Rendement Scolaire*

UN: United Nations

UNESCO: United Nations Educational, Scientific and Cultural Organisation

UNESCO – PROAP: United Nations Educational, Scientific and Cultural Organisation

– Principal Region Office for Asia and the Pacific.

UNICEF: United Nations International Childrens' Emergency Fund

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1. INTRODUCTION

Language is an essential factor in order to share and transmit knowledge from parents to children at home and from teachers to students at school constituting, according to Romaine (2013: 11) a “right and means of development”. Language also represents the way by which learners show and communicate their real capacities during the whole learning process by way of assessment. It is upon these foundations acquired through language that children build themselves as citizens and find their place into society. But, what about low SES (socio-economic status) children who live in developing countries and who are suddenly taught through a language foreign to them?

In several Sub-Saharan countries, a European language was established as official after their independence. In the case of Senegal, the target country of the present study, French was adopted by the Constitution of 1959 as official language and therefore as unique language medium of instruction (MOI) at schools despite the fact that it is employed regularly as a language of communication by a minority of citizens who are the high elite but not by a large majority whose first language or mother tongue (L1) is a local African language. From the very first day, children, especially those living in a rural environment, are taught and assessed through a language which they may have never had contact with before they stepped school, following a curricula which is based on the idea that maximum exposure to the L2 French (second language) leads to better proficiency. However, studies assessing the academic achievement of students in Senegal generally conclude that their level is poor as well as their proficiency in L2 French, the language in which they are supposed to understand the teachers’ lessons as well as the language of tests in order to give an appropriate answer. The particular case of young females is of special concern since they even have an added social duty. In the rural Sub-Saharan context, females have a significant role: They are responsible of the different household tasks and participate actively in the economy of the family. Consequently, they go to school exhausted and are not able to follow a lesson in a language they scarcely understand, thus lessening their chances of academic success and increasing school abandonment.

According to some authors (Mohanty, Mishra, Reddy and Gumidyala, 2009; Skutnabb-Kangas, 2009a; Rea-Dickins, Guoxing and Afitska, 2010; Skutnabb-Kangas and Dunbar, 2010) this practice at schools hinders students access to an education of quality by means of a foreign language MOI which embodies a linguistic barrier and, consequently, does not respect human rights. Furthermore, the fact that young learners of low SES are taught and tested through a language which they scarcely master is thought to be a tool for the ruling class in order to fix their hegemony in the administration and therefore classify people into society (Shohamy, 2001; Shohamy, 2011; Menken, 2008).

As shown by the different experiences of pilot schools in developing countries in which the official language is a European one, the use of the students' L1 in education together with the design of tasks which consider their socio-cultural background is a step towards social equity which may lead to different benefits to children (Jandhyala, 2001; Benson, 2005a; Orekan, 2011). Most of the students who attend these pilot schools experience better academic results and an enhancement in the level of the official L2. Moreover, it seems that they become more engaged in different pedagogic tasks, increase their self-esteem and develop a sense of cultural identity, a fact which helps to reduce academic failure in schools and, thus, grade repetition and dropout rates (Brock-Utne and Alidou, 2006; Mohanty, 2009; Skutnabb-Kangas and Dunbar, 2010). Moreover, it has also been noticed that parents can involve themselves in the learning process of their children since the linguistic mismatch between the school and their home is reduced. Assessments of experimental projects in which a local L1 is MOI have also revealed that the female population could especially take advantage since they participate more actively in the classroom and obtained academic results which helped to diminish grade repetition rates (Benson, 2001a).

Content taught at schools is supposed to be learnt by students and then to be assessed by teachers through tests. Thus, the latter represent a relevant tool in order to judge students' academic capacities which may depend on the language in which content is taught and assessed. With the purpose of analysing the effect that the language of tests may imply on the academic achievement of primary children living in rural Senegal and whose mother tongue was not the official one but a local

vernacular language (L1 Sérère) and, therefore, considering the possibility of bilingualism (or plurilingualism) at schools, the present study gathered data from 149 participants (66 males and 83 females) with a different length of exposure to academic L2 French: Three years in the case of students attending grade 3 and six years in the case of those attending grade 6. The data collection procedure took place in five schools of the regions of Kaolack and Fatick, in central Senegal.

Students were given a test of L (*leçons*) which consisted on six multiple-choice questions and a test of M (Mathematics) which comprised three problem-solving tasks. Participants were divided into an experimental group if tests were given in their mother tongue (L1 Sérère) or into a control group if they received them in the official academic language (L2 French). Taking into account the importance of the students' own context, tests were designed following a continuum along Cummins' matrix and adapted to the Sub-Saharan background. Thus, each pair of L multiple-choice questions and each M problem-solving task increased in language complexity (sentence structure and vocabulary) at the same time that they distanced from the students' socio-cultural background. Although the participants had never received formal education through L1 Sérère at school, results obtained revealed that the use of their mother tongue as language of tests made a difference in their academic achievement as compared to the use of the current official language at both grade 3 and grade 6, even in those L multiple-choice questions and M problem-solving tasks in which the language of tests was complex and the context of the task was far from their own background.

Furthermore, results along Cummins' matrix suggested that the relationship between L1 Sérère and L2 French was different depending on the length of time that students had been exposed to the official language MOI. It seems that transfer of academic and linguistic skills from L2 French to L1 Sérère was unlikely to occur at grade 3 due to their poor level of proficiency in the official language MOI. However, the fact those students in the experimental group obtained better scores than those in the control group, especially in the M test, might be attributed to the knowledge acquired within their community added to the advantage of L1 Sérère as the language of tests. Concerning results at grade 6, possibly due to the fact that participants' level of L2 French increased after three more years of academic

exposure, data gathered suggest that there might exist a bidirectional transfer from L1 Sérère to L2 French of knowledge acquired within their community and some content learnt at school which, added to the benefit of L1 Sérère as language of tests, heighten their chances of academic success.

In the present study, a special focus is given to the female participants. Taking into account the social circumstances lived by women in rural Senegal and in line with Benson (2001a; 2001b; 2005), it seems that L1 Sérère as language of tests not only may benefit young females in comparison with their current academic situation, but in some cases it can also confer them an advantage as compared to their male peers who are given also tests in their mother tongue.

The present dissertation is divided into 10 chapters. After the introduction in chapter 1, the second chapter is a presentation of the situation lived by children in developing countries who attend a submersion type of education system and who therefore receive instruction and tests in a language foreign to them. It also explains the importance for students in that context to receive instruction in their L1 with the purpose of reaching international agreements such as the *Millennium Development Goals* and the *Education for All*. The third chapter of the present dissertation starts first with a general explanation of academic models according to the presence of the students' L1 as MOI for later focusing on education systems in the Sub-Saharan context and the expected achievement of their students. The following sections of chapter 3 are dedicated to Cummins' ideas of the Threshold and Interdependence Hypotheses and his distinction between Basic Interpersonal Communicative Skills (BICS) and Cognitive/Academic Language Proficiency (CALP) which might be of great importance in the formal education of multilingual students in developing countries and in the design of the tests in the present study. Based on assessments and descriptions of pilot projects, the last part of chapter 3 is an overview of some educational experiences carried out in developing countries where the official language is a European one but which have introduced local languages as MOI, with special attention to those projects which took place in Senegal. Chapter 4 is a more precise presentation of the target country, Senegal. After a brief socio-linguistic description and based on data gathered mainly from the United Nations Educational and Scientific and Cultural Organisation (UNESCO)

Institute for Statistics and from the Senegalese Ministry of Education, among other sources, the content of chapter 4 is focused on the education system of Senegal and discusses whether quantity indicators such as enrolment, grade repetition or dropout rates correlate with quality ones, mainly students' academic achievement.

Bearing in mind the ideas previously presented, the fifth chapter presents the research questions to the present study as well as their corresponding hypotheses. Chapter 6 is a detailed description of the main elements involved in the present dissertation and its process. First, there is an introduction to Sérère, the L1 of the participants in the present study, followed by information about the context where the data collection procedure took place and a description of the participants involved. After that, chapter 6 deals with a precise design of the instruments used in order to collect data: The tests taken by students, the questionnaires given to students, teachers and parents, and finally, the interviews addressed to members of the educational community. After an explanation of the piloting process of tests, chapter 6 closes with the explanation of the data collection procedure and its respective analysis. The seventh chapter deals with the descriptive and inferential analysis of the data and the results obtained, taking into account the objectives of the present study. The discussion of the results is presented in chapter 8 and established according to the research questions previously determined. Also, results obtained in the present study together with possible suggested outcomes are explained and then related or compared to previous studies as a support for later rejecting or accepting the hypothesis predicted earlier. The pedagogical implications of the results obtained are also included in that same chapter since the main objective of the present dissertation is the analysis of the academic achievement of students' in a rural Sub-Saharan context linked to the language of tests. Chapter 9 deals with the conclusions of the present study and finally, chapter 10, unfolds the limitations of the present study and suggests further research which might be taken into account in order to carry out studies in a similar context to the present one.

Bearing in mind the study carried out for the present dissertation and taking into account Cummins' ideas of the Threshold and Interdependence Hypotheses, it is suggested that the presence of local languages all along the Senegalese curricula is important for the academic development of children and their future professional

attainment. Moreover, since one of the main objectives in the education system of Senegal is the acquisition of L2 French, the students' L1 may be given the role of a bridge which transfers knowledge and academic skills from the students' L1 to L2 French. However, despite the general concern about the poor quality in the education systems of Sub-Saharan countries which is shown up on students' low academic achievement, a poor acquisition of language skills, multiple grade repetition and early dropouts, the language issue is still seen by rulers as "the least appreciated of all the major educational problems" (Brock-Utne, 2014: 4).

2. REVIEW OF THE LITERATURE: HUMAN RIGHTS FOR THE ABOLITION OF THE LANGUAGE AND CONTENT BARRIERS

2.1 Introduction

In most Sub-Saharan African schools, difficulties appear when children are taught and assessed throughout the whole formal education by means of a language unfamiliar¹ to them (Rea-Dickins et al., 2010). Consequently, *indigenous/tribal minority (ITM)*² languages are not used at all in schools meaning that they have no official status recognised, a fact leading to detrimental socio-economic and personal consequences for students and their communities, speakers of these local languages (Skutnabb-Kangas and Dunbar, 2010; Cummins, 2009a).

In chapter 2, there is a review of experts' opinion about the negative consequences for ITM students in developing countries to be taught in a foreign European language (section 2.2) and within a foreign Western culture (section 2.3). Also, reasons are given so that they could be educated and assessed in their own language and within their socio-cultural background (section 2.4), all of them with specific mentions to arguments made by the UNESCO. Finally, section 2.5 is focuses on two international agreements, the *Millennium Declaration Goals and Education for All*, which are objectives to be reached in the education sector for the benefit of the population in developing countries, with mother tongue instruction at schools as one of the most adequate solutions. This fact becomes of special interest in the current study because the use of the students' L1 in the academic context may be one of the key answers in order to reach these objectives.

¹ The term *familiar language* refers to the fact that African children are surrounded by a bunch of different languages and therefore may become proficient not only in the language spoken at home but also in those local languages used as interethnic communication (Brock-Utne, 2013; Brock-Utne, 2014). One of the school directors interviewed especially referred to it as "*langue environnementale, la langue avec laquelle l'enfant vit, elle peut être maternelle ou pas, mais c'est la langue que l'enfant comprend le mieux*" (the environmental language, the language which the child lives with, it can be their home language or not, but that is the language which the child understands the best).

² Acronym used by Skutnabb-Kangas (2009a) to describe children speakers of minority and non-dominant indigenous and tribal languages in developing countries.

2.2 The right to receive an education of quality: The negative consequences of the language barrier in academic submersion programmes

Access to an education of quality and to knowledge cannot be denied to any children in the world as established in the Right to Education and thus, rulers of countries ought to “respect, protect and fulfil” that right (UNESCO, 2014a: 12). Furthermore, that same declaration argues that governments should provide means to accomplish the second objective of the *Millennium Development Goals* about ensuring basic schooling to every child (see appendix 1). However, a large number of ITM children living in developing countries are deprived of that right because their mother tongue (L1) is a language which is just restricted to their communities and is therefore falsely considered underrated and not suitable for personal academic development (Mohanty, 2006). McKenzie (2009) blames governments for that dishonest discourse because, as the author argues, ITM languages have not been fixed a script, grammar rules or a technical scientific lexicon since States have ignored them from education and have designed academic curricula in the prestigious language as it is the easiest choice for them.

Thus, most children in the sub-continent must face a *language barrier*³ built upon *submersion*⁴ (also called *sink-or-swim*) academic programmes imposed by governments at schools in which minority language students are plunged into a monolingual second language (L2) education system without any other way out but ‘swim’ to the surface for survival (Benson, 2004a; Heugh, 2006; Benson, 2008; Heugh, 2011b) and, unfortunately, “at the costs of the mother tongue” (Magga, Nicolaisen, Task, Skutnabb-Kangas and Dunbar, 2005: 1; Skutnabb-Kangas and Dunbar, 2010: 11). Consequently, these education models become a productive industry of *circumstantial bilinguals* (or multilinguals) who are obliged to learn the official and more prestigious *international language of wider communication*

³ Term used by Hallberg (2010) mentioning Vygostky (1978) to describe the psychological obstacle causing misunderstanding between people due to small language proficiency. Also used with the same purpose by Brock-Utne (2002) and Magga et al. (2005).

⁴ I would like to mention here Heugh’s (2011b) distinction between immersion and submersion programmes: While both imply learning through a language which is not spoken at home, in Canada, for instance, children are born in a context which pushes them towards success: Parents with university degrees and good incomes, books at home, access to adequate material and technology; in Sub-Saharan Africa the reality is the opposite. As Heugh (2011b: 124) argues “what is immersion for middle-class children in well-resourced settings becomes submersion and sink, for most, or swim, for very few children, in resource-poor conditions”.

(*ILWC*⁵) for outliving reasons (Valdés, 1992; Valdés, 2005; Bee Chin and Wigglesworth, 2007). That is to say, a European language, foreign to ITM children, is the unique *medium of instruction (MOI)*⁶ at school, replacing and depriving students to develop their mother tongue skills in a monolingual *subtractive* language learning way (Skutnabb-Kangas and McCarty, 2008; García and Woodley, 2015). Rather, in education programmes in which the students' L1 is used throughout the whole compulsory education, for instance, an *additive* programme (see section 3.2.1 and 3.2.2), an L2 is added to the students' L1 as MOI and plays the role of linguistic basis for both academic content learning and L2 acquisition (Mohanty, 2009); a fact which would enrich and motivate learners leading them to be proficient in both the mother tongue and in the official language (Cummins, 1986; Skutnabb-Kangas and Dunbar, 2010; Brock-Utne, 2014).

Subtractive models imply that students not only have to understand the lesson that the teacher is trying to teach but, additionally, they have to make an extra effort to decipher the code of the academic language, quite often in vain because they are merely consecrated to reproduce on their notebooks what the teacher writes on the board (Mohanty, 2009; Jhingran, 2009; MacKenzie, 2009). Consequently, as Benson (2004a), Brock-Utne and Alidou (2006) and Jhingran (2009) argue, minority language learners have no other option but to retain by heart content in a language foreign to them; for instance, Brock-Utne (2013) explained that Ghanaian students obtain low results in Mathematics because they have no other solution but to memorize mathematical algorithms because they could not understand what was taught at school (see section 2.4.1). Moreover, MacKenzie (2009) explains that when ITM students are required to extract the meaning of readings displayed in textbooks, it is almost inefficient because texts are written in a code they do not master. According to Benson (2004a) to really seize the message of a text may take ITM students a long time after they had tried to read it. Hence, ITM children go back home not just with small ideas of the content of the lessons but scarcely having improved their L2 skills as consequence of the

⁵ Heugh (2006) refers to the international language of wider communication to the L2 of European origin which is MOI at schools and official language in developing countries.

⁶ Acronym used by Heugh (2006) to refer to *medium of instruction*.

poor quality of the school systems they are forced to attend (McKenzie, 2009; Smits et al., 2008), added to the incomprehensible speech of teachers who often do not feel themselves confident on the mastery of the language MOI (García, 2009; Rea-Dickins et al., 2010) and, moreover, are not usually prepared to teach in the dominant language (Jhingran, 2009; Benson, 2004a; Rea-Dickins et al., 2010). In words of Trudell (2010: 337), “when ‘Prof’ speaks, who listens?” As a matter of fact, as Orekan (2011) argues, ITM learners advance into the academic curricula acquiring the programme and the new language with a large number of deficiencies.

According to Mohanty (2009) and Mohanty et al. (2009), those education systems which do not consider the learners’ L1 as a MOI are no longer the means by which academic content and language are taught for future and personal growth; but instead, those are the systems which generate a vicious circle of failure and socio-linguistic indifference, including poverty and exclusion. Further, language which is believed to be the way by which students gain knowledge, it is transformed in submersion models into “the enabling factor for access to quality education” (Mohanty et al., 2009: 290). In words of Benson (2004a), one cause of poor education in submersion models may be explained because of a blurring between concept learning and language acquisition. Therefore, according to the researcher, three different gaps appear in students: The awareness of the concept taught, the understanding of the language used as MOI and the comprehension of questions in tests.

Fazio and Lyster (1998) make a comparison between additive and submersion academic programmes. They insist that the former aims at improving the proficiency of the students’ languages and help them to join later L2 curricula. Moreover, the researchers maintain that teachers in such programmes ought to share the L1 with their learners, a fact which improves confidence during the teacher-student communicative exchange and which should be considered by governments in order to “recruit teachers from minority language groups [...] trained to teach in two languages and to understand the needs of second-language learners” (UNESCO, 2014b: 284-285). Fazio and Lyster (1998) blame submersion agendas for not regarding ITM students’ needs and being source of failure in

academic achievement in a way in which the L1 skills are substituted by the L2's. They add that teachers do not usually speak the L1 of the learner and ignore their culture thus hindering the teacher-student communication channel and impeding knowledge being reached by the student. This fact is denounced by Skutnabb-Kangas and Dunbar (2010) and Jhingran (2009) because it means denying minority language students access to education. Further, Rea-Dickins et al. (2010) add that in Sub-Saharan countries learners are unable to give right answers in tests because of other realities in the classroom directly connected to the language MOI. Due to teachers' low qualifications and insecurity when teaching through a foreign language, their teaching strategies are not very much adequate and, therefore, they stay in a teacher-centred-safety-position by forcing students to replicate orally their utterances, finish their sentences with closing words or duplicate on notebooks those texts that teachers have copied from textbooks. Consequently, as Skutnabb-Kangas (2009c) claims, children can scarcely learn anything about the content taught.

It is a fact in Senegal that the Government employs teachers who may be sent somewhere around the country regardless of their L1 (Faye, 2013; Giuliano Sarr, 2013). Therefore, they do not share the same L1 with the students and are forced to use only L2 French without the possibility of teaching content difficult to understand through a shared code. Learners are then confronted to a language which they have little contact with and which they have to rush to learn (with several gaps) if they want to succeed in education. As a matter of fact, academic objectives are underachieved, firstly due to the language barrier and secondly to the mismatch between the home language and the one employed at school (Mohanty, 2006; Mohanty, 2009; Mohanty, et al., 2009; García, 2009; García and Hesson, 2015). This code divergence is believed to be an obstacle for students to have access to education (Skutnabb-Kangas, 2009b; Smits et al., 2008), and therefore one of the causes for children's academic failure, school dropout, poverty and social marginalisation (Magga et al, 2005; Benson, 2005; Smits et al., 2008; Mohanty, 2006; Mohanty, 2009; Hallberg 2010; Rea-Dickins et al., 2010). As Cummins (1979-1980) states, using minority language learners' L1 as a MOI is, in

primary education, a way to shorten the gap between the home language and the language MOI at school.

Studies on Linguistic Human Rights and mother-tongue-based multilingual education (MLE) agree that, under subtractive schooling, ITM students are deprived of their right to receive a quality education and are denied an opportunity to enlarge their knowledge and develop their academic and literacy⁷ skills (see Benson 2004a; Benson, 2005a; Benson, 2005b; Magga et al., 2005; Mohanty, 2006; Shohamy, 2007a; Levin and Shohamy, 2008; Skutnabb-Kangas, 2008, 2009a, 2009b; Cummins, 2009a; Mohanty et al., 2009; Panda and Mohanty, 2009; Smits et al. 2008; García, 2009; Skutnabb-Kangas and Dunbar, 2010; Menken and Kleyn, 2010; Hallberg, 2010). This may become a negative fact which, in words of Orekan (2011: 28), “poses serious language learning and literacy development problems”. The effects of submersion and the poor quality that this system guarantees were analysed by Menken and Kleyn (2010). In their study, the researchers gathered 29 English language learners who had been in the USA for seven years or more and whose mother tongue was Spanish. They found out that the students did not fully acquire competencies in their L1 or in their L2 because they attended a subtractive school where the system did not take into consideration their mother tongue skills. As a consequence, although these students had an adequate master of the language in an oral face-to-face conversation, their literacy skills showed poor proficiency, a fact which involved adverse academic results.

2.2.1 An education of quality in Sub-Saharan Africa: An objective still far to reach

The fact that some minority language students are submersed in a subtractive model of education without developing their L1 skills causes serious damages because they hardly ever reach adequate proficient levels in their L2 in order to receive instruction in that language (Benson, 2001a; Heugh, 2006). This is a wide spread phenomenon among minority language children in different countries of Sub-Saharan Africa, for example in Senegal. The students’ L1 is mainly oral, they do

⁷ Sampa (2003) makes reference to *literacy* as the linguistic ability to understand and pronounce easily a text while reading and to express oneself intelligibly in a written format. In the current paper, *biliteracy* and *multiliteracy* are used to refer to that same skill in two or more languages.

not develop literacy skills in their mother tongue (Skattum and Brock-Utne, 2009; Fall, M., 2014); therefore they have little academic and linguistic skills developed before they encounter L2 French, without any possibility to acquire proficient competence in both languages (biliteracy).

Halaoui (2003) asserts that an education of quality in the multilingual context of Sub-Saharan countries must be *relevant*; in other words, it has to consider that students attending the school system are there for their personal empowerment and the development of the country, and therefore, any denial of education to children through a foreign language as a MOI goes against those principles. The author adds that introducing an African language in education would contribute to help students to find a place into their society and contribute to its economic development.

Bamgbose (2011) affirms that a fair situation for ITM students in Africa would be to receive instruction in their mother tongue throughout the whole primary education with the ILWC taught as a subject. According to Benson (2001a), a mother-tongue-based MLE syllabus which aims at students to succeed should start in the first grade of primary by teaching them reading and writing in their L1; that way, they would relate each sound with its corresponding letter (or letters) and transfer it to the L2. The author states that “the minimal condition for that transference is oral understanding of the L2” (Benson, 2001a: 23); therefore, the ILWC should not be abruptly imposed, but students should get familiar with it through a first oral contact as a first approach towards L2 acquisition; in other words, it is a way for students to fix the L2 by interacting and not by learning words and rules by heart. In other words, as Bialystok (2007) claims, early training of oral skills in a L2 is essential for later literacy development in that same language since it facilitates the transfer of phonological awareness across languages. After that step, as Traoré (2001) describes, the ILWC should become a subject. In that same year, for the instruction of content, the mother tongue should be used as the MOI. Once mother tongue literacy skills have been developed and the student has acquired academic habits during primary education, an ILWC can start as MOI; however, L1 literacy and instruction should not be avoided. The author claims that many bilingual models have been unsuccessful due to a low dedication to train L2 oral

skills. Moreover, it should not be forgotten that there is an important aspect that should be taken into account apart from the use of an African language familiar to the students for promoting language transfer: The design of bilingual material in the curricula of mother-tongue-based MLE projects, which is of especial relevance in the case of those languages in absence of a standardised script (Brock-Utne and Alidou, 2006).

It must be considered that there are several African vernacular languages which have little gone through a process of written standardisation, a fact that increases their difficulty to be introduced as MOI in schools (Chabata, 2013). However, the author supports the importance of standardising by first, creating dictionaries in those languages and second, designing of a bank of terms in each school subject so that students could have linguistic support in their mother tongue. The purpose is starting to acquire specific vocabulary for each content area in the L1 for a later transfer to the L2 as it increasingly becomes the language MOI. But the nuisance appears when non-existing specific terms are required in the academic context. In order to cope with that problem, Halaoui (2003) argues that the traditional and easiest solution has been to adopt the term of the colonial language or to translate it. Nevertheless, according to Bamgbose (2011) there is a strong necessity to conceive terms by linguists, educators and local authorities in the ITM language so that it could become MOI and be used in professional domains.

One example showing that this is possible is Mongaba (2012). The author shows the procedure for creating a set of lexicon in order to teach chemistry in L1 Lingála in Congolese secondary schools, where the official language MOI is L2 French. Mongaba (2012) explains that there were different steps to respect. First, linguists checked the possibility of any previous adaptation to the African language: They found out that the periodic table had already been translated. After, as Mongaba (2012: 314) describes, there was “derivation, followed by compounding, loan transfer and borrowing”. For instance, in the case of loan transfers, experts aimed at expressing the term ‘atomic number’ in Lingala and came up with a set of words which designed it: ‘motango ya atómi’. Once the inventory of terms was finished, these were examined by a group of forty-two educators of the area. If thirty-five of them approved the term, it became part of the official lexicon in Lingála for

teaching chemistry. Once the structure of the language was established, bilingual material could be designed and bilingual (or multilingual) teachers could be trained to learn strategies for promoting transfer of academic knowledge and literacy skills to their students (Skutnabb-Kangas and Dunbar, 2010; Halaoui, 2003; Bamgbose, 2011).

Paxton (2009) adds that, in order to solve the problem that many African languages have not a compilation of academic terms, another resource could be the daily use of those languages inside and outside the classroom. The author carried out an experiment in which university students had to discuss in an informal situation specific terms of economy in L1 IsiXhosa⁸. Paxton (2009) argued that students did not only turn to borrowings from L2 English or to long explanations in their L1 if they did not come up with a single term, but they also developed terms which appeared from spontaneous conversations which were rooted from their own experiences.

Finally, the involvement of the community in the decisions taken and related to the education of the youngsters should not be disregarded together with the presence of the community's cultural background and realities in the curricula or, in words of Halaoui (2003: 18) "the more the curriculum is adapted to local realities, the more, education, of which is the vehicle, is relevant".

2.3 Language and cultural identity: Two interrelated essentials in the curricula

There are several documents published by major organizations protecting the right of humans to receive quality education, and especially those addressed to children in fragile environments such as minority language students in developing countries. To start with, the United Nations' (UN, 1989) *Convention on the Rights of the Child*, article 28 section e, heartens states to guarantee all children's schooling by "taking measures to encourage regular attendance at schools and the reduction of dropout rates" (UN 1989: 8), a proposal which may be closely attained in developing countries with the presence of African languages and a local cultural approach in

⁸ Although there were other local languages involved (IsiZulu, Sotho, Tswana, Pedi, Afrikaans and English), Paxton (2009) focuses her study on L1 IsiXhosa speakers since it is a part of a study from the Language Development Group at the University of Cape Town, South Africa, which aimed at creating a multilingual lexicon.

the academic curricula. According to García (2015) language constructs children's identity; therefore, in the school context, as Abidogun and Adebule (2013: 270) argue, not introducing the learners' L1 in education is "denying [...] culture and ways of life of the community to the young ones", that is, not granting instruction in ITM students' mother tongue is not only undervaluing their language but also their cultural identity. The authors add that ITM children, as they grow up, they acquire a sense of belonging to a community and therefore have the need of strengthening their cultural identity through their L1. Unfortunately, in Sub-Saharan Africa there is not only a language mismatch between home and school, but also a cultural one which is hidden by a foreign language MOI rooted in a Western context (Giuliano Sarr, 2013).

In her study, Benson (2005a) portrays what is currently happening with ITM children instructed in a foreign language and suggests that they are a vulnerable group prone to suffer from grade repetition and dropout because they barely understand what they are taught through the language of academic tuition; therefore students and their parents wonder why children have to attend a way of instruction which they scarcely understand. In other words, the language barrier impedes the acquisition of content caused by an uncomplete exchange and comprehension of messages between ITM learners and their teachers which therefore weakens quality in education and demotivates students in the process of learning (Hallberg, 2010; Brock-Utne, 2002); moreover, the language barrier also discourages parents who are tired of investing inefficiently on schooling expenditures. Consequently, due to a lack of economic support and to continuous failure at school, parents believe that their children ought to abandon formal education with the purpose of contributing to the economy of the family (Brock-Utne, 2014).

Shelley (2010) asserts that most ITM students give up school because they feel powerless when submersed in a system which does not regard their language or their culture; therefore, as Hallberg (2010) argues, they may perceive demotivation and rejection of their cultural identity. These feelings are caused by the imposition of both a foreign language and a cultural background which intends to push ITM learners towards the culture of the "civilised" (Skutnabb-Kangas,

2008a: 118) by persuading them that the foreign language and foreign culture are positive and will enable them to reach higher SES (Skutnabb-Kangas and Dunbar, 2010). Therefore, as Smits et al. (2008) emphasize, ITM children are not only affected from an academic point of view, but also from a social and psychological perspective. The authors argue that language and cultural identities are linked and the fact that children experience an undervaluation of them at school may also be a cause for academic failure and dropout.

In other terms, Cummins (2009a) mentions Ogbu's (1992) expression *involuntary minorities* to define those ITM communities who have been forced to assimilate the identity (language) of a dominant one, for instance, through colonisation; consequently, learners experience academic failure and have fewer opportunities to reach a quality job place. According to the author, referring to Portes and Rumbaut (2001), it is an unconscious reaction of ITM students who struggle a "disengagement from academic effort" (Cummins, 2009a: 29) as a way of denial of a foreign linguistic identity, that is, minority language students feel no motivation to acquire the L2 due to the fact that they do not recognise the L2-community speakers' culture as their own (Cummins, 1979a). In fact, Collier (1995) refers to the issue that there are social factors which affect negatively the ITM learners' academic results and their own image among the country's citizenry, among them, the way they perceive marginalisation exerted by the ruling class as well as the way they see their cultural identity and language displaced from the academic curricula, thus facing a second obstacle at school: The *content barrier*⁹ (Mohanty et al., 2009).

Cummins (1986) adds that there exists a very close relationship between the school environment and the students' identity which is relevant for ITM students' academic success. The researcher, together with other authors (Collier, 1995; Mohanty, 2009; Brock-Utne and Alidou, 2006; Mohanty et al, 2009; Skutnabb-Kangas and Dunbar, 2010; Brock-Utne, 2016) suggest that ITM communities' environment, language and culture should be considered when designing curricula

⁹ Mohanty et al. (2009) refer to the content barrier when ITM students' cultural background and knowledge are not included in the academic curricula and therefore, students are taught a cultural and historical background which is far from their reality.

for minority language students because the amount of L1 and cultural background in schooling models are supporters of ITM students' success and, at the same time, increase their self-motivation. That is to say, in words of MacKenzie (2009: 377), "the culture is contained in the language and so indigenous knowledge is best learned through indigenous language". This effect, together with an active participation of the community in the academic scene with the L1 as tool of communication leads, according to Cummins (1986: 661; 2009: 30), towards an "empowerment" of ITM students in school. Cummins (1979a) concludes that if ITM learners were given the opportunity to deal with their languages and their cultures in the academic context, they would feel encouraged to learn and to attend their lessons. Halaoui (2003) adds that if ITM languages were used as a MOI in the academic milieu, students would not feel themselves ignored as they do when submerged in an unfamiliar context for them because mother tongue instruction "opens the access of a large number of children to education" (Halaoui, 2003: 10).

Although Landry and Allard's (1993) study was carried out in a developed country, it is a good example in order to manifest the importance of the cultural need in the educational curricula for young learners. The researchers analysed 1160 L1-French speakers in Canada who attended schooling models ranging from mother tongue instruction in all subjects except English as a second language to a system regarding instruction in the both languages. In their study, they suggest that identification with the culture of the language MOI is related to academic proficiency and showed that those L1 French speakers with low L1 proficiency were those who received little instruction in their mother tongue and, therefore, had a slight feeling for identifying themselves with the French Canadian community. Inversely, those empathising with the linguistic group and receiving L1 instruction through the whole education system had better academic scores and higher language proficiency. The authors conclude that curricula should make allowance to the socio-cultural background of the students and that it "should be adapted to the relative ethno-linguistic vitalities of the language communities they are designed to serve" (Landry and Allard, 1993: 22).

Similarly, Tsung and Cruickshank (2009) carried out a study in the Akeshu district, in West China, where 75.5% of the population were minority groups. After

interviews to students, teachers and parents, the authors showed that minority Uyghur L1 Chinese students receiving instruction in their mother tongue had low academic result and recorded high dropout rates because pedagogy was based on inappropriate methods for ITM students: Their culture and background were ignored, the methodology used was teacher-centred, and the school material was based and translated from Chinese language and culture and frequently embedding political ideologies. Nevertheless, Tsung and Cruickshank (2009) report the success of a Uyghur and Chinese bilingual Mathematics class whose students scored between 40% and 50% higher than the average. The researchers attributed such good results to the student-centred methodology used by the teacher who used strategies to promote language transfer. The fact that curricula in submersion models do not consider minorities' L1 and cultural identity is, according to Shohamy (2013: 227), a representation of "the discourse of power"¹⁰. That is to say, most governments do not consider any manifestation expressed in any other tongue but the official and prestigious one (Shohamy, 2007a: 123); it is a behaviour which, according to Mohanty et al., (2009: 301) "dehumanises" ITM communities.

Giuliano Sarr (2010) carried out a study in South-Western Senegal. The researcher gathered primary multilingual students at grades 5 and 6 whose mother tongue was L1 Fula but who could also speak other local languages. Through a game in small groups, the goal was to start a discussion in L1 Fula, L2 Wolof or L2 French in order to illicit spontaneous information on the conflict between cultural practices and transmission of indigenous knowledge learnt within the community members and Western culture spread in a francophone school. Giuliano Sarr (2013) observed that students engaged more actively in discussions when they expressed their feelings through a local language. Further, she concluded that there is a loss of cultural values which are not included in the school curricula and which are being replaced by Western ones at school such as individualism (see the idea of ubuntu translanguaging in section 3.2.2).

This situation is opposed to section 2 of Article 26 in the *Universal Declaration of Human Rights* which proclaims that "education shall be directed to

¹⁰ Shohamy (2003) refers to *discourse of power* (or *language discourse*) as the use that governments make of language in education in order to marginalise minorities and empower social classes.

the full development of the human personality” (UN, 2015: 54) and to Article 5 in the *World Declaration on Education for All* affirming that “literacy in the mother tongue strengthens cultural identity and heritage” (UNESCO, 2000: 76).

The UNESCO’s *Right to Education* (UNESCO, 2014a) aims at promoting inclusive education and point out that schools should regard students according to their linguistic and cultural needs, without distinction, disregarding any type of discrimination and especially, to fragile communities like linguistic minorities. In fact, from the first moment that minority language children start primary school, they feel the need for developing their L1 skills and for enlarging their prior knowledge¹¹, but these are not considered and are supplanted by the language of submersion at school. In that sense, according to Sampa (2003), Brock-Utne and Alidou (2006), Paxton (2009) and Giuliano Sarr (2013), education experts ought to use strategies to promote language transfer by including ITM students’ indigenous knowledge and cultural and social practices to advance in the learning process and to preserve heritage wisdom rooted on their *language ecology*¹².

2.4 Minority language students in developing countries: An education in their languages and within their cultures

The United Nations, in the first section of Article 14 of the *Declaration of Rights of Indigenous People* affirms that “indigenous peoples have the right to establish and control their education systems and institutions providing **education in their own languages**¹³, in a manner appropriate to their cultural methods of teaching and learning” (UN, 2008: 7). However, through submersion programmes, minority language students are prevented from enjoying knowledge enlargement and literacy skills development in their L1 due to a linguistic barrier which violates rights to education (Cummins, 2001; Skutnabb-Kangas, 2009a; Skutnabb-Kangas and

¹¹ Cummins (2008a: 68) refers to *prior knowledge* as those linguistic skills, information and experiences that minority language students have acquired through their L1. In the Sub-Saharan context, as Brock-Utne and Alidou (2006), MacKenzie (2009) and Giuliano Sarr (2013) point out, experiences acquired in the students’ home environment are called *indigenous knowledge* (see section 2.3).

¹² *Language ecology* (also *linguistic ecology* or *ecolinguistics*) is a term used by Skutnabb-Kangas and Philipson (2008) to express the diverse amount of specific words and phrases contained by ITM languages in their lexicon to refer to their autochthonous natural environment.

¹³ My emphasis.

Dunbar, 2010). In words of Skutnabb-Kangas (2009a: 1), it constitutes a “genocide and a crime against humanity”. Moreover, the UN’s *Declaration of Rights for Indigenous People* also encourages States at developing ITM cultures, community identities and local background through minority local languages at school by including them in the academic curricula (Skutnabb-Kangas, 2008b), but unfortunately this is not the case in several developing countries where states carry on a policy of monolingual education curricula which is adverse to the expression of ITM peoples’ language and identity (Skutnabb-Kangas and Dunbar, 2010).

In the same way, Hallberg (2010) claims that any ITM student should have equal opportunities to receive academic instruction. But, as MacKenzie (2009) argues, this is not generally the case and many indigenous learners receive instruction in a language they do not comprehend and follow a programme grounded on a cultural context inappropriate to them. This reality distances ITM learners from the dominant group in society and causes an unfair situation of possibilities (Smits et al, 2008: 8) because first, they have little access to sources of information for social purposes and second, they undergo fewer opportunities to succeed at school and to get a good job compared to those children having the language MOI as L1. In fact, the majority of ITM children speakers of a language different from elite groups live in poor rural areas and are, mainly because of the language barrier, highly exposed to non-attendance and school abandonment which ends up in academic failure (Romaine, 2013).

At that point, education in the mother tongue becomes an important factor because, if these people were given instruction in their L1 to profit from natural resources of their environments and improving their agricultural and farming capacities, they would improve their quality of life and at the same time not be forced to escape from rural poverty with the dream of finding a work place but really meeting a worse urban penury or, the other alternative for most low SES young men, joining the army (UNESCO, 2011).

2.4.1 Languages in formal education and in tests: A tool for marginalizing some students and empowering others

Education has always employed tests for assessing the students' progress in the process of learning and the acquisition of content in a specific academic area (Shohamy, 2007b; Rea-Dickins et al., 2010). These are tools which give students access to higher school grades and to a professional life or may even prevent that possibility depending on the students' proficiency on the language used to express them and answer them (Shohamy, 1998; Shohamy, 2007a; Shohamy, 2011; Menken, 2008; Rea-Dickins et al., 2010). Shohamy (2001), Shohamy (2007a), Shohamy (2013) and Menken (2008) denounce inequalities at schools established by *language education policies*¹⁴ which lead to marginalisation of communities whose own languages are not considered at school as a consequence of what Shohamy (2001: 375) calls "the power of tests" or as a mechanism with the purpose of discrediting local languages and conferring prestige to a more prestigious ILWC. Consequently, by means of a prestigious language and foreign to ITM students, the elite society, who master that language due to better academic support, learning opportunities and use of that language at home, become privileged in a multilingual society where exists a hierarchy of languages (Shohamy, 2007b; Shohamy, 2011; Shohamy, 2013; Brock-Utne, 2014; Brock-Utne, 2016; García, 2016; Wei and García, 2016). It is not therefore strange that García and Woodley (2015: 138) claim that "attitudes, values and beliefs about language are always ideological, and are enmeshed in social systems of domination and subordination of groups". Shohamy (2013), Shohamy (2008), Shohamy (2007b) and Menken (2008) claim that those types of policies which, by means of the unique prestigious language in tests, send a message to citizens and to all the educational community which tells that only the language of tests is the correct one and the language of local minorities is the insignificant one. Introducing a local language in the school curricula of developing countries and therefore, in tests, would imply a new assignment of power among societal groups and an open access for non-dominant communities to higher status (Brock-Utne, 2002).

¹⁴ "Decisions made about languages and their uses in the specific contexts of schools" (Shohamy, 2007a: 119).

It should be taken into account that the amount of African population who is proficient in an official ILWC is about 5% to 10% (Brock-Utne and Alidou, 2006). In other words, they are the privileged high SES people who are the most advantaged and therefore are more prone to understand the language of tests at school and to answer them more adequately (Shohamy, 2008). The author adds that they are the only members to succeed at school and to have access to appropriate workplaces or to well-resourced universities (Shohamy, 2008). That way, according to Cummins (2009: 28), “material and symbolic violence” is exerted towards those ITM children for whom academic failure is perpetuated. Heugh (2006) ratifies this fact when claiming that in South Africa, only less than 1% of ITM students L1 speakers of a local language reach the faculties of Mathematics or Science. In Senegal, the *power of tests* seems to be associated to the high social sphere. As Ndiaye, S. (2006 : 144) argues, “*le statut économique et social des diplômés liés à la maîtrise du français confère à cette langue une image puissante et lui ouvre la voie à des aspirations faites pour durer longtemps¹⁵*”. That is to say, L2 French language and university certificates are linked: Mastery of L2 French gives access to a university degree; at the same time, it is the entrance to a higher position in the socio-economic sphere. Those people who master L2 French, mainly the high SES, have more chances to obtain a university degree, not because they have more capacities, but because the language of tests and MOI at schools had not represented for them a language barrier to them along their academic education because. As Menken (2008) argues, the language of tests chooses those who succeed.

Skutnabb-Kangas and Dunbar (2010) go further and assert that submersion and the absence of ITM communities’ language and cultural background at schools minimises their SES and deprives them from reaching power in both societal and economic context. In that sense, the researchers mention the Navajo community in the USA to exemplify that submersion can lead to ITM learners’ L1 attrition and loss of their cultural and biodiversity knowledge. Thus, the privileged high SES elite have guaranteed access to a quality education, to better future opportunities and to ruling places whereas ITM groups, whose L1 is not used in the official domain but

¹⁵ The economic and social status of certificates associated to the mastery of French confer to that language a powerful image and open the way for aspirations done to last for a long time.

marginalised, are prevented from enjoying private quality schools or from taking place in reasonable job places (Shohamy, 2007a). As Benson (2005b: 249) argues, this unbalanced situation “puts at disadvantage all students who do not have prior access to this language”, referring to the official language MOI. By way of explanation, in post-colonial countries, the way in which official documents and hence, exams, are designed is in the official language of the country, the standard variety of a European language which very few ITM learners master (Shohamy, 2011). Instead, choosing a local language could facilitate comprehension and could counterbalance power between the privileged and the disadvantaged (Brock-Utne, 2001; Smits et al., 2008).

Using in academic tests a language foreign to the students means that they cannot show their real capabilities (García, 2009); in other words, failure is almost ensured at school because they cannot really express all their knowledge due to the fact that they scarcely understand what they are being asked in (Shohamy, 2011). Consequently, as Skutnabb-Kangas and Dunbar (2010: 47) claim, minority language students become “exo-categorised, defined by others”. That is to say, it is generally the ruling class who marginalises minority language students, portrays them as having academic deficiencies and depicts them as ‘bad students’ with failures in their academic and literacy skills (Cummins, 1982; Cummins, 1986; Shohamy, 2001; Cummins, 2009b; Brock-Utne, 2013; Benson, 2013; Brock-Utne, 2014; García and Hesson, 2015; García, 2015). Therefore, they are penalised and condemned to exclusion, grade repetition and dropout or to occupy a workplace in low conditions causing a large social gaps (Mohanty, 2006). In words of Shohamy (2006: 177), minority language students become a “second class group of students who are marked for life”. These learners have no alternative but to accept the unique academic situation offered to them (Shohamy, 2013). In Sub-Saharan Africa, the indigenous knowledge and linguistic richness inherited through a local L1 which would engage rural learners in the development of cognitive and linguistic abilities at school is just very little considered (Cummins, 2009b).

Indeed, several authors (Shohamy, 1998; Shohamy 2007b; Mohanty, 2006; McKenzie, 2009; Brock-Utne and Alidou, 2006; Rea-Dickins et al., 2010) suggest that an ILWC as language of tests and also as MOI could define the future of ITM

students in developing countries of Sub-Saharan Africa. That is, not granting students the possibility of expressing their academic capabilities for their future development is a crime against Human Rights since any ITM student should have the chance to be assessed in his/her L1 (Shohamy, 2007a; 2013; McNamara and Shohamy, 2008; Mohanty et al. 2009).

Brock-Utne and Alidou (2006) claim that the cultural background and social life of ITM communities should be included not only in the curricula of mother-tongue-based MLE programmes, but also in tests because, as Solano-Flores, Trumbull and Nelson-Barber (2002) argue, students' results may be affected by the way in which tests are written and also by the context in which they are focused; that being so, the authors assert that tests which are directly translated from a major language and which also include the cultural context of its speakers can have negative outcomes for minority language children. Brock-Utne and Alidou (2006) denounce those tests which are taken by African learners and which are designed in European countries based on Western cultural contexts. Brock-Utne and Alidou (2006) suggest that these should be designed by African educational experts in the case of pedagogical models where a local language is the MOI or by test designers who have a wide knowledge of the language, context and curricula of the community to which they are addressed.

Cummins (2009b) also considers the supremacy that the dominant language discourse exerts on minorities in the school context. He defines *coercive relations of power* as the struggle that the privileged high SES class brings to bear upon minorities by means of the prestigious language and academic MOI. According to Mohanty (2006), this fact creates a linguistic power structure in which the ILWC language exerts power upon languages of wider use which, at the same time, subdue tribal languages which have no presence on official domains and are just restricted to minor communication. In contraposition, Cummins (2009b) and Cummins (2013) give the meaning of *collaborative relations of power* when there is collaboration between individuals or social groups for a change as main objective; translated into the classroom, students are empowered to attain better opportunities when their L1 and their identity are considered.

In the academic context, these ideas may be linked to the *power of tests* and the *language barrier* or their abolition through the introduction of the mother tongue as MOI. Cummins (2009b) portrays the communication between the teacher, the learner and the community (what he calls *micro-interactions*) as the key factor for the students' success or failure. It is upon these interactions and the language used that students acquire knowledge and build a sense of identity in two directions: Towards coercive relations of power if the L2 is the unique language of exchange or pointing to collaborative relations of power if the L1 is considered as knowledge-transmitter and identity-carrier. The author suggests that *coercive relations of power* must be defeated by introducing ITM students' L1 in bilingual programmes for succeeding at school and for a future life. With the proposal of showing *the power of tests* and the differences in opportunities given between high and low SES status students caused by the language barrier in subtractive schooling, Levin and Shohamy (2008) analysed the academic performance of 3000 students in three grade levels (5, 9 and 11) in Israeli schools: 1,321 were native speakers of Hebrew (the language MOI) forming the control group and the other half were immigrants, constituting the experimental group. It should be said that the latter was divided into two subgroups according to participants' origin: 1,066 from the Former Soviet Union and 374 from Ethiopia. The tests which participants had to complete were designed for two subjects: Hebrew, in order to check the students' proficiency in the academic language, and Mathematics because "there are indicators that both Mathematics reasoning and problem solving capabilities depend largely on students' language capabilities" (Levin and Shohamy, 2008: 10).

Results of the study showed that in both subjects, native students reached higher scores than immigrants, especially in Hebrew, suggesting that immigrant students did not reach a native-like level of proficiency in the language MOI and therefore had to face the language barrier at school in order to learn. One of the interesting points of this study was the difference existing between scores attained by the two different immigrant subgroups. On the one hand, Russian speakers improved their skills in Mathematics problem solving and Hebrew throughout grade levels and years of exposure to the language MOI, although they only equalled their native peers in some Mathematic tasks. On the other hand, Ethiopian students

were those who attained the lowest scores without showing any significant improvement even after several years of exposure to Hebrew at school. The researchers concluded that this fact could be due first, to the low proficiency and mean skills development that the Ethiopian students had of their L1; second, to the fact that they might not have been schooled in their country of origin; and third, the present poor conditions and low means for further academic exposure related to their low SES. Levin and Shohamy (2008) concluded that immigrant students started primary school and encountered a language they did not understand and had to develop literacy abilities in L2 Hebrew when they had scarcely developed linguistic abilities in their L1.

In the case of Sub-Saharan Africa, Brock-Utne and Alidou (2006) give evidence of that fact by mentioning Safarani Kalole's study (2004) in Tanzania where 23 correctors of tests were interviewed. The study concluded that the use of English in test was disadvantaging ITM students. Other interesting pieces of evidence that Brock-Utne and Alidou (2006) and Brock-Utne (2013) mention two articles written by two local Mathematics teachers Fredua-Kwarteng and Ahia (2005a; 2005b) who gave reasons for the very low scores of Ghanaian students in Sciences and Mathematics in the *International Mathematics and Science Study* in 2003 who, among 45 countries, Ghana was placed the 44th. The authors asserted that ITM learners were not capable of giving answer to problem-solving tasks because they did not understand the language at which tests were expressed. Both teachers argued that if learners had the chance to read test in their L1 and to answer them in that same language, their scores would be much higher.

Brock-Utne (2013) gives the example of two studies carried out in Tanzania for the project *Languages of Instruction in Tanzania and South Africa*: Mwinsheikhe (2007) and Vuzo (2007). Both researchers carried out an experiment which involved teaching and assessing biology or geography, respectively, in L1 Kiswahili or L2 English in secondary schools. For that purpose, Mwinsheikhe (2007) and Vuzo (2007) carried out an experiment in which learners received academic instruction during six weeks in L1 Kiswahili (experimental group) and then in L2 English or codeswitching L2 English and L1 Kiswahili (control groups). Data obtained in both studies showed that learners obtained better scores in each respective test when

these were administered in L1 Kiswahili. It is interesting to mention that Vuzo (2007) observed a larger standard deviation (SD) among students who were given geography tests in L2 English, a fact which the author attributes to social inequalities caused by the use of a ILWC as MOI in a developing country in which the language of the coloniser was established as official. In words of (Brock-Utne, 2013: 84), teaching and testing students through a language foreign to them is “an excellent way to keep people from advancing”.

Nevertheless, local governments in developing countries are not the only ones exerting pressure upon ITM people. Brock-Utne (2001; 2010; 2013) condemns European countries (mainly the United Kingdom and France) which offer funds and school-books initially addressed to European students in their corresponding languages and designed within their social context with the hidden ambition of perpetuating them as MOI in their former colonies at the expense of African languages. According to Brock-Utne (2010) and Skutnabb-Kangas and Dunbar (2010) these are new ways to recolonise African countries. Once again, it is the marginalised non-dominant communities who are being persuaded that the real values are those of the dominant high SES groups (Skutnabb-Kangas and Dunbar, 2010) and to whom this ‘out-of-their-context’ material is addressed. Hence, ITM children may not have complete access to its content because, not only it is written in the official language they partially understand, but moreover, far from ITM students’ reality, it is designed in the standard variety and according to occidental values (Shohamy, 2011).

In order to reach a more equitable way of assessment and higher quality education in those developing countries where a multilingual reality exists, Shohamy (2007b) suggests that tests should be designed in such a way that they motivate students for success rather than hinder their growth; in other words, the real power of tests should be used to really focus on the problem of the language barrier and improve the real educational needs of students in Sub-Saharan Africa who attend instruction through a European language (Shohamy, 2001; Rea-Dickins et al., 2010). In the Sub-Saharan context, Benson (2013) and Benson (2017) argue that it could be possible by offering students the possibility of receiving tests in two languages and giving them the opportunity to show their knowledge by answering

in the language they would feel more comfortable: The official language MOI or one local language familiar to them. Therefore, as Benson (2017) claims, teachers could diagnose the real difficulties of students. Cummins (2009b) adds that schools should be spaces for the promotion of knowledge and cultural identity. He claims that “learning will be optimised when these interactions maximise both cognitive engagement and identity investment” (Cummins, 2009b: 264) through the use of the L1. As argued by Skattum (2010), although bilingual schools and their curricula are a powerful context by which ITM communities may see their languages recognised, it should go hand by hand with the public sphere in the use of these languages in order to reach and raise students’ consciousness that their own language is not just oral, but that it has a space and an importance in society.

2.5 The *Millennium Declaration Goals and Education for All: Objectives and fulfilments*

The *Millennium Declaration Goals and Education for All* are two objectives which aim at the development of countries, especially those in poor conditions, taking education as a priority and a basis for amelioration. As the Institute for Development in Economics and Administration (IDEA, 2008) argues in his report for Senegal, *Education for All* should be a preference for States with mother tongue as a central concern because, as Niang (2014) argues, several young learners leave school without the possibility of developing academic skills.

In the year 2000, a number of 189 country members of the United Nations embraced the *Eight Millennium Development Goals* with the purpose of enhancing the quality of life of ITM communities, abolishing discrimination and marginalisation and empowering minorities. As Romaine (2013: 2) explains, there are five related structures derived from these *Millennium Development Goals* which would improve in the community of local language speakers if their L1 was taken as a central point: “Education, poverty, health, gender and environment”. Hence, if ITM students received instruction in their L1, attendance would increase and most students would profit from primary education and many others would continue to secondary and superior studies and reach a good paid job, therefore decreasing poverty and malnutrition.

Instruction through L1 would also be a tool for personal consciousness. How many people in Africa die because they have no idea about diseases like diabetes or AIDS? How many others confuse a simple cold with malaria? In words of the Africanist Chabata (2013: 51), “development in Africa will remain unachievable unless indigenous African languages are used for all key socio-economic and political transactions in African communities”. Finally, the extinction of species and ecosystems is a reality and indigenous languages are a crucial source of knowledge related to environmental diversity and a key to maintain them (see language ecology, section 2.3); this is the reason why they need to be transmitted at homes and at schools (Skutnabb-Kangas and Philipson, 2008). That is, according to Romaine (2013) none of the *Millennium Development Goals* can be fulfilled without education and instruction through the L1.

Education for All is an engagement of the UNESCO whose origin is in the *World Conference on Education for All* which took place at Jomtien (Thailand) in March 1990. The main goal of the 150 country-representatives was to ensure primary education to all humans and decrease illiteracy rates. These objectives were revised by 164 states in Dakar (Senegal) in April 2000 with the challenge of accomplishing six aims in education (see appendix 2), so that children and adults could receive, at least, basic education, regardless of their community of origin or gender (UNESCO, 2000). These goals pay special attention to the most disadvantaged social groups like women and minorities in fragile conditions; in order to guarantee their realisation, among others, the use of the mother tongue in education is considered relevant. At the UNESCO’s Framework for Sub-Saharan Africa, it is argued that only very few children can develop basic literacy skills and recommend, among others, to “promote the use of mother tongue in early childhood education, early years of primary education and adult education” in order to ensure quality in the school context and children’s attainment of academic competencies (UNESCO, 2000: 28).

Furthermore, in UNESCO (2014b), it is claimed that the use of the mother tongue by proficient teachers in the local language for the transmission of academic content and literacy development at school is a tool for ensuring ITM students’ achievements in education as well as a foundation for the acquisition of the L2. At

that point, it is important to mention that some of the states which signed the *Education for All* commitment have done little efforts for the introduction of local languages in education, including Senegal (Cisse, 2005; Faye, 2013). Therefore, are all these arguments possible in the context of those developing countries where learners are receiving instruction in a subtractive context? Maybe, as Romaine (2013: 6) declares, “education for all translates into schooling for some”.

The answer to the formulated question can be found in Shohamy (2006) who ‘imagines’ a multilingual school where all students are taught and assessed according to a language they feel comfortable with. Also, as García and Hesson (2015) claim, students could be tested and could give answers feeling free to use their full linguistic repertoire. In this fictional academic school ITM learners would acquire high levels of proficiency in different languages and would reach fair academic scores, consequently promoting their inclusion and enhancing their self-esteem. However, Shohamy (2006) comes back from her dream to reality and criticizes those systems which marginalise ITM learners and their languages by means of a dominant and more prestigious language giving power to high SES groups who either speak that language at home and at school or master it. That is, in such contexts, this is just a fantasy rationale about a quality and equality in education for those less advantaged students, namely those speaking an African local language because, “as long as education is delivered mainly in international languages, at the expense of local vernaculars, education will reproduce rather than reduce inequality of access” (Romaine, 2013: 6). Furthermore, by means of the language barrier, more “minorities at risk” (UN, 2004: 32) are created by discriminating and disadvantaging ITM groups, hindering them access to the country’s social and political life (Bamgbose, 2011; Chabata, 2013). As Brock-Utne (2001: 115) inquires, “education for all – in whose language?”

The worst is that, despite evidence shown on research and articles from conventions portraying discrimination and genocide, governments of developing countries still are not listening and not conscious about the effects of submersion programmes and continue exerting an education policy based on subtractive education which damages ITM communities living under their government (Heugh, 2011b; Brock-Utne, 2013; Brock-Utne, 2014). This denial of introducing local

languages in education and insisting on teaching through a Western language is, according to Skutnabb-Kangas and Dunbar (2010: 67) “an «intention» to destroy a group or even to «seriously harm» it”. Rather, as Shohamy (2008: 371) claims, those languages MOI should be a “creative, constructive tool for sensible and progressive language policies” which would help to create bilingual curricula in which trained teachers would be able to employ strategies for enhancing multiliteracy and academic content and assess students in a fair way. Through exposure to their L1, the author adds that minority language learners would acquire solid linguistic skills as a basis to start instruction in the L2 and attain good academic results.

More specific to Senegal, the documents UNESCO (2010-2011) and *Consortium pour la Recherche Économique et Sociale* (CRES, 2012) about the education system of that Sub-Saharan country report that educational syllabus was modified with the objective of reaching the *Millennium Declaration Goals* and *Education for All* objectives by focusing on the development of students’ competencies and using a methodological approach based on integration. The strategy called *Programme Décenal de l’Éducation et de la Formation* (PDEF) started in 2000 after two years of elaboration and aimed at reaching 90% of students completing primary education by 2012. However, data from the UNESCO Institute for Statistics reveals that in 2014, the gross intake ratio¹⁶ for primary education was 59%, that is to say, 31% below the objective. The CRES (2012) argues that the major cause for not attaining the expected rates were due to the situation of worldwide crisis which decreased the number of funds addressed to Senegal, a fact which may have had dangerous consequences for the investment in future projects in education programmes of the country.

With the end of the PDEF period, started the *Programme d’Amélioration de la Qualité, de l’Équité et de la Transparence* (PAQUET), a new reform in education which was supposed to be implemented in 2013 although Niang (2014) claims that it has not been put into practice yet. That new programme aims at “*assurer, d’ici 2025, une éducation de base de qualité pour tous, partout, afin que chacun puisse se*

¹⁶ According to the UNESCO Institute for Statistics, the gross intake ratio to the last grade of primary is the total number of new entrants in the last grade, regardless of age, expressed as a percentage of the population at the theoretical entrance age to the last grade.

*réaliser pleinement et apporte sa contribution à la société*¹⁷ (Ministère de l'Éducation Nationale, 2013: 9). Although PAQUET considers French as the unique MOI during the whole academic education, it mentions the aim at developing a programme for introducing those local languages which are codified into the first years of primary.

2.6 Summary

Denial of children's right to receive formal education by means of a language foreign to the students is today a general phenomenon in most countries of Sub-Saharan Africa when their academic curricula follow a submersion programme in which local languages are officially absent. In such context, children receive instruction and are assessed at school in a European language which they have poor command. Furthermore, quite often, the programme followed by teachers is grounded on a context which is far from theirs. As a consequence, students are forced to face linguistic and content barriers which, in most cases, hinder them access to knowledge. This type of formal education can lead to negative consequences, not only at the level of the student (academic failure, grade repetition and dropout), but also within the community (exclusion and poverty). According to experts, the best way to overcome these deficiencies is to introduce African local languages at schools and create pedagogic material which matches the socio-cultural realities of the sub-continent.

But that barrier embodied by language is sometimes used by the members of the ruling class in order to fix their hegemony in the country since they are those who master the official language. By means of the power of tests (see Shohamy, 2001), citizens whose L1 is a local language and have a small proficiency of the official one have no access to administration. By offering students the opportunity to be assessed at school through a local L1 as language of tests, they would be able to express their knowledge. That way, schools would become a place for social justice rather than classifying people. Despite the fact that both international objectives *Millennium Development Goals* and the *Education for All* were agreed by

¹⁷ Ensure, from now until 2025, a basic quality of education for all, wherever, in so that everyone could be entirely fulfilled and could bring its contribution to society.

several developing countries, added to the poor academic outcomes of children, there are still countries where local languages as MOI at schools are still neglected.

In the following chapter, there is a general explanation of the different education systems according the importance they attribute to the L1 of minority language students as MOI, and more specifically in the Sub-Saharan context, with their related students' expected outcomes. After that, Cummins' (1979a; 1986; 2005) theories of the Threshold and Interdependence Hypotheses as well as the authors' distinction between Basic Interpersonal Communicative Skills and Cognitive/Academic language proficiency are related to the education of ITM students in developing countries and in Sub-Saharan Africa from which examples of mother-tongue-based MLE programmes are given.

3. REVIEW OF THE LITERATURE: ITM STUDENTS' MOTHER TONGUE IN EDUCATION

3.1 Introduction

Chapter 3 is divided into two parts. In the first, we discuss the undeniable importance of language in education and in children's' learning process although different academic systems differ in the way in which the students' L1 or another language non-familiar language is used as MOI. Thus, section 3.2 offers a description of the different general education programmes and a review of different linguists' perception about minority language students' achievements attending those different models which have been experienced in African countries. The next section (3.3) deals with the positive effects of L1 instruction on ITM students' achievements at school which are believed to be essential for an education of quality and the initial point for the development of a community. Finally, section 3.4 is a review of Cummins' theories of the *Threshold* and *Interdependence Hypothesis* and their relevance in the curricula of mother-tongue MLE programmes, together with the distinction that the author establishes between the two different language proficiencies: Basic Interpersonal Communicative Skills (BICS) and Cognitive/Academic Language Proficiency (CALP).

The purpose of the second part of chapter 3 (section 3.5) is to give examples of some mother-tongue-based MLE projects addressed to ITM students in different developing countries. It is explained the way in which learners have succeeded thanks to a reliable organisation of strategies carried out by experts in linguistics and in education together with the target ITM community who designed good academic material in both the students' L1 and L2. These projects also show the importance of a syllabus for training teachers to use strategies for an adequate transfer of academic content and language skills. At the end of the chapter, a special attention is attributed to trials in the education system of Senegal in order to introduce local languages.

3.2 Mother-tongue-based MLE: A review of the different models

3.2.1 General models

As has been shown in chapter 2, linguists claim for the positive effects of using the students' mother tongue in the academic context. Moreover, as Romaine (2013) claims, applied linguistics is of great importance in order to first, attain both the *Millennium Development Goals* and the *Education for All* objectives and second, to continue on researching to show governments in developing countries that they are acting against Human Rights (see sections 2.2 and 2.3). According to Mohanty et al. (2009) introducing local languages into education is one of the answers to social, economic and personal development of minorities and the way to reach the *Millennium Declaration Goals* and *Education for All* objectives.

Skutnabb-Kangas and Dunbar (2010) point out at four goals which should be of special concern to bilingual programmes in which one of the languages MOI is the students' L1: Acquire biliteracy, reach academic success, show empathy towards other cultures as well as feel identified with its own and, finally, acquire basic academic competences to be able to develop in society. The authors affirm that the degree at which these objectives are reached depends mainly on the length of exposure of the learner to the language MOI. The researchers make a general description of those academic programmes where minority language students attend (see appendix 3 for a summary of their ideas). Broadly speaking, they make a distinction between *non-models*, *weak-models* and *strong-models* of bilingual education according to the amount of the students' exposure to their L1 at school. The first is featured by monolingual academic instruction in the official language; the second by a short varying exposure of the mother tongue MOI towards a transition to the dominant language MOI; finally, in strong-models, the mother tongue MOI is present throughout the whole schooling and coexists with the L2. The latter is, according to the authors, the unique model which reaches the four goals of ITM education above described, promoting both bilingualism and biliteracy.

When dealing with bilingual programmes for minority language learners, Skutnabb-Kangas and Dunbar (2010) argue that, in non-models, most children fail into losing their mother tongue which is pushed away by a language and a social background which is not theirs and even sometimes "feel ashamed of their parents,

their language and culture” (Skutnabb-Kangas and Dunbar, 2010: 49). The authors state that, although early-exit and late-exit transitional programmes consider the mother tongue as a MOI (or just as a means of education support), these do not guarantee the accomplishment of the education goals because students have not yet acquired literacy skills in their L1 that they are submersed into a classroom where a prestigious ILWC language is the MOI, consequently not reaching good levels of biliteracy and not respecting Human Rights. As an example, Collier (1995), in her study, argues that minority language learners in the USA who received instruction during their first 2 or 3 years of education responded initially well but failed as the requirements of the academic curricula levels increased.

Panda and Mohanty (2009) and Mohanty (2009) go a step further by arguing that transitional programmes play the role of an ambush because they falsely show an intention from States’ to introduce mother tongues into academic curricula when the hidden reality is exertion of power over ITM communities through a displacement of the mother tongue towards a more prestigious language which is rarely acquired completely.

In order to guarantee academic success for minority language children, Skutnabb-Kangas and Dunbar (2010) suggest that there is no better way than strong models of bilingual education which develop proficiency in both languages and thus attain quality and equality in ITM’s education by increasing students’ *linguistic awareness* so that they become conscious of which aspects of the language can be transferred to the other. As Skutnabb-Kangas and Dunbar (2010: 75) claim, strong-forms of bilingual education and linguistic awareness “enhance creativity [...] creativity leads to innovation [...] innovation invites investment”. According to García (2009), García and Hesson (2015), García and Woodley (2015), García and Wei (2015), Wei and García (2016), Esteve and González-Davies’ (2016) and García (2017) an example of such bilingual education is *translanguaging*. It is important to mention the distinction that García (2009), García (2012) and García and Hesson (2015) make between an additive model and another where translanguaging is present: Whereas the students’ L1 and L2 are used as MOI separately in additive models, any language indistinctively may be used when translanguaging in a single lesson. According to García (2009: 140), “translanguaging is the act performed by

bilinguals of accessing different linguistic features or various modes of what are described as autonomous languages, in order to maximize communicative potential". In that sense, as García (2012) points out, academic programmes which includes a space for translanguaging demolishes the idea that there is one language more prestigious than another, helps students to develop their L1 at the same time that they acquire the L2; moreover, it contributes to expand students' academic knowledge in a fair way and in accordance with human rights (see chapter 2).

García and Hesson (2015) suggest that translanguaging not only may occur inside the classroom (see section 3.4.1), but also throughout the whole academic programme (macro-level). The latter would be divided into three intervals of time: The first in which the students L1 would become the main language MOI and the L2 would be used spontaneously; a second in which the whole linguistic repertoire of the students (L1 and L2) would be employed when teaching, solving tasks or taking tests; and finally, a third in which the L2 would increase as language MOI but the L1 would also remain. At the end of the programme, as Wei and García (2016) argue, students would be able to distinguish those situations in which their whole linguistic repertoires should be used and in which language or languages.

Finally, García (2009), García and Woodley (2015) and García and Wei (2015) point out to two new modern types of bilingual programmes: The *recursive model* and the *dynamic model*. The authors refer to the former as the bilingual programme which aims at revitalizing those languages which were in a process of losing speakers and attributed to small communities such as the Maori; with the second, García (2009) and García and Woodley (2015) define the type of bilingual model in which students who attend are able to communicate in diverse languages for different purposes although their proficiency in each differs due to the fact that their parents had to work in different environments or because a wide range of languages is spoken at home.

3.2.2 Academic models in Sub-Saharan Africa

More specific to the Sub-Saharan context, some experts have also portrayed the different education models which are (or which do not longer exist because these were trials or projects) being carried out in the sub-continent. Under this idea

Heugh (2011b) picture the different ways in Sub-Saharan Africa in which the ITM students' L1 is adopted by teachers in primary education according to its amount of use:

- **Subtractive or submersion model:** The students are immediately taught at first grade of primary education through an ILWC, the language of the colonising country. Their L1 is very often prohibited during lessons. Senegalese mainstream classrooms are a clear example of that model (see section 4.3).
- **Early-exit transitional model:** Children only receive instruction in a local African language at the very first years of education (between grades 1 and 3). Then, it is abruptly replaced by an ILWC as MOI, for instance, in Mozambique (see section 3.5.3).
- **Medium-exit transitional model:** The MOI is the students' L1 during the first four years of primary education and then it is switched to an ILWC. Then, the local language may be studied as a subject. One example appears in the education system of Burkina-Faso and experimental projects in Senegal (see section 3.5.4).
- **Late-exit transitional model:** Mother tongue is present during five or six years of primary education. Then students join the mainstream monolingual model. One example of such programme took place in Zambia (see section 3.5.3).
- **Very late-exit transitional model:** During eight years of the academic education, the L1 is MOI with the L2 taught as a subject. In the following years, the L2 becomes MOI, for instance, in Ethiopia.
- **Additive bilingual education model:** The students' L1 is present during the whole academic education: It is MOI for five or six years while the ILWC is taught as a subject before it is introduced also as MOI in parallel with the mother tongue, for example, in South Africa.

Bearing in mind that there are 2,632 languages in Africa and that only 13% of ITM students have access to education in their L1 (UN, 2004: 34), it is important to take into account Cummins' (1979-1980) question of the students' L1 as a bridge to learn the L2 and also as an enriching tool towards biliteracy, content learning and

academic success. Similar to Skutnabb-Kangas and Dunbar's (2010) description of general education models for minority language students (see section 3.2.1) Benson (2004a), Heugh (2006) and Heugh (2011b) claim that even if the use of a language familiar to the student in the first grades of early-exit transitional programmes may seem to be effective at first since children obtain high scores, their improvement diminishes as they are suddenly submersed in L2 instruction, a fact leading to failure because, in higher grades, skills have not been sufficiently developed and do not represent strong foundations of linguistic skills for both the acquisition of the L2 and content taught through an ILWC. Heugh (2006) argues that, in Africa, there have been three successful academic ways in which the learners' mother tongue as MOI has been found to facilitate L2 acquisition and to enhance students' academic achievements: First, in late-exit models when the mother tongue is used as MOI during the whole primary education with the ILWC as a subject; second, in additive models, the ITM students' L1 is MOI until grades 6 or 8 and then, they are shifted to a bilingual model in which subjects are taught in one or the other language; finally, in very late-exit transitional models, ITM learners deal with their L1 as MOI and the L2 as a subject until grade 8; after that period they start receiving complete instruction in the ILWC. The author further claims that a local African language should not only be present in primary education, but also it can be MOI to communicate knowledge to students in secondary and pre-university studies. According to Benson (2017), an education model in the Sub-Saharan context, in order to offer quality, should not start using an ILWC as MOI until students have not acquired strong skills in their L1, perhaps, until primary education is not finished.

Concerning submersion models in Africa, Wolff (2006) blames governments of French and Portuguese speaking African countries for being the cause of ITM students' academic failure because they mainly adopt an education policy in which subtractive programmes are widely spread. In the case of English-speaking countries, Heugh (2006) and Heugh (2011b) explain that missionaries encouraged the use of local languages until children were six years old; however, the author criticizes the fact that some governments have changed education policies after independence and have established the use of an ILWC as MOI in education, therefore reducing the extent of exposure to the mother tongue.

According to Orekan (2011), there have been several attempts to introduce local languages in education in countries of Sub-Saharan Africa but which have not succeeded. In the case of the target country of the present study, Senegal, Cisse (2005) claims that bilingual MLE programmes did not root in the country for different reasons (see section 3.5.4). Heugh (2011a) adds that poverty and lack of educational material are just minor excuses because it has been proved that students in better situations than those in Sub-Saharan contexts and attending submersion and early-exit models have also failed in their academic achievements (see Levin and Shohamy, 2008). With the same purpose, after comparing models in which ITM students were instructed in their L1 for a different period of time, Cummins (2009) asserts that programmes which do not develop minority language students' L1 skills for a wide period have more learners with academic gaps because the development of linguistic abilities is only superficial.

As previously explained, the length of exposure to the L1 varies according to the different models. However, skill foundations in the mother tongue are an important issue for ITM students to acquire the L2 and to attain acceptable school achievements (Magga et al, 2005). According to Heugh (2006; Heugh, 2011b), the different academic models which Sub-Saharan students attend are essential in predicting their level of proficiency in the ILWC as L2. That is, based on second language acquisition research on non-dominant language students, the author suggests that there is a correlation between the length of exposure to the mother tongue as MOI and the expected achievements in the L2. She further argues that if minority children in the first world need at least between 6 to 8 years of L1 instruction to reach acceptable results in the L2, that will also be the case for African students whose learning conditions may be worse. It should be here taken into account Esteve and González-Davies's (2016) claim that students need to rely on their linguistic knowledge in order to become aware of the structures of the new language.

As Heugh (2011b) points out, when an education system tries to shorten the period in which learners develop L1 skills, they do not learn the L2 properly and therefore, when it becomes the language MOI, they show big deficiencies and do not learn adequately the academic content. Taking into account that the mastery of

the language MOI is relevant to communicate the content of the different subjects and to answer tests at school, Heugh (2006) and Heugh (2011b), based on research carried out in with minority language students in Africa and in other countries, picture the expected achievement in the L2 of Sub-Saharan learners after 10 to 12 years of formal education and according to the different education models (see figure 1).

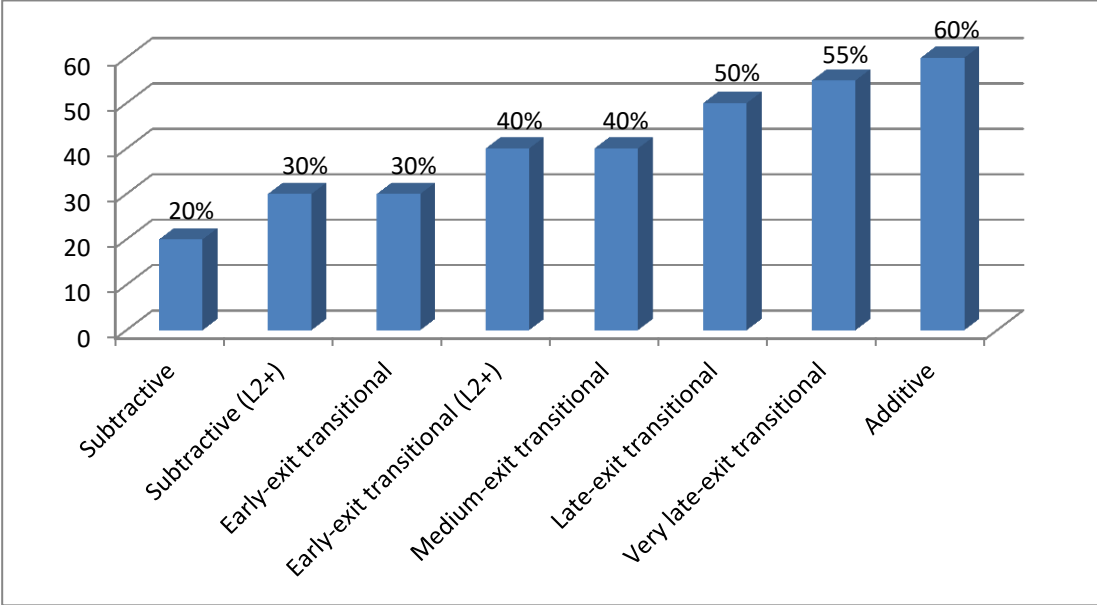


Figure 1: Expected students' L2 outcomes according to the amount of exposure to their L1
Adapted from: Heugh (2006) and Heugh (2011b)¹⁸

As shown in figure 1 above, in subtractive schooling, students are only expected to reach a score of 20%, but when the mother tongue is introduced as a MOI and the time of exposure increases, also the learners' achievement does in the L2; that is to say, in early-exit programmes students are taught through their L1 between 2 to 3 years and they attain a score of 30%. Good scores in the academic language and subsequent positive language transfer from the L1 are thought to be reached in late-exit transitional models (50%) after 6 to 7 years of L1 instruction and additive models (60%) when teachers use the L1 to transmit knowledge to their students during 5 to 6 years and after the L2 becomes, together with the mother

¹⁸ By (L2+) I have identified those programmes in which, according to Heugh (2011b), there is a reinforcement of L2 vocabulary for specific subjects.

tongue, the language of formal schooling or, the L1 is the MOI throughout the whole primary education and the L2 is taught as a subject.

Apart from a classification of education models related to the length of time of L1 instruction, Halaoui (2003) and Heugh (2006) picture the different patterns according to the number of languages that have been adopted in some African countries which have tried to introduce a local language as a MOI in the first years of school education. Halaoui (2003) distinguishes between a *monolingual model*, a *successive bilingual* and a *simultaneous bilingual*. The author argues that the former acknowledges for a unique African language as MOI in two variants which Heugh (2006: 59) has defined as “*Development and use of a single African language for literacy development and as MOI*” and “*Development and use of several African languages for literacy development and as MOI*”; in other words, one country one African language MOI for the whole children as it is the case in Somalia and Tanzania or one country several local African languages (one per linguistic area), for instance in Guinea and Mauritania.

In the *successive bilingual model*, the initial language MOI is a local African language which shifts to an ILWC, as it was the case in Niger (see section 3.5.3) where a local language is MOI until grade 4 and then it is substituted by L2 French. In Mali (see section 3.5.3), instruction in 11 of the 13 local languages is possible during the first four grades of primary education with the initiation of L2 French for some hours from grade 2 as an oral language; in the two final years of that cycle, the ILWC becomes the MOI and African languages continue to be taught as a subject. In Burundi, Halaoui (2003) asserts that the number of years of instruction through Kirundi is about four years of primary education and then it is suddenly substituted by L2 French. According to Halaoui (2003), the *simultaneous bilingual model* is used in Zambia; in this country, seven African languages were introduced as MOI in the academic year 2002-2003 (Wolf, 2006). Under that programme (Primary Reading Programme), two languages, an L1 Zambian and L2 English, were used as MOI. The author exemplifies it by explaining that during the first year of primary, students learnt to read in the African language but then, based on a text they have read, they used L2 English for the development of oral skills. In the highest grade, the oral and writing skills of the ILWC were developed upon reading

in the African language. From the third to the seventh grade, as explained by the author, the objective was the attainment of biliteracy (Wolf, 2006).

More recently, Benson (2013), Makalela (2016) and Brock-Utne (2016) claim that a space for students to use their full linguistic repertoire is possible in the multilingual context of Sub-Saharan countries (see section 3.2.2). But, as Makalela (2016) and Brock-Utne (2016) argue, a translanguaging model could not be possible without the African concept called by Makalela (2016: 12) as *ubuntu* or the cultural idea of union and participation of the whole community which considers that “the use of one language is incomplete without the other”. According to Makalela (2016) the *ubuntu translanguaging* reflects the current multilingual reality of Sub-Saharan societies and could become a fair space in schools which would establish social justice by changing the colonial idea that languages should be taught and used as independent MOI units in order to avoid influences among them. That way, academic failure, grade repetition and dropout would be diminished in Sub-Saharan education systems and open those gates which are only restricted to the elites to local minorities who are not proficient in the official language at home (Brock-Utne, 2016).

Ngcobo, Ndaba, Nyangiwe, Mpungose and Jamal (2016) claim in their study that Sub-Saharan African programmes should be revised in order to give a space to local languages in education and help students develop their L1 for an improvement of the L2 skills and better acquisition of academic content through *translanguaging*. The researchers carried out a study in South-Africa among 38 L1 IsiZulu speakers enrolled in a literacy course in L2 English at first year of university. Participants were first asked to read a text in their mother tongue and write a summary in L2 English and vice-versa; after that, they had to answer questions about their feelings when translanguaging. Ngcobo et al. (2016) report that learners required their two languages in order to fulfil the tasks and especially to make themselves clear the specific concepts of vocabulary with which they were not familiar in each target language. Therefore, as the researchers argue, the learners were getting more conscious about the grammar use of their two languages and further, they were enriching their lexicon as they completed the summary, a fact attributed to Cummins’ theory of interdependence by which happened a transfer of academic

content and language skills (see section 3.4.1). An interesting observation in Ngcobo et al. (2016) is that some of the participants found it difficult to deal with IsiZulu because they had never been exposed in an academic situation to that language and therefore transfer of academic concepts was more difficult to occur. Consequently, the authors claim that in those cases in which minority language students' L1 are not present at school is not comparable as when it is used in an academic context and therefore call for an introduction of local languages in academic programmes in Sub-Saharan Africa for the empowerment of local communities (section 3.5.3 for a description of different mother-tongue-based MLE programmes in some Sub-Saharan countries). Moreover, in multilingual countries such as Senegal where citizens from different language and cultural backgrounds move from the countryside to cities, translanguaging in the classroom could be a way to establish an education of quality (see García, 2017).

3.3 Benefits of mother-tongue-based MLE programmes for ITM learners and their communities

The benefits for ITM young generations to receive instruction in their mother tongue are several. Smits et al. (2008) describe three areas having positive effects on ITM children: Psychological, social and educational. First, the authors argue that through their own language, students would feel culturally identified and would strengthen the links towards their community; secondly, it would enable them to participate in the social and political events of their country, facilitating access to any formal piece of information; finally, they would take advantage from inclusion leading to academic success and an increase in the intercommunication between the school and the students' families. It should be mentioned that not only students would benefit from receiving instruction through their L1, but also teachers. According to Rea-Dickins et al. (2010), teaching through a familiar language could encourage teachers to give up their teacher-centred strategies (see section 2.2.1) and thus promote the communicative exchange between them and their students, heighten their self-esteem, reduce their absences and become more engaged in designing active tasks.

One of the aims of Smits et al. (2008) was to analyse the effect of the use of a local language as MOI in schools on attendance rates among students in 153 linguistic groups in 23 developing countries. After analysing country profiles, they confirmed that attendance average rates were 10% higher in those communities where local languages were used as a MOI, and this was especially beneficial for those students living in rural areas. For instance, in Burkina Faso, attendance rates increased 72% in students aged between 7 to 11-year-old and 67% for the 12 to 16. The authors blamed the situation of disparity between the language used in the community environment and the one for academic purposes as one of the main causes of academic failure and non-attendance for ITM students. As a conclusion, they recommended mother tongue as a MOI in order to reduce education problems in developing countries by enhancing self-confidence and self-esteem.

It is a reality that Sub-Saharan students living out of cities (more precisely in Senegal, 54.8% of the population live in rural areas according to the *Agence Nationale de la Statistique et la Démographie*¹⁹ [ANSD], 2014), have geographical and economic difficulties to reach the education centres, and sometimes have to go over several kilometres every day across dangerous pathways in very bad conditions; why to increase demotivation when they feel out-of-the-system and powerless once they reach school? Obviously, they would prefer carrying out their community duties where they use their L1, taking care of the cattle or doing the housework, rather than going to school where they little understand, thus encouraging academic dropout and high non-attendance rates.

Anders-Baer, Magga, Dunbar and Skutnabb-Kangas (2008), Skutnabb-Kangas and Dunbar (2010) and Roche (2016) argue that the cause for minority language communities to be internationally identified with school dropout, unemployment, poverty and marginality, is partly due to the absence or little presence of both their L1 and their culture in education. Moreover, Skutnabb-Kangas and Dunbar (2010) add that the absence of the communities' L1 at school may lead into negative consequences in different areas of the individual: Educational, physical, psychological, and socio-economical. Hence, if subtractive programmes involve ITM students' academic failure and school dropouts, the researchers argue that it may

¹⁹ National Agency for Statistics and Demography

push students to fall into alcohol and drug dependence with hard consequences, both physical (suicide, incest and abuse among others) and psychological (shame towards their language and culture and a consequent shift to dominant ones [see *wolofisation* in section 4.2]).

That situation suffered by ITM students in developing countries might be diminished through the introduction of local languages in education which would empower ITM communities and contribute to the development of society (Benson, 2005a); according to Skutnabb-Kangas and Dunbar (2010), that fact would break a chain starting with L2 instruction leading to a search of identity, loss of motivation, school failure and dropout, poverty, marginalisation and psychological and physical harms. In fact, Jandhyala (2001: 17) refers to UNESCO-PROAP (1998) to explain that “education empowers people, particularly the poor and the weak, by attacking ignorance, building skills, and by changing the outdated attitudes and values”. The author adds that this is especially true if it is given access through a familiar language to the learner.

Hovens (2002), for instance, aimed at analysing the benefits of mother-tongue-based MLE pilot projects in Niger where the official language is French (see section 3.5.3 for further detail on that country). The researcher had a special interest on children living in rural areas and on the female population. For that purpose, Hovens (2002) gathered a total number of 1,664 students at grades 3, 4 and 5 among 36 schools; they were divided into an experimental group if they attended a bilingual school (458 males and 331 females) and a control group if they were enrolled into a traditional monolingual programme (489 males and 386 females). All participants in both the experimental and the control groups were given tests of Mathematics and reading comprehension which were completed in a local L1 (Hausa, Zarma, Fula, Tamajaq and Kourani) or in L2 French; the procedure of each task was explained in the target language of the tests.

Although results obtained in Mathematics revealed that there was not any significant difference between the experimental group and the control group, the author noticed that all students obtained better results if the language of the test was in a local language familiar to them regardless the type of school they attended because, as Hovens (2002) argues, students were more confident when calculating

in the language they felt more comfortable. Concerning reading skills, participants in the three grades of the experimental group obtained better results than their colleagues in the control group not only when the text was written in a local L1, but also when it was written in L2 French. Hovens (2002) claims that such results are attributed to Cummins' theories of the Common Underlying Proficiency Model and Language Transfer (see section 3.4.1). Similar to Martín-Chazeaud (2014) who noticed that L1 Diola learners were able to write in their mother tongue, Hovens (2002) went further and observed that participants attending the monolingual L2 French school were capable of reading a text in their local L1 with close results to their texts in L2 French despite the fact that they had never received academic instruction in that language and "perhaps, by reading it out loud, they understand the content" (Hovens, 2002: 260).

The researcher concluded that the students with the average lowest results were those attending a traditional monolingual L2 French school and who received tests in L2 French. With respect to female students, Hovens (2002) observed a gender gap in favour of males in all tests, but the differences shortened when the language of tests was a local L1; one exception was a females' advantage when grade-3 students in the experimental group were given the reading comprehension test in their L1. According to the researcher, the presence of a local language in education could benefit female participants since they have fewer opportunities to be exposed to L2 French as compared to males because they do not participate of the public social life outside their homes (see section 3.3.1). Similarly, the use of a familiar language in education, as Hovens (2002) argues, would also benefit very low SES children who live in the countryside and whose parents obtain small incomes from the countryside since results in tests showed that rural children who attended a bilingual school obtained almost equal scores than those settled in urban contexts in tests written in a local L1 and as well as in L2 French.

Jandhyala (2001) argues that deprivation of quality instruction at schools is a major reason for communities' underdevelopment to be reverted. The author asserts that formal instruction can be a tool in order to diminish poverty as a bias towards the development of local resources and its impact on communities' economy. Jandhyala (2001) adds that higher gains lead to possibilities of better

education in a successive chain of personal and intergenerational development which, in the case of ITM communities, would follow the next steps:

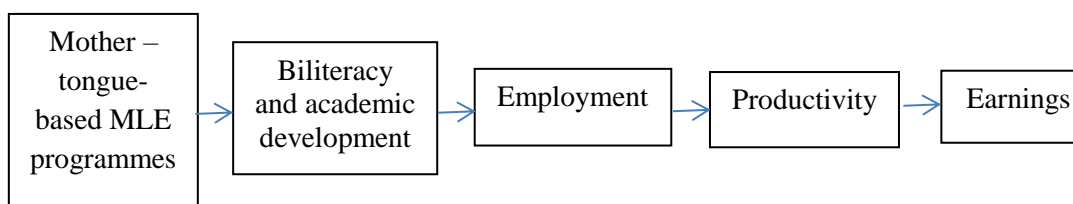


Figure 2: Mother-tongue-based MLE as a way to development
Based on Jandhyala (2001: 13)

In the African context, Orekan (2011) gives four arguments to explain why the L1 should be introduced as MOI in schools of developing countries where a foreign language is MOI: First, to diminish dropout and non-attendance rates; second, to increase quality of life and diminishing poverty; third, to strengthen social and gender equalities; and finally, to grow the feeling of belonging to a cultural identity. Furthermore, the author argues that, when ITM students receive instruction through their L1, they not only “develop cognitive skills more easily in a familiar language, but they also develop cognitive skills and master content material more easily” (Orekan, 2011: 29).

3.3.1 Mother tongue instruction, especial benefits for the ITM female population

A foreign language as MOI and assessment in submersion programmes of Sub-Saharan schools is thought to have especial negative effects for the female population (Rea-Dickins et al., 2010; Benson 2001b). In their study, Van Der Slik, Van Hout and Schepens (2015) pointed out that duties attributed to gender in society added to a poor education system could lessen females’ capacity in acquiring languages. In fact, the authors conducted a study involving 27,119 immigrants learning L2 Dutch. Participants came from 88 different countries (16 were African) and were L1-speakers of 49 different languages. After tests on L2 skills (speaking, writing, reading and listening) were given to participants, one of the most relevant conclusions which the authors suggested was that, in general, the gender gap shortened as the time of academic exposure increased. It is interesting for the

present study to mention that in Van Der Slik et al. (2015) males outperformed slightly women in literacy skills in general; nevertheless, it was not the case for African participants: Females scored 6 points higher than males. However, it must be taken into account that participants in Van Der Slik et al. (2015) attended Dutch courses in the Netherlands, a context different than participants in the present study. As the authors argued, females' background was influential in the acquisition of L2 Dutch.

The report of the UNESCO (2014a: 13) shows that the unfair language barrier in Sub-Saharan Africa is evident in constraining local communities when considering girls and women, speakers of a local language, who are the group which "constitute the majority of out-of-school children and illiterate adults [...] and represent the majority of people living in poverty". Romaine (2013) refers to data in UNESCO (2010) showing that 12 million women in Sub-Saharan Africa are expected to never enrol in school; the author affirms that the most marginalised human being in education are those ITM women living in rural areas and in poor conditions. Benson (2001b) adds that the number of African young females who can regularly go to school is smaller than the number of males, and those who enrol, have big chances of failure, grade repetition and dropout before grade 3. Subsequently, after five years of basic education, girls "represent less than one-third" (Benson, 2001b: 81). The author goes further and argues that poverty added to cultural practices force parents to choose which of their children may have the opportunity to receive formal education; very often, it is the oldest son who is believed to maintain his relatives. However, that is not the case of daughters who, once they get married, they become part of their partner's family. As Van Der Slik et al. (2015) add, due socio-cultural traditions which suppose that women have to work inside their home and within their communities but men outside that context, parents believe that mastery of the L2 is more important for males. In the present study, the survey given to parents did not reveal a different linguistic background within the household depending on the children's gender: 96.2% (25) of parents used L1 Sérère to communicate with their sons and 95.8% (23) used that same language with their daughters.

Benson (2001a; 2005a) states that girls have fewer opportunities than boys to be exposed to their L2 due to the fact that their duties are confined to the household environment where the language of communication is their L1. According to Stromquist (2001) and Benson (2001b), school activities coincide with domestic duties and girls have to choose between school and family charges; consequently, they do not attend lessons regularly leading to academic discontinuity, loss motivation and a feeling of time waste, especially if the language MOI is incomprehensible to them, a situation which causes school failure, grade repetition and dropout. Therefore, young females prefer staying at home where they can easily communicate in their L1 and are not being forced to listen to unclear boring and long speeches and copy indecipherable texts from a blackboard. Consequently, as Benson (2001b) states, young females are considered slothful or academically incompetent compared to males because, tired after hard housework, they rest during lectures.

Benson (2001b; 2005a) argues that instruction through mother tongue can have positive effects on ITM girls' scores at school, especially those settled in villages, leading to motivation and active participation in the learning process. One Benson's (2001a) purpose was to analyse the effect that instruction in a local L1 could have on girls' school attendance rates and academic achievements. The researcher observed that those girls attending a mother-tongue-based MLE programme in Mozambique, after four years of L1 instruction, their age average was 1.7 years younger than those girls attending a traditional school in which the only MOI was L2 Portuguese. Moreover, Benson (2001a) points out at the different number of females who started at grade 1 in the bilingual school (38%) and those who finished grade 4 (47%). The author suggests that female participants benefitted from the mother-tongue-based MLE programme because they experienced less grade repetition indices. Another interesting data is that teachers reported active participation of female students during oral tasks, a phenomenon which was completely the opposite in those classrooms where the target language was the ILWC (see section 3.5.3 for further detail on the mother-tongue-based MLE programme in Mozambique).

In Senegal, Montgomery and Hewett (2005) carried out a study based on the Multiple Indicator Cluster Survey²⁰ which aimed at analysing inequities between female and male rural and urban children in primary school. After analysis of answers given by 27,755 teenagers between 13 and 19 years old, results showed that there existed an academic disparity between genders and that it was larger in the rural than in the urban context (see table 1).

	Ever attended school		Completed four or more years at school		Currently enrolled at school	
	Males	Females	Males	Females	Males	Females
Urban	84.4%	74.9%	73.7%	62.5%	78%	73.1%
Rural	54.4%	39.6%	30.6%	19.7%	62.2%	50.9%

Table 1: Academic attendance among children in Senegal: Gender disparity in urban vs rural contexts

Adapted from: Montgomery and Hewett (2005)

According to the *Millennium Development Goals and Education for All*, one of the objectives is to ensure gender equality and literacy and education to all women, and such is the ambition of mother-tongue-based MLE programmes. However, these models must take into account that L1 instruction is not the unique way of increasing females’ attendance. School material ought to contain messages of gender equality and active engagement of women in society because, as explained by Stromquist (2001: 33), it “expresses deeply embedded gender ideologies”. Moreover, Benson (2001a) found out that school material in Mozambique contained the double number of representations of females than males, and suggests that books should be designed focusing on their gender objective.

Moreover, Benson (2001a; 2001b) argues that in many African countries, most of the teachers are men and therefore girls have not any standard to follow; and it was the case in the schools where the data collection for the present study

²⁰ The Multiple Indicator Cluster Survey is a collection of data from massive surveys conducted by the United Nations International Children’s Emergency Fund (UNICEF) in order to analyse the situation of children and women in developing countries.

was carried out since there were 4 women among the 26 surveyed teachers. Another relevant issue is that most parents are scared to take their daughters to schools because they could become pregnant by a classmate or even a teacher. It is important, as Stromquist (2001) claims, that during teachers' training workshops both men and women teachers should become conscious of this gender difference and try to fight for equality, inclusion and girls' attendance. It should be said that in the present study, no apparent gap was detected through questionnaires about school attendance: Parents asserted 69.2% (18) of males and 75% (18) of females missed school in very few occasions, if so, due to illness (see appendix 5 for the original French version of the survey given to parents and appendix 6 for its English translation and a complete overview of their results). However, it must be said that they were probably influenced by the questionnaire and did not want to really express the truth.

Finally, it should be argued that by means of education through the L1, women would enrich themselves of knowledge and acquire the L2 better, empowering and allowing them to participate in the political life of the country, reach higher status in society and become economically independent (Van Der Slik et al., 2015). Moreover, they would have access to sources of information, for instance, awareness about illnesses and nutrition habits, increasing family health and reducing children mortality (Romaine, 2013). That way, benefits to the female population would spread to the whole community.

3.4 Instruction through an L1 in developing countries

3.4.1 Cummins' *Threshold* and *Interdependence Hypotheses* in the education of ITM students

A minimum of six years of L1 instruction together with the L2 taught as a subject in primary education in Sub-Saharan Africa is believed to be necessary for adequate transfer of linguistic and academic skills from the L1 to the L2 for academic success when the L2 becomes the MOI (see section 3.2.2). As Heugh (2006: 74) claims, "if the L1 is removed as a medium of instruction too early, there is no (or insufficient) transfer" from the mother tongue to the L2. More precisely, this is what Cummins (1979a) called the *Threshold Hypothesis*, that is, the level of skill-development that

ITM students have of their L1 at the moment that the L2 starts to be learnt influences the L2 proficiency (Cummins, 2001). The researcher added that there were two interrelated types of thresholds in learners' language proficiency: A *lower threshold* corresponding to not-demanding linguistic skills but which are required to be developed to attain the *higher threshold* as the cognitive demands increase in both languages (in case of bilingual school models).

In fact, through very late-exit transitional and additive schooling programmes (see section 3.2.2), students strengthen literacy in the mother tongue and become aware of metalinguistic knowledge (Skutnabb-Kangas and Dunbar, 2010). Thereafter, according to the *Interdependence Hypothesis* and by means of a *Common Underlying Proficiency* or common storage of knowledge and literacy skills to both languages that bilingual (and multilingual) learners have in their minds (Cummins 1979a; 1986; 2005), students transfer acquired academic content and linguistic abilities from the L1 to the L2, thus reaching biliteracy (or multiliteracy) which promotes academic abilities and encourages children to attain high school results (Cummins, 1979a). Cummins (2005: 4) explains that language transfer occurs at both "cognitive/academic and literacy-related proficiency" levels. More precisely, the linguist claims that, in the former, there are five areas at which the phenomenon occurs: *Conceptual* (the learned concepts in one language can be explained in another), *metacognitive* and *metalinguistic strategies* (those strategies that students develop in the learning process via one of their languages are also employed as strategies in the other language) *pragmatics* (the use of gestures and other symbols for communication), *specific linguistic elements* (shared cognates) and *phonology* (although some sounds are specific to languages, many others are common and can develop phonological awareness to acquire proper pronunciation).

More centred on literacy acquisition, Durgunoğlu (2002) suggests that transfer across languages may occur in different areas which should be developed in an L1 academic context for L2 acquisition. He first refers as *phonological awareness* to the capacity that learners have to be conscious of the different phonemes, syllables, words, and rimes in a specific language; the author adds that this ability is closely linked to the capacity of spelling and therefore also predictor of

literacy acquisition. The second area is *syntactic awareness* or the capacity that young learners have to perceive the rules of language; according to Durgunoğlu (2002), this is also influential in literacy acquisition and text comprehension. The third area, related to phonological awareness, is *functional awareness* or the automatization of the orthographic rules of printed language; the researcher argues that transfer of that skill can be bidirectional. The next area is *decoding* or the ability that students have to represent sounds with alphabetical letters of a target language as they listen to them; as Durgunoğlu (2002) argues, that type of transfer may occur forward but also backwards and students might adapt the spelling of their L2 to their L1 in the case that they have not been trained to read in their L1 (see Hovens, 2002 and Martín-Chazeaud, 2014); the author adds that transfer of decoding systematic features may transfer across languages but those which are specific features of each language may not happen. The *use of formal definitions through a decontextualized language* is another area for transfer to occur, in other words, it is the capacity that students have to understand and express technical academic concepts which are even not related to their realities. Next, the *knowledge of writing conventions* is the skill by which students can recognise the different types of texts and their characteristics. Finally, *good meaning-making strategies in reading comprehension* such as checking word meaning or back reading for better comprehension are features which may determine the degree of comprehension of a text which are easily transferred across languages.

There are different studies giving value to theories of transfer across languages despite the fact that these were carried out in a context different from the present one. A piece of research supporting the effect of ITM students' L1 instruction as a foundation for transfer to L2 proficiency and positive development of knowledge for consequent academic success is Huguet, Vila and Llurda (2000). The researchers focused their study on a bilingual Spanish area (Baix Cinca) where Catalan is spoken but does not enjoy an official status and therefore it is not MOI at schools (Spanish is the language used to teach). However, the possibility exists that parents choose their children to attend schools where their L1 is MOI if they get to neighbouring Catalonia; there, learners attend immersion academic models in which Catalan is the main MOI. For their study, Huguet et al. (2000) recruited 389

students aged 12 and divided them into four groups: 59 bilingual L1 Catalan/L2 Spanish speakers and also 89 monolingual Spanish speakers who attended a monolingual Spanish mainstream model; 141 learners who received school instruction in their L2 Spanish and voluntary L1 Catalan lessons; finally, 100 who were instructed in their L1 in the neighbouring Catalonia where they also received Spanish lessons of language and literature.

After all the students had filled-in a questionnaire for socio-economic information details, they were assessed in skills of both languages: Reading and listening comprehension, writing and spelling, speaking and phonology. Results revealed that those students attending immersion programmes in Catalonia and therefore, being instructed through their L1, were those showing the highest rates in the development of Catalan skills and obtained the best scores in tests for both languages and even outperformed those L1 Spanish speakers who attended the mainstream Spanish monolingual model. Those students who also received some hours of optional Catalan instruction also showed some better scores in their L2 than their peers in programmes where Spanish was MOI. It is interesting to give special attention in that study to the SES of the participants' families. The authors divided participants according to their SES into three groups: Low, medium and high. They observed that in all cases, students attending L1 lessons obtained better scores in their L2 Spanish than monolinguals. Consequently, Huguet et al. (2000) argue that minority language students with a low SES are advantaged by the use of their L1 in education because they develop their literacy skills in their mother tongue and then the L2 is benefited from transfer.

Huguet et al (2000) attribute the high scores of those students receiving instruction in their L1 to Cummin's *Interdependence Hypothesis* and a transfer of literacy and other linguistic skills from the L1 to the L2. Taking that same idea to the case of African learners, if literacy and academic skills were developed and strengthened in late-exit transitional or additive bilingual models in the L1 first, they would be transferred to the L2 and therefore ITM students would have enough foundations to acquire it. Moreover, they would become proficient and would be able to understand the lesson and to communicate with their teachers who would

use it as a MOI. In other words, L1 instruction would diminish the effect of the language barrier in a quality and fair academic model.

An interesting study in the African context which gives evidence of Cummin's theories and which gathered participants with a similar profile to those in the present study is Soares de Sousa, Greenop and Fry (2010). The researchers aimed at analysing if there was transfer of literacy skills across languages of bilingual L1 IsiZulu and L2 English students. For that purpose, they recruited 60 grade-2 participants in South Africa: 30 English monolinguals (control group) and 30 L1 IsiZulu and L2 English bilinguals (experimental group). The interesting resemblance with the present study is that the latter had never received previous instruction in L1 IsiZulu because they attended a school where they were instructed through L2 English. After some tests measuring phonological awareness in the participants' L1 (knowledge of names and sounds of the letters in the alphabet, segmentation of words into syllables, rime detection and deletion of syllables and phonemes and phoneme blending) and spelling ability of words and non-words in L1 English to the control group and in L1 IsiZulu and L2 English to the experimental group, Soares de Sousa et al. (2010) concluded that transfer of phonetical skills occurred from L1 IsiZulu to L2 English since results obtained from bilingual participants revealed that there was a close relationship between L1 IsiZulu phonological skills (especially concerning rime detection) and both L1 IsiZulu and L2 English spelling abilities, respectively.

Moreover, the researchers pointed out to the degree of correlation which was similar between bilinguals' ability to detect rime in L1 IsiZulu and their L2 English skills for spelling words and monolinguals ability for deleting phonemes in L1 English and their L1 spelling skills. However, regarding spelling, it should be mentioned that the researchers not only noticed that monolinguals did much better than bilinguals in the tests of their corresponding L1 (71.30% and 11%, respectively), but they also found out that bilingual children obtained better results in the spelling tests in L2 English (41.60%) rather than in L1 IsiZulu, attributed to an absence of instruction in L1 IsiZulu and to the fact that IsiZulu has a distinct syllabic system than English which requires specific training though literacy instruction. Soares de Sousa et al. (2010) claim that once these specific language literacy

features in L1 IsiZulu are acquired, these are then transferred to L2 English. Again, the question of previous instruction of linguistic skills in the learners' L1 is of clear importance in order to acquire the L2 MOI. Taking into account that phonetic awareness is predictor of literacy skills (see Bialystok, 2007), and that it transfers from the L1 to the L2 as Soares da Sousa et al. (2010) show, if these L1 IsiZulu and L2 English bilinguals were taught literacy in their L1 for acquisition of both L1 IsiZulu specific features and literacy strategies for a later transfer to their L2 English, perhaps their spelling score in the language MOI would have been higher in both languages.

Fall, M. (2014) is a study carried out in Senegal which aimed at analysing the level of L2 French of L1 Wolof children attending grade 1. More precisely, the research focused on students' abilities to differentiate phonemes, to relate a word with its concept and to understand a written text in the ILWC. For that objective, the researcher gathered 60 participants who were divided into two groups: 30 students who had received previous instruction in reading religious texts in L3 Arabic and 30 others who had not; none of them could read or write in their L1.

The first test was phonetic discrimination and consisted on three series of three words; learners were read the items and had to detect which one had a sound different from the others (odd-one out). The second test was a picture-word identification in which participants were given nine illustrations and nine corresponding words; they had to match each word with a picture portraying its concept. For the last test, students had to read a short text which was accompanied with illustrations; they were asked to answer ten questions (seven multiple-choice with four options and three open). Fall, M. (2014) asserts that all contents and tests typologies used in his study were based on the Senegalese curriculum for grade 1.

Results showed that those students who received instruction in a qur'anic school outperformed those who did not in picture-word matching and reading comprehension, but not in phonetic discrimination. Further, the author points out that in any of the groups there appeared to be significant differences between genders. Fall, M. (2014) concluded that previous instruction in L3 Arabic does not advantage young learners in the acquisition of L2 French phonetic skills but it does in vocabulary acquisition and reading comprehension due to the theory of the

interdependence hypothesis. He finally suggests that prior absence of literacy development in the students' L1 Wolof impedes L2 French reading comprehension skills unless it is bridged by an earlier L3 Arabic training. This last affirmation in Fall, M.'s (2014) study seems not fully reliable since the author did not use L1 Wolof or the L3 Arabic in the tests of his study. Moreover, he did not take into account that Arabic and French use a different type of script: Semitic and Latin, respectively. In that case, according to Cummins (2005: 5), in the case of typologically different languages "transfer will consist only of conceptual and cognitive elements"; therefore, the abilities to relate sounds to graphemes and read and comprehend a text have little possibilities to occur. Further, Durgunoğlu (2002) and Bialystok (2007) claim that the distance between languages may positively or negatively affect literacy acquisition in bilingual students when decoding printed words and relate them to a sound when reading because there are particularities of each language; in the case of close languages, transfer of common systematic features are prone to happen whereas in distant languages a particular training is required in order to internalize the specific features of each language.

In Fall, M. (2014), it is aimed at showing that through a language foreign to very young children (L3 Arabic) another foreign language (L2 French) has more opportunities to be acquired if L1 instruction is not possible; in other words, the L3 would work as a bridge towards L2 acquisition in the absence of L1 at school. One study analysing the influence of language distance between L1 and L2 from L3 for the acquisition that L3 is Schepens, Van Der Slik and Van Hout (2015). After gathering data from 39,300 participants from different backgrounds learning L3 Dutch, they concluded that the facility for acquisition of a L3 is less likely to happen as languages get typologically distant. They added that the L2 is less influential than the L1. Therefore, Fall, M.'s (2014) argument that L3 Arabic decoding literacy skills would transfer to L2 French (in absence of L1 Wolof instruction) does not match with the ideas explained. Finally, it should also be noticed that the type of language (lexicon and grammar structure) used in the text as well as in the questions seems to be too much complex for students who are in their first year of exposure to L2 French since they had never or scarcely been exposed previously to that language.

One step further to the *Interdependence Hypothesis*, Cummins (2001) argues that transfer of linguistic and academic skills may have a double direction, that is, there exists the possibility of transfer from the L2 to the L1. In her study with 98 second generation of Turkish immigrants to the Netherlands aged between 6 and 8 years old, Verhoeven (1994) observed that, taking into account that participants started learning to read in the L2, their reading comprehension strategies and literacy development correlated between the L1 and the L2. This fact that makes think on the possibility that present ITM students in submersion models could profit from their late-acquired literacy abilities in the L2 to develop their mother tongue skills. However, the question is if this delayed development of the L1 would have benefits on ITM students' academic achievement; from Benson's (2004a: 3) view, it is plausible although "highly inefficient as well as being unnecessarily difficult".

However, Paxton's (2009) claim that transfer of specific academic concepts may not happen automatically must be considered. Bearing in mind Cummins' theories of the Common Underlying Proficiency and the Interdependence Hypothesis (see above), García (2009), García (2011) García and Hesson, (2015) and García and Wei (2015) and Wei and García (2016) suggest *translanguaging* as a strategy in the classroom which would help develop linguistic skills of any of the students' languages, promote content learning and, at the same time, contribute to social justice in the classroom without neglecting the students' L1 or their cultural identity (see section 3.2.1). Moreover, teachers would promote transfer by designing activities involving all the learners' languages so that they could "use their entire linguistic repertoires in meaningful ways" (García and Hesson, 2015: 229) in both the learning and assessment processes. Esteve and González-Davies (2016) argue that such pedagogic strategies should include a reasoned use of the language which heightens linguistic awareness and therefore would rely on already acquired languages in order to learn new ones by the transfer of linguistic skills. In that sense, not only the students acquire their two languages adequately (Wei and García, 2016), but teachers also become the allied of social justice who may defeat those monolingual programmes which do not accept any other language than the one used as MOI and create an environment in the classroom in which students engage freely in discussions and meaning negotiation (García and Hesson, 2015).

Translanguaging could become especially meaningful in those multilingual contexts (for instance, in Sub-Saharan Africa) in which there is a certain lack of confidence from teachers because they are not fully competent in the language MOI (García, 2009); furthermore, students see their self-esteem increase since first, they experience their cultural background and their daily social activities which are included in the translanguaging space (Wei and García, 2016) and second, they have the opportunity to show their knowledge in tests by using their whole linguistic repertoire (García and Wei, 2015). In other words, through translanguaging, the classroom may be transformed into a space where teachers and students would interact and where the language and content barriers would be abolished.

3.4.2 Basic Interpersonal Communicative Skills and Cognitive/Academic Language Proficiency in mother-tongue-based MLE programmes

Cummin's theories of the *Threshold* and *Interdependence Hypotheses* are of main concern in the context of Senegalese rural students and very much in connection with the two different types of language proficiencies that they ought to acquire to attain biliteracy: BICS and CALP. In their paper, Skutnabb-Kangas and Dunbar (2010) denounce that minority language students attending early-exit programmes, even though they are proficient in BICS, have not learned enough CALP that they are shifted to system where a monolingual ILWC is the MOI.

Cummins (1979b; 1980; 1981, 2008b) makes reference to BICS (also referred as *conversational fluency* in Cummins, 2009a) and defines it as fundamental aspects of language or "sociolinguistic competence" (Cummins, 1980: 177) which are naturally acquired by input in the first years of life; on the other hand, CALP (or also *academic language proficiency* in Cummins, 2009a) is that sort of complex language which is learned through academic instruction and which is transferred, in the best of the cases, from well-developed academic/cognitive and linguistic skills in the L1 to the L2. Krashen and Brown (2007) argue that CALP is structured upon two pillars: *Knowledge of Academic Language* (the precise register which acquired at school and used in formal and technical settings) and *Knowledge of Specialised Subject Matter* (specific lexicon needed to understand and express the content of a subject); these are both improved by literacy and problem-solving leading to the

acquisition of CALP in the target language. Cummins (1999, 2008b) distinguishes CALP from BICS stating that the former is always ameliorating through academic studies while the latter is limited.

Another major difference (particular to minority language children living in Western countries) is the minimum length of exposure to the target language for optimal acquisition. According to Cummins (2008b), BICS is acquired after 2 to 3 years of exposure to the language and CALP, in a favourable environment (see footnote 4), after 5 or 7 years. However, when minority language students are neglected their L1, as Levin and Shohamy (2008) argue, the time required is longer: 7 and even 11 years. This is a possible explanation to the reason why some educators tag minority language students as having an academic disability because they assume that those students are proficient in the L2 and therefore can understand the lesson taught since they show proficiency in BICS; however, they really lack of CALP proficiency and are, consequently, put apart (Cummins, 1981, 1982, 1999, 2008b).

What about the Sub-Saharan African context? According to Skattum (2009), minority language children in Francophone Sub-Saharan Africa can scarcely show signs of oral BICS in L2 French after 2 years of academic exposure and after 6 years their proficiency is quite low. As Heugh (2006) and Heugh (2011b) argued, a minimum length of 6 to 8 years learning the L2 as a subject is necessary to show some proficiency in that language so that it can become MOI (see section 3.2.2). With a lack of mastery in L2 CALP, Brock-Utne (2010) claims, minority language children are considered by the system as inept since they are unable to understand the lesson. In fact, Skutnabb-Kangas (2009c) explains that ITM children are fully competent in BICS in their L1 which is mainly enriched with a CALP type of language at school and taking as starting point their knowledge acquired through the L1 within their community. The author adds that, if CALP in L1 is not worked out in the classroom, they “may never have an opportunity to develop higher abstract thinking in any language” (Skutnabb-Kangas, 2009c: 1).

Having dealt with Cummin’s distinction between BICS and CALP, Panda and Mohanty’s (2009) proposal of discerning between two pedagogical processes in bilingual schools can be considered here: *Replacement* and *interweaving*. The first

consists of a shift from a colloquial type of language or BICS to a more technical or CALP whereas the second considers an interaction between the two proficiencies. The authors suggest that at early stages, replacement is the most suitable because it allows students to put together the foundations upon which a more specialised and complex language is erected; soon after, through *interweaving*, specific subject terms are introduced in the classroom communication and a more complex language substitutes progressively a social one. According to Panda and Mohanty (2009), a focus on only one of them would imply either the loss of interaction among students and between the teacher and the students or a standstill in the development of language skills. Cummins (2009: 24) points out at a third type of language proficiency claiming that there exist *discrete language skills* which are those “rule-governed aspects of language” such as phonological, spelling or grammar traits which are characteristic of each language and that transfer can only occur if languages share the same rules.

A concern which is especially meaningful and characteristic in the context of the current research is that the attainment of certain levels of CALP may be acquired before BICS (Cummins, 1999). This might be the case of Senegalese students who develop a type of technical vocabulary in French (CALP) due to ILWC instruction before they could be able to express it in their L1 but on the contrary, they often fail when they try to express a thought or maintain a conversation using a type of language involving basic L2 abilities (BICS) or specific language features (discrete language skills). The cause may be grounded in the fact that those who are responsible for their transmission, that is, teachers, are themselves not qualified (Skutnabb-Kangas and Dunbar, 2010). It may continue as long as the government does not require superior studies than just the baccalaureate as the least requirement for teaching at primary and in some cases, even in the secondary. It should be mentioned that before 2011, only the *brevet de fin d'études moyennes* (certificate of middle studies) (BFEM) obtained at the end of the grade 9 was the only condition (UNESCO, 2010-2011), or the baccalaureate since 2012 (Giulliano Sarr, 2013). In fact, the *Ministère de l'Éducation* (2013) recognises that one of the major problems of the Senegalese education is the poor qualification of teachers (see section 2.2.1).

Perhaps, the most interesting contributions of Cummins (1980: 180) to the introduction of ITM students' mother tongue as a MOI in developing countries is his affirmation that "To the extent that L_x is effective in promoting cognitive/academic proficiency to L_x , transfer of this proficiency to L_y will occur provided that there is adequate exposure to L_y ". In other words, the learners' L1 CALP transfers to their L2 CALP in a common storage of knowledge and language skills through adequate L2 language training and thanks to transfer. One of the author's proposals in that sense is that minority language older learners who have been exposed to L1 CALP may reach better scores in academic content areas taught in the L2 compared to those who have not already acquired the adequate skills. Upon this statement understood among linguists as "the relationship between language and cognition" (Coyle 2005: 8), Cummins (1982) designed a matrix to describe those tasks which would promote linguistic transfer of literacy and knowledge and a better acquisition of the L2 through scaffolding along tasks designed through a continuum from context-reduced and cognitively undemanding towards context-embedded and cognitively demanding. In that sense, similar to Panda and Mohanty's (2009) idea of *replacement* and *interweaving* (see above), Coyle, Hood and Marsh (2010) adapted Cummins' matrix and argued that teachers should guide their students along a path across three quadrants established upon two axis of symmetry for both linguistic and academic demands: A first quadrant (Q1) requiring basic language and simple academic abilities; a second (Q2) in which linguistic complexity increases but slightly those related to the students' context; and finally, a third (Q3) which implies higher commands of linguistic academic skills and more specific knowledge of a content area.

Taking into consideration the importance of ITM learners' socio-cultural background in a gradual demanding learning-process of academic and linguistic skills in an L2 from a first oral conversational situation to a MOI as exposure advances (see sections 2.3 and 2.4), Cummins' matrix can be adapted to the context of a bilingual programme in developing countries (see figure 3). Across these three quadrants, an arrow shows the scaffolding direction along a continuum in an academic situation in which tasks would be designed for the acquisition of L1 content and linguistic skills for transfer them to the L2 using pedagogical strategies.

Thus, as shown, the arrow starts in Q1 concerning a context close to ITM students and a basic language (BICS); in Q2, the type of language is increasingly more complex (CALP) but the context still remains familiar to the students; at last, in Q3, the language is also academic but the context is further from the students environment.

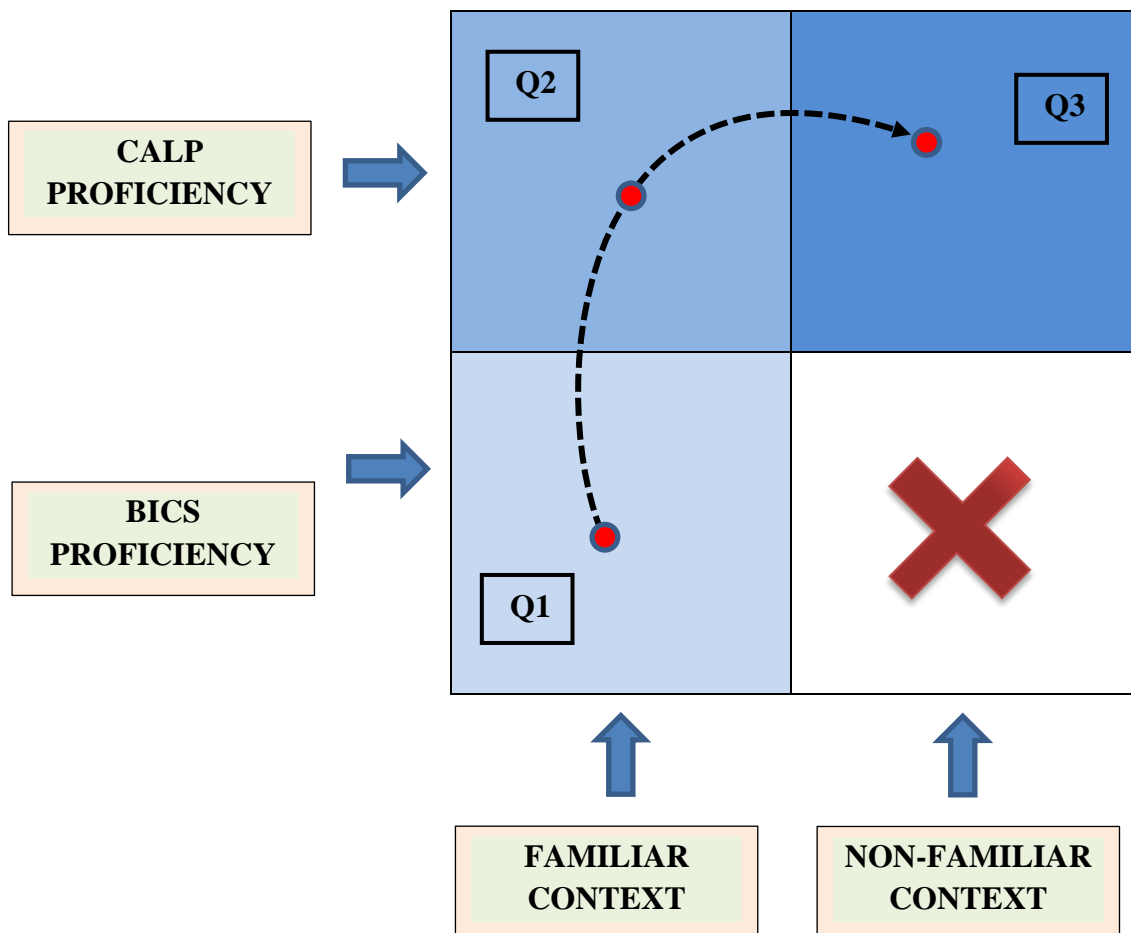


Figure 3: Cummins' matrix applied to the education of ITM students in developing countries
Adapted from: Coyle, Hood and Marsh (2010)

Therefore, ITM language students taught through their L1 acquire first linguistic and academic skills in that language which are thereafter transferred to the L2 involving at the same time language acquisition and knowledge enrichment by scaffolding activities designed along the pathway through the quadrants: From a familiar context involving daily activities and indigenous knowledge and a not grammatical or technical complex type of language towards a concrete content area

related to higher language ability demands and a mastery of a more specific academic lexicon.

However, it should be taken into account that there might be some external factors which may impede the *Interdependence Hypothesis* to occur, for instance, as previously argued, lack of motivation caused by a removal of the students' identities in the academic context (Cummins, 1980). In that sense, ITM students' success in education could be reached if Cummins' theories were linked to the specific needs of minorities in the school curricula.

3.5 Mother-tongue-based MLE programmes: Different experiences in developing countries

3.5.1 Mother-tongue-based MLE projects in the Latin American context

One of the most challenging mother-tongue-based MLE models in South America may be the *Proyecto de Educación Intercultural Bilingüe* (PEIB) (Bilingual Intercultural Education Project) which was addressed to ITM groups in different countries of Latin America.

One example can be found in Bolivia, a country where ITM students show significant rates of school grade repetition, among them the three largest local communities: Quechua, Aymara and Guaraní. D'Emilio (1996) reports the big success of this bilingual model implemented in 140 schools where students started primary education in their local L1 and where L2 Spanish was introduced regularly by increasing the number of exposure along grades. Results from the assessment of that model revealed a great success for students who received instruction in their mother tongue, especially in writing skills and literacy. But according to d'Emilio (1996), these were not the only positive effects of the presence of the mother tongue in school context: There was also an increase in the learners' self-confidence and females' academic success, a reduction of violence towards ITM students who used a local language in class, and finally, the engagement of parents in school activities.

The author attributes most of the success of the project to the involvement of communities in the education of their children via their L1 and their commitment in its management as the project advanced. It is important to mention that through

PEIB, the Guaraní community experienced for the first time the possibility to write in their language since, it was mainly oral.

D'Emilio (1996) also portrays the attitude of young generations of indigenous groups towards their own language through a questionnaire which was answered by 176 primary students belonging to the Guaraní, Guarayo and Chiquitano ITM communities, 70.5% of them having a local language as L1 and 29.5% having Spanish. The author reports that 82% of the students were in favour of receiving instruction through their L1 because they believed that they would acquire academic content better and they would feel more self-confident when communicating. It should not be omitted here that among all the learners, 74.1% were in favour of keeping their local L1 in a country where the number of monolingual Spanish speakers increases each year. However, as Zavala, Robles, Trapnell, Zariquiey, Ventiades, and Ramírez (2007) argue, the Chiquitano children's wish to receive instruction through their L1 was vanished in 2006 with the change of government in Bolivia.

Zavala et al. (2007) explain that the PEIB was adopted in 1997 by the Chiquitano community, in Western Bolivia, with the aim of enlivening their L1, Bésiro, by introducing it at schools. The first step was to organise councils where linguists and members of the community and local authorities could come up with agreements about the production of a script with appropriate graphical symbols, grammar standardisation and a renewal of technical vocabulary so that students were not forced to coin words from the ILWC. Then, a group of teachers led the creation of books in the ITM language together with the advice of local councils. This material was not just focusing on the academic content of primary education, but also on the compilation of Chiquitano stories and legends so that the students could feel their cultural identities in the classroom. The final step was to ensure that bilingual teachers were appropriately trained to instruct both L1 Bésiro and L2 Spanish in an environment which promoted transfer and biliteracy. For that purpose, in 2006, a group of 37 teachers started a two-year programme organised by the PEIB to analyse all the aspects of their mother tongue so that they could guide their students. Through this campaign, as Zavala et al. (2007) argue, parents supported their children to receive instruction in their L1, a fact that has permitted

the members of the community to feel empowered and not to feel ashamed of speaking their language any longer. Unfortunately, the researchers claim that, despite all the efforts made, the effects of Bésiro as MOI in Chiquitano schools cannot be assessed because of the governments' loss of trust in the programme. This fact demonstrates that the support of States and their respect of Human and Children's Rights are a crucial factor for the success of and continuity of bilingual programmes for ITM communities.

Contrary to Bolivia, the PEIB programmes in Ecuador have reflected positive results with minority language children. The main objective of this bilingual education was to avoid school abandonment on the side of unmotivated students who felt their culture undervalued. Other goals were to diminish poverty among marginalised indigenous communities, maintain the language and to incite learners to learn academic content and acquire literacy strategies by including their social and cultural identity into the classroom. Zavala et al. (2007) show the situation of rural ITM learners who had to migrate to urban areas, for instance, Quito, where they were ashamed of speaking their mother tongue because they were relegated to the fringe. The authors explain the case of *Tránsito de Amaguaña*, a school which in 2006 was said to be the best bilingual experience among the PEIB programmes. In that model, L1 Quechua and L2 Spanish were both MOI of a system addressed to those marginalised native rural students whose L1 was the local language and, in some cases, may have the ILWC as L2. The strategy of that school in primary education, as Zavala et al. (2007) argue, was the frequent code-switching in order to activate a connection between both languages. That way, students felt free to use the language they were comfortable in order to express academic content because "*la lengua no se impone, sino que se disfruta*"²¹ (Zavala et al., 2007: 146).

However, at *Tránsito de Amaguaña*, there was a difference with secondary education where languages were studied separately in both the oral and the writing. The authors explain that in the first grades, teachers used one language or the other depending on the wish of each learner; thus, most of them developed literacy and writing abilities through L2 Spanish and used L1 Quechua for the oral expression although there are several written texts on the boards of the school in

²¹ Language is not to be imposed, but to be enjoyed.

the ITM language. One of the main reasons for that choice was the social pressure they suffered outside the school which forced them to speak L2 Spanish not to be left at the margins of society. However, in secondary grades, students were capable of expressing themselves in both languages and especially use Quechua to tell about their identity, cultural background, indigenous knowledge of their peoples and the ecology included in their language (Skutnabb-Kangas and Dunbar, 2010; McKenzie, 2009). To show the students' achievement, the researchers argue that most of the learners reached higher biliteracy skills at the end of compulsory education and were capable of producing high quality texts in both languages. Nevertheless, Zavala et al. (2007) insist that, in order to have trustful data on the positive effects of L1 Quechua and L2 Spanish in that bilingual model, a detailed assessment should be fulfilled.

The PEIB in Latin America has also arisen in Peru. As an example, according to Zavala et al. (2007), it took place in 30 rural primary education centres in the Andean province of Quispicanchis, department of Cusco. In that bilingual L1 Quechua and L2 Spanish programme of the PEIB called *Proyecto de Educación Rural Fe y Alegría*, there were involved 4,470 students and 150 teachers. Previous to that programme, instruction at schools was totally in L2 Spanish and it was addressed to a population who was mainly L1-Quechua speaker. With the PEIB, students of primary education were instructed in their L1 in the first year and then the ILWC is gradually introduced. The objective of the programme was not only addressed to students, but also to teachers and families. First, mother tongue instruction was a tool for students to lessen dropout and transmit them an interest for learning, enhance their self-esteem and increase their own value of their cultural identity. Second, teachers were trained and taught language skills and pedagogical strategies in both languages so that they could teach bilingually and promote transfer of literacy abilities and academic content from L1 Quechua to L2 Spanish through students' interaction, reading and writing tasks and Mathematical problem-solving tasks (Fe y Alegría, 2009). Teachers were also given advice throughout the academic year in regular teaching workshops as well as feedback from the observation of a bilingual education expert in the classroom. Another important aspect was that teachers' efforts were very much valued and their motivation was an important

aspect in the programme in front of the poor social consideration that they were used to have in the country. Through regular workshops and their involvement in the design of curricula of the PEIB, teachers' self-esteem increased; it appeared to be a fundamental aspect for designing positive bilingual educational strategies.

One of the main problems encountered in the process of bilingual education was an early opposition by the side of parents who claimed their children to be instructed in L2 Spanish because they perceived their own language as inferior. Moreover, they claimed that it was the only way to reach academic success and a future paid job despite the controversial fact that they felt attached to their own culture. The approach that PEIB experts carried out towards families was to organise talks about the purpose of the bilingual programme at which their children attended. There were also parents' workshops where they dealt with social topics with the objective of shortening the gap between the different consideration of their rich culture but undermined language, taking consciousness about the relevance of their children's education through L1 Quechua for decreasing dropout rates and integrate them in the school system.

The result of this programme, as Zavala et al. (2007) claim, has been reflected into an increase in the quality of education and into better academic achievements for ITM learners. The authors argue that in the year 2000, most of the students showed low proficiency in the skills of both L1 Quechua and L2 Spanish. But four years later, students in the six grades of primary education were capable of producing proficient oral and written texts in both languages in accordance to their school grade, even outperforming students attending mainstream monolingual schools. As explained in Fe y Alegría (2009), one of the main reasons for such a success is that students have met their identity and felt the real value and knowledge of their culture. This fact is an issue which motivated them and heightened their self-esteem because it "constituye una base que favorece su aprendizaje²²" (Zavala et al., 2007: 271).

²² It constitutes a base which favours their learning.

3.5.2 Mother-tongue-based MLE models in Asia: Examples to follow

The multilingual education experience in Northern Philippines, a country where 181 languages coexist (Ethnologue, 2015) is another piece of evidence in favour of the introduction of mother tongue instruction in schools among ITM communities.

Dumatog and Dekker (2003) illustrate the *First Language Component Bridging Programme Pilot Project* which took place in Lubuagan District. The goal was to introduce L1 Lubuagan in first grade of primary education in a country where L2 Filipino and L3 English are MOI. The experience started in 1997 with several meetings of teachers and community members to raise people's consciousness about the importance of including the students' L1 into education and with teachers' training lessons. One year later, 5 schools initiated the project in which literacy and numeracy skills were taught in L1 Lubuagan during 4.5 hours per day whereas L2 Filipino and L3 English were taught as subjects for 1 hour. The pedagogical model included a collection of local stories and songs as well as information of events in their community so that students could be conscious of their cultural identity and feel part of their community.

The researchers gave tests to grade-1-students on reading comprehension in L1 Lubuagan, L2 Filipino and L3 English in four of the five pilot schools. The experiment considered an experimental group of students who received instruction in L1 Lubuagan and a control group who did not. The average scores for those students in the experimental group were much higher in the three languages than those in the control group as shown by the difference between the achievements between the two groups: 16.86 in L1 Lubuagan, 19.24 in L2 Filipino and 18.08 in L3 English (see table 2).

	Lubuagan (L1)	Filipino (L2)	English (L3)
Experimental group	56.69	54.32	54.65
Control group	39.83	35.08	36.63

Table 2: Scores obtained by the experimental and control groups
Adapted from: Dumatog and Dekker (2003)

Another interesting point in this study is that the highest marks of those students who did not receive mother tongue instruction are higher in their L1 than in the languages MOI, suggesting that the introduction of mother tongue in education benefits students in the acquisition of their L2, literacy skills and academic content. Dumatog and Dekker (2003) conclude that the effect of mother tongue instruction has been positive in many aspects. First, it has promoted the acquisition of literacy and writing skills which were initially acquired through L1 Lubuagan and then transferred to the two official languages. Moreover, it has favoured learners' participation and interaction in class, leading to a dynamic learning and high attendance rates which, at the same time, have motivated teachers to produce material despite the long time it required. However, as mentioned in sections 3.2.1 and 3.2.2, short exposure to mother tongue instruction for just one academic year as it is the case in the First Language Component Bridging Programme Pilot Project is, perhaps, an insufficient period of time required for students to develop biliteracy and promote transfer of academic content and linguistic skills.

A project which requires to be mentioned is the mother-tongue-based MLE model in primary schools of Papua New Guinea, a country where coexist about 838 languages, mother tongues to near seven million people (Ethnologue, 2015). According to Klaus (2003), there are two main local languages: Pidgin and Hiri Motu. In first pilot bilingual projects of 1993, these two languages were used as MOI together with L2 English, unique language MOI in traditional schools. The main objectives of that programme were to increase attendance rates among students and to attain gender equality. Academic gains among students were important and consequently, in the year 2000, the spreading number of local languages which could be used by teachers to instruct at grades 1 and 2 was 470. Klaus (2003) argues that those children attending the new schooling model acquired strong literacy skills in their L1 and reached higher proficiency levels in the ILWC than those older generations of learners who were submersed in the old system. Moreover, the author confirms that they showed motivation in their classrooms and felt more engaged in the process of learning.

The success of that mother-tongue-based MLE project, as Klaus (2003) argues, was grounded on different key factors. First, the presence of the students' cultural identity in the curricula was important to face its blurring caused by the use of a European language. Second, the participation of community members in the school life and in the selection of content related to the social life, and especially the engagement of parents in school commitments and in the academic education of their children. The researcher argues that although family members were sceptical about their children to be instructed in their L1, they became conscious about its benefits when they discovered the literacy improvements of their children and the fact that their language was given certain relevance in their society. Third, training local teachers became a central point, not only for the academic improvement of students, but also because they constituted a bridge of communication between the school and ITM families, taking local languages as a tool of exchange. Moreover, the fact of hiring people from the same community helped to the economic development of the area. Finally, new teaching material and dictionaries for each indigenous language were created. In the case of those languages which were oral, a script consensus was decided among community members, education and language experts.

However, Klaus (2003) points out at weak points in the bilingual programme, for instance, the short period of time that students are exposed to their mother tongue at school rather than receiving L1 instruction in higher grades. According to the author, this is due to the fact that creating material in such a high number of languages would be much expensive, an issue which made of this mother-tongue-based MLE programme an early exit-transitional model in which, suddenly at grade 3, students were forced to attend traditional schools in which L2 English was the unique language MOI. The best option for ITM children in Papua New Guinea, Klaus (2003) suggests, would be enlarging mother tongue instruction to higher grades.

The linguistic situation in India is highly complex since there are 1,652 mother tongues spoken according to Jhingran (2009) who refers to the 2001 census of the Asian country. Mohanty (2006), Mohanty (2009) and Jhingran (2009) portray a multilingual and multi-ethnic landscape where languages are spoken according to different domains and classified according to a hierarchical pyramid in which

English, the language of the high SES people, MOI from grade 1 in private schools of urban areas, and symbol of power, is at the summit. The prestige of that ILWC has even undervalued Hindi, the local mother tongue for most Indians, which is a subject and also MOI at schools. At the same time, Hindi has depreciated other major languages²³ (Bengali, Tamil, Telugu, Punjabi and Oriya, among others) which are MOI in those provinces where they are vernacular. At the bottom of the pyramid, there are minor languages which have no place at important domains although a small number of ITM communities have reached to have them as MOI at schools: Less than 1% of ITM children can study in the mother tongue (Mohanty, 2009).

The so called tribal languages are 218 mother tongues to 84.3 million people of which only 13 are included in the school curricula either as MOI (3 or 4 of them) and the others, only as subjects (Mohanty et al., 2009). The current policy in education in India does not regard most of ITM languages despite the fact that ITM children enrolled in primary schools in India are highly present: In 165,869 education centres, 50% of the students come from tribal groups; 128,873 schools include 75% of ITM children; and 103,732 primary institutions incorporate 90% of tribal students (Jhingran, 2009). The reality is that these children are not instructed in their L1, a fact which is believed to be a main source of failure and cause of 50% of dropout rates (Mohanty, 2009). Jhingran (2009) adds that the absence of the students' L1 at school is the main source of important learning troubles to 25% of the students. Thus, the author claims that the mainstream Indian schooling system forces most tribal students from grade 1 to be taught in a language they do not understand and they cannot use to communicate; consequently, children's language skills experience little improvement throughout the first years of schooling and at the end are not capable of extracting information in a reading comprehension task or cannot express properly in a written composition.

With the aim of empowering ITM communities, Mohanty et al (2009) picture two mother-tongue-based MLE pilot models in Andhra Pradesh and in Orissa in

²³ There are 22 *official languages* in India, Hindi among them. English is considered *associate official language*. The remaining local languages, mother tongue for many Indian citizens, are gathered under the name of *other languages* (Mohanty, 2006).

which the mother tongue was the base of education. The main goals of the studies were first, that students strengthened content and linguistic foundations in their local L1 for a later transfer to the main language of the state (L2 Telugu), to the main national local language (L4 Hindi) and to the ILWC (L3 English). The mother-tongue-based MLE programme in Andhra Pradesh started in 2003 and was established in classrooms in 2004 for students at grade 1; four years later, it covered the first five grades of primary education. It involved 1000 schools and eight ITM languages: Gondi, Koya, Kalami, Kuvi, Savara, Konda, Adivasi Oriya and Banjara. The students' L1 was MOI during the three first grades of primary when they developed cognitive and literacy skills. At grade 4, the language MOI was shared between the local L1 (50%) and the major language of the state, L2 Telugu (50%). Moreover, at the same time, students also started developing oral, written and literacy skills in L3 English. Progressively, at grade 5, there was an increase in the use of L2 Telugu as a MOI; therefore, students received 25% of the subjects in the mother tongue and 75% in L2 Telugu, together with L3 English which became a subject. At grade 6, learners had to join the mainstream curricula where the MOI was the main language of the area, together with L3 English as a subject and the introduction of L4 Hindi. In order to reach educational objectives, MacKenzie (2009) points out to that bilingual material and in the mother tongue were designed by linguists together with local teachers containing strategies to improve literacy skills and to favour language transfer. Moreover, it took one and a half year to create multilingual dictionaries containing 20,000 words in the students' L1, L2 Telugu, L4 Hindi and L3 English for academic use.

Mohanty et al. (2006) describe a similar model in Orissa. Although designed in 2006, the mother-tongue-based MLE model started in the classrooms in 2007. It included ten local languages in 195 schools. Nevertheless, in 2008, the project was enlarged and inserted in 495 education centres. Similarly to Andhra Pradesh local L1 was MOI through the three first years with the difference that L3 English became a language of oral use one previous year, that is, at grade 3. In the two following grades, teachers instructed all subjects in the main language of the state (L2 Oriya); the local L1 and L3 English became a school subject. At grade 6, students entered in the ordinary programme where L2 Oriya was the MOI and L3 English and L4 Hindi

remained subjects. It should be mentioned that new curricula were designed each year as the project embraced higher grades (McKenzie, 2009). That material was created in both cases in the students' mother tongue and, for such a purpose, the script of the local languages was based on the spelling of the major language with some phonological adaptations (Mohanty et al., 2006).

Notwithstanding, Panda and Mohanty (2009) observe that in the Orissa project the methodology used was too much focused on manuals and the teacher; that is, teachers were not behaving as expected and their lessons were very much focused on the teachers' speech and not giving relevance to the students' interaction. Moreover, they had little knowledge of strategies to include the indigenous knowledge and the everyday life of local communities in the curricula as well as to promote language transfer, two facts which, according to the authors, "limit the prospects of developing dynamic and strong MLE practices" (Panda and Mohanty, 2009: 306).

With the aim of designing an effective mother-tongue-based MLE programme, a new project, the MLE Plus, took place in 2007 in eight schools in Orissa and regarding two communities, speakers of L1 Kui and L1 Saora. The objectives were first, a part from the students to become multiliterates at the end of primary education, to have competent multilingual teachers who used strategies for transferring academic content and language skills and for enhancing children's identity by including it as a teaching approach; and second, to make parents and other members of the community get involved in the learning process of their children. A first assessment of the project showed that students at grade 1 who attended the mother-tongue-based MLE Plus programme reached much better scores in Language, Mathematics, Sciences and Arts than those students in traditional schools.

The success of the mother-tongue-based MLE Plus project grounds on different factors. Panda and Mohanty (2009) and MacKenzie (2009) assert that academic content was very much linked to the culture and context of the community. In that sense, after observation of the community habits, a group of linguists, teachers and community personalities identified those social situations where a school content area was present; then, they designed strategies to

generate a bridge linking academic content and the cultural background of minority groups; for instance, a Maths or Science topic was entrenched in the community's indigenous knowledge: Traditional songs, legends, art, the natural environment or their popular agrarian techniques. Through that methodology taught in the local L1, students acquired the academic contents without difficulties and were "given access to scientific concepts that enable them to reconceptualise their everyday experiences" (Panda and Mohanty, 2009: 308). That is to say, they built the foundations for discovering unexplored content (MacKenzie, 2009). At that point, the authors describe as crucial the function that teachers adopted while teaching and their capacities for using pedagogical strategies for such a purpose. This was why they gradually met in workshops together with education experts in which they discussed possible pedagogical matters and created and revised teachers' guides and student-centred material which promoted interaction. Moreover, they received feedback from experts after regular observations during their lessons.

Another factor for success of the mother-tongue-based MLE Plus programme was the implication of parents in the learning process: They took part in helping their children with their tasks as far as community practices were included and thus felt that their language and culture were given a value (Panda and Mohanty, 2009). Consequently, parents became conscious of the importance of their own mother tongue and culture included in education at a point that they asked for the possibility of attending lessons themselves (MacKenzie, 2009). However, the prospering of these mother-tongue-based MLE projects, MacKenzie (2009) argues, depended very much on the support of local and national authorities and on the consciousness of the ruling people about the harmful effects of the language and content barriers in education. For instance, the author claims, other mother-tongue-based MLE programmes in India, precisely in Assam and Chhattisgarh, did not prosper due to impediments from the political side.

3.5.3 Africa: Trials and impediments

One of the first experiences in the use of mother tongue in African schools was in Niger. Hamidou, Mijinguini, Amani and Salley (2010) argue that the government of the country prioritised first quantity to quality with the aim of reaching the

Millennium Development Goals and Education for All objectives, causing an increase in the number of children per classroom who had not enough material available. This practise was, according to Hamidou et al., 2010: 15), the origin of “a very advanced state of deterioration in their education system” leading to high percentages of school abandonment and grade repetition. The solution that Niger adopted was to increase, then, the quality of education by teaching their students in their mother tongue or at least, in a language familiar to them. Thus, in 1973, students in the region of Zinder experienced for the first time a lesson in L1 Hausa. Three years later it was possible for L1 Zarma-speakers and in 1979, for L1 Kanuri, Tamajaq and Fulfulde L1-speaker-children. From grade 1 to 4, learners received instruction through their L1 whereas in the last two years of the primary cycle, it stayed as a subject. Concerning L2 French, it was a school subject from the last months of grade 2 (starting orally); at grades 5 and 6 it became MOI and stayed as a subject. That way, the number of hours of L1 exposure progressively decreased, especially in the two last years of primary whereas the use of the ILWC increased substantially due to the fact that, as Hamidou et al. (2010) argue, the national examination for the end of the cycle did not take into account the use of local languages.

In order to carry out the project, it was important that teachers mastered local languages; so, they had to attend regular workshops for the development of linguistic skills in the African languages. They were also instructed in specificities of each language and in pedagogic strategies to employ in their classrooms. The material was also an aspect which required special consideration because it had to include the background of the students and it had to contain also the specific terms of the content area. The specific lexicon was decided after meetings by experts of the different school domains.

Hamidou et al. (2010) argue that one of the major issues for the project to become a reality was the linguistic policy in favour of the use of the African languages in education. The first step was made in 1967 by the bureau of the National Ministry of Education who officialised the scripts and grammars of five Nigerien languages (Fulfulde, Hausa, Kanuri, Tamajaq and Zarma). It was followed by the government’s decision in 1989 to give the status of *national languages* to ten

local Nigerien languages: Arabic, Fulfulde, Gulmancema, Hausa, Kanuri, Songhai-Zarma, Tamajaq and Tubu. Finally, in June 1998, the Law 98-12 was the fundamental document which officialised the entrance of Nigerien local languages in the education system.

Among different assessments of the mother-tongue-based MLE programme, that carried out in 1998 may be of special significance. In that experiment, students' results from 18 bilingual schools were compared to learners' scores in 18 classical schools (1,664 participants) in reading abilities and in arithmetic. Findings suggested that literacy skills in both languages were better developed when students attended the bilingual model. About the test of arithmetic, the average scores were 6.21 for participants in the experimental school and 6.15 for those in the traditional one. Moreover, interesting data from the Mathematics test were the marks obtained in the three grades: They were higher when tests were given in a local L1, including the marks for those students who were instructed in L2 French (see table 3).

	Tests in one African language		Tests in French	
	Bilingual school	Traditional school	Bilingual school	Traditional school
Grade 3	7.8	7	5.7	5.8
Grade 4	9.8	9.2	6.8	8.5
Grade 5	4.3	3.5	2.9	2.5

Table 3: Comparison of students' scores obtained in Arithmetic depending on the type of school they attended: Bilingual or traditional. Assessment carried out in 1998
Adapted from: Hamidou et al. (2010)

Hamidou et al. (2010) not only shows that the introduction of an L1 in education in an African multilingual context has positive effects on children's academic achievement, but it also suggests that the language of tests is also a factor that must be taken into account for the assessment of students whose mother tongue is a different one than the official ILWC (see section 2.4.1).

Zambia is one African country where mother-tongue-based MLE programmes have successfully prospered with the support of the Ministry of

Education with the aim at reaching the *Education for All* objectives. Side by side with the Zambian academic curricula which regards L2 English and one local African language as MOI, Sampa (2003) explains that the Primary Reading Programme (PRP) was initiated in 1998 in 25 primary schools for grade 1 students to promote biliteracy in the ILWC and in one of the seven Zambian languages (Cinyanja, Chitonga, Ibibemba, Kiikaonde, Lunda and Luvale). One year later, after a first assessment showing an upgrade of 64% in literacy, it was incorporated as a strategy in 4,721 schools around the country.

The author associates the completion of that project to different basic points: A teaching method which regards students and their cultural identity as the centre, teachers who attend workshops and receive frequent feedback, different evaluations of the programme throughout its implementation and the participation of the community members for the design of syllabuses. The PRP was designed following a structure of five courses along seven years of primary education as displayed in table 4.

Course	Grade	Skill	Language	Dedication
Zambian New Breakthrough to Literacy	1	Literacy	L1	1 hour/day
Pathway 1	1	Oral	L2	60 minutes/week
Step in to English	2	Literacy	L2	1 hour/day
Pathway 2	2	Oral	L2	30 minutes/day
Read on Course	3 and 4	Literacy	L1 + L2	1 hour/day
	5, 6 and 7	Literacy	L1 + L2	2 hours and 30 minutes/week.

Table 4: Organisation of the PRP project in primary schools in Zambia
Adapted from: Sampa (2003)

As shown, students at grade 1 developed literacy skills in a local L1, as a basis for transfer these abilities at grade 2 to L2 English. Moreover, they received oral input in the ILWC which would enhance further linguistic awareness and L2 acquisition as it became more and more present in the Zambian curricula.

Although the PRP is centred on the enhancement of literacy skills in the local L1 in the first grade of primary education and in L2 English in the second, a gap is noticeable in the use of ITM students' L1 in the second year of the project design. It may seem that the reading skills that students had previously acquired are suddenly interrupted and both literacy and oral skills only focus on the ILWC, thus delaying the construction of language foundations and consequently not fracturing the continuum of literacy transfer. Fortunately, that is not the case and the curricula for grade 2 consider 4 hours per week in the study of Zambian languages out of the PRP as a subject. Sampa (2003) argues that the creation of the teaching material was designed by a group of education experts and members of the community who initially created it in L2 English and then adapted it to each culture corresponding to the seven local African languages with the introduction of daily life activities and cultural practices of the target communities.

In order to observe the efficacy of this mother-tongue-based MLE project, students were assessed in literacy skills in 1999 and 2002; then, results were compared. At grade 1, students reached an improvement of 780% in the literacy abilities of their L1 which, at the same time, was transferred to L2 English literacy skills at grade 2 with an enhancement of 575%. Sampa (2003) reports that students at higher grades of primary education also experienced a significant progression in reading and writing skills (from 165% to 484%) which helped the comprehension of content and the achievement in other school areas. It is interesting to mention here the author's argument that before the PRP project started, literacy abilities of Zambian students were very poor when they were ready to start secondary education; therefore, they were not able to cope with subjects taught in L2 English and consequently were condemned to academic failure. Moreover, the author shows in the results of the first data collection of 1999 that most of the students' scores in reading were higher in the ILWC than in their mother tongue but these were the opposite in the second procedure in 2002 after three years of implementation of the mother-tongue-based MLE programme.

As the researcher shows, a well-organised mother-tongue-based MLE programme with adequately trained education experts using strategies for literacy transfer to an ILWC and appropriate material regarding the local cultural

background supports ITM students reading and writing in their L1 leading to an increase in the scores of their two languages and a decrease in dropout rates due to the fact that ITM students “have found something meaningful to them” (Sampa, 2003: 45).

A mother-tongue-based MLE programme was first piloted in Mozambique between 1992 and 1998 with the objective of observing the effects of early L1 instruction and late transition to an ILWC. The *Projecto de Escolarização Bilingue em Moçambique*²⁴ (PEBIMO) is a pilot bilingual programme in two districts of the Lusophone country (Tete and Gaza) where two ITM languages were involved: Nyanja and Changana, respectively. According to Benson (2001a), students received instruction in the local languages during the first three years of primary education with a first contact with oral L2 Portuguese at grade 2. It was at the following grade that learners started Portuguese literacy. At the very end of that same year, the ILWC was used as MOI together with the L1 studied as a subject until grade 5. In order to analyse the efficacy of that pilot project, Benson (2001a) carried out a series of test for ITM students at grade 4: Classroom management observation, questionnaires to students and parents and tests to students on Mathematics and Science and oral and written Portuguese.

Benson (2001a) gathered 342 students from the two provinces, 169 of them attending PEBIMO (experimental group) and 173 receiving instruction in Portuguese (control group). The oral test was not carried out by all the participants due to a lack of means, but by 104 students, 71 in the experimental group and 33 in the control group. Results showed that those students in the submersion programme scored higher than those in PEBIMO in the three areas tested despite the theory of L1 instruction leading to high academic scores and better L2 acquisition. However, the researcher analysed the situation, gave explanations for such results and conferred recommendations for strengthening PEBIMO and for future implementations of mother-tongue-based bilingual programmes in Africa. One of the major reasons found in the failure of learners in PEBIMO was that teachers were not enough prepared for teaching the local L1 or academic subjects in in the L1. Besides, they had few strategies to promote transfer of literacy and content to L2 Portuguese.

²⁴ Bilingual Schooling Project in Mozambique.

Due to the lack of ability to plan tasks and the time of preparation it required, teachers lost ambition for the project. Moreover, the Benson (2001a) claims that most of them had a long experience, but in subtractive models. As a matter of fact, their methodology was not student-centred and lacked of interaction engaging teachers and students; on the contrary, it tended towards a teacher-centred approach and memorization of concepts. Another aspect concerning teachers was that when the project started, they joined their job places at PEBIMO about five weeks late; as a consequence, the classroom of students attending the bilingual programme was formed “by taking students who had been rejected by other teachers” (Benson, 2001a: 39). In order to enhance the teaching quality on the side of educators, the author proposes that those experts conducting the project should not only observe lectures and give feedback, but they should also organise workshops so that teachers expose their problems they have to face in the classroom and come up with methodologies to teach the L1 and the L2 as a subject and other areas in the L1.

Another important cause for underachievement was the bad conditions of the material: Textbooks of content areas which were expected to be taught in the local L1 were just simple translations from those used in the submersion model in L2 Portuguese, therefore not adapted to the bilingual model and not taking into account the cultural background of the students. Moreover, the material arrived after the project had begun and with a very poor printing quality, for instance, words had not enough space between them and confused the learners, who, at grade 4, reproduced what they had wrongly learned. Moreover, it is important to mention that students who attended PEBIMO lessons were not repeating any of the grades. This was a double inconvenient, first because students in the control group had grade repeaters and therefore had received further instruction and further literacy lessons in L2 Portuguese; second, some grade-4 students at the bilingual project were moved to a higher level despite the fact that they had not acquired academic the content taught at previous grades. Both conditions, added to the fact that the bilingual group was formed by students that teachers excluded, made of the experimental group a selection of students with low skills.

Despite those circumstances and low scores at the assessment, the author argues in favour of a positive effect of PEBIMO. Benson (2001a) argues that teachers felt students in the mother-tongue-based MLE programme more active when engaging into communicative tasks. Moreover, the author states that parents, despite their initial negative belief in favour of PEBIMO, told that their children helped other students in the community who attended the traditional model. Finally, at the end of grade 5, PEBIMO learners not only have acquired knowledge of each content area, but have also a mastery of literacy in both their L1 and L2 Portuguese. This is why the author suggests another assessment of the project when students were at grade 5, that is, when they had one more year of development of reading and writing skills and exposure to L2 Portuguese and to their L1.

It was in 2003 that started a new mother-tongue-based MLE project involving 16 local languages (Chimbutane and Benson, 2012; Trudell, 2016). The authors explain that this project introduced L2 Portuguese gradually from grade 1 to grade 4; on the other hand, the students' L1 was maintained as a subject until grade 7. Despite its success, Chimbutane and Benson (2012) assert that there have been initial problems, most of them common to other bilingual projects: Delay of (inadequate) material and teachers not enough trained who lack of strategies for transfer of linguistic abilities and academic content and therefore make use of strategies more typical of teacher-centred methodologies and submersion programmes such as "coached answers" (Chimbutane and Benson, 2012: 15). According to Trudell (2016), in 2015 there were 551 schools and 98,000 students participating in that programme.

A project in which students benefitted from a mother-tongue-based MLE programme was the *Pédagogie Convergente* (Convergent Pedagogy) in Mali, a country where academic failure, grade repetition and school abandonment were high. Traoré (2001) defines that innovative plan as a teaching methodology which aims at biliteracy in the students' L1 and in L2 French by starting developing language abilities (writing, reading, oral expression and numeracy) in the L1 and transfer them to the ILWC once they have been rooted on the learner. Traoré (2001) explains that it was in 1979 when the first schools teaching in L1

Bamanakan appeared. Although education failure indices decreased, the author reports that the main inconveniencies were first, the methodology used by teachers which was similar to the traditional one, and second, the material which was just a translation from textbooks originally written in L2 French. Consequently, the country opted for piloting the *Pédagogie Convergente* in primary education.

In order to carry out the project, a group of Malian education experts were trained in Belgium, the country were started the *Pédagogie Convergente*. These people were at the same time responsible for training and giving feedback to teachers and to other participants as the project spread to higher levels. Thus, in 1987 the new methodology was piloted in two classrooms in the region of Ségou, with L1 Bamanakan as initial MOI for a later transition to L2 French. Each following year, one more generation of students started the mother-tongue-based MLE programme and by 1992, as Traoré (2001) reports, the first group of students attending the *Pédagogie Convergente* were at their last year of primary. The programme started with children being instructed in a local L1 throughout the first year and it was not until grade 2 that L2 French was introduced but just in the oral and in 25% of the scheduled time. It is in the two following grades that there was an increase in the use of the ILWC (75% of the school lessons) for instruction of subjects and development of all literacy skills together with a local language. In the last grade of primary education, students dealt with both languages at an equal distribution of time for each content area.

One of the most relevant goals in the pedagogical methodology of *Pédagogie Convergente* was the students' development of literacy and numeracy abilities through activities which engage them into oral and written tasks which tried to reproduce true situation of their cultural background and their social life. One such activity was story-telling and its representation which was believed to enhance imagination and both the oral and the written communication. According to Traoré (2001), transfer of linguistic abilities and academic content occurs easily, but not only due to linguistic awareness, but also because learners already knew the path to follow in order to learn L2 French: It was the same they went along when they acquired the local L1.

Other measures taken for the success of the bilingual programme were a reliable teachers' training workshop and the creation of material in African languages. First, teachers were recruited in summer workshops where they got familiar with the script and grammar rules of the target African language. Furthermore, they learnt activities to develop the oral expression and strategies to reinforce transfer of language skills and content. During the school year, they received feedback from education experts specially qualified for the mother-tongue-based MLE programme. Second, the production of volumes in the L1, Traoré (2001) explains, did not show many difficulties at first because only two classrooms and one African language were involved. But as the project was enlarged to other languages and to higher grades, different teams composed of linguists, education experts and cartoonists, were in charge of designing material for the African languages involved. They also anticipated to other local languages due to the fact that the new education model was expected to cover the other Malian local languages (Bozo, Minianka, Hassaniyya, Malinké and Khassonké).

A first assessment of that mother-tongue-based MLE programme in 1993 showed that students attending pilot schools reached higher levels in L2 French (77%) compared to those in the mainstream schools (66,24%). Moreover, as shown by results in the general state exam for Malian students at grade 6 from 1994 to 1999, learners in the bilingual model attained higher scores than the average students who were only taught through L2 French. For instance, in 1999, learners in the national programme reached a score of 49.13% whereas those who received mother tongue instruction attained 78.75% on average. When the students of the first enlargement to other local languages had completed primary education in 2000, scores for the tests to enter into secondary education were again compared. The difference in the average between students receiving instruction in their L1 was 16.23% higher than their peers in the traditional model. Due to good results obtained through research and assessment showing benefits for students, the *Pédagogie Convergente* was increasingly spread around the country and involving other local languages. Thus, in 2001, eight of the thirteen national languages in Mali (Bamanankan, Fulfulde, Songhay, Soninké, Dogon, Tamasheq, Syenara and Bomu)

were used in primary education for the 345 schools which adopted the bilingual methodology.

Despite the impact in raising the participation of students in the classroom, decrease dropout, grade repetition and academic failure, the project met some difficulties. To start with, Traoré (2001) states that material lacked of specific terms in African languages and suggests that further linguistic research ought to be done with a view to come up with technical lexicon. The author added that there were some experts who thought that a maximum exposure to the L2 led to a better acquisition. Further problems were found at the pedagogical level: Due to a poor quality in teachers' training about local languages, students suffered from a lack of writing skills in their L1 but were corrected in L2 French grammar (Skattum, 2010). Finally, Traoré (2001) blames national tests in Mali which were not adapted to the methodology of the *Pédagogie Convergente* and therefore students could not really show their capacities as if these tests fitted the lines of the education reform.

After analysis of weaknesses of *Pédagogie Convergente*, a new reform took place in 2002 (Skattum, 2010). The new project started in 80 schools and, in 2005, it embraced 2,550 (31.6%) primary schools, among them those which had established the *Pédagogie Convergente*. However, in 2008 this number decreased to 2,338 schools as a result of the rulers of the country who suggested the abandonment of bilingual education in favour of the tradition school with L2 French as a unique MOI.

3.5.4 Steps towards trials: First mother-tongue-based MLE projects in Senegal

Article 22 of the Senegalese Constitution of 2001 declares that "*toutes les institutions nationales, publiques ou privés, ont le devoir d'alphabétiser leur membres et de participer à l'effort national dans une d'alphabétisation dans une des langues nationales*"²⁵ (Fall, I.M., 2007). Immediately after it was made official, the first signs for the introduction of African local languages in pilot schools in Senegal appeared in 2002 with 150 experimental classrooms (IDEA, 2008). However, as Cisse (2005) objects, these new programmes had not any guarantee of survival because the government failed in its design: Teachers were not trained, there was

²⁵ All national institutions, public or private, must make literate their members and participate in the national effort of making literate in one of the national languages.

not appropriate bilingual material as teaching support and the government did not take much care on it. From the side of families, Faye (2013) adds that parents also rejected the idea of using a local L1 at school because they did not know the objective of such reform.

Faye (2013) describes the pilot project which took place from 2002 to 2008 and carried out by the *Direction de la Promotion des Langues Nationales*²⁶ and the Ministry of Education. This experiment concerned the six main national languages (see section 4.2) and 155 classrooms around the country. The curricula were designed in such a way that a local language familiar to the student was used as MOI in four grades of primary education. Faye (2013) has attributed the failure of that project to different factors: Teachers were not motivated or were not appropriately trained for promoting strategies of transfer of linguistic and academic skills in the classroom, manuals were delayed and a monitoring from supervisors was almost absent. Consequently, it is not worthless to mention Faye's (2013) claim that all students in these pilot projects were much more proficient in L1 than their mates who attended traditional schools but were not better in L2 French because "*le transfert vers la langue française se fait difficilement aussi bien à l'écrit qu'à l'oral*" (Faye, 2013: 124).

Benson (2004a) adds that not enlarging experimental mother-tongue-based MLE projects across the country is a strategy of States with two sides of the same coin: It seems that local languages are given a priority but they really do not undertake any firm decision. Moreover, it should also be mentioned that although Senegalese national languages have got a script, the majority of the population are not capable of writing them because these have not been further developed for an academic use and therefore have been restricted to an oral use (Chabata, 2013).

IDEA (2008) explains about the amount of time that African languages were devoted in those experimental bilingual primary schools carried out by the project *École et Langues Nationales en Afrique* (ELAN²⁷). The first contact with L2 French

²⁶ Board for the Promotion of National Languages.

²⁷ ELAN is an initiative by the *Agence Française de Développement* (French Agency for Development) and the *Organisation Internationale de la Francophonie* (International Organization of Francophonie). Its goal is to carry out experimental projects in which local languages are introduced as MOI at schools of French speaking countries of Sub-Saharan Africa, among them, Senegal.

was oral and took place half a year after the students had begun grade 1. It was at grade 2 that students started writing in the L2 from the very beginning of the year and it also becomes the language MOI for teaching Mathematics. It was at grade 3 that the ILWC and the local L1 had were devoted the same amount of time of instruction. The time of exposure to L2 French as MOI increased gradually from grades 4 to 6 until the presence of the local L1 was just symbolic (10% of the total amount). As shown, although this trial of mother-tongue-based MLE programme may try to show that the L1 is relevant in education, the time that students were exposed to a local African language was not enough to develop literacy abilities or to transfer academic content. If compared to other African models such as PEBIMO in Mozambique (see section 3.5.3), first oral contact with the ILWC started at the middle of the second year, so students had more time to strengthen their L1 skills and internalise content. Moreover, in the ELAN project, the L1 did not become a subject in the two last grades of primary as it was the case of Mali with *Pédagogie Convergente* (see section 3.5.3), but it was only maintained as a reading tool.

Mathematics, a subject which requires a certain degree of comprehension of the language, especially for problem-solving tasks, was taught completely in L2 French already in the second year of the ELAN project, a moment at which students have not already strengthened linguistic abilities in their L1, in such way, transfer could not occur. As IDEA (2008) claims, although mother-tongue was present, this type of programme might be considered subtractive (see section 2.2) because mother tongue was not given the required importance and its use was minor. As claimed by experts, possibilities which may explain that phenomenon might be first, the absence of advanced pedagogical material and dictionaries in the local languages (Chabata, 2013; IDEA 2008) and second, as noticed in other pilot projects in the Sub-Saharan context, the lack of a team of teachers adequately trained for taking part in bilingual programmes (Halaoui, 2003; Heugh, 2006; IDEA 2008).

The *Système National d'Évaluation du Rendement Scolaire*²⁸ (SNERS) is a regular assessment of the education system that the Senegalese Ministry of Education and the *Institut National d'Étude et d'Action pour le Développement de*

²⁸ National System for the Evaluation of School Results.

*l'Éducation*²⁹ regularly carry out. The study SNERS IV (see *Ministère de l'Éducation Nationale* and *Institut National d'Étude et d'Action pour le Développement*, 2007) aimed at analysing scores of students who received bilingual instruction. It compared the results in tests of L2 French obtained by students at grade 4: there were 2,180 who attended a traditional school where the language MOI was L2 French and 332 who received instruction in a local L1 and L2 French (see table 5).

	Average	Verb conjugation	Grammar	Reading comprehension	Writing expression
L2	51.4	39.3	50.35	49.1	57.6
L1+L2	44.2	38.2	42.5	44.95	54.4

Table 5: Grade-4 students: Comparison of results on different linguistic skills
Adapted from: *Ministère de l'Éducation Nationale* and *Institut National d'Étude et d'Action pour le Développement de l'Éducation* (2007)

Based on the results obtained, The Senegalese Ministry of Education argues that the general linguistic ability of those grade-4 students in a mother-tongue-based MLE programme is noticeably lower than those students receiving instruction in L2 French. However, it should be taken into account Heugh's (2006) claim that students should be exposed to their L1 for a minimal period of five to six years (or further) for a good development of linguistic skills and academic content for later transfer to the L1 (see sections 3.2.1 and 3.2.2). Considering this argument, little transfer occurred at grade 4. And this is even more evident provided that those students were exposed to L2 French at grade 1. Moreover, another cause for low scores of students attending the bilingual programme, as above mentioned, might be the absence of adequate manuals as well as poor pedagogical techniques from the side of teachers.

Although bilingual students' proficiency in the ILWC was not developed enough at that stage, there was a sign of the effect of mother-tongue instruction: One of the sub-tests for conjugation included metalanguage, that is, it measured linguistic awareness. Scores for students in the bilingual programme were 2.2%

²⁹ National Institute of Study and Action for School Performance.

higher than those in the traditional model. This leads to Skutnabb-Kangas and Dunbar's (2010) idea that L1 instruction enhances linguistic awareness for a better L2 acquisition. However, nothing is mentioned in the SNERS IV that strategies for transfer are used in the methodology of bilingual schools but rather, these are included in the general tendency in which *"l'enseignement du français s'articule autour d'exercices parcellisés et disséminés au lieu de s'appuyer sur des situations d'apprentissage et d'exercices de réflexion"*³⁰ (SNRES, 2007 : 8). This suggests that the approach was teacher-centred and that material in the L1 was just a simple translation which did not consider the students' background.

Similarly, with the aim of discerning the effects of mother tongue instruction in education, IDEA (2008) is a study which compares Mathematics and literacy scores for a total number of 1,943 students attending a bilingual school (726 participants for the experimental group) or a traditional programme (1,217 participants for the control group) at grades 2, 4 and 6 of primary education. It is important to mention that 489 lived in an urban environment and 1,454 in a rural one. The language of the tests differed depending on the grade. The distribution of students per grades and their scores in the tests are shown in table 6 below.

	Grade 2		Grade 4		Grade 6	
	Bilingual (n=176)	Traditional (n=392)	Bilingual (n=240)	Traditional (n=376)	Bilingual (n=310)	Traditional (n=449)
Literacy	74	63	52.6	47.2	51.5	52.9
Mathematics	80	58	61.2	64.6	62.2	63.8

Table 6: Students' scores (%) in Mathematics and literacy
Adapted from: IDEA (2008)

Grade 2 students in traditional schools had their tests in L2 French whereas those in experimental schools took them in a Senegalese local language. As shown in table 6, scores in both subjects were higher for those students receiving instruction in a familiar language. Consequently, IDEA (2008) wonders if those

³⁰ The teaching of French is articulated through divided and disseminated exercises instead of being based on learning situations and thinking tasks.

students in classical schools would have improved their marks if the language of instructions in tests had been in their L1. Apart from that, it ought to be observed that in the writing sub-test, scores were 39% for students in experimental schools and 37% for those in traditional ones. These numbers reflecting low mastery of writing skills may suggest, on the one hand, a lack of adequate material in the L1 which obstructs transfer of linguistic skills to the L2 and, on the other hand, the need to develop linguistic skills in the L1 for a better L2 acquisition.

At grades 4 and 6, all students took the literacy tests in L2 French. As shown in table 6, scores for those grade-4 participants in the experimental group (52.6%) were significantly higher than those in the control group (47.2%). One of the reasons may lie on the positive effects of academic mother tongue exposure during four years. However, at grade 6, it was the contrary and scores were slightly higher for students in traditional schools (52.9%) as compared to those in experimental projects (51.5%). This may be in agreement with Heugh (2006) and Heugh (2011b) who argued that, despite that fact that early mother tongue instruction seems to be beneficial for African learners, these diminish because the L1 linguistic skills had not rooted (see section 3.2.2), and it is especially noticeable in Senegalese bilingual programmes in which learners see their L1 losing presence at along grades.

In order to discuss grade 4 students' scores in Mathematics it should be taken into account that they are taught that content area in L2 French at grade 2. In IDEA (2008), it is explained that students in experimental schools had their tests in a local L1 whereas their mates in traditional ones took it in L2 French. Higher scores for the control group (64.6%) compared to those in the experimental group (61.2%) may suggest that one year of exposure to the L1 is not enough for students to acquire adequate mathematical CALP and transfer it to the L2. Scores in sub-tests for the experimental group may confirm that proposal: Although results for numeracy were 65.6% and for geometrics 63.9%, scores declined when a certain mastery of language comprehension was involved, in other words, in problem solving the average mark was 32%. Therefore, it could be argued that participants in the experimental group could not properly understand the language of tests and were disadvantaged because they had one less year of mathematical training with the ILWC. In other words, students in the bilingual programme could not benefit

from one year of exposure to a local language in Mathematics due to the fact that they were suddenly shifted to an L2 as MOI at grade 2. In that sense, the advantage was for students in traditional schools who had been exposed one more year to L2 French. It suggests that the need of an additive or translanguaging model in which the mother tongue is largely present throughout the whole primary education for students in order to develop the necessary skills to be transferred to an L2 and at the same time, attain biliteracy and binumeracy (see section 3.2.2).

Nonetheless, grade 4 students in traditional schools also found difficulties in problem-solving tasks (35.8%) compared to calculation (71.8%) and geometrics (59.1%) a fact which may suggest that a foreign language as MOI becomes an obstacle to these students. On the one hand, they may have been trained with problem-solving tasks during lessons which they have not understood because the language in which these were written were in a language they did not master (their score in language comprehension was 47.2%) and in a context foreign to them.

Regarding grade 6, both groups of students had their tests in L2 French. As shown by results, the difference in Mathematics between average scores was not relevant: 62.2% for participants in experimental schools and 63.8% for those in a monolingual programme, with again, a lack of L2 French mastery reflected in low scores in the problem-solving sub-tests: 49.4% and 50.3%, respectively.

With these numbers, one of the conclusions of IDEA (2008) is that differences between students in both models tend to vanish along the years; therefore, attending a mother-tongue-based programme did not represent any advantage to students. However, as already argued, the failure of that bilingual model in Senegal may hide several gaps (see above).

In fact, a second part of the IDEA (2008) reveals that there were effectively some deficiencies. A questionnaire given to 33 teachers (15 working in a bilingual programme and 18 in a mainstream school) revealed that interaction and group working was not a pedagogical strategy very much employed: It was only used by 33% of teachers in experimental schools and 50% in traditional ones; further, 73% of bilingual teachers and 89% in monolingual argued that students mainly worked individually. These numbers suggest that interaction, which is believed to be a tool for language acquisition and transfer, was scarcely adopted in the Senegalese

mother-tongue-based MLE programme. It is interesting to picture that 33% of teachers in traditional schools claimed to use the students' L1 during their lessons and only 47% in experimental schools. Therefore, is it really a mother-tongue-based MLE programme? This may confirm the reason why such programme was depicted as subtractive.

Another important aspect is the proportion of teachers who encouraged students to ask questions: 80% for teachers in bilingual schools and 61% in monolingual. IDEA (2008) claims that the difference in favour of the former was due to the language barrier. Moreover, it is added in the report that the frequent use of the mother tongue in the traditional classroom might be detrimental for the acquisition of L2 French. But what IDEA (2008) may not consider is that some students in traditional schools are not so much prepared to ask questions first, because they have difficulties to understand the content of the subject and second, their language mastery is not enough developed to ask a question because they have not rooted linguistic or academic foundations in the local L1 for transfer to L2 French (*Ministère de l'Éducation Nationale, 2008*).

According to the survey, there were other main deficiencies found in resources and support. In fact, only 1% of the teachers in experimental schools recognised that they had received an adequate training and 10% claimed that they were not receiving regular feedback and assessment. Furthermore, 12% of them claimed that manuals arrived when the academic year had already begun. Another important inconvenient to 14% of the teachers surveyed was that they were frequently conveyed to other schools. In that case, the replacing person was not sensible of the bilingual methodology and may not even master the vernacular language of the area; consequently, the L1 lesson in a mother-tongue-based MLE programme shifted to a traditional classroom in L2 French.

The non-governmental organisation Associates in Research and Education for Development (ARED) also started a mother-tongue-based MLE project in 2009 involving two Senegalese national languages: L1 Wolof and L1 Pulaar in the regions of Dakar, Kaolack and Saint Louis. In the academic year 2012-2013, the programme comprised 114 primary schools which followed the Senegalese bilingual model, that is to say, the introduction of oral L2 French at grade 1 and the presence of African

languages as MOI until grade 4. In ARED (2014) it is argued that the main issues of that model were first, teachers trained before the beginning of the academic year with the assessment of pedagogy experts and pedagogical manuals; and second, students reading and Mathematics material in their L1 ready at the beginning of the academic year. Moreover, it is claimed that strategies for transfer of literacy were used in the process of learning. Thus, in the first year, students initially learnt to read in their mother tongue while they acquired oral skills in L2 French. After, they tried to compare languages and identify those letters and sounds which were common and different. The last step consisted on making a differentiation between graphemes and their corresponding phonemes as first approaches towards biliteracy.

In order to assess the efficiency of the programme, ARED (2014) compared literacy and Mathematics scores of 828 students in the experimental model and 750 in a traditional one at grades 1, 3 and 5. The procedure consisted on a pre-test carried out at the beginning of the academic year and a post-test at the end. Instructions of tests for both groups were in L2 French. Results in the post-test show that those students receiving instruction in a familiar language had better achievements than those who were taught in the ILWC (see table 7), therefore suggesting that using a local language in Senegal contributes to enhance the academic and linguistic development of the child.

	Grade 1		Grade 3		Grade 5	
	Literacy	Numeracy	Literacy	Numeracy	Literacy	Numeracy
Experimental group	14.90	36.50	36.16	42.24	46.73	26.80
Control Group	8.90	26.10	33.8	30.20	30.10	19.50

Table 7: Scores (%) in the post-test
Adapted from: ARED (2014)

However, it can be noticed that there was no score which reached the threshold of the 50%, especially in reading skills for grade 1 students in the experimental group. ARED (2014) claims that the main cause was due to the fact

that teachers started applying transfer strategies from the L1 to the L2 too late in the academic year. Other causes were grounded on human resources (a lack of feedback from specialists to teachers and the organisation of regular workshops to learn strategies for bilingual approaches where they could speak about their methodological experiences) or material (it was not allowed that students could take their textbooks at their homes), suggesting that students did not work at home and, on the other hand, parents did not participate in their children’s process of learning. Therefore, parents were not aware about the importance of mother-tongue instruction believed that a maximum exposure to L2 French led to a better and faster acquisition.

ARED (2014) pictures another fact: The difference between the scores in the pre-tests and the post-test (see table 8). The highest rates were recorded by participants in the experimental group. For example, in literacy skills, grade-1 students in the bilingual programme had a mean score difference of 13% whereas those in the classical schools had 7.20%. In the Mathematics tests, the largest difference between the pre-test and the post-tests (10%) can be found at grade 3, with a difference between both tests of 32.80% for the experimental group and 22.80% for the control group. An interesting reason that ARED (2014) gives for students’ better results in Mathematics was that they were used to deal in their daily life with that content area, and more precisely when they had to use currency in their household duties.

	Grade 1		Grade 3		Grade 5	
	Literacy	Numeracy	Literacy	Numeracy	Literacy	Numeracy
Experimental group	13	23.20	19.60	32.80	19.40	15.50
Control Group	7.20	16.80	14.40	22.80	12	9.10

Table 8: Mean differences (%) between the pre-test and the post-test in reading comprehension and in numeracy
Adapted from: ARED (2014)

ARED (2014) claims that there were several aspects which had to be improved, starting with an increase in the participation of communities in school activities and in their children process of learning. This fact suggests Benson's (2004a) claim that, due to poverty and the link between high SES and the mastery of L2 French, parents believe that maximum exposure to the ILWC at school would help their children to have better job opportunities in their future. Therefore, a campaign to inform families was strongly necessary asking for a higher implication and a decrease in the children's household duties. ARED (2014) also requests from the government first, a deepest support in regular teachers' training sessions focused on bilingual programmes and in the mastery of both languages MOI; second, an implication from education authorities in respect to assessment and feedback to those who work in the classroom; Finally, a higher amount of printed material with the purpose that each student could individually work with it and parents could participate and learn with them. Today, ARED carries out a pilot project involving three local languages as MOI (Wolof, Pulaar and Sérère) which are MOI together with L2 French along the six grades of primary education.

In order to analyse the acceptance among population about the introduction of African languages in the Senegalese education system, Diallo, I., (2011) interviewed 404 people (69% from an urban milieu and 31% from a rural one) aged from 15 to 45 from all around the country and from different SES, cultural context and job domains. As shown by results of the questionnaire, 87% of participants expressed an interest for the establishment of local languages as MOI at schools and 11% were against that idea (the other 2% did not answer or were indifferent). The main reasons that participants gave for their responses were that teaching through a familiar language made easy the comprehension of the cognitive demands of the content area because comprehension of messages between the teacher and the student were more efficient; moreover, it would contribute to diminish illiteracy rates. People surveyed also reported that it was important for feeling one's own identity at school. Those who answered against the use of local languages claimed about the inferiority of Senegalese local languages arguing that they were only restricted to the country and that they were source of tribal division. They added that African languages as MOI at school could be detrimental because

they hindered the acquisition of L2 French and also were not prepared to be MOI to teach complex content areas. Despite this behaviour, Diallo, I. (2011) concludes that L1 instruction may benefit children's achievements at school enhancing transmission of knowledge, reinforcing cultural identity and increasing the quality of French acquisition. The author suggests that Senegal should consider all the efforts that neighbouring Sub-Saharan countries were carrying out to promote literacy and numeracy in their local languages and learn from their experiences. Diallo, I. (2011) encourages government rulers to seriously engage into projects for the introduction and spread of local languages in education.

The results described in Diallo, I. (2011) are similar to information revealed by the population surveyed in the present study. Most of the students stated that they agreed about reading and writing in L1 Sérère at school (73% [65] of those at grade-3 and 83.3% [50] at grade 6) and also about the use of L1 Sérère as a MOI (77.5% [69] of the younger and 76.7% [46] of the older), the main reason was "*pour mieux comprendre*"³¹ what was being taught. Concerning the language of tests, 80.9% (72) of grade-3 students and 90% (54) of grade-6 claimed that L1 Sérère was the best language to solve a Mathematics problem-solving task; the same was said by 74.2% (66) of learners at grade 3 and 93.3% (56) at grade 6 who preferred L1 Sérère for answering multiple-choice questions of geography and sciences, as they specified, "*parce ce que je suis sérère et le sérère est ma langue*"³². Generally speaking, most participants (76.4% [68] at grade 3 and 85% [51] at grade 6) considered that if they were taught in their mother tongue, they would obtain higher academic results (see appendix 6 for the original French version of the survey given to students and appendices 7 and 8 for its English translation and a complete overview of its results at grade 3 and at grade 6, respectively).

Regarding teachers, 92.3% (24) claimed that the use of the students' L1 in education would increase quite much academic results because, as one of them said "*pour qu'ils soient capables de transformer leur propre milieu*"³³. When asked about the language of tests, 76.9% (20) answered that students would have more

³¹ To better understand.

³² Because I am Sérère and Sérère is my language.

³³ So that they could become capable of changing their own environment.

chances to give a correct answer if questions were expressed in L1 Sérère rather than in L2 French; however, it should be mentioned that not all of them agreed with that idea: 15.4% (4) acknowledged that it would only help a little and 3.8% (1) not at all because, as one of them argued, *“il y a plusieurs ethnies au Sénégal et seul le français peut faire l'équilibre”*³⁴. Finally, 61.5% (16) claimed that the best language for students to express themselves in an exam was L1 Sérère, although 23.1% (6) preferred L2 Wolof, 3.8% (1) L2 French and 11.5% another local language (L3 Fula or L3 Bambara). The diversity of choices might be rooted on the fact that teacher participants were influenced by their own linguistic background and also, as described in section 6.3, by the different linguistic contexts of local minorities in the target area of the study (see appendix 9 for the original French version of the survey given to teachers and appendix 10 for its English translation and a complete overview of their results).

According to parents, 96.2% (25) found it useful for their children if they could learn to read and write in L1 Sérère at school. Moreover, 100% (26) believed that if the students' mother tongue was used as MOI, learners would obtain better academic results. In fact, it was affirmed by the majority of parents that the best MOI for their children to learn at school was L1 Sérère (80.8% [21]) since *“ils comprennent mieux leur langue maternelle”*³⁵. There were also different points of view and some claimed that both L1 Sérère and L2 French (7.7% [2]) were the best languages to teach because *“ils doivent comprendre le français à travers le Sérère”*³⁶; however, it should be mentioned that 7.7% (2) preferred only L2 French *“parce que c'est la langue officielle de l'état et la langue du colonisateur”*³⁷.

3.6 Summary

There are different educational models according to the presence of the students' L1 as MOI, and some of them have been established in the curricula of Sub-Saharan African schools, being the subtractive one the most widespread and that with the least expected students' outcomes. According to experts, the expected level of

³⁴ There are diverse ethnic groups in Senegal and only French can provide the balance.

³⁵ They understand better their mother tongue.

³⁶ They have to understand French from Sérère.

³⁷ Since it is the State's official language and the language of the coloniser.

proficiency that students in Sub-Saharan countries have of their L2 depends largely on the exposure to their L1. It should be considered that students attending models in which the students' L1 is only present during 1 or 3 school grades, such as the early-exit programme, initial positive effects might be noticed on their achievement, but these gradually vanish since there is an abrupt shift to the L2 as MOI before linguistic and academic abilities could be fixed.

The positive effects that instruction through the students' L1 can have are not only academic, but they are also social since it may lead to economic earning and development. More precisely, the use of local African languages in education might be of especial advantage to the female population, thus counterbalancing the social effects of the Sub-Saharan society on their academic results. It is believed that the use of the females' L1 within the classroom could engage them more actively in the learning process and increase their self-esteem in order to diminish grade repetition and school abandonment.

Cummins' (1979a) ideas of the Threshold and Interdependence Hypothesis are of relevant concern in the education of young learners in Sub-Saharan Africa. The researcher argued that the level of proficiency that students had of their L1 at the moment that they start learning an L2 is essential in order to acquire that language because all linguistic and academic abilities are transferred. In Sub-Saharan submersion programmes children have not the opportunity to develop linguistic and academic abilities in their L1 and, as a result, their level of L2 is poor.

In order to design scaffolding tasks to promote the transfer of linguistic and academic skills from the students' L1 to the L2, Cummins (1982) established a matrix taking into account two types of language proficiency (Basic Interpersonal Communicative Skills or BICS and Cognitive/Academic Language Proficiency or CALP) and therefore establishing three quadrants with a different level of academic and linguistic demand. Taking into account the relevance of the students' socio-cultural context, Cummins' matrix is adapted in the present study to the Sub-Saharan reality and considered in order to design the tests.

Different mother-tongue-based MLE pilot projects which have prospered or not, have been carried out in some developing countries where different local vernacular languages are L1 to children but where only a foreign European language

has the status of official, among them, in Senegal. These pilot projects have different points in common. Apart from considering the students L1 as MOI, these mother-tongue-based MLE programmes take into account the importance of the students' socio-cultural background in the design of material for an effective learning. An adequate teachers' training is also essential in order to learn teaching strategies for the transfer of linguistic abilities and academic content and meet in regular workshops with the purpose of discussing the difficulties they may face. Finally, the fact that students learn in their L1 can allow parents to participate in the learning process of their children. But, without the support of their respective government, the prospering of mother-tongue-based MLE pilot projects and their spread to the whole country seems almost impossible.

In the next chapter, the focus is mainly on Senegal, the target country of the present dissertation. After a brief description of the socio-linguistic situation of the country, the focus is set on its education system. Quantity indicators gathered from the UNESCO Institute for Statistics such as enrolment, grade repetition and dropout from 1996 to 2015 (if data available) are presented first; then, they are matched to quality through an explanation of indicators, for instance, data from primary students' success at the national test or different assessments of the education system.

4. SENEGAL: LANGUAGE, SOCIETY AND EDUCATION

4.1 Introduction

This chapter is a presentation of the socio-linguistic and academic situation in Senegal, the country where the current study focuses, and a deep analysis of some data on education gathered from UNESCO Institute for Statistics.

First, there is a brief description of some population features and the country's linguistic background (section 4.2). It is followed by an introduction to the education system and the presentation of some interesting data comparing Senegal to other Sub-Saharan countries in which African languages are MOI in education (section 4.3). However, the main point of chapter 4 aims at picturing a close examination of the Senegalese primary education by contrasting quantity indicators with quality indicators. The former is based on data from the UNESCO Institute for Statistics on the gross-enrolment ratio³⁸, the net-enrolment ratio³⁹, the number of out-of-school children, the number of grade repeaters, the number of children who abandon their studies and those who reach the last grade of the stage. Quality indicators are the results in the national exam at the end of primary as well as assessments of the system in different grades (section 4.5). Despite the fact that the current study focusses on that stage, and in order to have a wider idea of Senegalese children's academic path through the whole system (especially girls), I thought important to have a brief overview of the previous stage, pre-primary (section 4.4), and the following, lower-secondary (section 4.6).

Thus, the goal this chapter is to try to identify if attempts made by the Senegalese State to reach the *Millennium Development Goals* and the *Education for All* objectives really attain students from a qualitative aspect (section 2.5). That is to say, do all children attend their lesson? If so, are language and content barriers at school for them? Do they really learn what they are taught? Is there any difference

³⁸ According to the UNESCO Institute for Statistics, the gross-enrolment ratio corresponds to the "number of students enrolled in a given level of education, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education" (<http://data.uis.unesco.org/#>).

³⁹ The UNESCO Institute for Statistics defines the net-enrolment ratio as the "total number of students in the theoretical age group for a given level of education enrolled in that level, expressed as a percentage of the total population in that age group " (<http://data.uis.unesco.org/#>).

between genders in school attendance and in academic achievement? And between children settled in an urban or in a rural environment? It might seem that efforts are not completely efficient because they do not acquire adequate L2 French skills for academic success.

4.2 Senegal: A portray

Senegal is a Sub-Saharan country located in the west of the African continent which counted in 2013 a population of 13,508,715 inhabitants (ANSD, 2014). According to the UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>), in 2011, the number of people below the poverty line of 1.90 Dollars in the Sub-Saharan country was 38%. Data also reveal that, in 2015, there was a 57.67% of the population at 15 years of age or older who could read or write: 69.72% of males and 46.57% females were literate.

This country can be said to be linguistically rich because there are 38 local languages (Ethnologue, 2015), some of them in danger of disappearing (Badyra or Mlomp) and some others, like Wolof or Pulaar, which are “trans-national” (Diallo, Y. S., 2006: 129), that is to say, spoken in different neighbouring countries.

After its independence from France in 1960, the Senegalese Constitution of 1959 established in its first Article the language of the coloniser (French) as official. Some years later, the President of the Republic, Léopold Sédar Senghor, declared in the Decree 71-566 of 1971 that, close to French as official language, there were six other main local ones which were given the status of *langue nationale*⁴⁰, hierarchically equal among them: Diola (also Jola or Joola), Pulaar (also Pular, Peul or Fula), Malinké (also Maninka), Sérère (also Sereer or Seereer), Soninké (or Soninke) and Wolof. It was in the Senegalese Constitution of January 2001 that the list of languages with the status of national increased after Article 1 declared that “*la langue officielle de la République du Sénégal est le français. Les langues nationales sont le Diola, le Malinké, le Pular, le Sérère, le Soninké, le Wolof et toute autre langue qui sera codifié*”⁴¹ (Fall, I. M., 2007). Consequently, according to the

⁴⁰ National language.

⁴¹The official language in the Republic of Senegal is French. The national languages are Diola, Malinké, Pular, Sérère, Soninké, Wolof and any other codified language.

Ministère de l'Éducation Nationale (2008), there are seventeen more African languages considered national (see appendix 11). Although Bamgbose (2011) asserts that the notion of national is only symbolic because local languages have not any real use in administration, an action towards a higher recognition happened in December 2014 when a new law allowed that all national languages could be used in the Senegalese National Assembly (Radio France Internationale, 2014).

According to Cisse (2011), the most widespread local language in Senegal is Wolof, spoken as mother tongue by 44% of the population. It is followed by Fula which is L1 to 23% of citizens. Then Sérère comes with 14% of speakers, after Diola (5.5%) and the languages of Mandingo group (6.2%) which includes Malinké and Soninké. The special case of Wolof should be taken into consideration. Sarr (2014) argues that due to a national feeling against the colonial power and its influence after independence, Wolof (largely spoken in urban areas) was adopted after a feeling of national personality and representative of a Senegalese State. Thus, the author adds, people from other ethnic groups lost their old ethnic language and adopted Wolof as their new identity. Therefore, among other socio-economic reasons such as the creation of the railway and the expansion of the peanut production during colonial times or the different ethnic migrations and the development of local market trading in big cities, that language spread in the country as national vernacular language under the so called process of *wolofisation* (Sarr and Thiaw, 2012). Wolof has increased its number of speakers in detriment of other local languages and has become familiar to 80% of the inhabitants (Diallo, I., 2005); this phenomenon is identified by Faye (2013) as *glottophagy*. As a matter of fact, Wolof has gained some privileges compared to the other national languages due to the fact that it was the first codified language in 1971 and nowadays it occupies a large space in the media together with French. Today, Wolof is especially main vernacular language in the urban trading sphere.

Brodal (2009) claims that another fact which has contributed to the supremacy of Wolof is its entrance in the political domain in 2000, the moment when it was used by the president of the country to address to the population together with French. As a matter of fact, as Brodal (2009) and Fall, M. (2014) argue, there were many citizens, especially those migrating to Dakar, who

abandoned the heritage ethnic language of their relatives since it was perceived as inferior and adopted Wolof as language of communication within and outside the family context. This social phenomenon is described by Sarr (2014: 97) as “a threat to the development of coexisting linguistic minorities”. In fact, the author argues that the number of speakers of other local languages have significantly decreased, even for those which have the status of *national*. For instance, it is estimated that 39.74% of people belonging to the Sérère ethnic group have broken off with their language and have embraced Wolof as L1 (Sarr, 2014). The author, who carried out interviews and questionnaires to 85 university students, concluded that although French is the language of higher studies and represents international communication and modernity and higher status, Wolof is widely used in the informal ambit even by those students who have another local language as L1.

The multilinguistic situation in Senegal has originated a hierarchical pyramid of languages similar to the case of India (see section 3.5.2). Brodal (2009), Skattum (2009) and Faye (2013) make reference to Calvet’s (1999: 47) term of “*diglossie enchâssé*”⁴² to describe the phenomenon in developing countries by which a European language is used in the official domain but it is closely followed by a local vernacular privileged language which threatens other ethnic languages. Thus, as Faye (2013) points out, French is at the topmost of the pyramid; it keeps down Wolof which, at the same time, oppresses the other national languages, for instance Sérère, which are codified and are vernacular languages in wider regions of the county. These pull down minor local languages which do not have the privilege of having a script.

4.3 The education system in Senegal

Many former colonies established in their schools an education system brought by the coloniser (Hamidou et al., 2010), and such was the case in Senegal: France brought its school organisation in 1817 (Diallo, I., 2005; Diallo, I., 2011). Therefore, the European country took control of an education system and its curricula with French language officially recognised as unique MOI and with French culture as the main principle, a fact that was “destined to assimilate Africans, while suppressing

⁴² Embedded diglossia.

their languages and cultures” (Diallo, I., 2011: 208). The author adds that colonisers persuaded local inhabitants that first, African languages had an inferior condition and that they could not be used to transmit knowledge concerning science or philosophy.

Moreover, it was said that during colonial times, the linguistic diversity in the country could generate conflict between ethnic groups (Diallo, I., 2011; Liddicoat and Curnow, 2014). The purpose of the French colonisers was to create through formal education a group of people who spoke French as L1 and who occupied the high positions of society; these citizens would rule the country and France would ensure a link between the African and the European countries (Ndiaye, R.N., 2012). According to the author, after its independence, the main funds for education that Senegal obtained came from the coloniser, a fact which meant the control of France over the whole education system of the Sub-Saharan state; the result was a curriculum not adapted to the real context of the African children who are taught in a language foreign to them.

In the PDEF reform of the Senegalese education syllabus in the year 2000 (see section 2.5), French was regarded as the unique MOI despite the fact that the law on education 91-22 of February 1991 states in Article 6 that *“L’éducation nationale est sénégalaise et africaine développant l’enseignement des langues nationales, instruments privilégiés pour donner aux enseignants un contact vivant avec leur culture et les enraciner dans leur histoire”*⁴³ (Recueil de Textes Relatifs aux Droits de Enfants au Sénégal, 1991). According to Article 2 of that same law, instruction should adapt to the requirements of learners in agreement with the methodology used, the content taught and the final objective of academic success. This fact is not very much put into practice since, as explained in section 2.2, in most cases, Sub-Saharan students are taught from the first course of primary in a foreign language, within a context unknown to them and under a teacher-centred methodology by which students learn to read by relating a letter or group of letters to a phoneme and by memorizing and copying from the blackboard.

As stated in UNESCO (2010-2011), the Senegalese formal education system

⁴³ National education is Senegalese and African developing the instruction of national languages, privileged tools to offer learners a living contact with their culture and to root them in their history.

consists of four stages: The *éducation préscolaire* or *maternelle*⁴⁴, a non-compulsory period of three years where attend 3 to 5-year-old children; after that comes the *enseignement élémentaire*⁴⁵, a compulsory period for students aged 7 to 12, although those students who previously were schooled in the pre-primary may enter at the age of 6; the next is *école secondaire*⁴⁶, a stage where study teenagers at the age of 13 to 19, but it is only compulsory until they are 16 years old; finally, those families with economic possibilities may send their children to *études supérieures*⁴⁷, or in other words, at university.

According to Montgomery and Hewett (2005), finding over-aged students in the Senegalese education system is very common due to late enrolment and grade repetition; in fact, the researchers found out that among participants of a survey, 40% were older than the supposed primary schooling age attendance, that is, they were between 13 and 19 years old.

It is here essential to mention that the unique language MOI at formal compulsory education in Senegal is L2 French (Diallo, I., 2011). The only exception is pre-primary education when instruction may start in a local vernacular language of a specific area where the school is settled. However, as soon as the second year, when children are 4 years old, L2 French is introduced as the main language of communication between the teacher and the learner (UNESCO 2010-2011).

The secondary stage is subdivided into two subsections. The first is a compulsory period of four years or *Enseignement Moyen*⁴⁸ until the student is 16 years. The second is not compulsory and is a three-year period which prepares and specialises students for university studies according to a scientific, social or linguistic choice of the learner. Each stage prior to higher education has got a specific education centre and is subdivided into different sections (see table 9).

When the last grade of each stage has been completed and in order to have access to the next cycle, students have to sit a national standard exam. Thus, at the end of primary education, students take the *Certificat de Fin d'Études*

⁴⁴ Nursery school.

⁴⁵ Primary school.

⁴⁶ Secondary school.

⁴⁷ Higher studies.

⁴⁸ Medium studies.

*Élémentaires*⁴⁹ or CFEE, then the *Brevet de Fin d'Études Moyennes*⁵⁰ or BFEM once they have completed grade 10; finally, at the end of grade 3, those who wish to enter university have to pass the *Baccalauréat*⁵¹.

Stage	Section	Grade	Age	Education centre	Requisite	
Précolaire (nursery school)	Petite		3	École maternelle	Non-compulsory	
	Grande		4			
	Moyenne		5			
Enseignement élémentaire (Primary school)	Cours d'initiation (CI)	1	(6) 7	École primaire	Compulsory	
	Cours préparatoire (CP)	2	8			
	Cours élémentaire 1ère année (CE1)	3	9			
	Cours élémentaire 2ème année (CE2)	4	10			
	Cours moyen 1ère année (CM1)	5	11			
	Cours moyen 2ème année (CM2)	6	12			
École secondaire (Secondary school)	Enseignement Moyen	Sixième	7	13	Collège d'éducation moyenne (CEM)	Compulsory
		Cinquième	8	14		
		Quatrième	9	15		
		Troisième	10	16		
	Enseignement secondaire général et technique	Deuxième	11	17	Lycée	Non-compulsory
		Première	12	18		
		Terminale	13	19		

Table 9: Organisation of the education system in Senegal
Adapted from: UNESCO (2010-2011)

⁴⁹ Certificate at the End of Elementary Studies.

⁵⁰ Certificate at the End on Medium Studies.

⁵¹ Baccalaureate.

4.4 A review of non-compulsory pre-primary education

Before dealing specifically with primary education, it is noteworthy to picture the previous schooling period to have an overview of general features of students who enter grade 1. Participation in pre-primary education has experienced an increasing number of students each year although it still remains low. According to the UNESCO Institute for Statistics, the gross-enrolment ratio in 1996 was 2.29% of the children in the country between 3 and 5 years of age, and 15.37% in 2014 (see figure 4 and table 55 in appendix 12) with a higher number of female students (16.31%) than males (14.45%), a tendency that seems to be repeated along the years. Although the population of children receiving instruction previous to compulsory education is increasing at a high rate, the average number of children supposed to receive instruction previous to compulsory education is small: 15.37% on average in 2014. Data from the UNESCO Institute of Statistics also reveal that attendance rate in pre-primary education in Senegal was below the average of Sub-Saharan countries: 19.8% that same year.

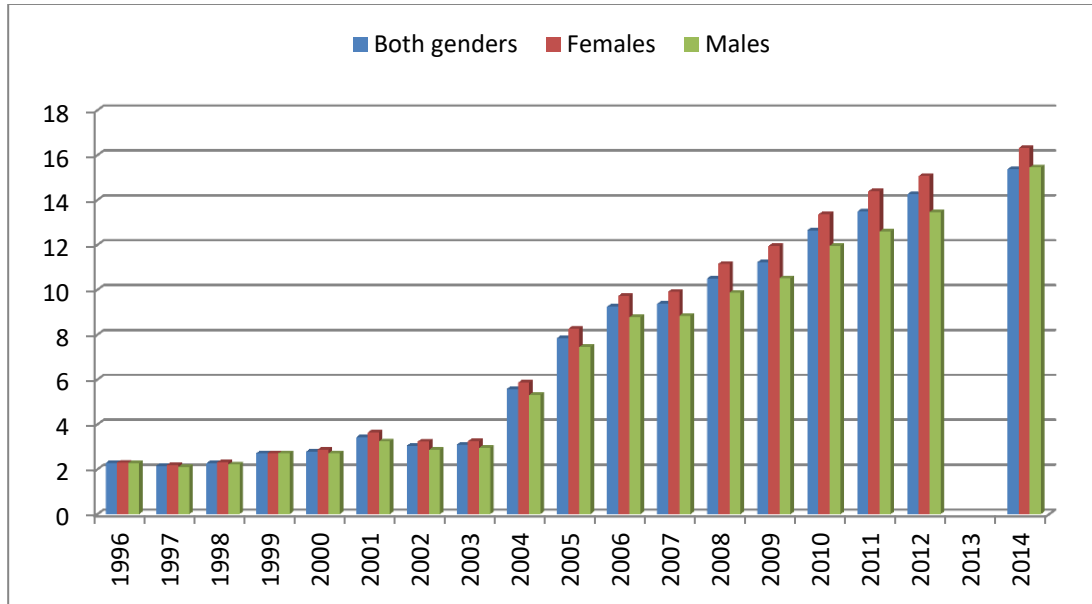


Figure 4: Gross-enrolment ratio in pre-primary education
Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

4.5 Primary education: Quantity and quality indicators⁵²

In order to have an overview of the quality of education in Senegal, different variables are analysed from 1996 (four years before the implementation of PDEF) to 2015 (if data from the UNESCO Institute of Statistics was available) in primary education: Gross-enrolment and net-enrolment ratios, out-of-school children, grade repeaters, and finally dropout and survival to the last grade of primary education. After that, quantity indicators are contrasted with children's achievements in the standard national tests at end of the cycle (CFEE) and with assessments measuring literacy and numeracy such as SNERS⁵³ (see section 4.7) and the *Programme d'Analyse des Systèmes Éducatifs de la CONFEMEN*⁵⁴ (Programme for the Analysis of Education systems in the CONFEMEN) (PASEC), a study carried out in several African French speaking countries. This information has been complemented with data from the study called Jangandoo (2013), an assessment which gives a general overview of the condition of the whole education system in the Sub-Saharan country.

4.5.1 Enrolment and out-of-school children

Primary education is the first compulsory cycle in Senegal. It recruits children from 7 (or 6 if they attended pre-primary education) to 12 years of age. As shown in figure 5 (see table 56 in appendix 12), the gross-enrolment ratio, the net-enrolment ratio and the percentage of those children who have never frequented school from 1996 to 2015 experienced an evolution: There was an increase of 21.58% of learners enrolled at primary school from 1996 (59.30%) until 2015 (82.17%) and an important reduction of 23.27% in the number of those children out-of-school. However, if the amount of students who did not attend school in 1996 was 50.28%, in 2015 this number decreased to 27.01%, that is to say, there were still 649,942

⁵² According to Niang (2014), rates of grade repetition, dropout and cycle completion represent quality indicators in education. Moreover, in the present study, enrolment and out-of-school rates are considered quantity indicators.

⁵³ In section 3.5.4, I deal with the part of SNERS IV which analyses the experimental projects concerning the introduction of a local language as MOI at grade 4. In section 4.7, I present from that same report the assessments of the traditional monolingual school at grades 2 and 6 followed by data from SNERS V.

⁵⁴ CONFEMEN or *Conférence des Ministres de l'Éducation des États et Gouvernements de la Francophonie* (Conference of Education Ministries from States and Governments of the Francophonie).

children in Senegal who were not schooled. It should also be mentioned that in 1996, the amount of students in schooling age who did not frequent any school (50.28%) was higher than the net-enrolment rate or percentage of those who attended a classroom according to their corresponding age (49.72%), but this tendency immediately changed. Moreover, a regular difference can be noticed from the data gathered between the gross-enrolment ratio and the net-enrolment ratio, suggesting that there was a percentage of students whose age does not correspond to the official one for the level due to grade repetition or over-aged enrolment.

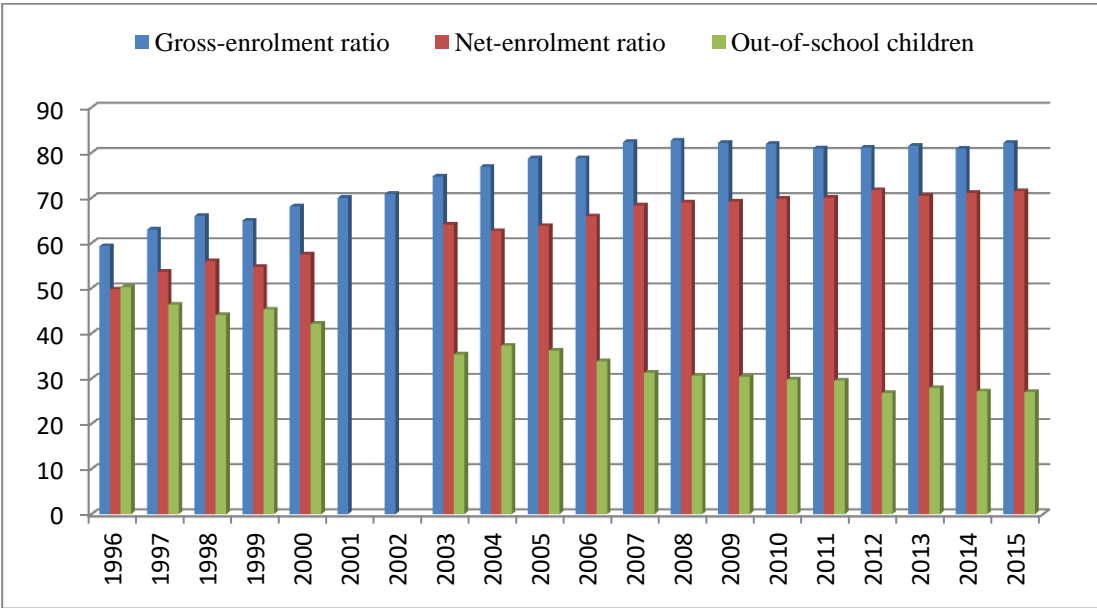


Figure 5: Enrolment in primary education
 Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

Two of the causes for formal education to be accessible to a higher number of students were the regular increase in the number of schools in the country and the consequent decrease in the pupil-teacher ratio. This fact happened after an agreement which, according to Hamidou et al. (2010), was concluded by several Sub-Saharan countries in Adis Ababa in 1961 to fix the goal of 80% of children enrolment by 1980 (according to the UNESCO Institute for Statistics [<http://data.uis.unesco.org/Index.aspx>], the gross-enrolment ratio for that same year was 43.19%). Later, in order to achieve the *Millennium Development Goals* and *Education for All's* objectives, these agreements were ratified in Dakar in 2000.

Thus, as the Senegalese *Ministère de l'Éducation Nationale*⁵⁵ (2000; 2011-2012) explains, the 2,458 education centres for primary education which existed in the school year 1990-1991 with a ratio of 57.6 students per teacher was expanded to 8,812 in 2012-2013 with 31.7 learners per educator, that is to say, there was an increase of 258.5% of schools built around the country (see table 10). Although these efforts from the side of the government may suggest that the PDEF has advantaged the Senegalese education system and that the reduction in the number of out-of-school children is important, there were still 649,942 young learners in 2015 without access to primary education (UNESCO Institute for Statistics [<http://data.uis.unesco.org/Index.aspx>]).

	1990/1991	1999/2000	2011/2012	Evolution (%)
Public	2,267	4,338	7,801	244.11
Private	191	423	1,011	429.31
Total	2,458	4,751	8,812	258.5

Table 10: Number of primary schools in Senegal
Adapted from: *Ministère de l'Éducation Nationale* (2000; 2011-2012)

The fact that primary schools were built around the country and reached rural areas benefited female attendance. At this point, it is interesting to picture the evolution of the gross-enrolment ratio in primary education taking into account genders. As shown in figure 6 (see table 57 in appendix 12), the number of children enrolled at primary schools according to the total amount of children at the age of being schooled increased. Until 2006 there was a difference between genders in school enrolment. For instance, in 1996 there were 13.41% more males than females who were enrolled in an academic centre. However, in 2008 that tendency reversed and in 2014, there were 84.31% of the total females and 77.52% of the total males were registered in Senegalese schools. In fact, according to the UNESCO Institute of Statistics, the gender parity index for the gross-enrolment ratio at

⁵⁵ National Ministry of Education.

Senegalese schools experienced a positive evolution from .80 points in 1996 to 1.09 points in 2014.

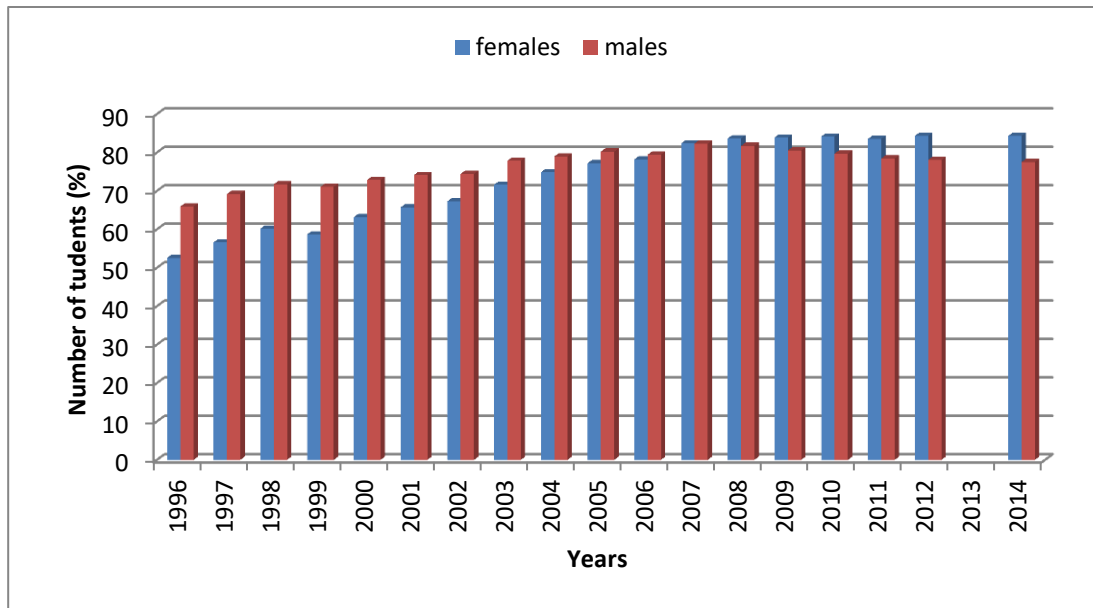


Figure 6: Female and male gross-enrolment ratio
Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

4.5.2 Grade repetition: One step towards dropout

Ndaruhutse, Brannelly, Latham and Penson (2008) define grade repetition as the procedure by which students have to retake an academic year because contents have not been sufficiently acquired. The authors argue that one of the main causes for repeating a school year in Sub-Saharan Africa is non-attendance and therefore, missing their lessons. The reasons why students do not regularly attend school might be related to different factors. According to Ndaruhutse et al. (2008), a long distance from the school added to family expenditures are among the main causes: If children retake a grade, it means that they have to buy new clothes, school material and pay transport. Consequently, parents adopt a position of hopelessness towards academic education and prefer to keep their children at home participating in the economy of the household such as taking part in agricultural works, taking care of younger brothers or, in urban areas, begging for charity. Moreover, the researchers claim that this feeling of families is stronger if they see that their failing children have to attend a system of secondary education which does not offer quality. Another reason that Ndaruhutse et al. (2008) explain for students to miss

lessons in a regular basis is the language MOI. The fact that students are taught in a language different than the one used at home and therefore parents cannot give academic support to their children. Furthermore, the authors denounce the inefficiency of the curricula when a language foreign to the student is used in primary education as MOI. Therefore, if grade repetition is linked to students' academic achievements and children "can only learn what they understand" (Ndaruhutse et al., 2008: 40), a mother-tongue-based MLE programme would not only help students to succeed in school but also motivate families who may see their children engaged in school duties and opening a pathway towards a future job.

In the case of Senegal, grade repetition rates in primary education have experienced a decrease along the last years maybe due to the government's objective to reach the *Millennium Development Goals* and *Education for All*. As shown in figure 7 (see table 58 in appendix 12), the percentage of grade repeaters for both genders lessened from 1996 (13.95%) to 2012 (3.42%), maybe because the establishment of the new methodological approach PDEF (see section 4.3). Ndaruhutse et al. (2008) argue that grade repetition leading to dropout tends to occur more often in a poor rural backgrounds and especially affecting the female population. As suggested by data form the UNESCO Institute of Statistics, in 1996 the number of female grade repeaters (13.97%) was slightly higher than that of men (13.94%). Nonetheless, this tendency soon reversed and, for instance in 2007, there were 31% more males retaking a grade than females. This fact is in accordance with Benson (2001a) asserting that females' attendance until grade 4 is higher than males' due to the fact that their aptitude to language is higher.

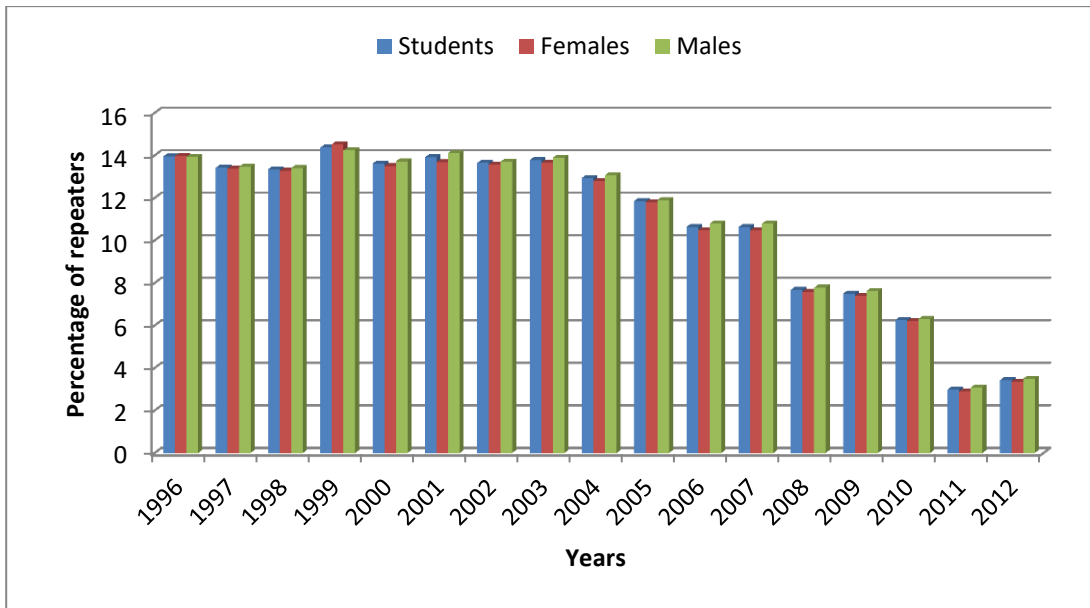


Figure 7: Percentage of grade repeaters in primary education
 Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

The number of grade repeaters can also be analysed in the different grades of primary education: There were increasing numbers of repeaters alongside grades in one same year, with the exception 2011 and 2012 when the highest number of repeaters appeared at grade 4 (see figure 8 and table 59 in appendix 12). Numbers in the year 2000 can be an example: There were 8.93% of repeaters at grade 1 gradually rising to 28.30% at grade 6. Bearing in mind this phenomenon, the fact that there were more children enrolled in the same year for a second (or further) time as grades increased, may lead to conclusions towards the type of language used as MOI and in tests.

In the report PASEC (2007), grade repetition is seen as a major cause of dropout in Sub-Saharan Africa and therefore, not considered a solution for the enhancement of students' achievement because grade repeaters are those students with higher difficulties in academic performance. In other words, although they have probably not acquired the essential linguistic abilities in the L2, retaking the same grade again can be more demotivating than encouraging for them because the system does not consider any other solution to heighten L2 proficiency but maximum exposure to L2 French.

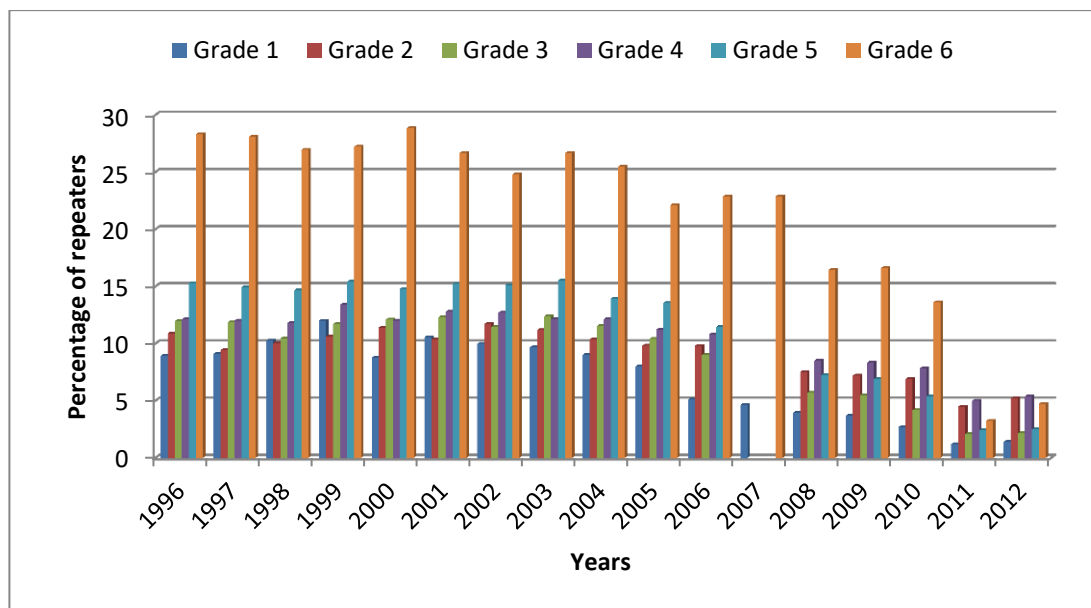


Figure 8: Percentage of repeaters in grades 1 to 6
 Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

Bearing in mind these numbers as well as the argument that grade repetition leads to demotivation on the side of the students and a consequent dropout, the question is whether the use of a language familiar to students to counterbalance demotivation should be suggested. That is to say, can a local L1 in education be a tool to increment interaction and student-centred approaches for acquisition of linguistic and cognitive abilities and transfer them to L2 French?

With the purpose of discerning if grade repetition was beneficial for young Senegalese learners, the *Ministère de l'Éducation Nationale* and the CONFEMEN (2004) followed a generation of 1,975 students at grade 2 (1,299 in an urban setting and 676 in a rural environment) along five academic years from 1995 to 2000. In the last grade of primary cycle, only 20% of the students completed primary education without repeating and 36% abandoned school prematurely. It was suggested in the research that grade repetition was the main cause of dropout. In fact, *Ministère de l'Éducation Nationale* and CONFEMEN (2004) argue that, in Senegal, about 42% of those students who repeated a grade once and 62% of those who repeated several times abandon their studies.

Taking into account those numbers which suggest academic failure, it is affirmed in the *Ministère de l'Éducation Nationale* and CONFEMEN's (2004) study that 28% of students with low scores may be capable of succeeding. The question

here might seem related to a question of language and identity: Might demotivation be caused by a lack of proficiency in L2 French added to a feeling of cultural marginalisation in the school context be one of the reasons for repeating a grade? (see section 2.4.1). Among others, one possible solution suggested by the *Ministère de l'Éducation Nationale* and CONFEMEN's (2004) is a closer approach adapted to the personal needs of those students with higher difficulties. Here the question is if mother tongue as MOI together with strategies for the transfer of linguistic skills and academic content could be included in that individual programme as a way to help grade repeaters.

One of the arguments at which the report points out was a general claim from educators who said that one of the reason for students to retake a grade is that "*la bonne maîtrise des connaissances des enseignées à l'étape n est nécessaire pour acquérir les connaissances de l'étape n+1*"⁵⁶ (*Ministère de l'Éducation Nationale* and CONFEMEN, 2004: 18). Taking into account the high rates of school abandonment (see above), there was a high percentage of students who could not reach the required knowledge and linguistic abilities in order to advance to a higher grade perhaps due to the language barrier (see section 2.2). Consequently, as the *Ministère de l'Éducation Nationale* and CONFEMEN (2004) argue, successive failure among learners forces parents to adopt the decision of keeping their children working in the economy of the family. It should be said here that grade repetition is one of the causes of essential expenses in families: According to *Ministère de l'Éducation Nationale* and CONFEMEN (2004), only grade repetition in primary education caused between 5 and 6 billion Francs CFA⁵⁷, possibly an important amount to start a quality mother-tongue-based MLE project.

4.5.3 Dropout and cycle completion

Cumulative dropout rate is the proportion of students of a generation who started in the first grade of a target cycle and abandoned their studies alongside. As shown in figure 9 (see table 60 in appendix 12), the percentage of cumulative dropout rate

⁵⁶ The mastery of knowledge at grade n is necessary for acquiring the knowledge at grade n+1.

⁵⁷ 7,633,588 and 9,160,305 Euros, respectively (1 Euro = 655.97 *Francs de la Communauté Financière en Afrique* [CFA]).

in primary education in Senegal maintained high alongside the years despite the fact that it is a compulsory stage.

Data also shows that the amount of female students renouncing to education was 13.33% higher than men in 1997, but that tendency changed and, in 2011, there were 4.77% more men giving up studies. It should be mentioned that the initial trend in 1997 towards diminishing the number of dropout rates experiences a new increase in 2004 and stagnation. Do these high numbers representing school abandonment reflect psychological demotivation because students feel their language and their cultural identity pushed away in the school environment? Could dropout rates be reduced if a general mother-tongue-based MLE programme was implemented in the country so students could see their cultural environment and their language embedded in the academic context?

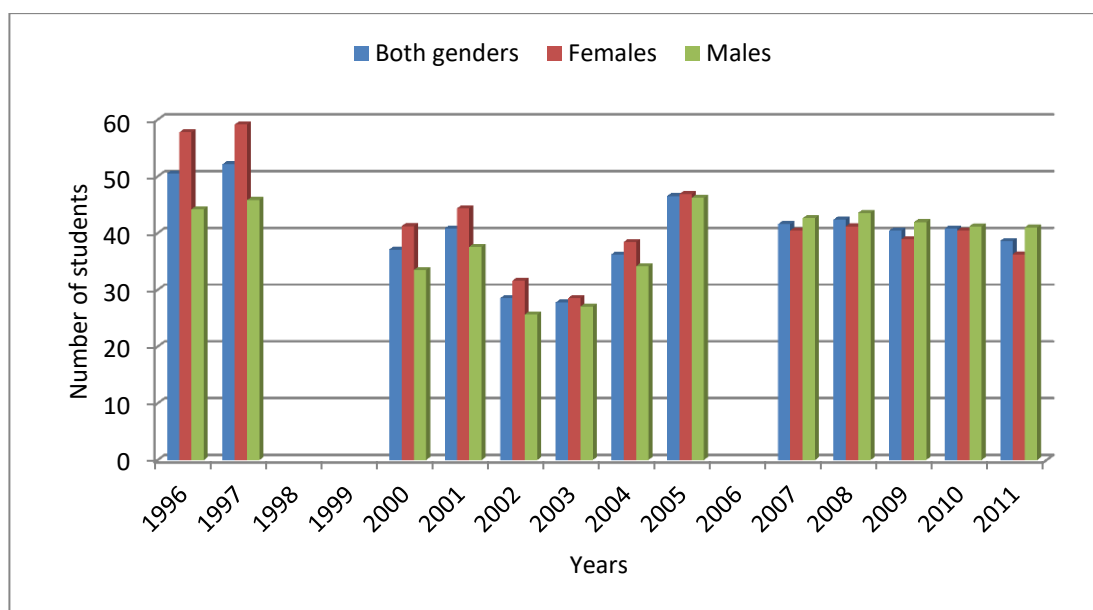


Figure 9: Percentage of cumulative dropout rate in primary education
Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

In figure 10 (see table 61 in appendix 12), it is represented the number of students who reached the last grade of primary education. It is interesting to mention that the big efforts of the education system to reach the *Millennium Declaration Goals* and *Education for All* are reflected in the raise of students completing primary education until 2003 (72.21%). However, in the following year,

a new decline started until 2007 with a slight and gradual increase. Regarding the difference between genders, in 1997 there were 13.33% more boys succeeding at school. That tendency was maintained until 2005, when that gender disparity started to lessen and in 2007, there were 4.77% more females than males who finished primary education.

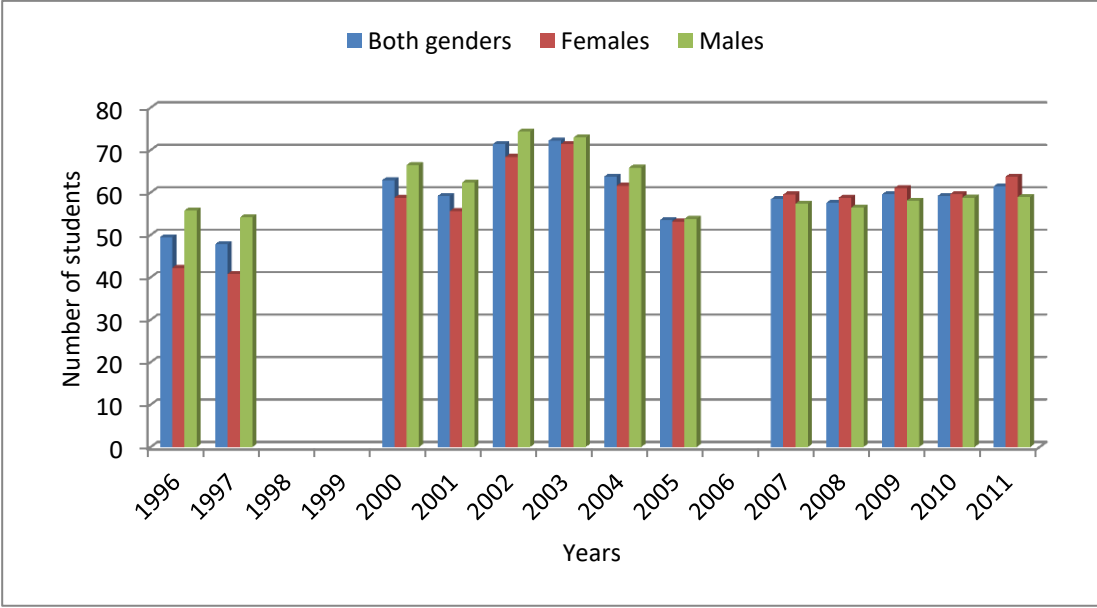


Figure 10: Percentage of students who have completed primary education
Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

As a consequence, the number of children out-of-school decreased substantially along the years, the dropout rate diminished and the number of grade repeaters lessened. However, there is much effort to do because, as explained in IDEA (2008), the numbers are still far from reaching the international objectives.

4.6 What after primary? A brief outlook at lower secondary education

In order to have a more complete overview of the evolution of students throughout the Senegalese education system, and especially that of girls, it is meaningful to discuss data about lower secondary education also gathered from the UNESCO Institute of Statistics. Despite the fact that the gross-enrolment rate increased a 22.3% from 1996 (17.56%) to 2008 (39.86%), it represents a small proportion of teenagers enrolled (see figure 11 and table 62 in appendix 12). Taking into account that, according to the UNESCO Institute of Statistics, in 2007 there were 58.42% of

students enrolled at grade 6, there were 18.56% of Senegalese students in 2008 who did not continue secondary studies despite the fact that it was compulsory education.

The World Bank (2008) argues that this phenomenon is generalised in Sub-Saharan Africa, especially in French-speaking states. There are different academic and social reasons for low enrolment numbers in Sub-Saharan countries, for instance the low quality of education and the reduced economic circumstances of families which require children to collaborate in the economy of the family or in the household, particularly for females (The World Bank, 2008). It should be noticed that, different from primary education, the number of females enrolled in lower secondary education was much smaller than that of males. For instance, there were only 13.58% of girls and 21.49% of boys enrolled in school in 1996; it was 36.07% and 43.61% in 2008, respectively. As it can be seen, there was a regular difference of approximately 7% between genders along the years.

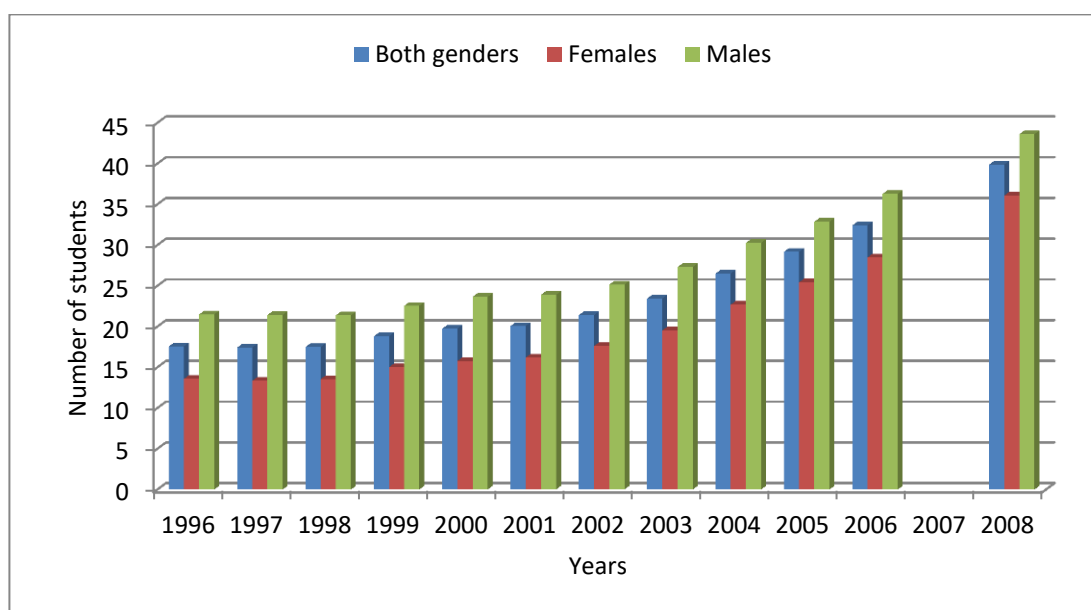


Figure 11: Gross-enrolment ratio in lower secondary education
Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

Concerning grade repetition (see figure 12 and table 63 in appendix 12), there was a minor difference in the number of grade repeaters between males and females. However, until 2008, the amount of females who took twice a grade was

slightly higher than that of males. From the following year, this tendency changed and proportions were quite similar for both genders.

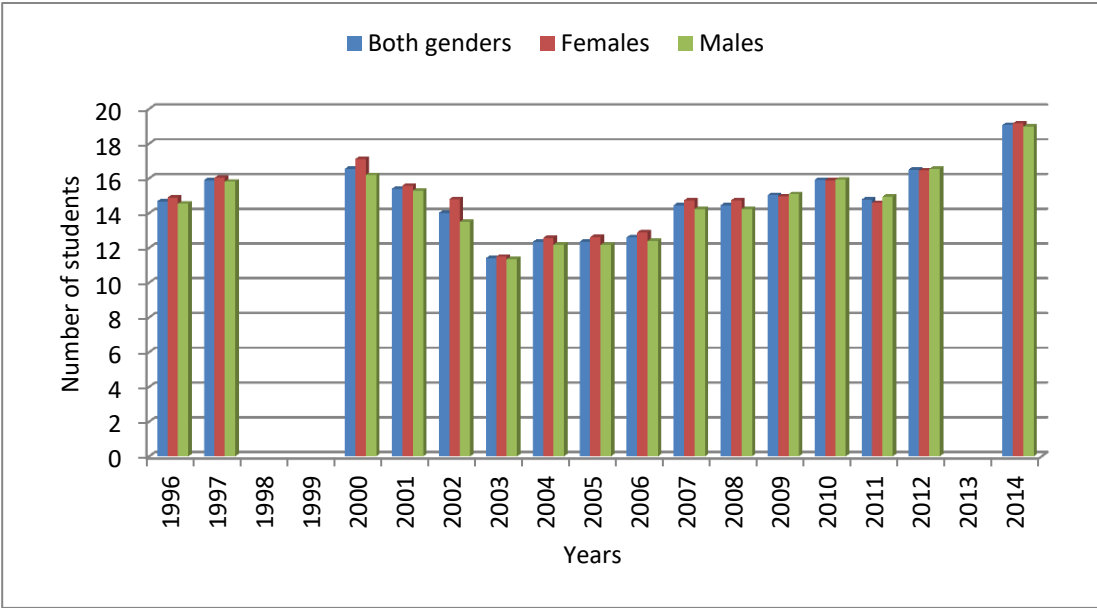


Figure 12: Percentage of grade repeaters in lower secondary education
 Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

Similar to primary education, the PDEF had positive effects on teenagers' education. First, lower secondary education has seen a decrease in the number of students who abandoned their studies from 1996 to 2003. However, from that year on, despite some oscillations, the percentage of dropout increased in 9.58% points until 2011. Second, it is also discernible that the dropout rate difference between males and females changed its tendency: From the year 2000, more males abandoned their studies than females, a phenomenon which might be explained by a tendency of young male teenagers who believe the army to be an opportunity (UNESCO, 2011). Also, The World Bank (2008) claims that those young Senegalese teenagers who feel demotivated in their studies and consequently abandon school are forced to find a job in a society where the number of citizens is gradually increasing and where the unemployment rate is high. Since Brock-Utne (2014) and Brock-Utne (2016) argue that there is not any secondary school in the whole Sub-Saharan Africa that uses a local language as MOI, perhaps the use of the students'

L1 on in early education may appear as a possible solution to motivate teenagers and increase their ambitions for the future (see section 3.3).

4.7 Does quality reach quantity? The language factor

The Senegalese Law 91-22, in its Article 11, makes reference to efficiency in education and declares that primary education is the period at school which should help students get hold of “*la maîtrise des éléments de base de la pensée logique et mathématique, ainsi que celle des instruments de l’expression et de la communication*”⁵⁸ (*Recueil de Textes Relatifs aux Droits de Enfants au Sénégal*, 1991: 6). However, data obtained from *Inspections de l’Éducation et de la Formation de Bakel*⁵⁹ (2014) and the *Ministère de l’Éducation: Direction des Examens et Concours*⁶⁰ (2015) does not really confirm that Senegalese primary education completely roots on young learners strong enough foundations of literacy and numeracy for personal development and future secondary studies.

As shown in figure 13 (see table 64 in appendix 13), there was a successful period between 2006 and 2010 with a high rate of learners (over 60%) who passed the national exam CFEE in order to be admitted at secondary education. However, the lowest amount of students who were successful is recorded in 2013 with a rate of 33.89%, preceded by a tendency of decay.

⁵⁸ The mastery of basic elements of logical and mathematical thought as well as that of tools for expression and communication.

⁵⁹ Inspectorate of Education and Training in Bakel.

⁶⁰ Ministry of Education: Board of Examinations and Competitive Exams.

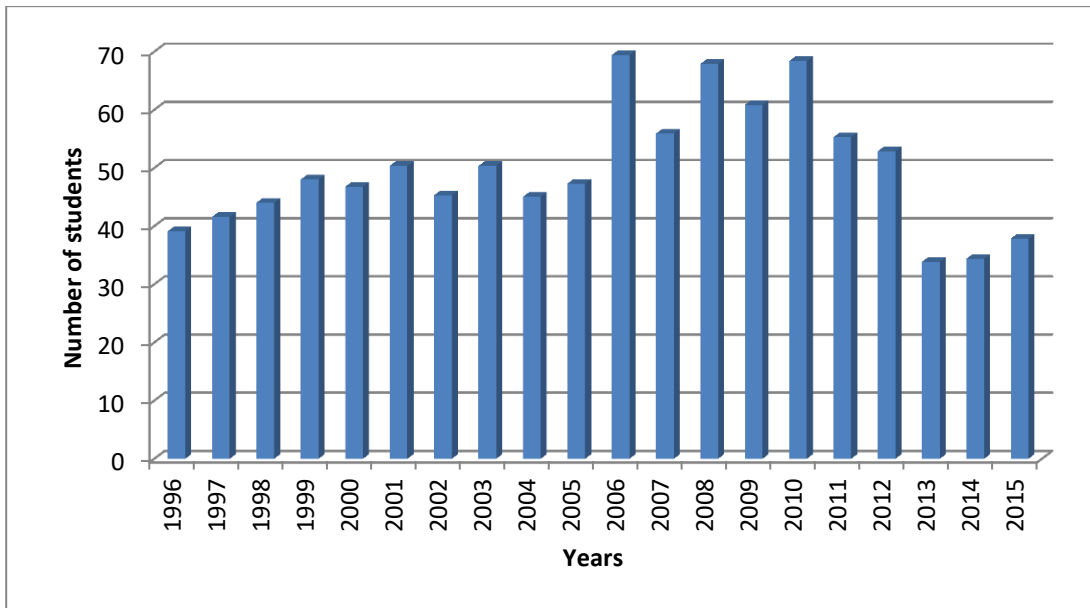


Figure 13: Number (%) of successful primary students at the CFEE
 Adapted from: *Inspections de l'Éducation et la Formation de Bakel* (2014) and *Ministère de l'Éducation: Direction des Examens et Concours* (2015)

There is one factor here which might be of main concern: Language. Although there are different social factors which undeniably contribute to students' failure in the CFEE, for instance the numerous teachers' strikes along the school year and a lack and delay of pedagogic material (Clasby, 2012; UNESCO, 2010-2011; Benson 2004b), the language of education (including the language MOI and the language of tests) may be also a major question to consider (Benson, 2014). The *Inspections de l'Éducation et de la Formation de Bakel* (2014: 10) argues that, although 90% students are aware of cognitive/academic skills, "*rare sont ceux qui pourraient résoudre des problèmes impliquant la mobilisation des connaissances*⁶¹". This affirmation suggests that students are somehow conscious of the content taught in each area after copying from a blackboard and after six years of exposure to the ILWC; however, the language barrier has impeded students along grades from acquiring the necessary abilities to put them into practice in a rational problem (see section 2.2). Language is also reflected in the instructions of the national standard tests are in L2 French and therefore build up a language barrier which impedes students showing their real capabilities (see section 2.4.1).

⁶¹ Those who could solve problems which imply the mobilisation of knowledge are rare.

The study PASEC (2007) is a national assessment which examines students' scores in L2 French (reading and writing) and Mathematics in a pre-test at the beginning of the academic year and a post-test at the end. For the experiment, 3889 students participated: 1,979 at grade 2 and 1,910 at grade 5. Scores in L2 French for the younger students were 31.1% in the pre-test and 45% in the post-test; it was 40.3% and 47.2% in Mathematics, respectively. For participants at grade 5, scores were 33.9% and 38.3% in the ILWC and 46.3% and 41.8% in Mathematics. As shown, there were no scores in average higher than 50%; moreover, PASEC (2007) insists that there are specific differences, of special concern in the current study, according to the background, the gender and the language spoken at home (see table 11). In both grades, those students who live in an urban environment had better chances of success at school than those who live in a rural environment.

		Grade 2	Grade 5
Rural	Pre-test	32.7	37.2
	Post-test	42.4	38.1
Urban	Pre-test	40	42.9
	Post-test	50.2	42.8

Table 11: Mean differences between students living in a rural vs urban milieu
Adapted from: PASEC (2007)

Concerning gender, results in PASEC (2007) revealed that at grade 2, males and females obtained similar average scores; however, that was not the case at grade 5, when males took advantage: At the beginning of the school year, males obtained 41% and females 39%. The difference was enlarged of 0.9% some months later in the post-test as girls got older and more engaged in household duties. As suggested by Benson (2001a, 2005a), instruction in mother tongue has positive effects for female students in motivating them in carrying out their studies and in participating actively in class activities, leading to a decrease in the number of girls who abandon formal education (see section 3.3.1). Further, gains are higher if the teacher is a woman; in fact, PASEC (2007) describes that female participants in the

experiment have incremented their results in Mathematics in 17.1% if they were taught by a female teacher.

The language spoken at home is an important aspect to take into account in the academic achievement of students. PASEC (2007) reports that only 2.7% of students at grade 2 and 5.3% at grade 5 said to use French at home, supposedly children whose parents occupy an important place in society. According to Cisse (2005), the number of French speakers in Senegal is 10% of the inhabitants. Versluys (2008) adds that this ILWC is of very frequent use to those people who are settled in privileged neighbourhoods of Dakar, ergo those high SES inhabitants whose privileged children enjoy receiving instruction in French under monolingual mainstream programmes with suitable teaching material and qualified teachers in private schools and for whom the language barrier does not exist for them.

PASEC (2007) compares the scores of this small proportion of children who speak French at home with the rest of the participants who speak a local African language and shows that differences are outstanding regardless of their living milieu and gender (see table 12). The most remarkable divergence is found in marks for grade 2 students in literacy (28.86%) followed by that same test at grade 5 (17.27%), suggesting that minority language students (the largest in the country) do not master basic abilities in L2 French for a good acquisition of academic content as reflected in low numeracy scores (39.70% for grade 2 students and 45.18% for grade 5).

	Test	French spoken at home	African language spoken at home	Difference
Grade 2	Literacy	58.57	29.71	28.86
	Numeracy	49.23	39.70	9.53
Grade 5	Literacy	50.11	32.84	17.27
	Numeracy	58.04	45.18	12.86

Table 12: Scores in literacy and numeracy at grades 2 and 5 according to the language spoken at home

Adapted from: PASEC (2007)

The SNERS IV is an evaluation carried out by the Senegalese Ministry of Education which analyses students' achievements in primary education through tests adapted to the curricula and individual questionnaires to get information about the environments' influence on schooling. Participants were gathered from all the regions of the country and selected at random. SNERS IV examines results attained in different linguistic skills in L2 French at grades 2 and 6.

Tests were administered to 2,073 participants at grade 2. Although their average score was 57.3% as shown by results, students had some difficulties in grammar and verb conjugation with scores of 48.9% and 51.8%, respectively (in the last skill, 20.6% of the students did not get any point). In the reading comprehension test, the average score was 62.2%.

Concerning grade 6, the average score for the 1,892 participants in linguistic competence was 56.1% (1.2% below students at grade 2); more specifically, they scored 63.3% in orthography, 58.4% in grammar, 61.4% in vocabulary, 42.3% in verb conjugation and 45.2% in reading comprehension. It is of special importance to notice that in the latter, 15.4% of students did not understand the text at all and that 77.1% of the participants reached a score equal or lower than 60 points. These data suggest Benson's (2004a: 3) argument that minority language students in submersion programmes are able to read the words of a text "but it can take years before they discover meaning". In the present context, poor reading skills of Senegalese learners may impede students to understand texts of content areas and to acquire specific CALP; therefore, they may not be able to reach good scores which would diminish grade repetition and dropout rates. Moreover, it is added to a second obstacle represented by the language of tests which students may not completely understand because they have not enough proficiency in L2 French. One statement expressed by the Senegalese Ministry of Education in the report is that *"l'enseignement, pour qu'il soit efficace, doit tendre vers une pédagogie de la maîtrise qui exige 80% des élèves interrogés réussissent 80% des questions"*⁶² (Ministère de l'Éducation Nationale and Institut National d'Étude et d'Action pour le

⁶² Teaching, in order to be effective, should show a tendency towards pedagogy of mastery which demands 80% of participants to attain 80% of questions.

Développement, 2007: 7). Taking into account this affirmation and the data obtained in the national evaluation, an education of quality in Senegal is far to be reached.

An interesting situation is found in the report SNERS V (see *Ministère de l’Enseignement and Institut National d’Étude et d’Action pour le Développement*, 2012). It gives results of 2,438 students at grade 2 in two subjects (L2 French and Mathematics) and distinguishing scores by gender. The average score for L2 French was 54.9%, with an advantage for female students (57.6%) over males (52.5%). In Mathematics, although the average score was 39.1%, the score for males (42.4%) was higher than for females (36.3%). But there is an interesting observation very much related to language which roots on the results of three Mathematics tests: Numeration, geometrics and problem solving. As shown in table 13, the scores on students’ ability for solving a mathematical operation were quite developed (70.7%) with a slight advantage for males (72.6%) than for females (69%). On the side of geometrics, the average score is acceptable (52.7%) although male learners (56.1%) overcame females (49.6%) who got close to the level of 50 points.

	Both genders	Females	Males
Numeration	70.7	69	72.6
Geometrics	52.7	49.6	56.1
Problem solving	19.1	19.2	19

Table 13: Results from the Mathematics test
 Adapted from: *Ministère de l’Enseignement and Institut National d’Étude et d’Action pour le Développement de l’Éducation* (2012)

In order to solve a mathematical problem, students need to have well developed numeracy and geometric abilities, as it was the case for participants in SNERS V. Therefore, as deduced from the results, a mathematical problem-solving task should not represent a hard difficulty to them. However, scores in the national assessment do not correspond to that argument but on the contrary, it shows big deficiencies: An average score of 19.1%. The question here may lie on both the language and the cultural barriers. First, in order give a solution to a mathematical problem task, the language must be understood for later applying an adequate

calculation. But, if the language in which the task is received is foreign to students or only they have been exposed to it only during a short period of time without previous L1 linguistic skills foundations, the result is that reasoning out a mathematical statement becomes almost impossible. Moreover, language may also represent an obstacle during lessons because the SNERS V is just analysing school efficiencies; therefore, if learners had the ability to solve problems at school, they should also be able to reason them out in the assessment test. Second, most of the instructions may not be based on their social and cultural environment; if that was the case, learners were confronted to an added obstacle and they had to try to understand those concepts which might be entirely unknown to them (see sections 2.2 and 2.3).

According to UNESCO (2010-2011), the average number of hours per week that students in primary education are devoted to the study of L2 French as a subject added to those for literacy development in that language are quite large: 16.15 hours at grades 1 and 2, about 12 hours at grades 3 and 4 and 5, and finally 11 hours at grade 6. Taking into account that dedication to the study of L2 French, added to those in which it is MOI, it may seem that there is a deficiency in the strategies employed in the education system still based on the theory of maximum exposure to language for better acquisition (Liddicoat and Curnow, 2014). Rather than using inefficient hours of students' incomprehension, it could be recommended to take as model those other countries where a mother-tongue-based MLE programme has been successful (Diallo, I., 2011). That way, students would dedicate some hours to fix linguistic foundations in their local L1 for first, Cummin's *Interdependence Hypothesis* to occur, and second, for an enrichment of the *Common Underlying Proficiency*. It would also lead to a better acquisition of L2 French and an enrichment of academic content.

With the purpose of having an approach about the efficacy of primary education in the country, the *Institut Fondamental d'Afrique Noire Cheikh Anta Diop* and the non-governmental organisation *Coalition des Organisations en Synergie pour la Défense de l'Éducation Publique*⁶³ have led a programme which aimed at analysing the education system in Senegal and identifying the reasons for its high

⁶³ Coalition of Organisations in Synergy for the Defence of Public Education.

number of dropouts, grade repetition rates and low achievement results. Thus, *Jangandoo* (2013), through first, a questionnaire to 5,000 families (in order to have information on SES, academic level and economic situation); and second, tests in Mathematics, literacy and general culture to students of all grades at primary education to gather information on learners' achievements at school. Results of the study *Jangandoo* (2013) showed that 66.2% of the participants failed in reading skills, 25.5% of them did so in calculation, but only 11% failed in knowledge of general culture. The study also revealed that the rate of failure decreased as the learners get older, that is to say, the exposure to the language MOI becomes larger. Thus, if the 6 to 8 year-old students recorded 98.5% of failure in average, this data decreases to 62.8% for students aged 12 to 14. It is interesting to mention that even after long years of exposure to L2 French, more than half (53.5%) of students in higher secondary education (from 16 to 14 years old) did not reach an acceptable average test score. Another point is that young students fail in two skills which are linked by language: Reading comprehension and mathematical problem-solving task. Moreover, there were several students who did not succeed in understanding a text in L2 French or in reasoning out a mathematical problem (see table 14). Perhaps, one of the main difficulties may lie on the absence of mastery of the official language of the school.

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Reading comprehension	98.3	88.8	67.3	67.9	34.5	18.7
Problem solving	98.6	94.2	89.7	78	63.2	32.7

Table 14: Percentage of students who failed in reading comprehension and Mathematics problem-solving tasks in primary education
Adapted from: *Jangandoo* (2013)

Other data from *Jangandoo* (2013) which are of interest in the current research is that 60.2% of students living in an urban context failed in the average score whereas 89% of learners from the rural context did not pass. With these results from *Jangandoo* (2013) and bearing in mind Levin and Shohamy's (2008) claim for the relationship between reading comprehension and Mathematics, some

questions arise: Could it be possible that a local L1 as a MOI may help to reduce the number of students who fail in reading skills? Could L1 enhance Mathematics' results by using the students' L1 as a tool for transmitting content and solving problems?

A study which should be taken into account in order to have a larger idea of quality of the education in Senegal and in other Sub-Saharan countries is PASEC (2014). It is an analysis and a comparison of the current education system in ten countries of the sub-continent in which L2 French is official language and MOI at schools. I am going to focus on data for Senegal and contrast it with some for Burundi because this country has got a general bilingual education system which uses L1 Kirundi⁶⁴ as language MOI and for assessment until grade 4; then the local language is taught as a subject and is substituted by L2 French which becomes MOI of other content areas (Mazunya and Habonimana, 2010).

The purpose of the study was to analyse the level of students in Mathematics and in the language MOI at the second year of primary education and at the end of that stage. In order to carry out that objective 3,712 Senegalese students (807 at grade 2 and 2,905 at grade 6) and 3,416 Burundian learners (855 at grade 2 and 3,461 at grade 6) were gathered. In order to analyse literacy skills, in PASEC (2014) it was established a scale of scores divided into five levels. Therefore, students were placed in levels 3 or 4 if they showed to master the target area; if not, they were in levels 2, 1 or below 1 and under a skill-threshold or *seuil suffisant de compétence* which helped to determine those students prone to demotivation and to school abandonment.

Tests given to grade-2 participants on literacy skills were measured through the number of letters identified in one minute and second, the number of correct words read also in one minute. As shown by results obtained (see table 15), 71.1% of the Senegalese students were under that skill-threshold; in other words, they presented a poor development of literacy abilities in L2 French. However, 79.1% of Burundian students who were used to study in their L1 Kirundi and who sat the test

⁶⁴ According to the University of Laval, Kirundi is mother tongue in Burundi to 97% of the population. It has got the status of national language together with French which is the official language of the country (Leclerc, 2017).

in that same language were placed in level 3 (23%) and in level 4 (56.1%). This data may suggest that using a language familiar to the student in the academic curricula of developing countries favours the development of literacy skills for later transfer to the L2 (see section 3.4).

	Below level 1	Level 1	Level 2	Level 3	Level 4
Senegal	13.9	29.3	27.9	12.5	16.4
Burundi	.2	3	17.6	23	56.1

Table 15: Percentage of grade-2 students in each level according to their attainment in literacy skills
Adapted from: PASEC (2014)

In order to measure numeracy skills, students were asked to count as far as they could and to calculate six operations of different complexity. But different from literacy, the scale for Mathematics was divided into four levels; therefore students in levels 1 and below-1 were considered under the skill-threshold. As shown by results obtained in PASEC (2014) (see table 16) 37.7% of Senegalese participants did not reach the skill-threshold; however 67.7% of Burundian students reached the highest level. These numbers may suggest that the use of a local language in developing countries for the instruction of Mathematics helps to strengthen that ability and to store CALP in the students' *Common Underlying Proficiency* to be transferred to the L2 (see section 3.4).

	Below level 1	Level 1	Level 2	Level 3
Senegal	12.6	25.1	32.2	30.1
Burundi	.1	3.2	28.9	67.7

Table 16: Percentage of grade-2 students in each level according to their attainment in Mathematics
Adapted from: PASEC (2014)

Bearing in mind the different results of both countries and the fact that Burundian students recorded the best scores in literacy in the language MOI and in Mathematics, it should be argued that those participants with poor results in literacy also obtained unsatisfactory results in Mathematics and vice-versa (PASEC,

2014). It is concluded in the study that *“la force de ces liens suggère que l’apprentissage des mathématiques tout au long de la scolarité est fortement dépendant du niveau de maîtrise de la langue d’enseignement et ceci, dès le début du primaire⁶⁵”* (PASEC, 2014: 37). This conclusion is similar to the one argued by Levin and Shohamy (2008) in their study when comparing scores of Mathematics and Hebrew as MOI between natives and immigrant students in Israel (see section 2.4.1).

For students in the last grade of primary education, literacy tests measured their capacity for reading and comprehending single words and for extracting information from different texts. In that grade, I have also included data from Burundi although taking into account that tests for grade-6 Burundian students were expressed in L2 French. As shown in table 17, contrary to grade 2 results, there were more Senegalese students (61.1%) than Burundian (56.5%) above the skill-threshold. One of the possible explanations for that fact may root on the issue that Burundian students shifted after 4 years of instruction in a language familiar to them to a foreign language and therefore the time of exposure to the L1 decreased. This idea is in agreement with Heugh (2006) and Heugh’s (2011b) argument that students enrolled in a mother-tongue-based MLE programmes need 6 or more years of exposure to the academic use of the L1 to internalize literacy skills in order to transfer them to the L2 (see section 3.2.2). On the side of Senegalese students, it seems that after six years of exposure to L2 French, their reading abilities experienced an improvement. However, there were still a large number of participants (38.8%) who did not show adequate development of literacy skills.

	Below level 1	Level 1	Level 2	Level 3	Level 4
Senegal	4	13.5	21.3	26.3	34.8
Burundi	.2	4.6	38.7	49.1	7.4

Table 17: Percentage of grade-6 students in each level according to their attainment in literacy skills
Adapted from: PASEC (2014)

⁶⁵ The strength of those links suggests that the learning process of Mathematics along the whole academic education depends strongly from the mastery of the language MOI and this, since the beginning of primary education.

Arithmetic, measure of units and geometrics were the tests given for assessing mathematic skills at grade 6. As shown in table 18, 58.8% of students in Senegal reached levels 2 or 3, compared to 62.2% at grade 2. In other words, there are 41.2% of learners in the Sub-Saharan country who did not master these Mathematical abilities. Contrasted to data from Burundi, 86.7% of participants overcame the skill-threshold. Again, it seems that L1 instruction of Mathematics during the first years of primary education is beneficial for students' results. However, if data from grade 2 and grade 6 are compared, there is a decrease of 9.9% of Burundian students above the skill-threshold, suggesting that, although L1 instruction may seem to have positive results in mother-tongue-based MLE programmes in which the L1 is only present at early grades, skill foundations are not fixed since students have not been exposed enough time to solidify academic and linguistic abilities (Skutnabb-Kangas and Dunbar, 2010; Benson 2004a, Heugh, 2006) (see section 3.2.2).

	Below level 1	Level 1	Level 2	Level 3
Senegal	14.7	26.5	29.7	29.1
Burundi	.8	12.4	46.8	39.9

Table 18: Percentage of grade-6 students in each level according to their attainment in Mathematics
Adapted from: PASEC (2014)

Due to the fact that the current study was carried out in an urban milieu, it is worthwhile to mention some data from PASEC (2014) which contrasted results from students living in a city or town and those in a village. In the study, 42.5% and 44.1% of grade-2 and grade-6 Senegalese participants, respectively, were living in the countryside. Results show that younger urban learners scored 67% higher in literacy and 41.3% in numeracy than their rural colleagues. Similarly, the difference for grade-6 students between urban and rural was 80% in reading skills and 70.9% in Mathematics in favour of students living in the city. These data portrays the big disadvantage of children who are living in villages: Lower opportunities of exposure to L2 French, fewer chances to attend a private school which only high SES families

can afford, poorer conditions of schools and manuals, more time spent in farming and agricultural work, among others.

It should be noticed that the contrast between urban and rural for a country with a familiar language as MOI like Burundi was much smaller. Urban students at grade 2 obtained 28.1% higher in literacy and 10.8% in numeracy than their rural mates; however, at grade 6, they scored 17.6% better in language but not in Mathematics in which rural students overtook urban learners in 3.4%. Bearing in mind this example and taking into account that in the rural sphere the ILWC is almost absent and that a local language is vernacular, would that language in education benefit Senegalese students? In Huguet et al's. (2000) study (see section 3.4.1.), those students receiving instruction in their L1 benefited from transfer of literacy skills to outperform their monolingual colleagues in the L2 MOI.

Another interesting aspect shown in PASEC (2014) and of special concern in the present study is the difference between males' and females' achievement in tests for Senegalese learners. On the one hand, grade-2 scores for males were 8% and 15% higher as compared to those obtained by females for language and Mathematics, respectively. On the other hand, these were 4.4% and 18.8% higher at grade 6. As Benson (2001a; 2001b; 2005a) and Stromquist (2001) point out, this fact is possibly due to the time that young females spend for household duties after school time without the possibility of doing their homework or taking a time to rest. Perhaps, their L1 as MOI at school would increase their participation in class, increasing their self-esteem and motivation for school success (see section 3.3.1). In fact, data from Burundi is a clear example for that last argument. If Senegalese males outperformed females in both grades and both subjects, it was the opposite case for Burundian students: Grade-2 girls scored 4.7% and 8.7% higher than their male peers in literacy and numeracy, respectively. This was more evident for female participants at grade 6 who obtained 11.7% better results in language and 33.14% in Mathematics. With these data in mind and in agreement with Benson (2001a; 2001b; 2004a; 2005a; 2005b), it may seem that the use of a local language in education may help the female population of developing countries in their academic success.

Data presented in that section shows that, in general, academic scores for Senegalese students are low despite the efforts done in order to reach the *Millennium Declaration Goals* and the *Education for All* objectives. And this is evident for females who dedicate more time to household duties and also for students living in rural areas where chances of exposure to L2 French was minor and where possibilities for having adequate academic material are small. It is true that the Senegalese education system is going through several difficulties such as numerous teachers' strikes or a lack of material which also affect students' achievement. However, it should be taken into account that an adequate development of literacy and academic skills in a language familiar to the student may be necessary for increasing their self-esteem leading to school success.

4.8 Summary

After some data on the social situation of Senegal, chapter 4 gives details about the multilingual landscape of the country, especially focusing on the different status of the languages spoken and explaining the phenomenon of wolofisation or the process by which Wolof, one of the local languages, has become the lingua franca gaining social prestige.

The central point of the chapter is the education system in Senegal. Two types of data are presented: Quantity indicators retrieved from the UNESCO Institute for Statistics and quality indicators gathered from primary students' results at the CFEE and also from assessments of the education system in the Sub-Saharan carried out by from the Senegalese Ministry of Education or the CONFEMEN.

The Senegalese education system was inherited from the French colonisers, despite the country obtained its independence in 1960, the government decided to keep L2 French as the unique official language at schools, meaning that students receive lessons and tests in that ILWC. Data gathered from 1996 to 2015 (if available) suggests that the government is taking into account the education issue in Senegal since they built several schools around the country leading to an increase in the number of children who enrolled in primary education. However, it is interesting to notice that the number of primary students who abandon their

studies and those who decide not to continue secondary education, especially that of females, is elevated despite the fact that it is compulsory education. Perhaps one of the key factors, among other social circumstances, might be rooted on L2 French as unique official language of education.

About quality indicators, as suggested by data from different assessments of the Senegalese education system, the level that primary students have of Mathematics and L2 French, among other content areas. A special mention requires the study Jangandoo (2013) which reveals the poor levels of literacy in L2 French of Senegalese students, especially at younger ages. Interesting for the present study is to mention two facts from the study PASEC (2007): Children living in an urban context are more advantaged than those in a rural milieu and males obtain better scores than females, especially as they grow older. The assessment of different education systems of the francophone Sub-Saharan Africa PASEC (2014) compared grade-2 and grade-6 students' results in literacy and Mathematics. In the present study, data from Senegal was gathered in order to compare it with that of Burundi, a country in which students received instruction through L1 Kirundi. As shown by the results, participants from Burundi scored in general higher than those from Senegal, especially at grade 2.

Bearing in mind the ideas and studies above described, chapter 5 presents the research questions and their corresponding hypothesis according to the aims of the present study.

5. RESEARCH QUESTIONS

5.1 Introduction

After a revision of the literature, two research questions are proposed to contribute to research in the field and try to cover the gaps from previous studies. This chapter presents the research questions and hypotheses of the present study.

5.2 Research questions and hypotheses

5.2.1 Research questions

Taking into consideration ideas from studies reviewed and bearing in mind the aim of the present study, the following questions need to be answered in the present research:

1a. Does the language of tests have an effect on academic achievement of L1-Sérère students of primary education who live in rural areas of Senegal after 3 and 6 years of academic exposure to L2 French?

- Null hypothesis: $H_0: \mu_1 = \mu_2$
- Alternative hypothesis: $H_1: \mu_1 \neq \mu_2$

In which μ_1 represents the mean score obtained by students in rural Senegal who receive academic test in L1 Sérère and μ_2 the mean score obtained by students who take tests in L2 French.

1b. If the language of tests has an effect on academic achievement of L1-Sérère students of primary education who live in rural areas of Senegal after 3 and 6 years of academic exposure to L2 French, is there any relevant advantage for the female population?

- Null hypothesis: $H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4$
- Alternative hypothesis: $H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4$

In which μ_1 represents female's mean score in academic tests when these are given in L1 Sérère in Senegalese rural schools; μ_2 represents females' mean score in academic tests when they receive them in L2 French; μ_3 represents male's mean score when they have academic tests in L1 Sérère; μ_4 represents male's mean score when they are given academic tests in L2 French.

2. Does the language of tests make a difference for L1-Sérère primary students along a continuum from *Basic Interpersonal Communicative Skills* towards *Cognitive/Academic Language Proficiency* and from a *familiar* to a *non-familiar context*?

- Null hypothesis: $H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6$
- Alternative hypothesis: $H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \neq \mu_6$

In which μ_1 , μ_2 and μ_3 represent Senegalese rural students' mean score obtained under language and context conditions established in each of the three different quadrants along Cummins' matrix (Q1, Q2 and Q3, respectively) when they receive tests in L1 Sérère; μ_4 , μ_5 and μ_6 represent Senegalese students' mean score obtained in Q1, Q2 and Q3, respectively, when they receive tests in L2 French (see section 6.5.1 for the design of tasks along Cummins' matrix).

5.2.2 Hypotheses to research questions 1a and 1b

The purpose of research questions 1a and 1b is to analyse if L2 French, the current official and unique language MOI in the Senegalese academic curricula, is a linguistic barrier for L1-Sérère students in tests of primary education, and more specifically to low SES children living in a rural context (research question 1a) and to the female population (research question 1b).

Language as MOI cannot be ignored in order to formulate a hypothesis in the present study since it is the tool used to teach the content about which participants are tested. Several linguists (Mohanty, 2006; Shohamy, 2006; Smits et al., 2008; Skutnabb-Kangas, 2008; Skutnabb-Kangas and Dunbar, 2010) claim that the use of a unique foreign language MOI to teach minority language students in

submersion programmes hinders them access to education; this is of special interest in Sub-Saharan countries where the language used by teachers at schools is a European language inherited by colonisers. The fact that the students' L1 is not included in education is depicted by Skutnabb-Kangas (2009a) as an offense against humanity (see sections 2.2 and 2.3).

Since tests are elements which are broadly present in education to assess the students' process of learning, the language in which they are given may decide the future of young learners (Shohamy, 1998; 2007b; Mohanty, 2006; McKenzie, 2009; Brock-Utne and Alidou, 2009). In other words, due to the fact that ITM children are not proficient in the language of tests, not only they are unable to fully understand what they are asked but further, they cannot give a correct answer. Therefore, according to Cummins (1981; 1982; 1999; 2008b) an unfair situation happens in which most learners are considered by the system as faulty students; as Shohamy (2001, 2006, 2007a; 2007b; 2008; 2013) claims, the *power of tests*, by means of a linguistic barrier, classifies people into society giving privileges to those who master the official language and depicting those ITM communities as citizens of an inferior social class, that is to say, tests "create [...] the rejected and the accepted" (Shohamy, 2001: 374). In fact, according to Jandhyala (2001), Shohamy (2006), Cummins (1982; 2009b), Smits et al. (2008), Benson (2001a; 2004b; 2005a), Heugh (2006); Mohanty (2009); Skutnabb-Kangas and Dunbar (2010), Orekan (2011), the presence of students' L1 (or at least a language familiar to them) in the education system would give them access to an education of quality, motivating them and leading to a decrease in grade repetition and dropout ratios (see section 2.4).

In the present study, I have also presented different models in developing countries in which a local language MOI has been shown to be beneficial for ITM students which suggest that children can take advantage from the use of a local language in education (see section 3.5). Another good example mentioned was the study PASEC (2014) which compared data obtained from grade-2 and grade-6 students' tests in literacy and Mathematics in ten Sub-Saharan countries. Thus, in section 4.7 of the present study, data from Senegal (where L2 French is the unique MOI) and Burundi (a country in which the students' L1 Kirundi is present in the

education system) were selected and contrasted. It was observed that Burundian students obtained in general better scores than their Senegalese peers. Moreover, it seemed that Burundian rural students as well as Burundian females benefited from the use of their L1 Kirundi in tests and as a MOI.

The previous ideas may be of special concern for the female population who live in a context in which they are responsible of the household from a very young age. According to Benson (2001a; 2005a), young females attend school tired and not motivated, especially if the language MOI is incomprehensible to them. As Benson (2001a) claims, the use of girls' L1 as MOI at school would motivate them and allow them to participate actively in the learning process (see section 3.3.1). Translated into tests, young females would have the opportunity to equal or even outperform males and show their academic capacities.

In order to formulate a hypothesis for research questions 1a and 1b, it should also be taken into account the different assessments of the Senegalese education system. In general, as shown in Jangandoo (2013) and SNERS V, the academic achievement of Senegalese learners in primary education is low, especially in L2 French and in Mathematical problem-solving tasks (see section 4.7). Other assessments of the Senegalese education system also contrasted female and male academic achievement in primary education: PASEC (2007) and PASEC (2014). In general, males outperformed females in Mathematics and in language. Another important aspect was that the gender gap was enlarged as students grew older; in other words, as females were more engaged in household duties males took academic advantage (see section 4.7).

Bearing in mind previous theories and studies, and taking into account that those students had received lessons uniquely in L2 French at the moment of the data collection, the hypothesis put forward here for research question 1a is that the language of tests will be crucial in students' achievement in both M and L. Those L1-Sérère participants in the experimental group who will receive their tests in their mother tongue will reach higher scores than those in the control group who had tests in L2 French, especially for those at grade 3 who have been exposed to the ILWC three years less than those at grade 6. Moreover, even after 6 years of exposure to L2 French at school, it is predicted that the language MOI will represent

a linguistic barrier to participants in the present study. For research question 1b, it is hypothesized that the female population in the experimental group will outperform their female peers in the control group as well as males in the experimental group, even after 6 years of exposure to academic L2 French.

5.2.3 Hypothesis to research question 2

Research question 2 aims at analysing if students obtain different or similar scores along three different quadrants of Cummins' matrix adapted ITM students in developing countries and according to the language of tests (L1 Sérère or L2 French).

Coyle, Hood and Marsh (2010) established a quadrant following Cummins' theories of BICS vs CALP type of language and context-embedded vs context-reduced which established the relationship between language and content and which was employed to design scaffolding tasks in the CLIL classroom (see section 3.4.2). Considering the importance of the socio-cultural background for minority language children in Sub-Saharan countries (see sections 2.4 and 3.5.3), I have adapted the matrix taking into account such context. Therefore, tests designed follow a continuum increasing complexity along the three quadrants based on the type of language (a more basic or BICS and a more complex and technical or CALP) and on the students' social context included in the task (familiar to non-familiar) (see section 3.4.2 for a theoretical approach and section 6.5.1 for the design of tests along the continuum).

As mentioned above, including the students' environment in both tests and academic content are important in the learning process of students. It has been shown that successful mother-tongue-based MLE projects have considered relevant including children's socio-cultural background for a starting point in the learning process for then advancing towards the unknown (see section 3.5). In fact, Cummins (1986) claims that there is a close relationship between factors related to identity and academic results. Students who see their cultures included in the school curricula may experience an increase of motivation and self-esteem which leads to high attendance rates and improved achievement at school (see section 2.3). On the contrary, in submersion programmes where ITM students' socio-

cultural context is not considered, a content barrier is built, thus neglecting cultures not related to the L2 and discouraging students (Mohanty et al., 2009).

Cummins' (1979a; 1986; 2001, 2005) theories of the *Threshold* and *Interdependence Hypotheses* are of main concern here (section 3.4.1). The researcher argued that the level of attainment in the L1 at the moment when the L2 starts to be learnt was relevant to attain a competent level of proficiency in that L2. He added that linguistic abilities and knowledge acquired through the L1 were stored in the students' mind in a *Common Underlying Proficiency* and transferred to the L2. In other words, if L1-Sérère learners have not developed linguistic abilities or have not acquired content through their L1, transfer is not likely to occur and students may not be able to reach an adequate academic level in the L2 French. In the case of African learners, as Heugh (2006) argues, six to eight years of academic exposure to the L1 are necessary for an adequate acquisition of the L2 and transfer of content and linguistic skills (see section 3.2.2). On the side of L2 basic language, Cummins (2008b) claims that 2 to 3 years are required for minority language students (living in developed countries) to acquire it (see section 3.4.2).

Taking into account the results and theories explained above, and bearing in mind that participants in the present study have never been exposed to their L1 at school, it is predicted for research question 2 that the language of tests will make a difference depending on tasks designed according to the features of each quadrant. Both grade-3 and grade-6 participants who received tests in L1 Sérère will obtain better results in Q1 than their peers who took them in L2 French since first, they are familiar with their background in which they communicate and second, they have learnt indigenous knowledge through L1 Sérère. Regarding Q2 and Q3, students at grade 6 in the experimental group will not advantage those learners in the control group as the language of tests become more technical and more grammatically complex (CALP) due to the fact that the type of L2 French which they are mostly exposed is an academic one. Participants at grade 3 in the experimental group will obtain similar results than their peers in the control group in Q2 and Q3 because they have been exposed to L2 French during a short period of time and therefore they have a very low proficiency in that language which did not allow transfer of linguistic skills and content to L1 Sérère.

6. THE STUDY

6.1 Introduction

Chapter 6 has different objectives. The first is to describe the socio-linguistic background of the students who took part in the present study. The second is to explain the methodology used in order to design the experiment. Finally, the third one is to give details on the way in which data was collected and analysed. Thus, in section 6.2 there is a precise information concerning Sérère, the L1 of the participants in the present study. After that, in section 6.3, appears an overview of the social context of the area where the data collection of the present study was carried out and, in section 6.4, a description of the participants in the present study and the schools they attended. The last section of chapter 6 deals with the instruments employed for the descriptive and inferential analysis of the data collected.

Once school directors agreed about carrying out the experiment at their education centres, grade-3 and grade-6 students were gathered according to specific criteria and divided into the experimental group if they received tests in L1 Sérère or into the control group if they had them in L2 French. After that, they completed tests based on the Senegalese curricula which were designed by the researcher himself and reviewed by local and foreign experts in education and by local teachers; then they were piloted and adapted to the purpose of the study. Questionnaires to families, teachers and interviews to members of the Senegalese education system helped to complete information. Finally, after data was collected, it was corrected following a specific criteria and transferred to excel and to SPSS to be descriptively and inferentially analysed.

6.2 Sérère language: A portray

Sérère (also Sérère-Sine, Sereer, Seereer or Serer among others) is a West African language spoken by 1,130,000 citizens as L1 and to 300,000 as L2 for other inhabitants in Senegal, a country where it has the status of national language (see section 4.2). Sérère is also spoken by minorities in The Gambia, but it does not

benefit from any official status in that country (Ethnologue, 2015). Sérère belongs to the Niger-Congo linguistic family, and more specifically to the Atlantic sub-branch. The origin of that language is uncertain; however some historians place it in Egypt (see Ndiaye, R., 1994). Sérère people were thought to settle in the West of the continent following migration waves through the Sahara and along the valleys surrounding river Senegal.

According to Renaudier (2012) and Ethnologue (2015), this language has got five different varieties which are geographically distinct: Sérère-Sine or Singandoum which is spoken in the East and South-Est of the Sine-Saloum delta and in the region of Kaolack; the Sérère A'ool or Segum, located in the area of Baol, not distant from Dakar and influenced by Wolof; the variety used in the central coast of Senegal or *Petite Côte*, which is known as Jegem (also Dyegueme or Gyegem); the variety found in the West of the Sine-Saloum delta is the Sérère Fadiouth-Palmarin or Fadyut-Palmerin; finally, the dialect Nyominka or Nyomiñka which is spoken in the islands of the delta. Renaudier (2012) points out that there is inter-comprehension between the different varieties (see figure 14).

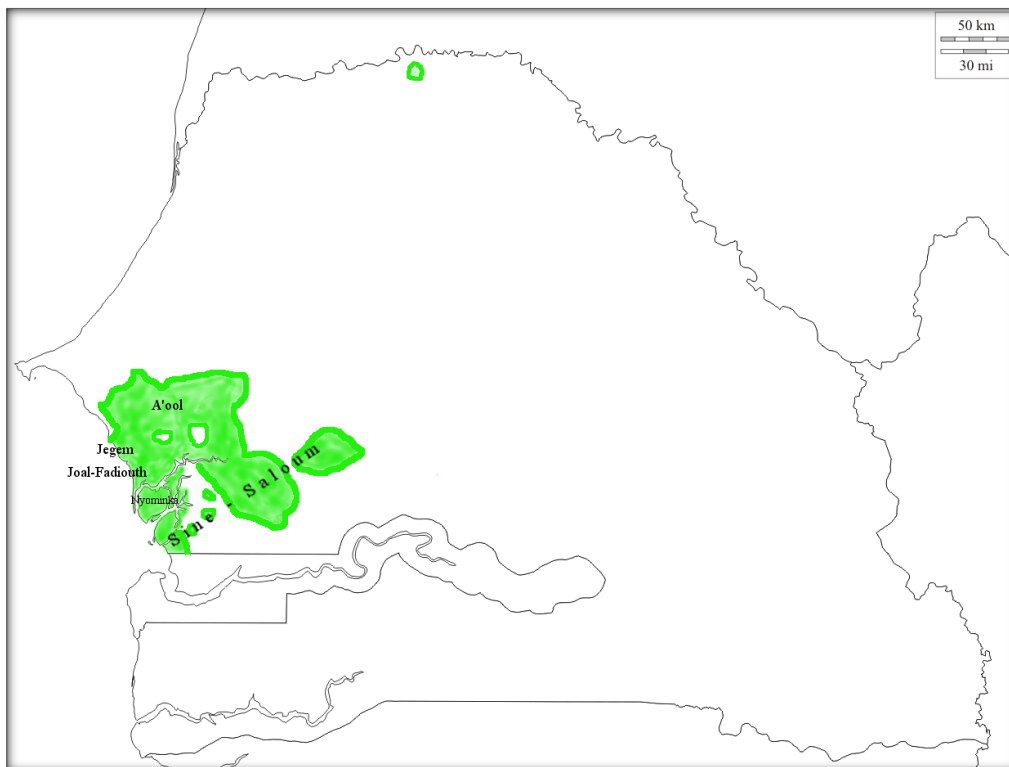


Figure 14: Sérère language and its varieties in Senegal
Adapted from Renaudier (2012) and Ethnologue (2015)

It is important to mention that Sérère-Sine has been established as the standard variety. There exists an official script, also French-Sérère dictionary, established in 1975 (see Crétois, 1977). The Sérère alphabet was updated in October 2005 by the government in the decree 2005-990 (<http://www.jo.gouv.sn/spip.php?article4800>). In that corresponding document, it is argued that those rules for codification of national languages are required in order to “*donner plus de moyens et d’efficacité à l’éducation*”⁶⁶ despite the fact that local languages in the Senegalese academic context have only been used as mere projects (see section 3.5.4). Despite all the efforts made to establish a written Sérère with its grammar rules, Renaudier (2012) argues that it ought to be considered an oral language due to the fact that the vast majority of its speakers ignore the orthography of their mother tongue, a fact of relevance in the present study (see section 6.4). The researcher adds that a written press in Sérère does not exist and its presence in the regional radio and television is minimal.

Renaudier (2012) claims that Sérère is in a delicate situation due to the phenomenon of wolofisation in the country and especially in the urban context (see section 4.2). However, as claimed by Sarr (2014), there are several Sérère-speaking regions where it is strongly rooted as the main language and considered a symbol of cultural identity. In those rural areas, Sérère is not only used as the language for minor communication situations within the family or the community but, as Renaudier (2012) explains, it is also the language employed for discussing important local events such as village councils, village leader-meetings or traditional contests.

6.3 Context

The data collection was carried out in Central-West Senegal where five primary rural schools agreed to participate in the present study. Four of them were allocated in the Region of Kaolack (Ndjigane Sérère, Sekhela Diarga, Keur Madiabou, and Keur Guirène Sérère) and one in the Region of Fatick (Badoudou) (see figure 15). That geographical distinction does not imply differences in the socio-linguistic profile of the participants in the present study.

⁶⁶ Give more means and efficacy to education.



Figure 15: Location of the schools participating in the data collection and in the test-piloting

The population living in the target area of the study belonged to a low SES. They lived in a rural environment where the crop of peanuts, millet and corn, as well as cattle raising and fishing were their main living resources to large families. As confirmed by the questionnaires in the present study, the big majority of the population has Sérère as L1: 94.4% (84) of grade-3 learners and 93.3% (56) of grade-6 affirmed that Sérère is mostly spoken in their villages added to 92.3% (24) of parents who claimed that they only used Sérère to speak to other members of the community.

However, due to migration movements around the country, other ethnic groups had settled and maintained their mother tongue at home. As a matter of fact, the vast majority of students attending the schools mentioned above are Sérère dominant although a minority have Bambara, Fula or Wolof as mother tongue. For the latter, and as expressed by interviewees in the present study, Sérère was learnt in a natural setting and represents the language for participating in the social life of the community. Due to interethnic contact, some Sérère students have learnt other local languages as the survey suggests: 10.1% (9) of grade-3 and 10% (3) of grade-6 students used often Wolof for communication

outside the school environment; also, 3.3% (3) of grade-3 and 6.7% (4) of grade-6 employed Bambara or Fula to inside the classroom at different frequencies.

The number of teachers in these rural schools was seven or eight, each of them responsible for a classroom with more than 40 students. As stated by law (see section 4.3), all of teachers used L2 French as the unique language of instruction. As Faye (2013) explained, teaching conditions are not easy because in many cases teachers do not share the students' L1 and cannot turn to Sérère for clarification of lesson concepts due to the big mobility of staff across the country which was confirmed with the questionnaire: 42.3% (11) had Wolof as L1, 26.9% (7) Sérère, 23.1% (6) Fula and 7.7% (2) Mandinka. As a work-around solution, they have to use Wolof although, as shown by questionnaires, it is not used by all students: 68.5% (61) of grade 3 students and 88.3% (53) of grade 6 affirmed that they never used L2 Wolof during lessons.

Schools are not equipped with electricity; therefore, access to online educational material is unthinkable. Moreover, computers and printers or photocopiers do not exist, a fact that forces teachers to write every lesson on the board for students to copy it. Quite often, due to the small number of classrooms, the students' communities have to build up new ones made of corn and millet straw.

Many students, especially the youngest, do not have notebooks and have to work on individual blackboards and write with a piece of chalk. In many cases, they have to walk long distances to receive formal instruction.

6.4 Participants

Initially, 214 participants at grades 3 and 6 were divided into two groups: The experimental (they received tests in L1 Sérère) and the control (they received tests in L2 French). In order to divide students, and always with the advice of teachers, it was controlled that there were no grade repeaters, that they had not attended nursery school and that their average scores in L2 French as a subject was equal or higher than 10 out of 20. I also checked out that the number of males and females was balanced. The questionnaire which they completed allowed to identify and to exclude all those students who did not accomplish a specific profile: To be L1-Sérère

speakers, to attend school regularly and not to use the ILWC as main language with relatives. That way, all students had received the same amount of exposure to L2 French as MOI depending on their school grade: 3 years for grade-3 students and 6 years for those at grade 6. Having omitted these students, the present study comprised 66 males and 83 females, that is to say, 149 subjects from the five schools above described (see table 19).

School	Grade 3		Grade 6		Total
	Males	Females	Males	Females	
Ndjigane Sérère	7	8	5	9	29
Sekhela Diarga	9	20	11	7	47
Keur Madiabou	7	11	1	2	21
Keur Guirène Sérère	7	5	4	3	19
Badoudou	6	9	9	9	33

Table 19: Distribution of participants in the different schools

The 149 students were born among low SES rural families, their age ranging between 7 and 16 years (mean=10.89) at the moment in which they took the tests. Among them, 91 were in the experimental group and 58 in the control group (see table 20).

	Grade 3 (7 to 13 years old)		Grade 6 (10 to 16 years old)		Total participants	
	Males	Females	Males	Females	Males	Females
Experimental group (L1)	24	30	18	19	42	49
Control group (L2)	12	23	12	11	24	34

Table 20: Distribution of students per grades and language of tests

Following Benson (2001a) and Montgomery and Hewett (2005) (see section 3.3.1), participants' mean ages were considered in order to check out if female participants in the present study were over-aged (see table 21). As shown, females were in average older than males in both grade 3 (.22 years) and grade 6 (.30 years), although not much older than the age for their corresponding school grade. However, it should be mentioned that the oldest female participant at grade 3 was aged 12 years (11 the oldest male) and 16 the oldest female at grade 6 (the oldest male was 14). That females' profile was in accordance with Benson (2001a) and Montgomery and Hewett (2005) who claimed in their respective studies which involved Sub-Saharan population that children enrol late at school due to their social situation.

	Males	Females
Grade 3	8.89	9.11
Grade 6	12.53	12.83

Table 21: Participants' mean ages

A large number of participants in the present study showed to be fluent in Wolof due to the fact that they have been hearing it since a very young age and may use it as an interethnic language. For example, according to the survey, with their teachers who come from different linguistic backgrounds, 56.2% (50) of grade 3 participants and 46.6% (14) of grade 6 affirmed to use that language at different frequencies in order to address to their teachers in an informal context outside the school. As explained in section 2.2, those students could be considered *circumstantial multilinguals* taking into account that they are forced to learn a language foreign to their community (L2 French) for an academic goal: Succeeding at school.

Other participants were asked to complete a survey or to answer oral questions. A survey was given to 26 teachers working in the target schools (22 males and 4 females) with ages ranging from 25 to 60 years (mean=38.35, SD=7.43) at the time of the data collection. The parents who were asked to participate in a

questionnaire were 12 males and 15 females with ages comprised between 20 and 67 years old (mean=38.23, SD=13.98). The three people interviewed were two school directors and one school inspector and collaborator in education assessments such as PASEC (2007). As it was a spontaneous face-to-face conversation between them and the researcher, it was preferred not to ask directly about their ages.

6.5 Instruments

In order to collect data, tests were designed following the Senegalese curricula for grades 3 and 6 in two academic areas: *Leçons* (or social sciences and natural sciences) and Mathematics (henceforth, L and M, respectively). In the case of grade 6, questions were also inspired from examples of the national exam CFEE given by the *Réseau Africain de Formation à Distance et Ministère de l'Éducation Nationale*⁶⁷ (<http://cm2.examen.sn/>). In all cases, tests were reviewed by a mathematical education expert⁶⁸ and by local primary teachers.

An answer sheet was given to participants where they had to solve M and give an answer for L. During the data collection of the masters' thesis, it was observed that some students took notes on their tables and only wrote the M problem-solving answer on the answer sheet. Bearing that in mind, an additional blank piece of paper was provided to all of them.

Finally, a questionnaire was also administered to learners, teachers and students' parents. Moreover, three members of the education sector who agreed to be interviewed (see section 6.5.2).

6.5.1 Design of tests

Based on both Levin and Shohamy's (2008) study which analysed the effect of the language of tests on minority language students' academic achievement (see section 2.4.1), on my research involving L1-Diola students in Senegal which I carried out for my Master's thesis (Martín-Chazeaud, 2014) and other research fulfilled in

⁶⁷ African Net for Distance Training and the National Ministry of Education.

⁶⁸ Problem-solving tests in the present study were designed, checked and corrected under the advice of Mr Martín, school inspector, expert in Mathematics and author of diverse academic books for students.

Sub-Saharan Africa such as Hovens (2002) and Brock-Utne (2013), in the present study oral tests were designed for grades 3 and 6 involving six L multiple choice questions and three M problem-solving tasks (see appendix 14 for tests given to grade-3 participants and appendix 15 for tests given to grade-6 participants). All of them were grounded on the Decree 79-1165 of 20th December 1979 (*Ministère de l'Éducation*, 1979) which determines the programme for primary education in Senegalese schools. Tests for M and for L were carefully designed following teachers' examples and official tests in order to be faithful to examination methods which students were used to take at school. Moreover, it was carefully checked that each group of students concerned had already been taught the target content of each test.

There are several reasons for the specific academic areas above mentioned. Firstly, these are present throughout the whole education and are part of the CFEE or end-of-primary examination. More concretely, M problem-solving exercises were chosen as part of the tests because language plays an important role: Students have to understand the language of tests in order to give a solution; moreover, it is a content area usually involved in international assessments of the education systems in Sub-Saharan Africa such as PASEC (2007) and PASEC (2014) or in internal ones such as Jangandoo (2013); moreover, it is an area used in linguistic studies analysing the effect of the language of test in bilingual students (Levin and Shohamy, 2008).

The L multiple-choice questions are easy to give an answer by students but they require especial attention from the students to the language in order to give the right one apart from memorizing content from class-notes. Different from Martín-Chazeaud (2014), four optional answers were given and not three with the purpose of decreasing the chance factor of giving answers at random (see appendix 16) and not to influence in the results of the present study as advised by a Senegalese school inspector and expert in tests design⁶⁹. The reason for the different type of design in tests between M and L and the small number of exercises in each one aim at avoiding students to get uninterested and tired.

⁶⁹ Mr Sy is an expert in Senegalese education who has participated in important assessments such as PASEC (2007) and PASSEC (2014). Currently, he is advisor in tests design of education systems in several francophone African countries and collaborates in ARED, an organisation devoted to the experimentation of local languages as MOI in primary education (see section 3.5.4).

Bearing in mind that in present study the notion of language of tests refers to the exposure of a situation and the students' capacity to solve directions with the objective of measuring students' knowledge (see section 2.4.1), those for M problem-solving tasks and L multiple choice questions followed a continuum designed along Cummins' matrix throughout three quadrants (see section 3.4.2) and according to an axis of abscissas (context) and an axis of ordinates (type of language proficiency). In that sense, the first problem and the two first questions were close to the context of the student and formulated in BICS, in other words, in a simple language. The second problem and the two following questions were also designed within a context familiar to the children but the type of language tended towards CALP, that is to say, sentences were more grammatically complex and the lexicon was more academic. Finally, the last tasks involved a context further from the students' than the previous and a more technical and demanding language. Taking into account that participants are young primary learners, the language of tests in L multiple-choice questions and M problem-solving tasks for Q3 was on purpose not totally far from the context of the students (see figure 16). Thus, in Q1 and Q2, the language of tests employed in the mathematical problem-solving tasks and the multiple choice questions is in the centre whereas, in Q3, it is not far positive in the axis of the content. The purpose of that idea was to avoid interference in the results by context disorientation.

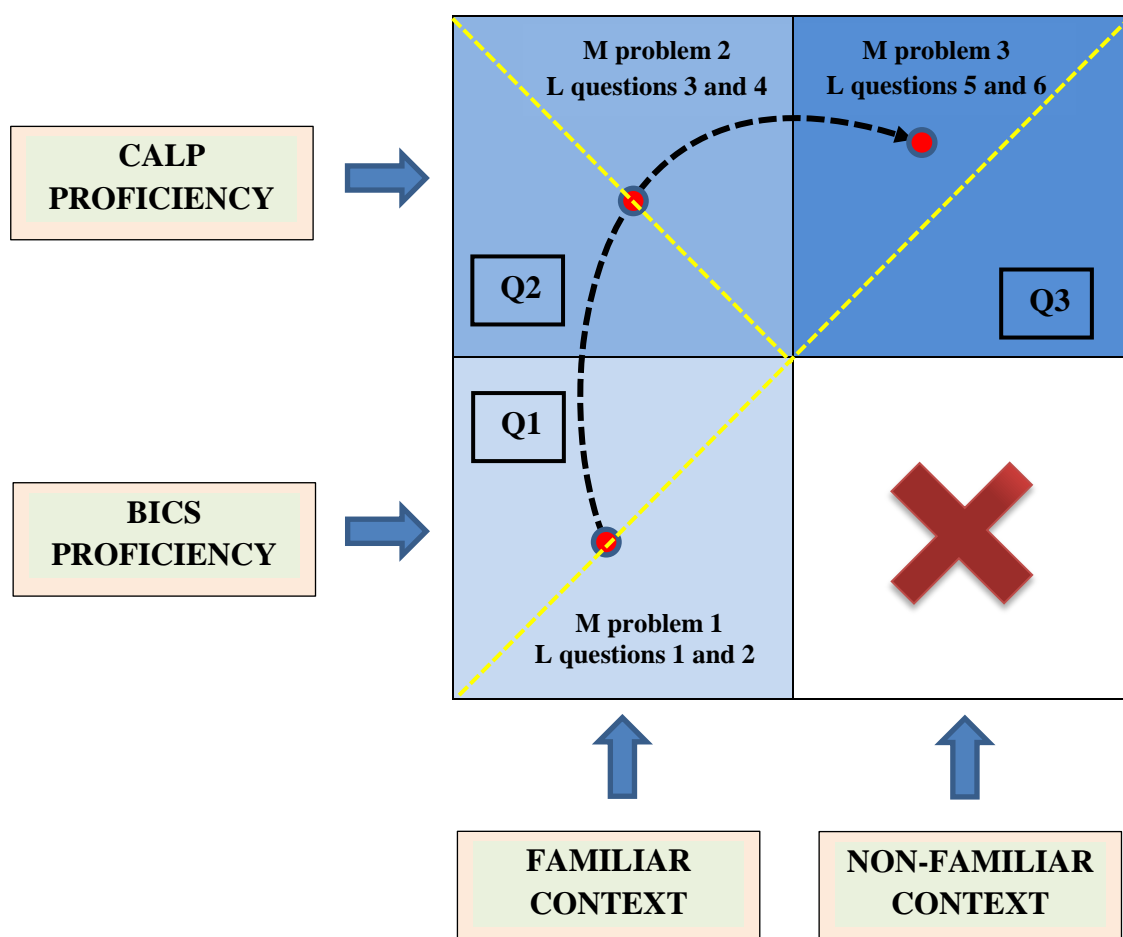


Figure 16: Design of tests in the present study along the continuum of Cummins' matrix applied to the education of ITM students in developing countries
Adapted from: Coyle, Hood and Marsh (2010)

Once tests were designed in L2 French, education experts in each target area and local teachers checked the appropriateness of the content and the type of language used for each grade in each quadrant. After that, these were translated into L1 Sérère with the help two local people: One had received instruction in that language and was therefore familiar with its script; the second assisted the researcher during the whole data collection procedure and read M and L tests in the students' L1 during the data collection⁷⁰. In order to detect any possible weak aspect in the design, translations were checked backwards and tests were piloted with students whose mother tongue was Sérère (see section 6.4.3). The

⁷⁰ The help of a research assistant whose L1 was Sérère and who mastered L2 French was essential in the present study: He participated in the translation of both L and M tests, he read the tests in L1 Sérère to participants during the data collection procedure and gave the questionnaires to families who did not understand L2 French.

participation of local volunteers in the final design of tests, their translation and their completion during piloting was important to make sure that wording was adapted to the students' daily school habits and that it fitted into their context in order to avoid influences caused by a possible direct translation from the original L2 French version which might be grounded in a Western culture (Solano-Flores et al., 2002).

6.5.2 Design of questionnaires and interviews

With the purpose of eliciting information and establishing a socio-linguistic and educational landscape of the target area, questionnaires were given to students, teachers and parents. Moreover, two school directors in the target area and one school inspector were interviewed. Results from interviews have mainly been used as a support for pedagogical implications (see section 8.5).

Each question in the three polls had a box for participants to tick. In the case that respondents were asked to give an opinion, answers had been designed along a four-point Likert-scale (*oui, beaucoup; assez; peu; pas du tout*⁷¹). Due to the fact that young students may doubt on answers and therefore feel pushed to choose a central item, a four-point Likert scale was chosen in order to avoid that a central-tendency-bias could alter results (Smith and Roodt, 2003; Kostoulas, 2013). However, it was not the case in questions dealing with the frequency of use of a target language; in that case, a five-point Likert-scale was established (*toujours; souvent; quelques fois; rarement; jamais*⁷²).

The survey for students was formed of 21 questions, all written in L2 French. In order to facilitate children the way to give an answer, each item had a small box to tick. Questions were ordered as follows: From 1 to 5 they focused on the linguistic use of students with their relatives and within the members of their community. The following six questions (6 to 11) were related to the language employed with classmates and teachers in and outdoors the school. Finally, questions 12 to 21 aimed at obtaining information about the children's knowledge,

⁷¹ Yes, a lot; quite much; a little, not at all.

⁷² Always; often; sometimes; rarely; never.

attitude and motivation towards their L1 and their opinion about its hypothetical introduction in the school system.

The second survey was addressed to teachers and comprised 15 questions. The first one asked about the teachers' L1 with the aim of comparing the samples obtained with other studies such as Faye (2013) who argued that one hurdle in pilot mother-tongue-based MLE programmes in Senegal was the big mobility of teachers around the country and the mismatch between their L1 and the students' L1 which hinder efficient communication. Other questions dealt with the language they used with their students and their colleagues in the school and outside the building (2 to 6), their knowledge of the students' L1 and its use in the classroom (8), their opinion about the use of the students' L1 in tests and in during their lessons (9 to 12). Questions 13 and 14 referred to their motivation to take part into a hypothetical mother-tongue-based MLE programme and, at last, 15 asked their opinion about the introduction of the students' mother tongue in the curricula.

The 15 questions of the third poll were delivered to students' parents. The first question asked about the schooling level of respondents and the second aimed at having information on their L1. Questions from 3 to 6 dealt with parents' literacy competence in L2 French and in L1 Sérère. The next three (7 to 10) portrayed a sociolinguistic view of the daily languages used with children (making distinction between male and female) and with members of the community. Questions 11 and 12 enquired about children's absence at school and, at last, the intention of questions 13 to 15 was to obtain data about their impression of the use of students' L1 at school.

Finally, three people, two school directors and one school inspector were interviewed with the objective of obtaining further information through spontaneous talking. After a presentation and a brief sight on their dedication within the field of academic education, they were asked their opinion about the plausibility of introducing local languages in education and in assessments and about teachers' motivation to take part in a hypothetical mother-tongue-based MLE programme (see appendix 17 examples).

6.5.3 Piloting of tests

After the consent form was signed by the school director of Sokone (see appendix 18), tests for grades 3 and 6 in L1 Sérère and L2 French were piloted with 9 L1-Sérère students for each grade. The objective was double: First, to observe if tests and their content had to be improved or changed and second, to familiarize the research assistant with the tests and with the data collection process.

Concerning the language of tests, it was observed that numbers in M problem-solving tasks could cause some confusion in L1 Sérère. The numerical system for prices in that language is different than that for counting since the devaluation of the local currency in 1994 (Larané, 2017). Therefore, as advised by local teachers and in order to avoid miscalculation and confusion between prices and quantities, numbers were first expressed in L1 Sérère and then repeated in L2 French for the experimental group. Furthermore, it should be mentioned that L1-Sérère speakers have incorporated French numeracy in their daily communication when dealing with telephone numbers or currency amounts since this system is much simpler and very much used by older generations. Similarly, Krause and Prinsloo (2016) also explain that in South Africa, speakers of local languages, for instance L1 IsiXhosa, employ L2 English numbers to express quantities when communicating in their L1.

While piloting tests, it was also noticed that most of the students were doubtful about the mathematical operation they had to apply in the first problem for grade 6. It was concluded that a possible solution could be to lower the level since the main objective was the study of the impact of the language of tests and not the assessment of the academic level of the students.

Finally, teachers at the school of Sokone recommended keeping more faithful to the way in which they formulated M problem-solving tasks since it was recommended to them by the education department and it was the way tasks were presented to learners. They explained that students ought to appear directly involved within the M problem-solving-task by using the second person singular in the design of tests and not a direct question. As an example, the problem for grade 3 in Q1, the following before being piloted:

Madame Ndong est partie au marché et a acheté un sachet de 5 kg de riz, 2 kg de poisson et 3 kg d'oignons. **Quel est le nombre de kg de nourriture qu'elle a ramené à la maison?**⁷³

After teachers' advice, the final question was changed into a command and reformulated in first person singular:

Madame Ndong est partie au marché et a acheté un sachet de 5 kg de riz, 2 kg de poisson et 3 kg d'oignons. **Aide Mm Ndong à trouver le nombre de kg de nourriture qu'elle a ramené à la maison?**⁷⁴

At no time did students show signs of tiredness or boredom but, on the contrary, they seemed engaged with tests and, especially, with questionnaires.

6.5.4 Data collection procedure

Previous contact with schools was required before tests could be carried out. For that purpose, a previous trip to the area of the study was necessary. Due to the fact that direct personal interviews with school directors were not possible because they were not at their job place, I had to communicate with the chiefs of the different villages who facilitated later correspondence with school directors. As I was back to my job place in Barcelona, the research assistant went to the target schools several times to request the directors' agreement for the research to take place in their establishments. Once I was back in Senegal, several calls were necessary to confirm the directors' agreement about the data collection. It should be said that some schools, especially those of secondary education, rejected their approval to carry out data collection once they were told that this was a research and they would not receive funds as it had happened with non-governmental organisations.

With the experience of the master's thesis research (Martín-Chazeaud, 2014) and bearing in mind the absence of electricity in the target area, several copies of the answer sheet for tests, the questionnaire and the consent form were made before travelling.

⁷³ Mrs Ndong went to the market and bought a packet of 5kg of rice, 2kg of fish and 3 kg of onion. What is the number of kg of food she brought home?

⁷⁴ Mrs Ndong went to the market and bought a packet of 5kg of rice, 2kg of fish and 3 kg of onion. Help Mrs Ndong to find the number of kg of food she has brought home.

Prior to administration of tests, each of the school directors signed a consent form so that they agreed that tests could be carried out in their schools. In that same document, the researcher thanked the members of the school and guaranteed anonymity of each test-taker. After that, they were given the questionnaires addressed to teachers, which were distributed and completed by the school staff members. Two of the school directors agreed to be interviewed.

In each school, students were assembled in two different classrooms, one for the experimental group and one for the control group. Then they were explained the system of each M and L tests with examples on the board, each of the groups in the language in which they took the tests. The order of the tests for both subjects was alternated in the different schools, that is to say, in three of the schools, students started with M problem-solving tasks whereas in the other two, the first tests were L multiple choice questions.

Tests were oral due to the fact that students had never read, written or received academic instruction in L1 Sérère. All tests were repeated as many times as students required it since the focus of study was the language of tests in order to give an answer; the following M problem-solving or L question was not read until all students had stated that they had finished. Tests were read by native speakers of each language: The researcher himself in L2 French and the research assistant in L1 Sérère. Differences in dialectal varieties were taken into account for each of the two languages, if required (see chapter 8 for a descriptive and inferential analysis of the results obtained).

When tests were completed, participants were given a questionnaire (see section 6.5.2). The reason for surveys to be answered after tests was to avoid participants being aware of the objective of the present study. Due to the fact that some students were very young, they were guided throughout the whole survey by the researcher with the support of volunteer teachers. Although questions were written in L2 French, the use of the students' L1 or L2 Wolof (in the case that the target teacher was not fluent in Sérère) was absolutely necessary in order to obtain real information. When the process of data collection finished, students were rewarded with refreshments and teachers with a present.

With the purpose of obtaining data from families through the survey (see section 6.5.2), it was necessary to visit them in their homes. It was not possible to give the document to children due to the fact that most parents were not fluent in French or did not know that language; moreover, some could not even read or write it. For that same reason, the research assistant used L1 Sérère and I gave the survey to those few parents who could answer in L2 French.

6.5.5 Data analysis

At the end of the data collection procedure, tests were corrected. Each correct answer from the L multiple-choice-test was given one point. If there appeared to be no answer or more than one, the target question was not given any point. The maximum possible score for L was 6 points, 2 for each quadrant of the suggested Cummins' matrix (see section 6.5.1).

For M, the participation of an expert in teaching and assessing Mathematics was required. Bearing in mind the continuum in Cummins' matrix adapted to ITM language students in developing countries (see section 6.5.1), the criteria suggested by the education expert and used to assess each problem-solving task was the following:

- There is not any element or number related to the comprehension of the problem-solving task or any intention for calculating: 0 points.
- One to three elements or numbers appear on the answer sheet: 0.5 points.
- More than three elements or numbers appear on the answer sheet; the participant tries to calculate: 1 point.
- Most of the numbers and elements of the problem-solving-task appear on the answer sheet, a fact which shows that the participant has understood the instructions of the test. There is a calculation but the answer is not correct: 1.5 points.
- All the elements and numbers of the problem-solving task appear on the answer sheet. The given answer is correct (or very close): 2 points.

In order to assess with the maximum objectivity, problems were not corrected participant after participant but first the problem for Q1, then that for Q2 and finally that for Q3. Similar to L, the maximum score for the M tests was 6 points, that is, 2 for each quadrant.

Once tests were codified, scores were transferred to an excel spread-sheet for descriptive analysis; for inferential analysis, the advice of two experts was relevant to apply statistical tools in SPSS⁷⁵. It was considered to examine the data collected through one way analysis of the covariance (ANOVA) taking the significance level at 95% (being the alpha number .05). In order to analyse statistically students' results for research questions 1b and 2, and only if one-way ANOVA confirmed significant differences between each of the subgroups⁷⁶ (four or six, respectively), an Honestly Significant Difference (HSD) Tukey test would be conducted with the purpose of identify specific significant differences between them.

In order to visualize data, for research questions 1a and 1b, individual scores for both the experimental group and the control group in each grade, subject and gender were represented in dispersion graphs and according to an academic skill-threshold or level of three points fixed for the present study and in the same way as other assessments carried out in Senegal such as SNERS IV or V (see section 6.5.5). After that, the percentage of students who obtained each possible score was calculated and classified along a scale (0 to 6 points) which increased in 1 point for L and in 0.5 points for M. For research question 2, it was figured out the percentage of students who obtained the different possible scores within each quadrant (from 0 to 2) and according to the language in which they took the tests. Then, average scores obtained in each of the quadrants were displayed in graphs and thus picturing the pathway along Cummins' matrix.

⁷⁵ In order to carry out inferential analysis, I followed advice given by Mr Martín and Mr Planes, both experts in Mathematics and statistics.

⁷⁶ In chapter 7, the term *condition* is used when conducting inferential analysis. According to the Math Resources Dictionary (2016), an *experimental condition* or *condition* is defined as "one of the distinct states of affairs or values of the independent variable for which the dependent variables are measured in order to carry out statistical tests or calculations" (<https://www.mathresources.com>). Thus, in the present study there are four conditions according to gender and language of tests related to research question 1b and six conditions according to language features in each of the three quadrants of Cummins' matrix and the language of tests related to research question 2.

7. RESULTS

7.1 Introduction

The present chapter aims at explaining the results obtained after descriptive and inferential analyses of the data in order to try to give answers to the proposed research questions (see section 5.2). With that purpose, sections 7.2 and 7.3 describe the data obtained in L and M, respectively, comparing the results of the experimental group (if they took tests in L1 Sérère) to those of the control group (if they took tests in L2 French) first for participants at grade 3 and then for those at grade 6. After that, sections 7.4 and 7.5 follow the same structure as the previous but focusing on females who were given tests in L1 Sérère (experimental group) and comparing them with their male mates in the same group and with females who took tests in L2 French (control group). Finally, the goal of sections 7.6 and 7.7 is to describe and analyse the effect of the language of tests (L1 Sérère or L2 French) on students' academic results according to the different levels of complexity established in each quadrant of Cummins' matrix, as explained in section 6.5.1.

7.2 Analysis of the language effect on the L test

The tests for L was designed following the curricula for primary education and making sure that students had already dealt with the target contents (see section 6.5.1). The L test included six oral questions with four possible answers among which to choose the correct one. Individual students' scores in L were taken into consideration in order to observe their position relative to the academic skill-threshold of 3 points (see section 6.5.5). As shown in figure 17, individual results in L for those participants who received tests in L1 Sérère are located at the level of 3 points or above, especially concerning those at grade 6.

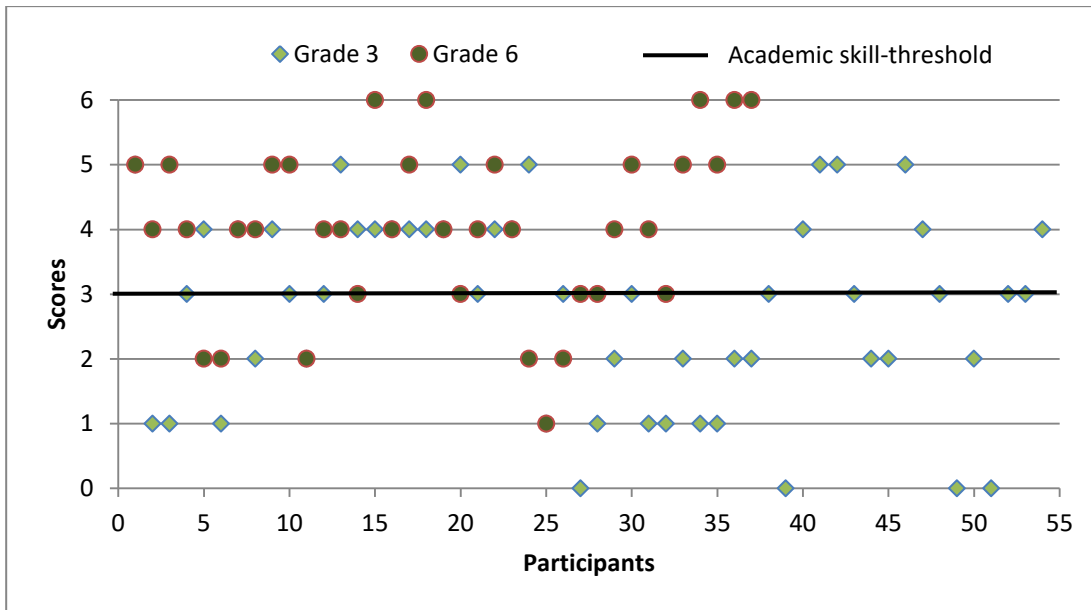


Figure 17: Distribution of students' scores in the L test in L1 Sérère

On the contrary, the majority of individual scores for those participants at grade 3 and grade 6 who took the L test in L2 French obtained individual scores below the level of 3 points, regardless of the grade they attended (see figure 18).

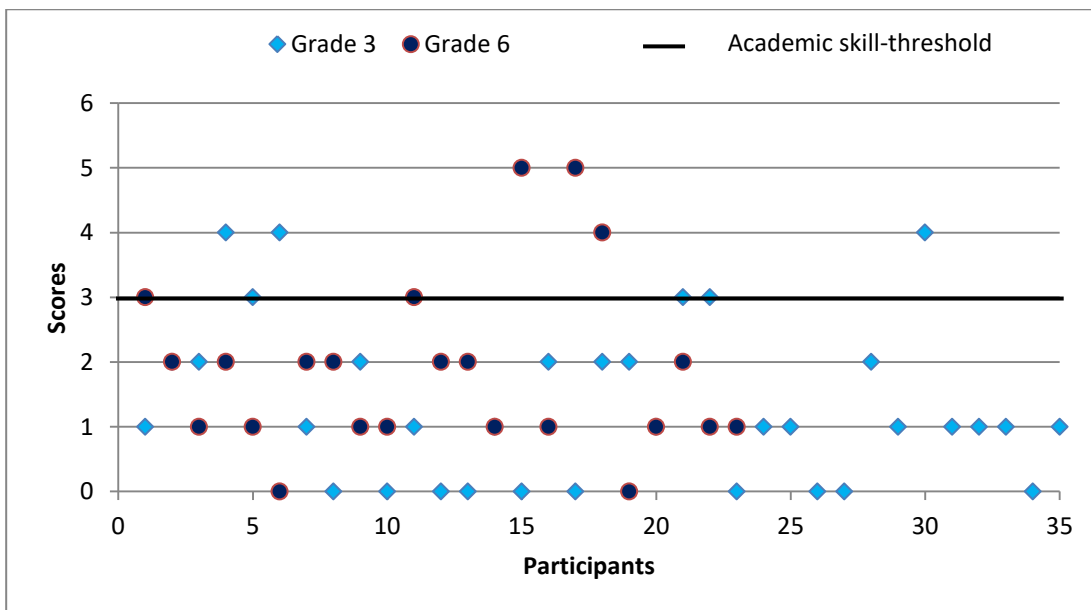


Figure 18: Distribution of students' scores in the L test in L2 French

The number of students with respect to the academic skill-threshold was calculated. As shown in table 22, there was a 59.26% (32) of grade-3 participants and 83.77% (31) of grade-6 who obtained scores equal or above 3 points if they

received tests in L1 Sérère. Compared to the control group, 17.14% (6) of students at grade 3 who received tests in L2 French and 21.75% (5) at grade 6 obtained marks equal or above three points.

		Grade 3		Grade 6		
		Language of tests	L1 Sérère	L2 French	L1 Sérère	L2 French
Score <3	%	40.74	82.86	16.23	78.25	
	raw number	22	29	6	18	
Score ≥3	%	59.26	17.14	83.77	21.75	
	raw number	32	6	31	5	

Table 22: Percentage of students below and above the academic level of 3 points in L

More precisely, the number of students at grade-3 is distributed along a scale which ranges from 0 to 6 according to the score obtained in L and to the language in which tests were given: L1 Sérère or L2 French (see figure 19 or table 23 for raw numbers). As it can be noticed, none of the participants reached a score of 6 points. The score of 5 was only attained by 12.96% (7) of learners in the experimental group. At the other side of the scale, only 7.41% (4) of students who had tests in their L1 failed in all questions, and 16.67% (9) were right in just 1 question. In comparison, the highest mark for participants in the control group was 4 points, attained by 8.57% (3) of them; it should also be said that 28.57% (10) had no right answers and 34.29% (12) only one.

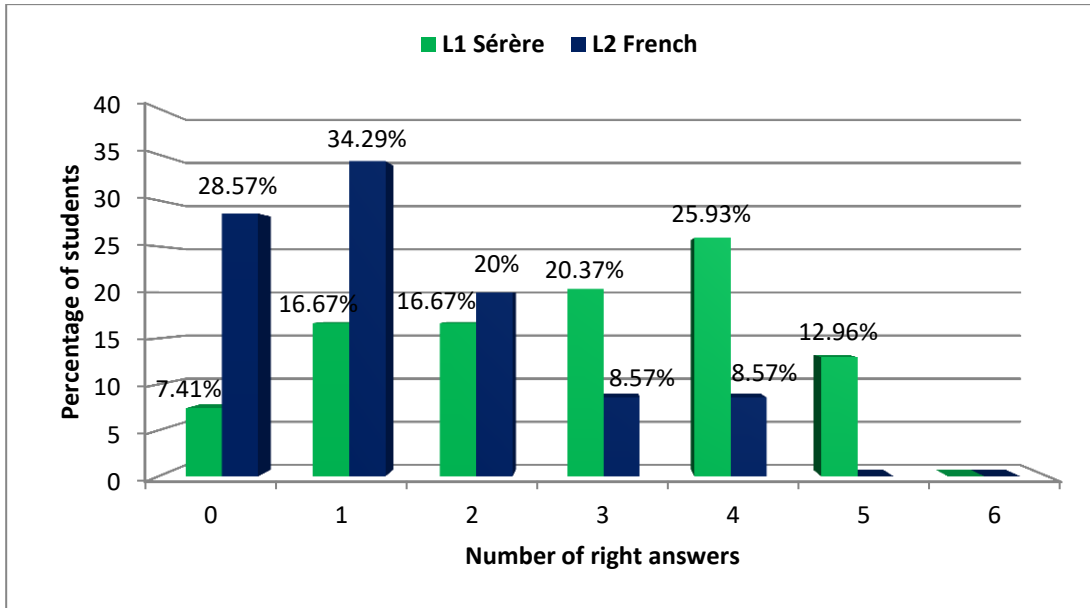


Figure 19: Distribution of grade-3 students according to their L scores

Possible scores	0	1	2	3	4	5	6
L1 Sérère	4	9	9	11	14	7	0
L2 French	10	12	7	3	3	0	0

Table 23: Raw numbers of grade-3 students according to their L scores

Statistical analysis was conducted with the purpose of contrasting grade-3 students' mean scores who took the L test in L1 Sérère (experimental group) with grade-3 learners' mean scores who received them in L2 French (control group). As shown in table 24, the mean score obtained by grade-3 participants who had the L test in L1 Sérère was 2.80 points (SD=1.51) and that of grade-3 participants who received them in L2 French was 1.34 points (SD=1.23), which implies a mean score difference of 1.46 points which was statistically significant as a result of data from the one-way-ANOVA ($F=22.61$, $p=.000$); therefore, the null-hypothesis ($H_0:\mu_1=\mu_2$) was rejected and the alternative hypothesis accepted ($H_1:\mu_1\neq\mu_2$).

Grade	Language of tests	N	L mean score	SD	F	p
3	L1 Sérère	54	2.80	1.51	22.61	.000
	L2 French	35	1.34	1.23		

Table 24: Grade 3: Results from one-way-ANOVA in L

The number of grade-6 students who obtained the possible scores in L along a scale of 0 to 6 points was calculated (see figure 20 and table 25 for raw numbers). On the one hand, it should be noticed that a great number of participants who were given tests in L1 Sérère obtained scores at the right side of the scale: The score of 6 points was reached by 13.51% (5) of them, that of 5 points by 24.32% (9) and that of 4 by 32.43% (12); there were no participants in the experimental group with all answers incorrect and only 2.70% (1) with only one correct. On the other hand, none of the grade-6 students who received the L test in L2 French obtained a score of 6 points and 8.70% (2) had 5 correct answers; the majority of them, on the left side of the scale, had a mark of 1 point (39.13% [9]) or 2 points (30.43% [7]).

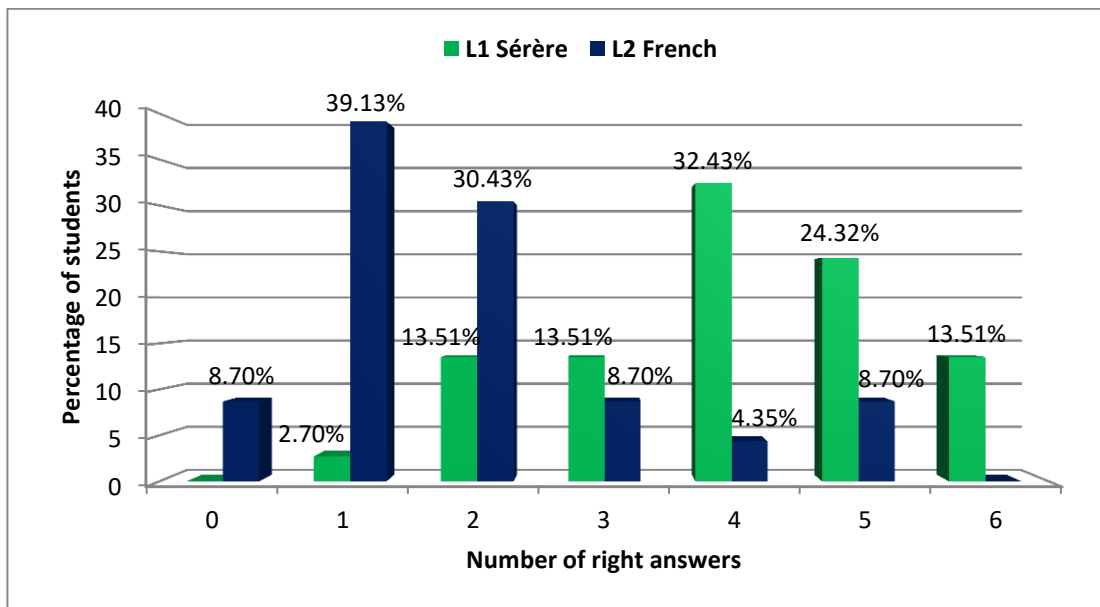


Figure 20: Distribution of grade-6 students according to their L scores

Possible scores	0	1	2	3	4	5	6
L1 Sérère	0	1	5	5	12	9	5
L2 French	2	9	7	2	1	2	0

Table 25: Raw numbers of grade-6 students according to their L scores

In order to statistically contrast grade-6 students' mean score when they received the L test in L1 Sérère (experimental group) with grade-6 learners' mean score when they had it in L2 French (control group), inferential analysis was applied on samples collected (see table 26). As shown in table 26, students in the experimental group (mean=4.03, [SD= 1.32]) obtained 2.16 points higher than their peers in the control group (mean=1.87, [SD= 1.36]). One-way-ANOVA analysis ($F=36.97$, $p=.000$) rejected the null-hypothesis ($H_0:\mu_1=\mu_2$) that both groups at grade 6 obtained the same results and thus confirmed the alternative one ($H_1:\mu_1\neq\mu_2$) and supported the idea that the mean score difference between the two groups was statistically significant.

Grade	Language of tests	N	L mean score	SD	F	p
6	L1	37	4.03	1.32	36.97	.000
	L2	23	1.87	1.36		

Table 26: Grade 6: Results from one-way-ANOVA in L

7.3 Analysis of the language effect on the M test

As explained in section 6.5.1, the M test consisted on three mathematical problem-solving tasks based on the academic content of primary education in Senegal. Individual results obtained by grade-3 and grade-6 participants who took it in L1 Sérère (experimental group) are distributed with respect to the academic skill-threshold of 3 points. As shown in figure 21, most of students' scores for both grades who received the M test in their mother tongue are located at the level of the skill-threshold or above.

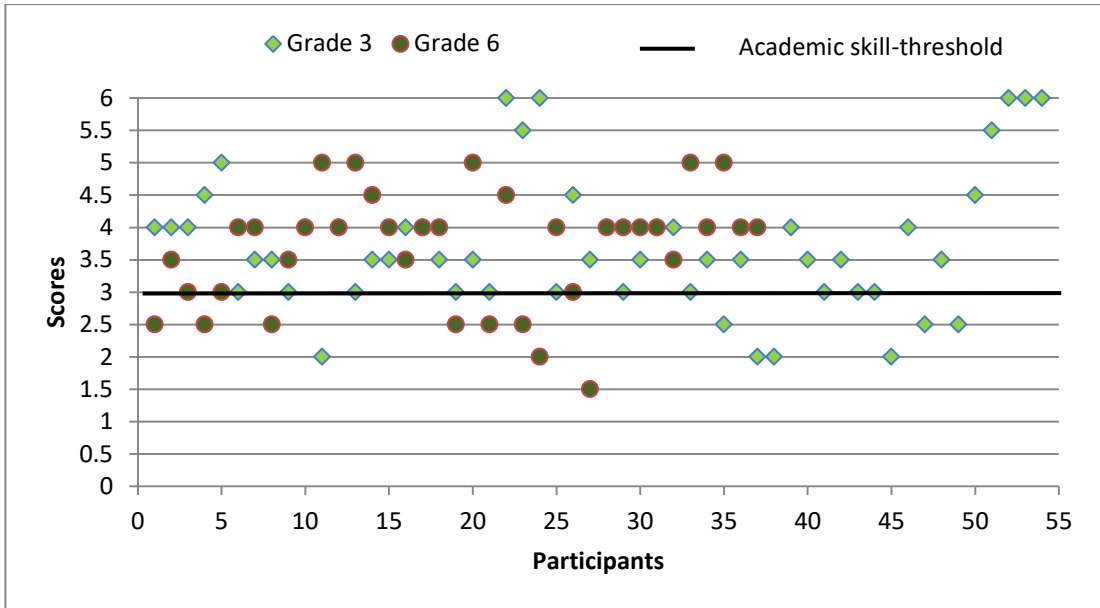


Figure 21: Distribution of students' scores in the M test in L1 Sérère

In the case of grade-3 and grade-6 students in the control group, it can be observed that nearly all participants who took the M test in L2 French are located below the academic skill-threshold, especially those students at grade 3 who were the least exposed to the language MOI (see figure 22).

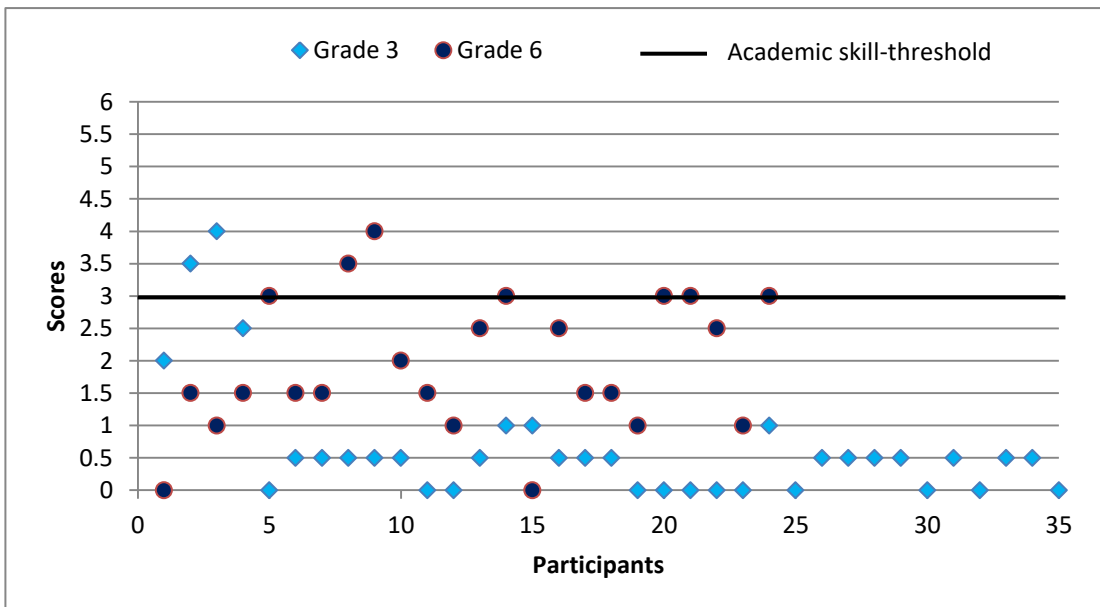


Figure 22: Distribution of students' scores in the M test in L2 French

As shown in table 27, most of the students who received the M test in L1 Sérère (87.03% [47] at grade 3 and 78.38% [27] at grade 6) scored equal or above 3

points. Contrastingly, students who had it in L2 French did not behave the same way: There were 5.72% (2) of participants at grade 3 and 30.43% (7) at grade 6 who showed to be able to solve M problem-solving tasks in that language.

		Grade 3		Grade 6	
Language of tests		L1 Sérère	L2 French	L1 Sérère	L2 French
Score <3	%	12.97	94.28	21.62	69.57
	raw number	7	33	8	16
Score ≥3	%	87.03	5.72	78.38	30.43
	raw number	47	2	27	7

Table 27: Percentage of students below and above the academic level of 3 points in M

After calculating the percentage of grade-3 students according to the mark they obtained in the M test along a scale ranging from 0 to 6 (see figure 23 and table 28 for raw numbers), it can be observed that 9.26% (5) of participants who had their tests in L1 Sérère attained the top mark of 6 points; moreover, most of them concentrated their marks in 3 points (20.37% [11]), 3.5 (24.07% [13]) and 4 (22.22% [12]). However, when focusing on participants' scores when they had tests in L2 French, a large number obtained scores at the left side of the scale: 34.29% (12) did not get any point and 45.71% (16) had a score of 0.5; the best mark was 4 points reached by 2.86% (1) of participants in the control group.

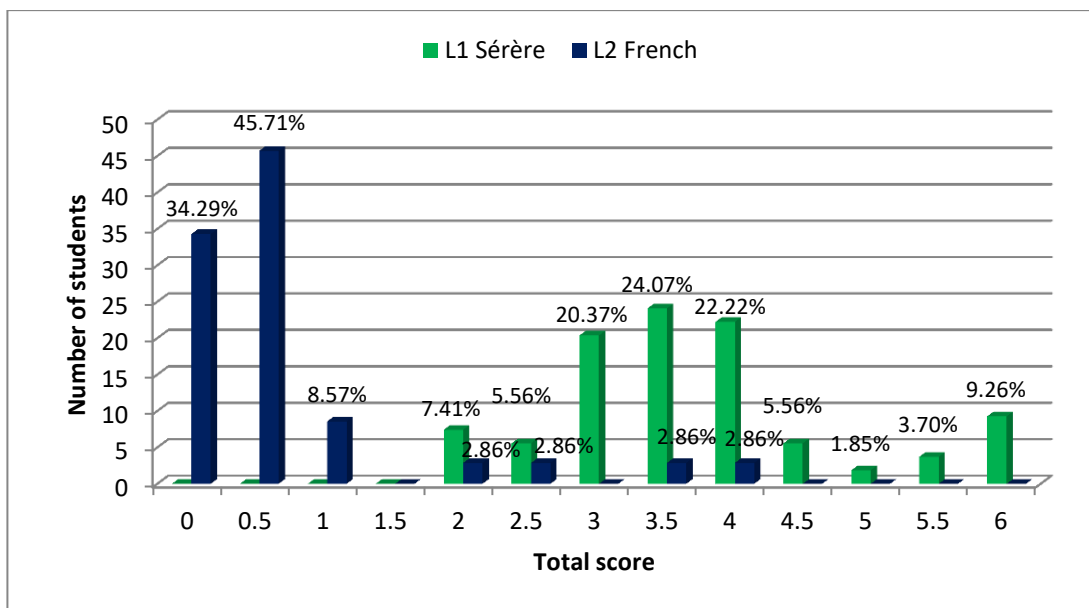


Figure 23: Distribution of grade-3 students according to their M scores

Possible scores	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
L1 Sérère	0	0	0	0	4	3	11	13	12	3	1	2	5
L2 French	12	16	3	0	1	1	0	1	1	0	0	0	0

Table 28: Raw numbers of grade-3 students according to their M scores

As it can be observed in table 29, the sample mean score for grade-3 participants in the experimental group was 3.73 points (SD=1.06) and that for grade-3 participants in the control group .66 points (SD=.95), with a mean score difference of 3.07 points. Data from one-way-ANOVA ($F=194.57$, $p=.000$) yielded a statistically significant difference, declined the null-hypothesis ($H_0:\mu_1=\mu_2$) and therefore confirmed the alternative hypothesis ($H_1:\mu_1\neq\mu_2$).

Grade	Language of tests	N	M mean score	SD	F	p
3	L1	54	3.73	1.06	194.57	.000
	L2	35	.66	.95		

Table 29: Grade 3: Results from one-way-ANOVA in M

Grade-6 students were grouped in different scores (0 to 6) according to their results in M (see figure 24 and table 30 for raw numbers). A large number of those who took the M test in L1 Sérère were at the right side of the scale; more precisely, 40.54% (15) of them obtained the 4-point mark and 13.51% (5) the 5-point which was the highest. In the case of students who received the M test in L2 French, a great number got scores at the left side of the scale; for instance, 17.39% (4) had scores of 1 point, 30.43% (7) of 1.5 points and 13.04% (3) of 2.5 points. The highest mark reached by 4.35% (1) of the participants in the control group was 4.

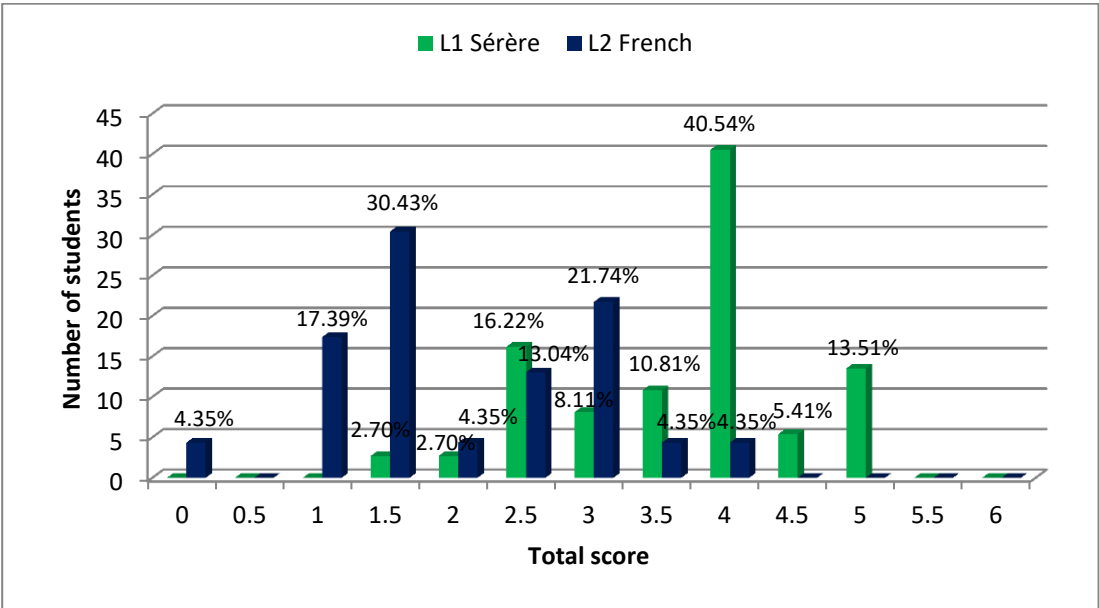


Figure 24: Distribution of grade-6 students according to their M scores

Possible scores	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
L1 Sérère	0	0	0	1	1	6	3	4	15	2	5	0	0
L2 French	1	0	4	7	1	3	5	1	1	0	0	0	0

Table 30: Raw numbers of grade-6 students according to their M scores

As shown in table 31, the difference between the mean score obtained by participants in the experimental group and those in the control at grade 6 yielded 1.60 points in favour of participants who had tests in L1 Sérère (mean=3.66, SD=.90) over those who received them in L2 French (mean=2.02, SD=.99). The one-way-

ANOVA test ($F=43.70$, $p=.000$) rejected the null-hypothesis ($H_0:\mu_1=\mu_2$) and admitted the alternative hypothesis ($H_1:\mu_1\neq\mu_2$), thus corroborating that such mean score difference between the experimental and control groups was statistically significant.

Grade	Language of tests	N	M mean score	SD	F	p
6	L1	37	3.66	.90	43.70	.000
	L2	23	2.02	.99		

Table 31: Grade 6: Results from one-way-ANOVA in M

7.4 Analysis of the language effect on the L test taken by the female population

Possible differences between females according to the language in which they took the L test and also between females and males in the experimental group were analysed taking into account gender, grade and the language of tests (L1 Sérère or L2 French). For that, first of all, individual scores were compared with respect to the academic level of 3 points. Second, the percentage of participants who scored below and above the academic skill-threshold of 3 points was calculated. Third, the number of participants distributed along a scale of possible scores in L (0 to 6 points) in both grades was calculated. Finally, statistical analysis one-way-ANOVA and post-hoc HSD Tukey were conducted on the data (see section 6.5.5).

As shown in figure 25⁷⁷, a large number of grade-3 and grade-6 participants who received the L test in L1 Sérère obtained scores equal or above the level of 3 points with the exception of younger females: A large number of them did not reach the academic skill-threshold.

⁷⁷ Due to format reasons, the darkest line representing the academic skill-threshold does not appear in the legend of figures 25, 26, 29 and 30.

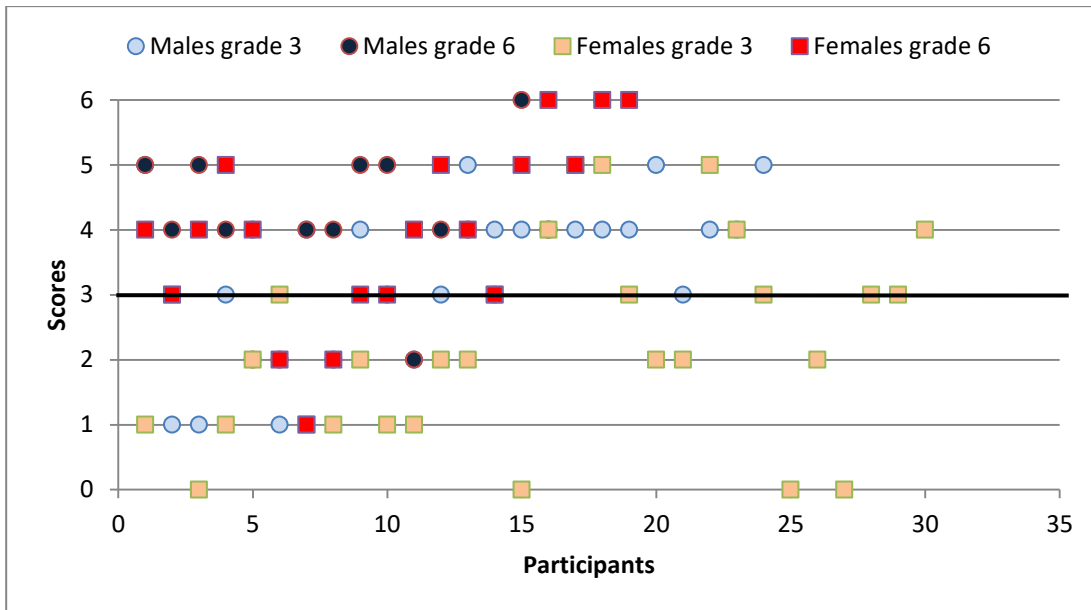


Figure 25: Distribution of students' scores in the L test in L1 Sérère

With respect to grade-3 and grade-6 learners who received the L test in L2 French, as displayed in figure 26, the majority of them did not reach the academic skill-threshold of 3 points regardless of their gender. However, it should be noticed that a few females at grade 6 got the highest scores among participants in the control group.

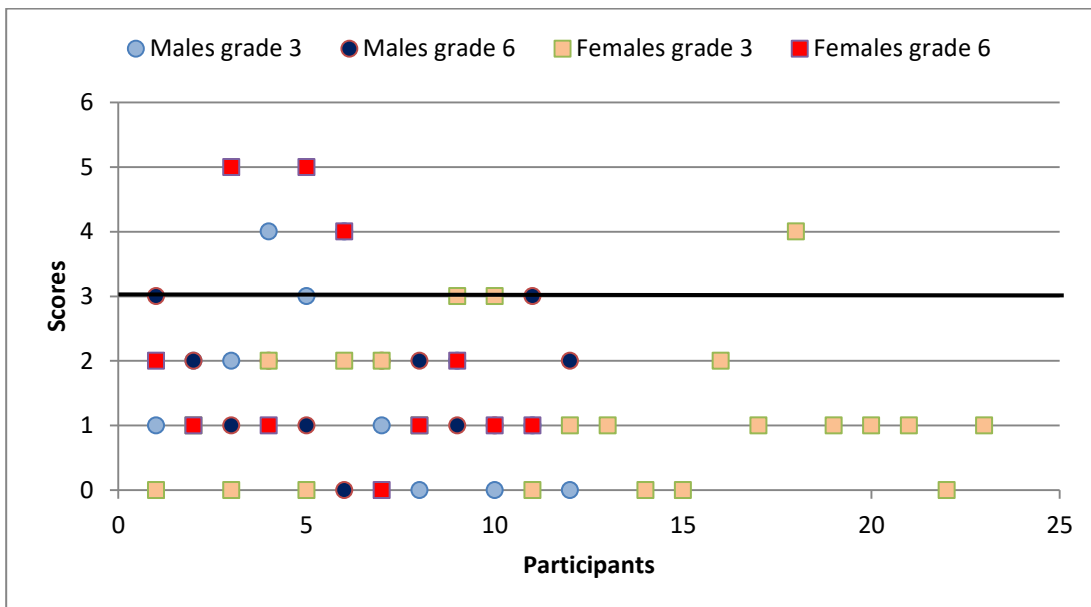


Figure 26: Distribution of students' scores in the L test in L2 French

The number of participants according to their scores obtained in L was calculated with respect to the level of 3 points (see table 32). Those female students at grade-3 who had tests in L1 Sérère, 43.33% (13) scored equal or above the academic skill-threshold, a small number if compared to the 79.17% (19) of males who showed adequate skills for L. Concerning female learners who had tests in L2 French, 13.05% (3) of them could reach the academic skill-threshold, a number which is smaller if contrasted to the 25% (3) of males in that same group. In the case of grade-6 participants, it should be said that the largest number of students who scored equal or above 3 points were the 84.21% (16) of females in the experimental group, followed by 83.33% (15) of males. In the control group, 27.27% (3) females showed a mastery of L when assessed in L2 French, a larger number than the 16.67% (2) of males.

		Grade 3				Grade 6			
		L1 Sérère		L2 French		L1 Sérère		L2 French	
		Males	Females	Males	Females	Males	Females	Males	Females
Score <3	%	20.83	56.67	75	86.96	16.67	15.79	83.33	72.73
	raw number	5	17	9	20	3	16	10	8
Score ≥3	%	79.17	43.33	25	13.04	83.33	84.21	16.67	27.27
	raw number	19	13	3	3	15	15	2	3

Table 32: Percentage of students below and above the academic level of 3 points in L

More specifically to grade 3 (see figure 27 and table 33 for raw numbers), the best score obtained by 10% (3) of female participants in the experimental group was 5 points; most of them got marks of 2 points (23.33% [7]) and 3 points (23.33% [7]). Similarly, the highest score for males in that same group was 5 points, reached by a 16.67% (4); it should be said that a great number of them (46.83% [11]) obtained a mark of 4 points. Regarding the control group, a large number of females who took the L test in L2 French did not score any point (30.43% [7]) or only had the 0.5-mark (39.13% [9]), the highest score being that of 4 points reached by

4.35% (1) of them. Likewise, a third of males also in the control group had scores of 0 points (25% [3]), 1 point (25% [3]) or 2 (25% [3]) points; the 4-point mark was the highest score for 16.67% (2) of males who had the L test in L2 French.

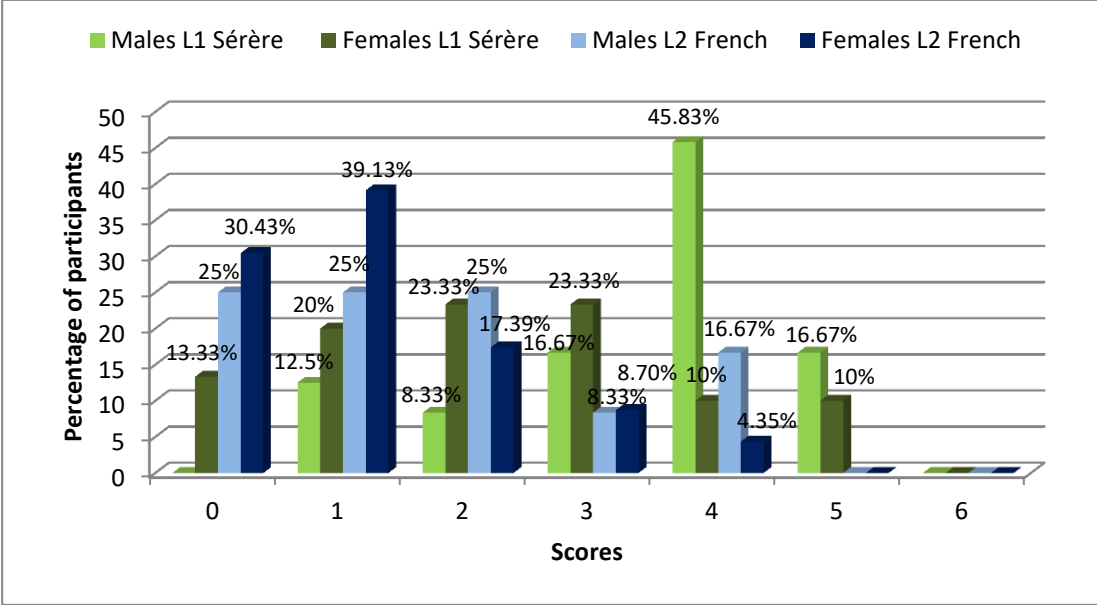


Figure 27: Distribution of grade-3 students per gender and according to their L scores

Possible scores		0	1	2	3	4	5	6
L1 Sérère	Males	0	3	2	4	11	4	0
	Females	4	6	7	7	3	3	0
L2 French	Males	3	3	3	1	2	0	0
	Females	7	9	4	2	1	0	0

Table 33: Raw numbers of grade-3 students per gender according to their L scores

In order to contrast grade-3 female participants’ mean scores with the other three conditions⁷⁸, statistical analysis on data collected from grade-3 students in L was conducted (see table 34). As it can be observed, female participants’ mean score when taking the L test in L1 Sérère was 2.27 points (SD=1.51), that is 1.46

⁷⁸ In the current analysis, there are four conditions according to the circumstances of each quadrant and to the language of tests: Females and males who received tests in L1 Sérère and females and males who received them in L2 French (see section 6.5.5).

points below their male colleagues (mean=3.46, SD=1.25) but 1.10 points higher when compared to female students who received it in L2 French (mean=1.17, SD=1.11). The latter appeared to have the lowest mean score of the four conditions since a mean difference of 0.5 points distanced them from males in the control group (mean=1.67, SD=1.44). One-way-ANOVA ($F=12.26$, $p=.000$) discarded the null-hypothesis that the four conditions obtained the same scores in L ($H_0:\mu_1=\mu_2=\mu_3=\mu_4$) and thus accepted the alternative hypothesis ($H_1:\mu_1\neq\mu_2\neq\mu_3\neq\mu_4$) that, at least, there was one significant difference.

Grade	Language of tests	Gender	n	Mean	SD	F	p
3	L1	Males	24	3.46	1.25	12.26	.000
		Females	30	2.27	1.51		
	L2	Males	12	1.67	1.44		
		Females	23	1.17	1.11		

Table 34: Grade 3: Results from one-way-ANOVA in L per gender

Since one-way-ANOVA revealed that there was one statistical significant difference among grade-3 participants' mean scores in L when considering both gender and language in which they took the test, a post-hoc analysis was necessary to determine specific differences. HSD Tukey test was applied on mean scores obtained from grade 3 students in L tests (see table 35). The mean score difference between females who had the L test in L1 Sérère and their colleague females who received it in L2 French turned out to be significant ($p=.021$), thus rejecting the null-hypothesis ($H_0:\mu_1=\mu_2$) and confirming the alternative one ($H_1:\mu_1\neq\mu_2$). When contrasting mean scores of males and females when they received tests in their mother tongue, significant differences also appeared ($p=.009$), consequently the null-hypothesis ($H_0:\mu_1=\mu_3$) was also discarded and the alternative one ($H_1:\mu_1\neq\mu_3$) confirmed. However, the difference between males mean score and that of females when they took the test in L2 French was not considered statistically significant

($p=.729$) according to HSD Tukey, meaning that the null-hypothesis ($H_1:\mu_3=\mu_4$) could not be rejected.

Contrast	Mean difference ⁷⁹	p
females L1 Sérère (experimental group) vs females L2 French (control group)	1.1	.021
females L1 Sérère (experimental group) vs males L1 Sérère (experimental group)	1.19	.009
females L2 French (control group) vs males L2 French (control group)	.49	.729

Table 35: Grade 3: Results from post-hoc analysis in L per gender and language of the test

Concerning grade 6, the percentage of students by gender who obtained the different possible scores in L along a scale ranging from 0 to 6 points was calculated (see figure 28 and table 36 for raw numbers). As it can be observed, 15.79% (3) of females who received tests in L1 Sérère was the largest number of participants who obtained the top score of 6 points; moreover, 21.05% (4) of them got 5 points and 26.32% (5) 4 points. An 11.11% (2) of males who took tests in their mother tongue attained also the 6 points, 27.78% (5) reached the 5-point mark and 38.89% (7) the 4-point. Compared to participants who received the L test in L2 French, a large number of females (45.45% [5]) obtained a score of 1 point; however, it should be said that 18.18% (2) of them reached 4 points, which is the highest score when females had the test in L2 French. Not so differently, the majority of males in the control group obtained 1 point (33.33% [4]) or 2 points (41.67% [5]), their best score being the mark of 3 points reached by 16.67% (2) of them.

⁷⁹ Mean differences are presented in absolute values.

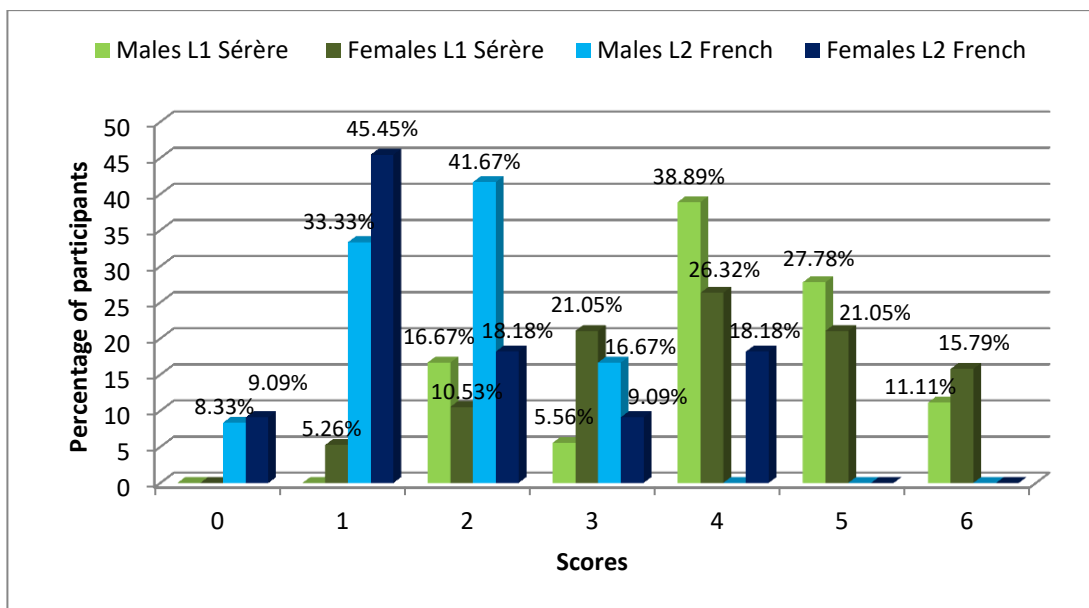


Figure 28: Distribution of grade-6 students per gender and according to their L scores

Possible scores		0	1	2	3	4	5	6
L1 Sérère	Males	0	0	3	1	7	5	2
	Females	0	1	2	4	5	4	3
L2 French	Males	1	4	5	2	0	0	0
	Females	1	5	2	1	2	0	0

Table 36: Raw numbers of grade-6 students per gender according to their L scores

With the purpose of analysing grade-6 female students' mean scores in L and observe if the language had a different effect on their results, inferential analysis was conducted on data collected. As shown in table 37, participants of both genders who received tests in L1 Sérère achieved the highest scores: Females' mean score (mean=3.95 points, SD=1.43) only differed of .16 points compared to that of males' (mean=4.11, SD=1.23). Contrasted to participants who had tests in L2 French, there was a difference of 1.86 points between females in the experimental group (mean=3.95 points, SD=1.43) and their mates in the control group (mean=2.09, SD=1.76). It should be noticed that females (mean=2.09, SD=1.76) outperformed males (mean=1.67, SD=.89) when they were given the L test in L2 French. The one-way-ANOVA test conducted ($F=12.27$, $p=.000$) discarded the null-

hypothesis ($H_0:\mu_1=\mu_2=\mu_3=\mu_4$) and accepted the alternative hypothesis ($H_1:\mu_1\neq\mu_2\neq\mu_3\neq\mu_4$) by which there was one significant statistical difference between the four conditions at grade 6 when they took the L test.

Grade	Language of tests	Gender	n	Mean	SD	F	p
6	L1	Males	18	4.11	1.23	12.27	.000
		Females	19	3.95	1.43		
	L2	Males	12	1.67	.89		
		Females	11	2.09	1.76		

Table 37: Grade 6: Results from one-way-ANOVA in L per gender

Because one-way-ANOVA found out statistical differences among grade-6 students according to gender and the language in which participants took the L test, a post-hoc test was applied to obtain detailed differences (see table 38). As shown, The HSD Tukey revealed statistically significant differences ($p=.003$) when females' mean score in the experimental group was compared to that of their female colleagues in the control group, thus rejecting the null-hypothesis ($H_0:\mu_1=\mu_2$) and accepting the alternative one ($H_1:\mu_1\neq\mu_2$). However, no statistically significant differences were found ($p=.983$) between the mean score obtained by females and that of males when receiving L tests in L1 Sérère, therefore the null hypothesis ($H_0:\mu_1=\mu_3$) could not be discarded. Similarly, the .42-point divergence between females' mean score and that of males' when they took L tests in L2 French was not statistically significant ($p=.875$) and the null-hypothesis ($H_0:\mu_3=\mu_4$) could not be refused.

Contrast	Mean difference ⁸⁰	p
females L1 Sérère (experimental group) vs females L2 French (control group)	1.86 points	.003
females L1 Sérère (experimental group) vs males L1 Sérère (experimental group)	.16 points	.983
females L2 French (control group) vs males L2 French (control group)	.42 points	.875

Table 38: Grade 6: Results from post-hoc analysis in L per gender

7.5 Analysis of the language effect on the M test taken by the female population

With the purpose of comparing the effect of the language of tests on the M problem-solving test taken by female participants in the present study, first individual scores were allocated for each student at grades 3 and 6 in both the experimental and control groups and tagged by gender. After that, the number of students who obtained scores equal or above the level of 3 points and those who did not was calculated. Then, participants at grade 3 and later at grade 6 were distributed along a scale of possible scores in M (0 to 6) according to the scores they obtained and the language of tests. Statistical tests one-way-ANOVA and HSD Tukey were conducted in order to determine if differences observed between the focused conditions were statistically significant (see section 6.5.5).

Individual scores in M for female and male participants at grade 3 and those at grade 6 who had tests in L1 Sérère were compared to the academic skill-threshold of 3 points (see figure 29). As it can be observed, although some students did not attain the level of 3 points regardless of their age and gender, a large number of those who received the M test in L1 Sérère obtained results above or equal to 3 points. However, despite the fact that grade-3 and grade-6 females who received tests in L1 Sérère are the sub-groups with a larger number of individuals below the established threshold, they are also those who obtained the larger number of topmost scores as compared to their male colleagues in the same grade.

⁸⁰ Mean differences are presented in absolute values.

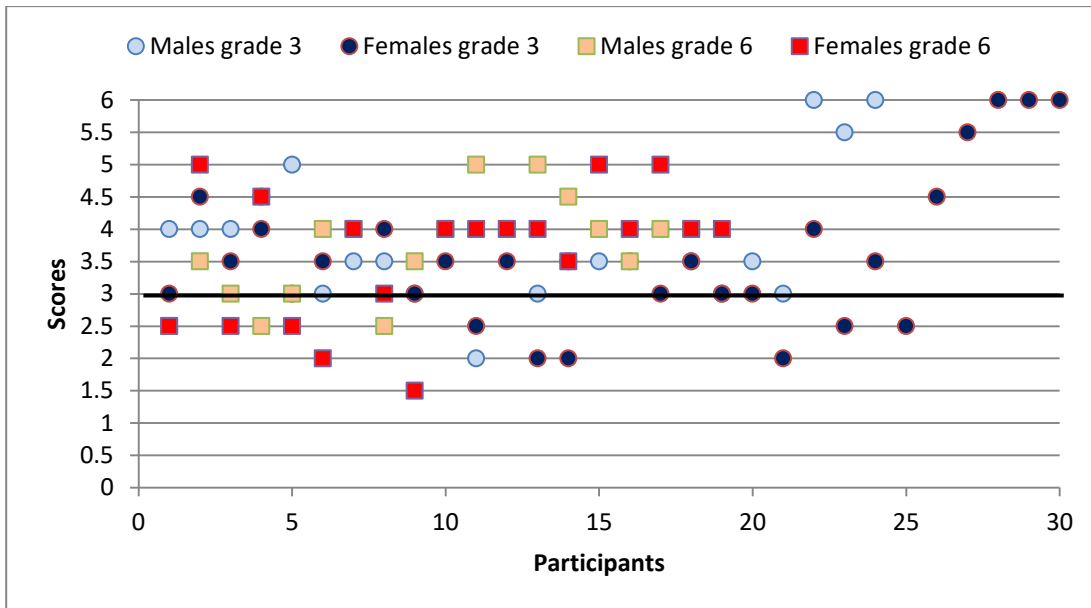


Figure 29: Distribution of students' scores in the M test in L1 Sérère

Individual scores in M for each of the participants at grade 3 and at grade 6 who were given the M test in L2 French were also compared to the academic level of 3 points. As shown in figure 30, most students in the control group obtained scores below the academic skill-threshold, and this fact is especially evident for females at grade 3. Only some females at grade 6 and some males at both grade 3 and at grade 6 reached the level of 3 points or above.

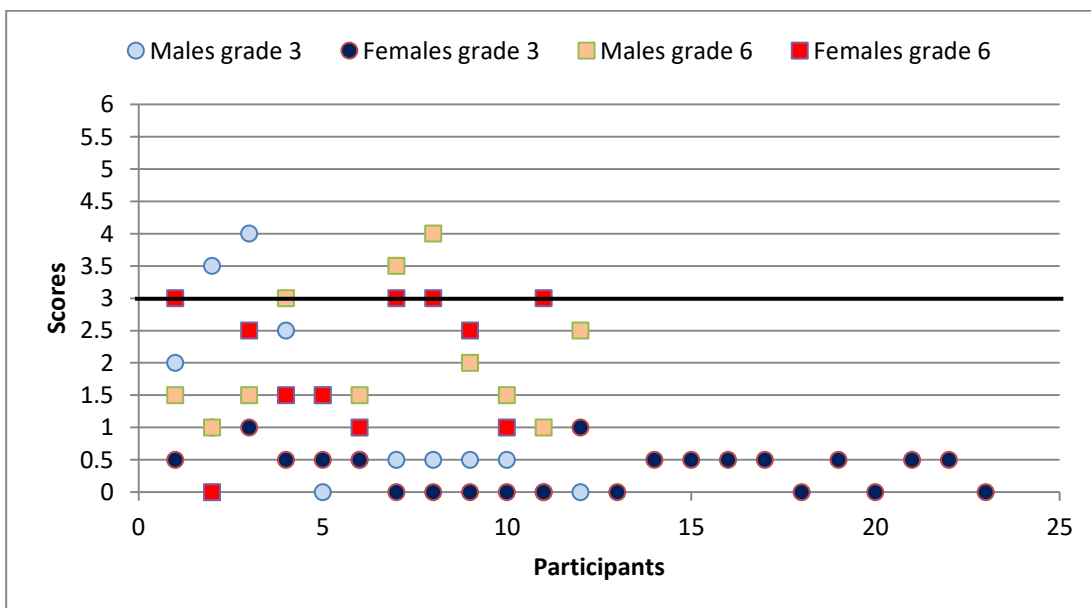


Figure 30: Distribution of students' scores in the M test in L2 French

The number of grade-3 and grade-6 participants who attained the level of 3 points in M was calculated according to gender and to the language in which they received the M test (see table 39). At grade 3, there were 80% (24) of females who received the test in L1 Sérère who attained scores equal or above the academic skill-threshold of 3 points; but that number was higher for males: 95.83% (23) of males who were given the M test in L1 Sérère had scores equal or above 3 points. The opposite happened with the control group: 100% (23) of females and 83.33% (10) of males did not reach the academic skill-threshold. Concerning grade 6, 73.68% (14) of females who had tests in L1 Sérère attained the academic skill-threshold, a smaller number than the 83.33% (15) of males in the experimental group. When participants took the M test in L2 French, 36.36% (4) of females and 25% (3) of males could reach scores equal or above the academic level of 3 points.

		Grade 3				Grade 6			
		L1 Sérère		L2 French		L1 Sérère		L2 French	
		Males	Females	Males	Females	Males	Females	Males	Females
Score <3	%	4.17	20	83.33	100	16.67	26.32	75	63.64
	raw number	1	6	10	23	3	5	9	7
Score ≥3	%	95.83	80	16.67	0	83.33	73.68	25	36.36
	raw number	23	24	2	0	15	14	3	4

Table 39: Percentage of students below and above the academic level of 3 points in M

At grade 3 (see figure 31 and table 40 for raw numbers), females' and males' scores were similar when they were given the M test in L1 Sérère: The best attainment for 10% (3) of females and 8.33% (2) of males was the top mark of 6 and the lowest score for 10% (3) of females and 4.17% (1) of males was 2 points. Moreover, a large number of both genders had middle scores: The 3-mark was obtained by 20% (6) of females and 20.83% (5) of males, the 3.5-mark by 23.33% (7) of females and 25% (6) of males and the 4-mark by 16.67% (5) of females and

29.77% (7) of males. Compared to females who were given the M test in L2 French, 39.13% (9) of them did not score, 47.83% (11) only obtained 0.5 points and 13.04% (3) scored 1 point, which was the highest score for them. Similarly, 25% (3) of males in the control group did not score any point and 41.67% (5) obtained 0.5 points; however, 8.33% (1) of them obtained 4 points which was the best mark for males who were given the M test in L2 French.

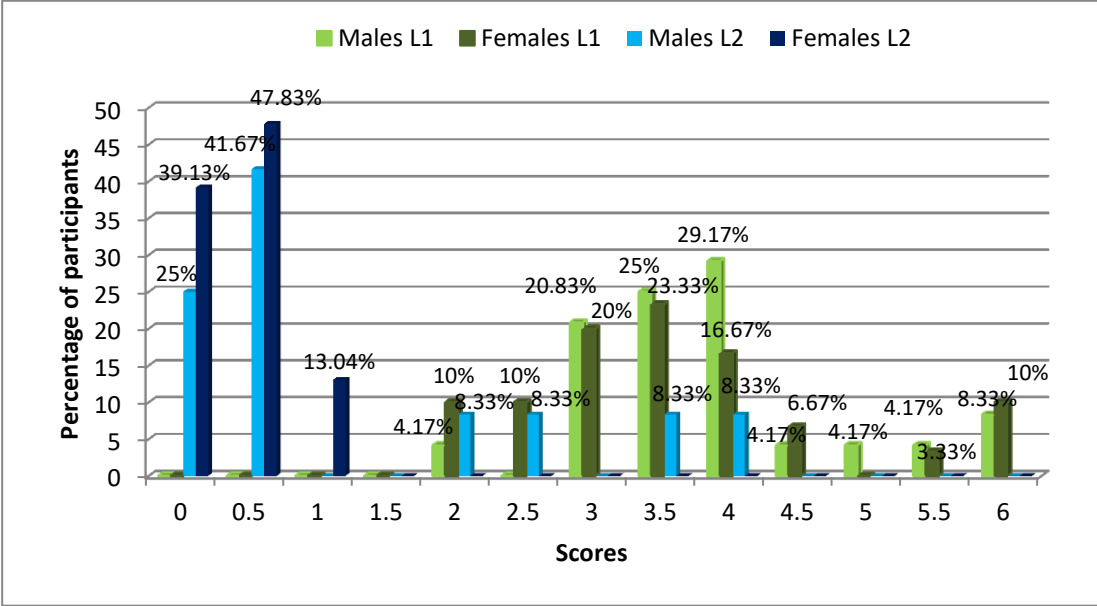


Figure 31: Distribution of grade-3 students per gender and according to their M scores

Possible scores		0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
L1 Sérère	Males	0	0	0	0	0	0	5	6	7	1	1	1	2
	Females	0	0	0	0	1	3	6	7	5	2	0	1	3
L2 French	Males	3	5	0	0	3	1	0	1	1	0	0	0	0
	Females	9	11	3	0	1	0	0	0	0	0	0	0	0

Table 40: Raw numbers of grade-3 students per gender according to their M scores

Inferential analysis was applied on sample scores collected from the M problem-solving task solved by grade-3 students. As shown in table 41, females (mean=3.61, SD=1.13) who received the M test in L1 Sérère was .21 points lower than that of males (mean=3.87 points, SD=.97) in the same group but 3.25 higher

than females (mean=.36, SD=.34) who were given it in L2 French. With respect to the control group, there was a difference of .85 points between females' (mean=.36, SD=.34) and males' (mean=1.21 points, SD=1.42) mean score when M tests were in L2 French. One-way-ANOVA revealed that there was at least one significant difference between the four conditions ($F=70.45$, $p=.000$), therefore rejecting the null-hypothesis ($H_0:\mu_1=\mu_2=\mu_3=\mu_4$) and validating the alternative hypothesis ($H_1:\mu_1\neq\mu_2\neq\mu_3\neq\mu_4$).

Grade	Language of tests	Gender	n	Mean	SD	F	p
3	L1	Males	24	3.87	.97	70.45	.000
		Females	30	3.61	1.13		
	L2	Males	12	1.21	1.42		
		Females	23	.36	.34		

Table 41: Grade 3: Results from one-way-ANOVA in M per gender

As shown in table 42, the HSD Tukey post-hoc analysis revealed that the mean score obtained by females who received the M test in L1 Sérère was statistically significant when compared to females who took tests in L2 French ($p=.000$), therefore the null-hypothesis ($H_0:\mu_1=\mu_2$) was rejected and the alternative one ($H_1:\mu_1\neq\mu_2$) accepted. However, the difference between females' mean score and that of males when both took the M test in L1 Sérère was not significant ($p=.776$) and the null hypothesis ($H_0:\mu_1=\mu_3$) could not be discarded. Finally, it should also be noticed that the slight advantage that males had over females when both genders were given the M test in L2 French was not statistically significant ($p=.089$), hence the null-hypothesis ($H_0:\mu_2=\mu_4$) could not be discarded.

Contrast	Mean difference ⁸¹	p
females L1 Sérère (experimental group) vs females L2 French (control group)	3.25	.000
females L1 Sérère (experimental group) vs males L1 Sérère (experimental group)	.26	.776
females L2 French (control group) vs males L2 French (control group)	.85	.089

Table 42: Grade 3: Results from post-hoc analysis in M per gender

The number of grade-6 students in each possible score along a scale ranging from 0 to 6 was calculated taking into account gender and the language in which they were given the M test. As seen in figure 32 and table 43 for raw numbers, 42.11% (8) of females who took the test in L1 Sérère obtained a score of 4 points; the best score for them was 5 points achieved by a 15.79% (3) of them and the lowest was 1.5 points obtained by a 5.26% (1). Similarly, 38.89% (7) of males who took the M test in L1 Sérère obtained a mark of 4 points; the highest mark for them was 5 points attained by 38.89% (7) of them and the lowest score was 2.5 points got by a 16.67% (3). With regards to the control group, 9.09% of females who received the M test in L2 French did not score any point but a large number (36.36%) had a mark of 3 points, which was the best score for them. The largest group of males (41.67% [5]) obtained 1.5 points; the top mark for that sub-group was 4 points reached by 8.33% (1) and the lowest 1 point got by 16.67% (2) of them.

⁸¹ Mean differences are presented in absolute values.

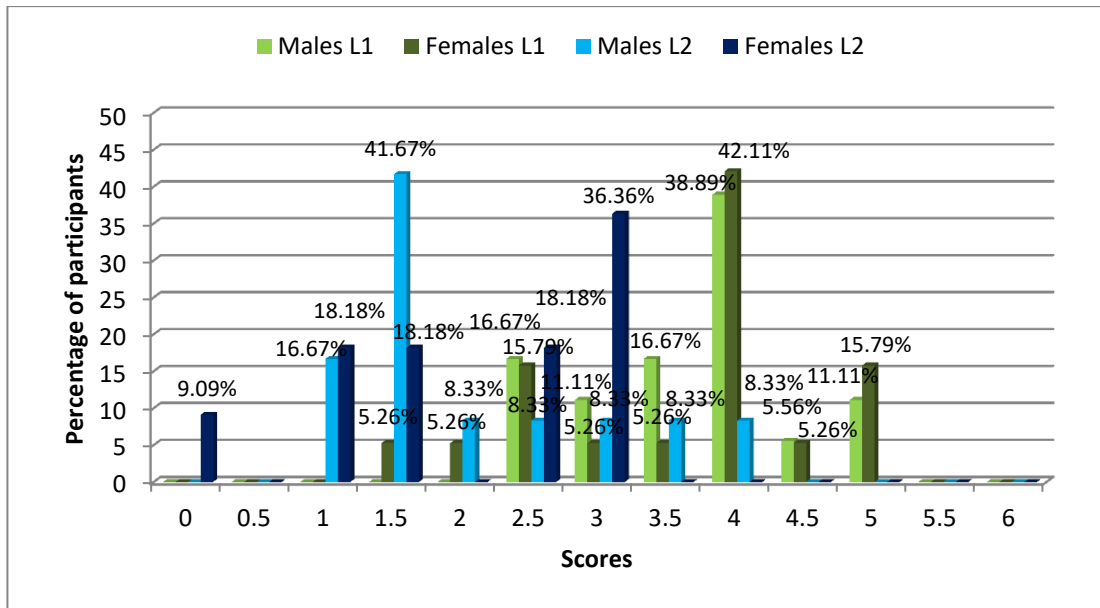


Figure 32: Distribution of grade-6 students per gender and according to their M scores

Possible scores		0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
L1 Sérère	Males	0	0	0	0	0	3	2	3	7	1	2	0	0
	Females	0	0	0	1	1	3	1	1	8	1	3	0	0
L2 French	Males	0	0	2	5	1	2	1	1	1	0	0	0	0
	Females	1	0	2	2	0	2	4	0	0	0	0	0	0

Table 43: Raw numbers of grade-6 students per gender according to their M scores

Statistical analysis was applied on data gathered from grade-6 participants after solving the M test (see table 44). As it can be observed, mean scores between both genders were very close to each other when students took tests in L1 Sérère: mean=3.63 (SD=1.03) for females and mean=3.69 (SD=.77) for males with only .06 points of difference. The same phenomenon appeared when students were given the M test in L2 French: Mean=2 (SD=1.05) for females and mean=2.04 (SD=.99) for males with only .04 points of difference. However, it should be noticed that female participants in the experimental group (mean=3.63 [SD=1.03]) outperformed their female peers in the control group (mean=2 [SD=1.05]) with a difference of 1.63 points between their respective mean scores. After one-way-ANOVA was applied

($F=14.06$, $p=.000$), the null-hypothesis ($H_0:\mu_1=\mu_2=\mu_3=\mu_4$) was rejected and the alternative hypothesis accepted ($H_1:\mu_1\neq\mu_2\neq\mu_3\neq\mu_4$), suggesting that there was at least one significant difference between the four conditions.

Grade	Language of tests	Gender	n	Mean	SD	F	p
6	L1	Males	18	3.69	.77	14.06	.000
		Females	19	3.63	1.03		
	L2	Males	12	2.04	.99		
		Females	11	2	1.05		

Table 44: Grade 6: Results from one-way-ANOVA in M per gender

A post-hoc analysis HSD Tukey was considered necessary to perceive exact differences after one-way-ANOVA confirmed statistically significant differences (see table 45). The mean score difference obtained by females and males in the experimental group was not considered statistically different ($p=.997$) and consequently the null-hypothesis ($H_0:\mu_1=\mu_2$) was accepted. The same was true between females and males in the control group whose mean score difference was not treated as significant ($p=1$), the null-hypothesis was also accepted ($H_0:\mu_1=\mu_3$). However, when females' mean score obtained in L1 Sérère was contrasted to that of females when they received the M test in L2 French, differences appeared to be significant ($p=.000$) and therefore the null-hypothesis ($H_0:\mu_2=\mu_4$) was rejected.

Contrast	Mean difference ⁸²	p
females L1 Sérère (experimental group) vs females L2 French (control group)	1.63	.000
females L1 Sérère (experimental group) vs males L1 Sérère (experimental group)	.06	.997
females L2 French (control group) vs males L2 French (control group)	.04	1

Table 45: Grade 6: Results from post-hoc analysis in M per gender

7.6 Analysis of the language effect on the L test along Cummins' matrix

The goal of this section is to describe if the language of tests (L1 Sérère or L2 French) made a difference between participants in the experimental group and those in the control group in each pair of questions of the L test especially designed according to the features of each of the three quadrants (Q1, Q2 and Q3) of Cummins' matrix (see section 6.5.1).

First of all, results of L were specifically calculated for each quadrant and according to the language in which participants took the tests; then, the number of students who obtained the different possible scores (0 to 2 points) in each quadrant which increased in 1 point was calculated. After that, inferential analyses one-way-ANOVA and HSD Tukey were applied (see section 6.5.5).

The percentage of grade-3 students who obtained the different possible scores within Q1 was analysed. As observed in figure 33, results for students who received the L test in L1 Sérère tended to increase: 27.78% (15) did not have any of the two answers right, 33.33% (18) got one and 38.89% (21) had both answers correct. In the case of participants who received it in L2 French, the tendency was a decreasing one: 65.71% (23) of them did not score any point, 31.43 (11) had one right answer and just 2.86% (1) obtained the 2-point score.

⁸² Mean differences are presented in absolute values.

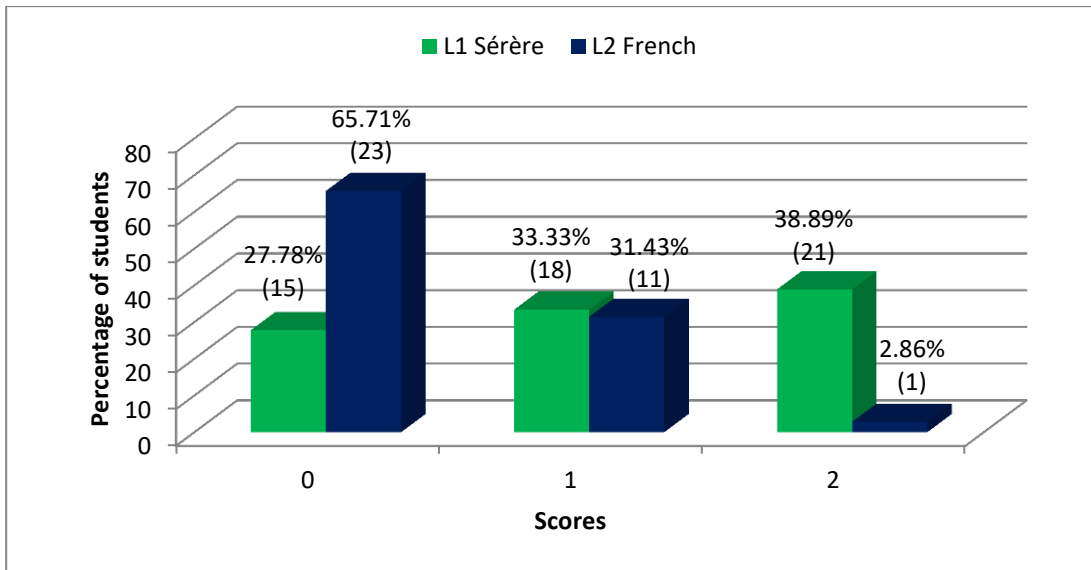


Figure 33: Distribution of grade-3 students according to their L scores in Q1

Questions designed in Q2 had language structures more complex than those in Q1 and a more technical vocabulary (CALP), but still within the students' context (familiar). Most of the students who received the L test in L1 Sérère obtained scores of 1 and 2 points: 48.15% (26) and 33.33% (18), respectively (see figure 34). It should be said that there were 18.52% (10) who did not have any of the two answers right. Concerning the control group, a majority of 57.14% (20) did not get any correct answer whereas 31.43% (11) had one and 11.43% (4) obtained both questions correct.

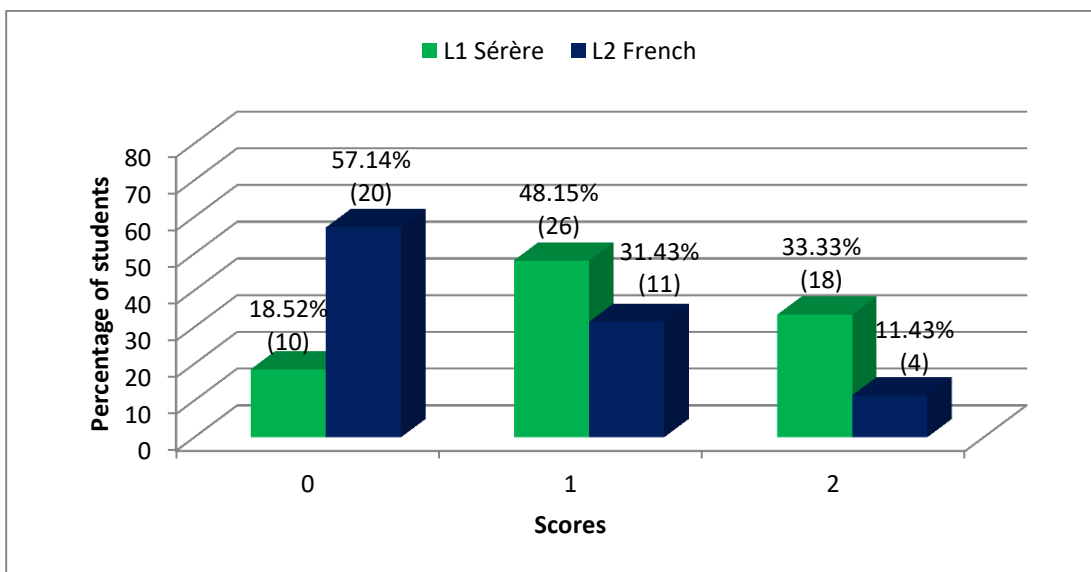


Figure 34: Distribution of grade-3 students according to their L scores in Q2

Questions designed in Q3 are the most complex in language structure, those which contain the most technical lexicon (CALP) and those which are located the furthest from the learners' socio-cultural background (non-familiar). Students who took the L test in L1 Sérère only obtained scores 0 and 1 point: 46.30% (25) and 53.70% (29), respectively; none of them got the top mark of 2 points (see figure 35). Contrastingly, 11.43% (4) of participants who received the L test in L2 French reached the top mark of 2 points and 20% (7) obtained 1 point; it should also be mentioned that 68.57% (24) of them did not get any correct answer.

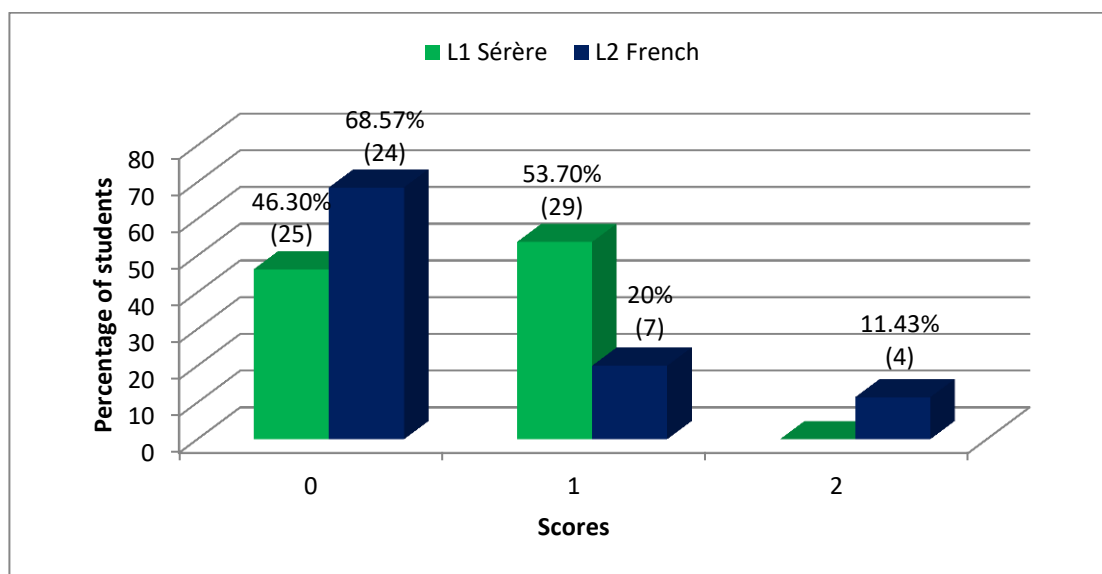


Figure 35: Distribution of grade-3 students according to their L scores in Q3

Mean scores for each group and in each quadrant were calculated: Students in the experimental group obtained higher mean scores than those in the control in all quadrants (see figure 36). However, it should be noticed that, as the language of the test became more complex and the context was further from their social background, grade-3 participants who received the L test in L1 Sérère experienced a decrease of .61 points from Q2 (mean=1.15, SD=.71) to Q3 (mean=.54, SD=.50) despite their previous slight increase of .04 points from Q1 (mean=1.11, SD=.82). In the last quadrant, they obtained a mean score (mean=.54, SD=.50) close to that of students in the control group (mean=.43, SD=.70). However, participants who received tests in L2 French experienced an improvement of .17 points from Q1

(mean=.37, SD=.55) to Q2 (mean=.54, SD=.70) and then a slight decrease of .11 points in Q3 (mean=.43, SD=.70).

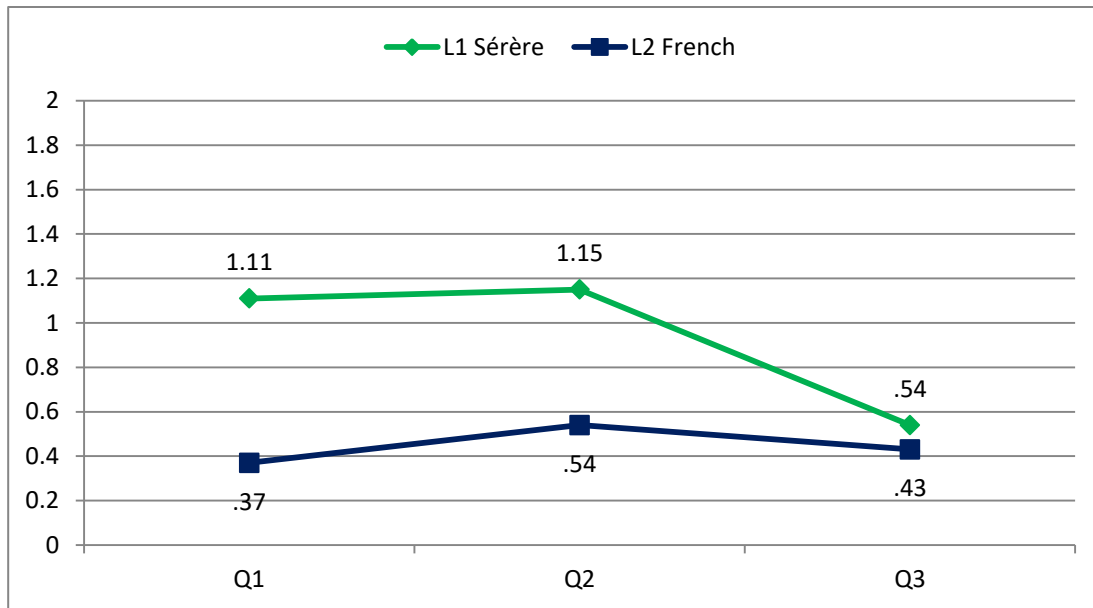


Figure 36: Grade 3: Students' mean scores along Cummins' matrix in the L test

Statistical tests were conducted on sample scores obtained by grade-3 in L tests in each of the three quadrants (see table 46). As observed, one-way-ANOVA analysis yielded significant ($F=12.35$, $p=.000$) and therefore rejected the null-hypothesis ($H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6$) and confirmed the alternative hypothesis ($H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \neq \mu_6$) suggesting that there was at least one statistical divergence among the six conditions⁸³.

⁸³ In the current analysis, there are six conditions according to the circumstances of each quadrant and to the language of tests: Q1 in L1 Sérère, Q1 in L2 French, Q2 in L1 Sérère, Q2 in L2 French, Q3 in L1 Sérère and Q3 in L2 French (see section 6.5.5).

		N	Mean	SD	F	p
L1 Sérère (experimental group)	Q1	54	1.11	.82	12.35	.000
	Q2	54	1.15	.71		
	Q3	54	.54	.50		
L2 French (control group)	Q1	35	.37	.55		
	Q2	35	.54	.70		
	Q3	35	.43	.70		

Table 46: Grade 3: Results from one-way-ANOVA in all quadrants of L

The post hoc HSD Tukey applied (see table 47) revealed that the .74-point mean-score-difference was significant in Q1 between grade-3 students in the experimental group and their mates in the control group, therefore rejecting the null-hypothesis ($H_0:\mu_1=\mu_4$) and confirming the alternative one ($H_1:\mu_1\neq\mu_4$). Differences were also significant ($p=.001$) in Q2 when learners who received the L test in L1 Sérère were compared to those who took it in L2 French with a mean score divergence of .61 points, consequently the null-hypothesis ($H_0:\mu_2=\mu_5$) was refused and the alternative one accepted ($H_1:\mu_2\neq\mu_5$). Finally, in Q3, when the language of the L test became more complex and the situation of the questions was further from the students' context, there appeared no statistical significant differences ($p=.977$) between grade-3 students who received the L test in L1 Sérère and those who took it in L2 French, ergo accepting the null-hypothesis ($H_0:\mu_3=\mu_6$).

Concerning the continuum along Cummins' matrix, grade-3 participants who received tests in L1 Sérère obtained results in Q1 which were not statistically significant ($p=1$) if compared to the results they obtained in Q2 since there was a slight difference of .03 points between means, hence the null-hypothesis ($H_0:\mu_1=\mu_2$) could not be rejected. However, differences were confirmed as statistically significant ($p=.000$) when the mean score in Q2 was contrasted to that in Q3 with a difference of .61 points, therefore declining the null-hypothesis ($H_0:\mu_2=\mu_3$) and accepting the alternative one ($H_1:\mu_2\neq\mu_3$). Contrastingly, no statistical significant differences ($p=.896$) appeared between mean scores obtained by grade-3

participants in Q1 and Q2 when they received tests in L2 French, therefore the null-hypothesis could not be rejected ($H_0:\mu_4=\mu_5$). It was also true ($p=.981$) between their mean scores obtained in Q2 and Q3, meaning that the null-hypothesis ($H_0:\mu_5=\mu_6$) could not be discarded.

Contrast	Mean difference ⁸⁴	p
Q1 L1 Sérère (experimental group) vs Q1 L2 French (control group)	.74	.000
Q2 L1 Sérère (experimental group) vs Q2 L2 French (control group)	.61	.001
Q3 L1 Sérère (experimental group) vs Q3 L2 French (control group)	.11	.977
Q1 L1 Sérère (experimental group) vs Q2 L1 Sérère (experimental group)	.04	1
Q2 L1 Sérère (experimental group) vs Q3 L1 Sérère (experimental group)	.61	.000
Q1 L2 French (control group) vs Q2 L2 French (control group)	.17	.896
Q2 L2 French (control group) vs Q3 L2 French (control group)	.11	.981

Table 47: Grade 3: Results from post-hoc analysis in L according to scores in quadrants

Regarding data obtained from grade-6 participants in Q1, 56.76% (21) of those who took the L test in L1 Sérère had the two answers right, 27.03% (10) had one answer correct and 16.22% (6) did not have any point. On the contrary, only 4.35% (1) of the participants who took the L test in L2 French could give right answers to the two questions of Q1, 21.74% (5) had 1 answer correct and, a large majority of 73.91% (17) could not score any point (see figure 37).

⁸⁴ Mean differences are presented in absolute values.

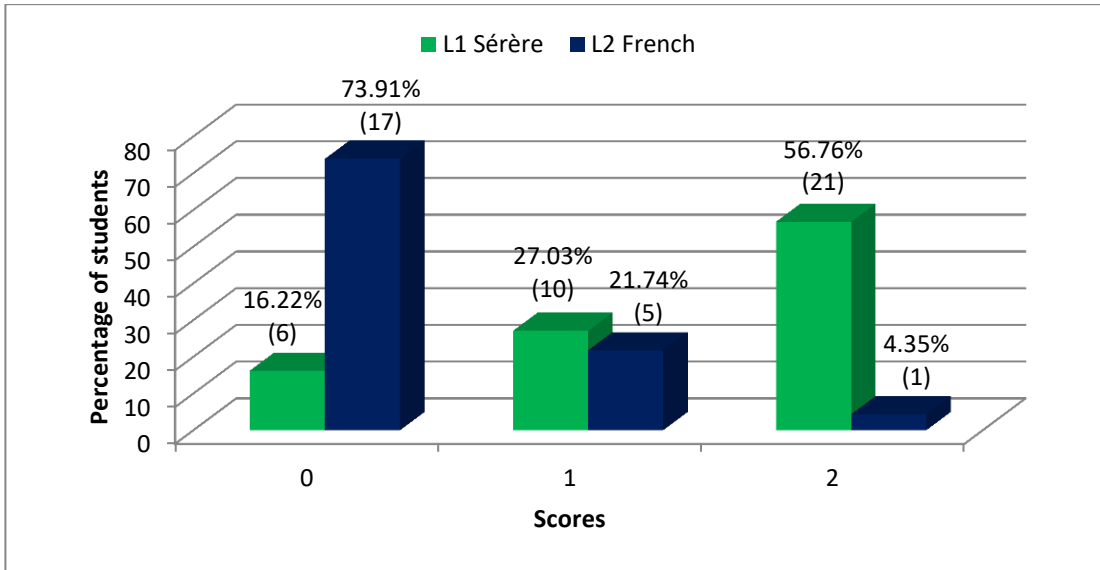


Figure 37: Distribution of grade-6 students according to their L scores in Q1

In Q2, most participants of both the experimental and the control groups obtained the mark of 1 point: 62.16% (23) and 60.87% (14), respectively. However, differences can be observed at both extremes of the scale: On the right side, 29.73% (11) of students who received the L test in L1 Sérère and 4.35% (1) of those who took it in L2 French obtained the highest mark of 2 points; on the left side, 8.11% (3) of students in the experimental group and 34.78% (8) in the control group did not score any point (see figure 38).

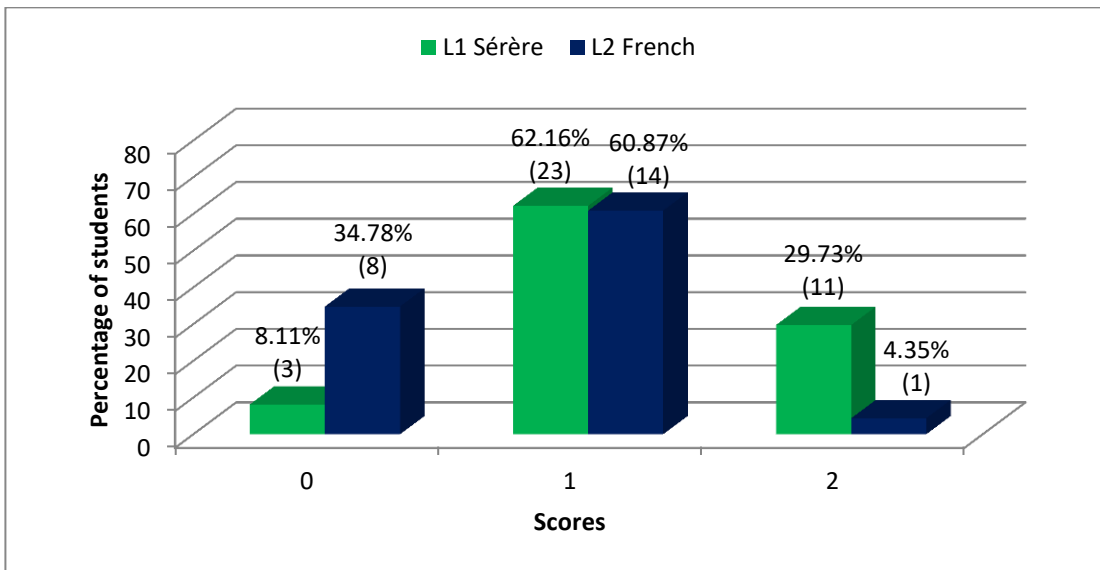


Figure 38: Distribution of grade-6 students according to their L scores in Q2

With respect to Q3 (see figure 39), as vocabulary became more technical and the context further from their own, most students who were given the L test in L1 Sérère got marks of 1 and 2 points: 48.65% (18) and 45.95% (17). Only 5.41% (2) did not score any point. On the contrary, 43.48% (10) of participants who received the L test in L2 French did not give any right answer. However, it should be said that 26.09% (6) of them obtained a score of 1 point and 30.43% (7) attained the highest mark of 2 points.

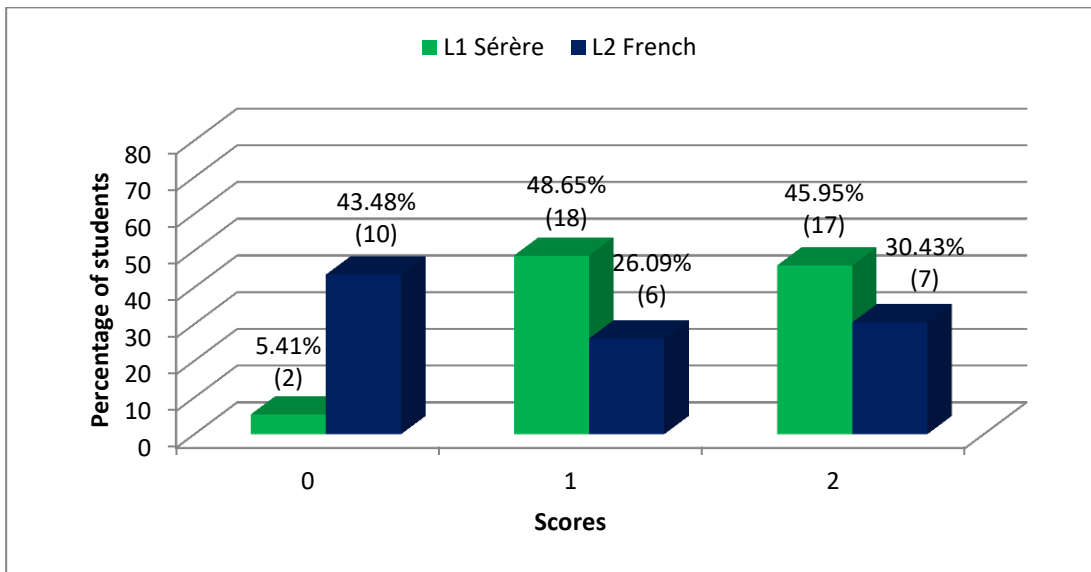


Figure 39: Distribution of grade-6 students according to their L scores in Q3

Grade-6 participants' mean scores in each of the quadrants were calculated. As shown in figure 40, students who had tests in L1 Sérère had higher scores than students who took the test in L2 French all throughout the continuum. However, it should be said that although participants in the experimental group experienced a decrease from Q1 (mean=1.41, SD=.76) to Q2 (mean=1.22, SD=.58) and then an increase to Q3 (mean=1.41, SD=.60), their mates in the control group underwent an improvement throughout the three quadrants as CALP increased and the context of the L test got more distant from their own: Q1 (mean=.30, SD=.56), Q2 (mean=.70, SD=.56) and Q3 (mean=.87, SD=.87).

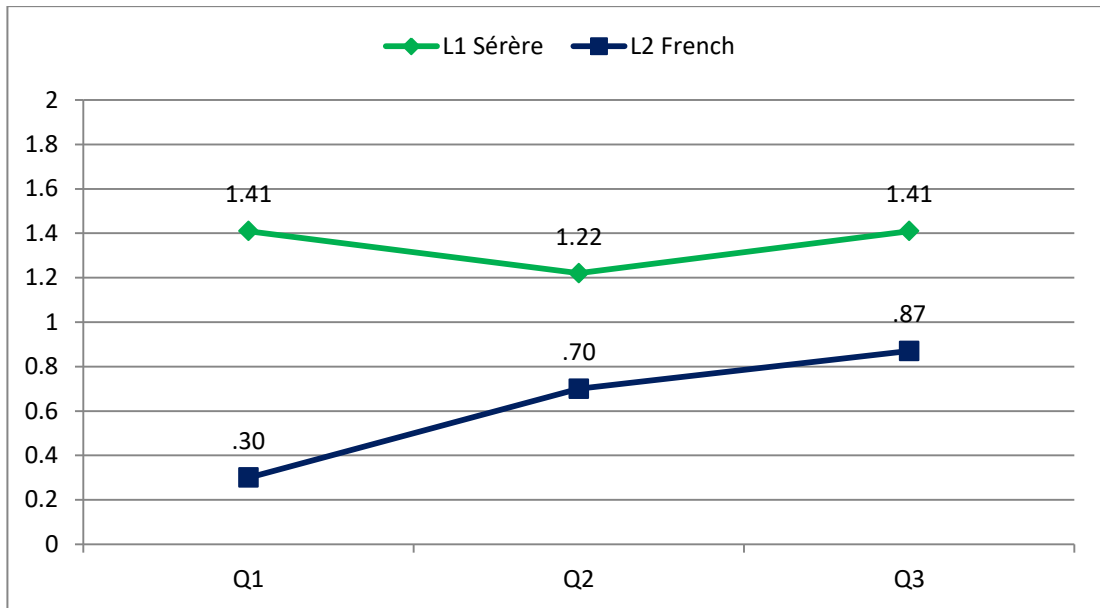


Figure 40: Grade 6: Students' mean scores along Cummins' matrix in the L test

One-way-ANOVA test was applied on the data obtained from grade-6 participants in each of the three quadrants (see table 48). As it can be observed, results from the statistical analysis revealed that there were significant differences between mean scores ($F=12.17$, $p=.000$); therefore the null-hypothesis was rejected ($H_0: \mu_1=\mu_2=\mu_3=\mu_4=\mu_5=\mu_6$) and the alternative hypothesis was accepted ($H_0: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \neq \mu_6$).

		N	Mean	SD	F	p
L1 Sérère	Q1	37	1.41	.76	12.17	.000
	Q2	37	1.22	.58		
	Q3	37	1.41	.60		
L2 French	Q1	23	.30	.56		
	Q2	23	.70	.56		
	Q3	23	.87	.87		

Table 48: Grade 6: Results from one-way-ANOVA in all quadrants of L

A post-hoc HSD Tukey was conducted on results (see table 49). When comparing in Q1 the mean scores of grade-6 students who received the L test in L1 Sérère with those who had it in L2 French, the 1.11 points of difference yielded significant ($p=.000$) and therefore the null hypothesis ($H_0:\mu_1=\mu_4$) was discarded and the alternative one accepted ($H_1:\mu_1\neq\mu_4$). Similarly, since the .52 points of difference between the mean score obtained by grade-6 students in the experimental group and those in the control group under Q2 circumstances were also statistically significant ($p=.041$), the null hypothesis ($H_0:\mu_2=\mu_5$) was rejected and the alternative one accepted ($H_1:\mu_2\neq\mu_5$). Finally, in Q3, when the context of the L test was the furthest from students' background and the language was the most CALP oriented, the .54-point difference between mean scores obtained by grade-6 students who received the L test in L1 Sérère and those who were given it in L2 French turned out to be statistically significant ($p=.032$) and, consequently, the null-hypothesis ($H_0:\mu_3=\mu_6$) was rejected and the alternative one accepted ($H_1:\mu_3\neq\mu_6$).

Concerning the continuum along Cummins' matrix, when grade-6 participants took the L test in L1 Sérère, the HSD Tukey analysis revealed that the mean score difference of .19 points was not statistically significant ($p=.823$) between Q1 and Q2 so the null-hypothesis ($H_0:\mu_1=\mu_2$) could not be discarded. Similarly, no significant differences ($p=.823$) appeared between Q2 and Q3 when the mean score difference was .19 points; consequently the null hypothesis ($H_0:\mu_2=\mu_3$) could not be refused. The same was true when grade-6 participants took the L test in L2 French: The .40-point mean score difference between Q1 and Q2 was not statistically significant ($p=.345$), thus accepting the null-hypothesis ($H_0:\mu_4=\mu_5$); finally, the mean score difference of .17 points between scores obtained in Q2 and Q3 was not statistically significant ($p=.949$) and thus the null-hypothesis ($H_0:\mu_5=\mu_6$) could not be discarded.

Contrast	Mean difference ⁸⁵	p
Q1 L1 Sérère (experimental group) vs Q1 L2 French (control group)	1.11	.000
Q2 L1 Sérère (experimental group) vs Q2 L2 French (control group)	.52	.041
Q3 L1 Sérère (experimental group) vs Q3 L2 French (control group)	.54	.032
Q1 L1 Sérère (experimental group) vs Q2 L1 Sérère (experimental group)	.19	.823
Q2 L1 Sérère (experimental group) vs Q3 L1 Sérère (experimental group)	.19	.823
Q1 L2 French (control group) vs Q2 L2 French (control group)	.40	.345
Q2 L2 French (control group) vs Q3 L2 French (control group)	.17	.949

Table 49: Grade 6: Results from post-hoc analysis in L according to scores in quadrants

7.7 Analysis of the language effect on the M test along Cummins' matrix

As explained in section 6.5.1, the test for M was designed along Cummins' matrix. It considered language complexity and the students' context in one problem-solving task for each respective quadrant (Q1, Q2 and Q3).

The first M problem-solving task in Q1 of Cummins' matrix was characterised by a simple language and a situation close to the students' environment. First, the distribution of learners according to the scores they had (0 to 2) in that quadrant was calculated (see figure 41). As observed, 75.93% (41) of participants who took tests in L1 Sérère reached the highest mark of 2 points and 14.81% (8) obtained 1.5 points; moreover, it should be said that none of them obtained a score of 0 or 0.5 points. Regarding participants who received the M test in L2 French, 8.57% (3) got the mark of 2 and none the score of 1.5 points; it is important to mention that a

⁸⁵ Mean differences are presented in absolute values.

great number of students in the control group (80% [28]) scored 0 points in M problem-solving tasks.

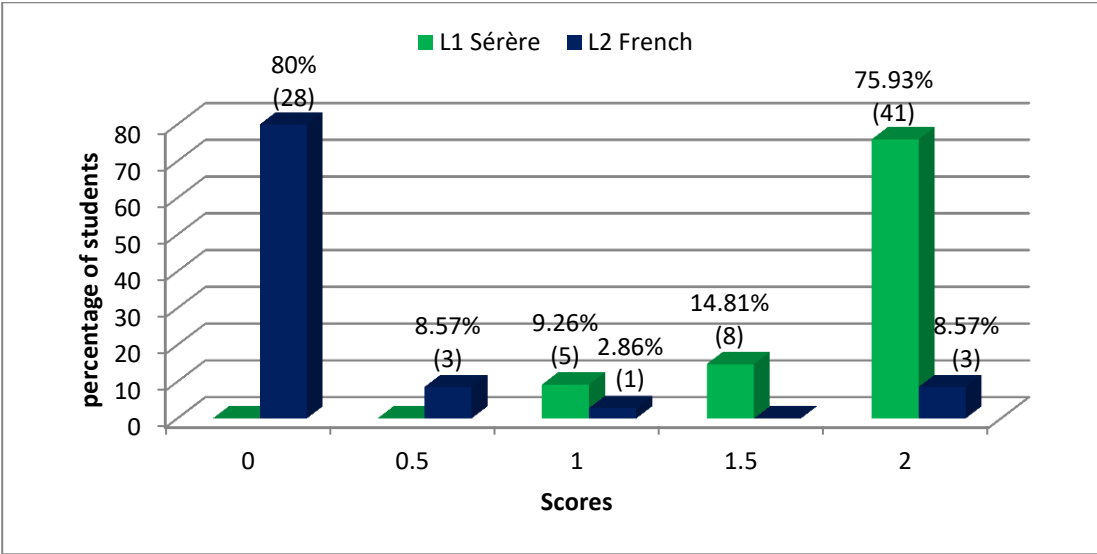


Figure 41: Distribution of grade-3 students according to their M scores in Q1

On the one hand, as CALP increased in Q2, most of the learners who had the M test in L1 Sérère obtained scores of 0.5 and 1: 50% (27) and 31.48% (17), respectively. Further, a number of 11.11% (6) could solve the two M problem-solving tasks with a mark of 2 points. On the other hand, a 71.43% (25) of participants who received the M test in L2 French had a score of 0 and 28.57% (10) of them got that of 0.5 points (see figure 42).

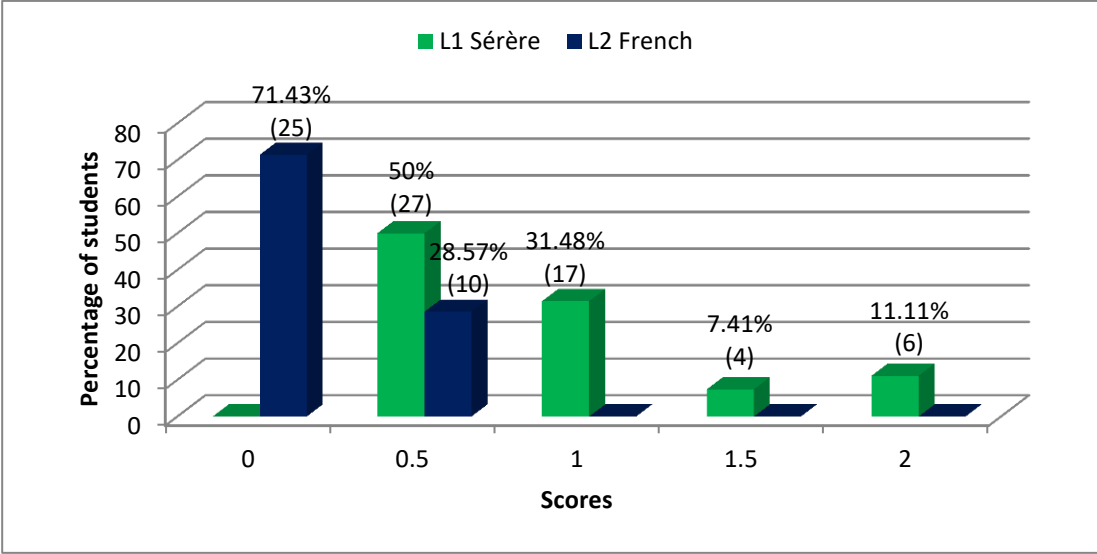


Figure 42: Distribution of grade-3 students according to their M scores in Q2

Concerning Q3, when the M test involved a more complex language and a context further from the students', 48.15% (26) of grade-3 participants who received the test in L1 Sérère obtained scores of 1 point, followed by 25.93% (14) who obtained 0.5 points. Moreover, it should be mentioned that 3.70% (2) of them did not understand any item of the M test. On the other side of the scale, 11.11% (6) of participants in the experimental group obtained 1.5 points and 11.11% (6) the 2-point mark. A large number of students who received the M test in L2 French had scores comprised between 0 and 0.5 points: 57.14% (20) and 37.14% (13), respectively; nevertheless, there were 2.86% (1) of learners in that same group who obtained 1 point and 2.86% (1) who reached the 2 point-mark (see figure 43).

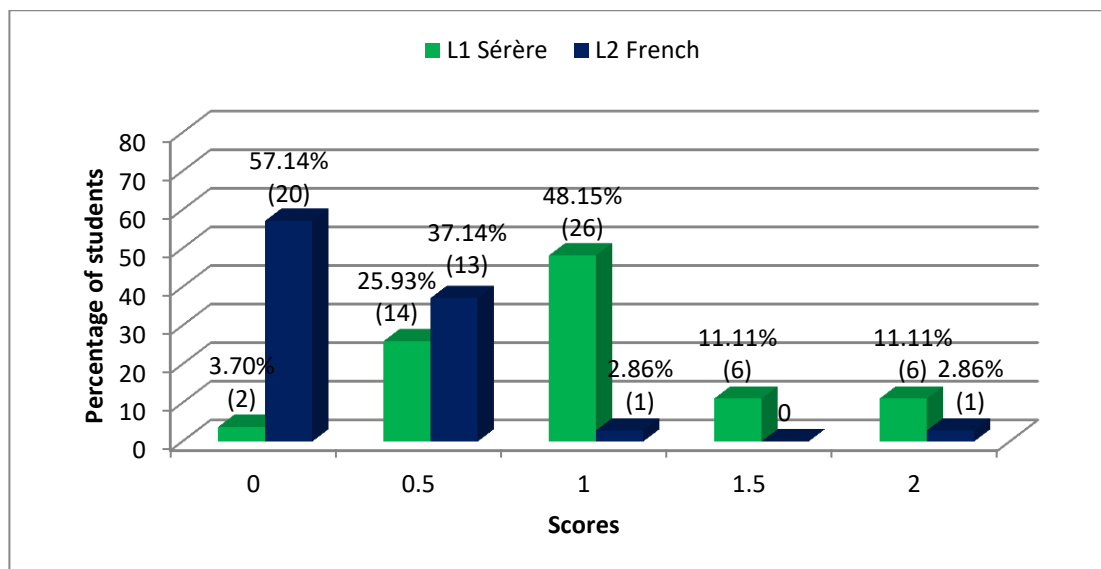


Figure 43: Distribution of grade-3 students according to their M scores in Q3

Mean scores of the M test for grade-3 students in each of the quadrants were calculated (see figure 44). As shown, students who were given the test in L1 Sérère reached higher scores in all quadrants than those who took it in L2 French. However, it should be mentioned that as CALP increased from Q1 (mean=1.83, SD=.32) to Q2 (mean=.90, SD=.50) the mean score obtained by participants in the experimental group decreased substantially, slightly increasing in Q3 (mean=1, SD=.50). Regarding participants in the control group, despite the slight decrease from Q1 (mean=.24, SD=.59) to Q2 (mean=.14, SD=.23), they experienced an

improvement in Q3 (mean=.27, SD=.41) as CALP increased and the context became further from theirs.

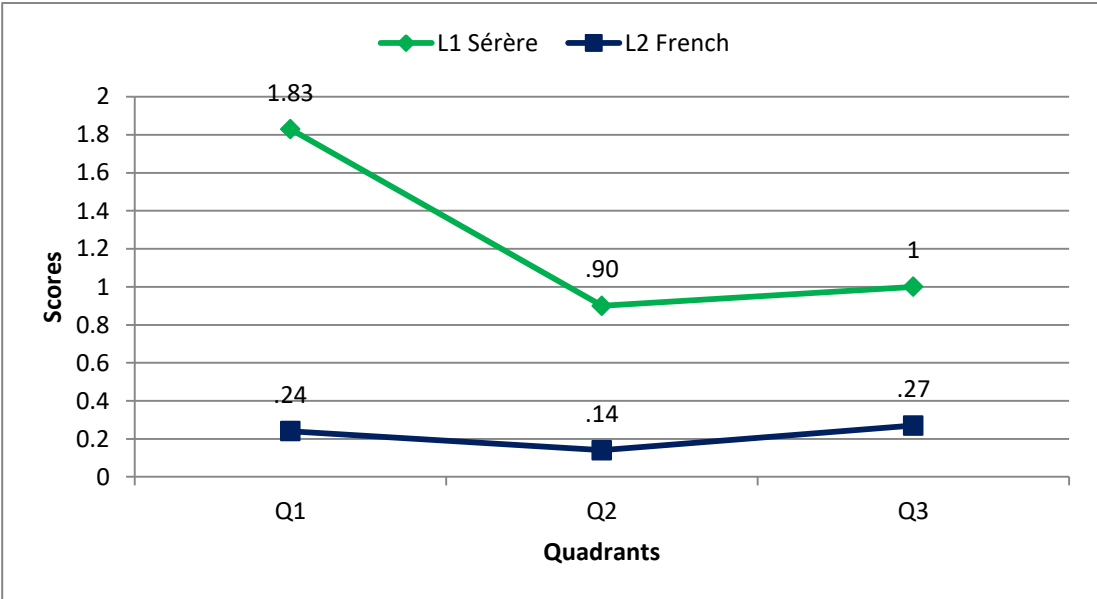


Figure 44: Grade 3: Students' mean scores along Cummins' matrix in the M test

Statistical analysis was applied on data obtained from grade-3 participants in the M problem-solving tests in each of the three quadrants (see table 50). The one-way-ANOVA conducted ($F=98.23$, $p=.000$) discarded the null-hypothesis ($H_0:\mu_1=\mu_2=\mu_3=\mu_4=\mu_5=\mu_6$) and therefore accepted the alternative hypothesis ($H_1:\mu_1\neq\mu_2\neq\mu_3\neq\mu_4\neq\mu_5\neq\mu_6$) suggesting that there was at least one statistical significant difference between the six conditions.

		N	Mean	SD	F	p
L1 Sérère	Q1	54	1.83	.32	98.23	.000
	Q2	54	.90	.50		
	Q3	54	1	.50		
L2 French	Q1	35	.24	.59		
	Q2	35	.14	.23		
	Q3	35	.27	.41		

Table 50: Grade 3: Results from one-way-ANOVA in all quadrants of M

A post-hoc analysis with HSD Tukey contrasted grade-3 students' scores in M (see table 51). The difference of 1.59 points between the mean scores obtained in Q1 by grade-3 students who received the M test in L1 Sérère and that of their peers who took it in L2 French yielded significant ($p=.000$); hence the null-hypothesis ($H_0:\mu_1=\mu_4$) was refused and the alternative one accepted ($H_1:\mu_1\neq\mu_4$). Similarly in Q2, significant differences ($p=.000$) were found between the experimental group and the control group with a mean score divergence of .76 points between them, consequently discarding the null-hypothesis ($H_0:\mu_2=\mu_5$) and accepting the alternative one ($H_1:\mu_2\neq\mu_5$). In Q3, the .73 points difference between the mean score obtained by grade-3 students who received the M test in L1 Sérère and those who were given it in L2 French was significant ($p=.000$), thus declining the null-hypothesis ($H_0:\mu_3=\mu_6$) in favour of the alternative one ($H_1:\mu_3\neq\mu_6$).

Concerning data along Cummins' matrix, the .93-point difference between the mean score that grade-3 students who were given the M test in L1 Sérère obtained in Q1 and that obtained in Q2 was considered statistically significant ($p=.000$) by the HSD Tukey analysis, thus discarding the null-hypothesis ($H_0:\mu_1=\mu_2$) and accepting the alternative one ($H_1:\mu_1\neq\mu_2$). However, it was not the case ($p=.837$) for the .10-point difference between mean scores obtained in Q2 and Q3, therefore the null-hypothesis was accepted ($H_0:\mu_2=\mu_3$). With regards to grade-3 participants who took the M test in L2 French, no statistical differences were found along Cummins' matrix: The .10 points which differed between the mean score obtained in Q1 from that in Q2 was not statistically significant ($p=.934$), therefore the null-hypothesis could not be discarded ($H_0:\mu_4\neq\mu_5$). Likewise, the difference of .13 points between the mean score obtained in Q2 and that in Q3 was not statistically significant ($p=.827$), consequently not rejecting the null-hypothesis ($H_0:\mu_5\neq\mu_6$).

Contrast	Mean difference ⁸⁶	p
Q1 L1 Sérère (experimental group) vs Q1 L2 French (control group)	1.59	.000
Q2 L1 Sérère (experimental group) vs Q2 L2 French (control group)	.76	.000
Q3 L1 Sérère (experimental group) vs Q3 L2 French (control group)	.73	.000
Q1 L1 Sérère (experimental group) vs Q2 L1 Sérère (experimental group)	.93	.000
Q2 L1 Sérère (experimental group) vs Q3 L1 Sérère (experimental group)	.10	.837
Q1 L2 French (control group) vs Q2 L2 French (control group)	.10	.934
Q2 L2 French (control group) vs Q3 L2 French (control group)	.13	.827

Table 51: Grade 3: Results from post-hoc analysis in M according to scores in quadrants

In a similar way, the M problem-solving tasks for grade 6 were designed along Cummins' matrix and adapted to minority language children in developing countries and in accordance to the target curricula for that grade.

The number of participants who obtained the different possible scores in the M test designed according to language features in Q1 was calculated. As shown in figure 45, most grade-6 students (64.86% [24]) who took the M test in L1 Sérère could understand the problem-solving of the two tasks and solve them adequately; 8.11% (3) of them obtained the 1.5-mark, 13.51% (5) that of 1 and 13.51% (5) that of 0.5; it should be said that none of the students in the experimental group had 0 points. About learners who were given the M test in L2 French, a large number of them, that is, 43.48% (10), obtained 0.5 points and 39.13% (9) obtained the top mark of 2 points. A few students in the control group (8.70% [2]) had 1 point and a few (8.70% [2]) had a score of 0 points.

⁸⁶ Mean differences are presented in absolute values.

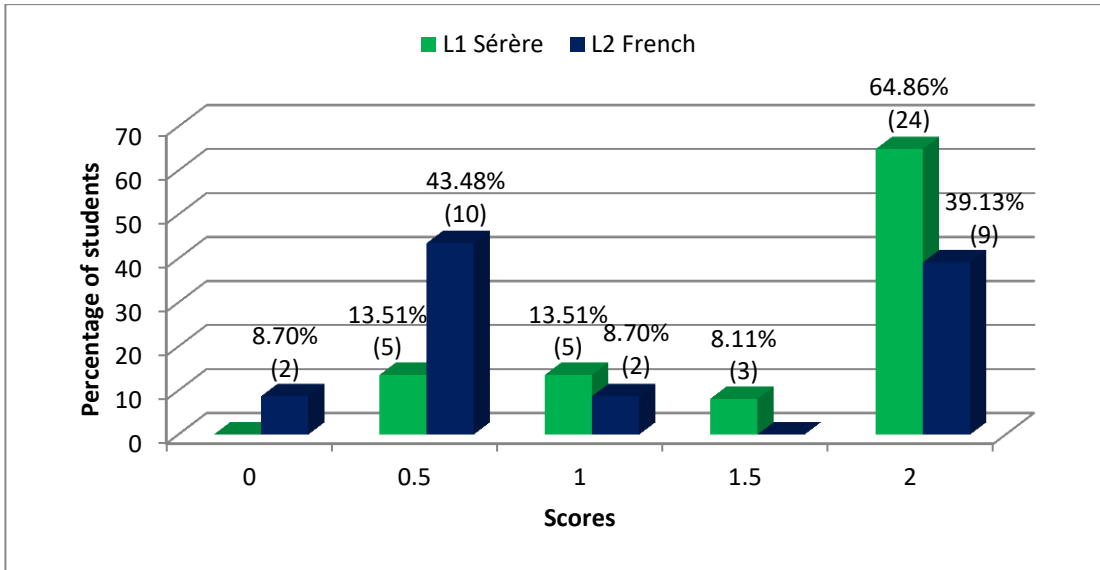


Figure 45: Distribution of grade-6 students according to their M scores in Q1

As CALP increased in tests but within students' background in Q2, most students who took the M test in L1 Sérère obtained the mark of 1 point: 62.16% (23). It should be said that 18.92% (7) of them had 1.5 points and 10.81% (4) attained the mark of 2 points. Concerning participants who received the M test in L2 French, a large number [69.57% (16)] got 0.5 points; 13.05% (3) of them obtained 1.5 points and 17.39% (4) could not solve any of the two tasks (see figure 46).

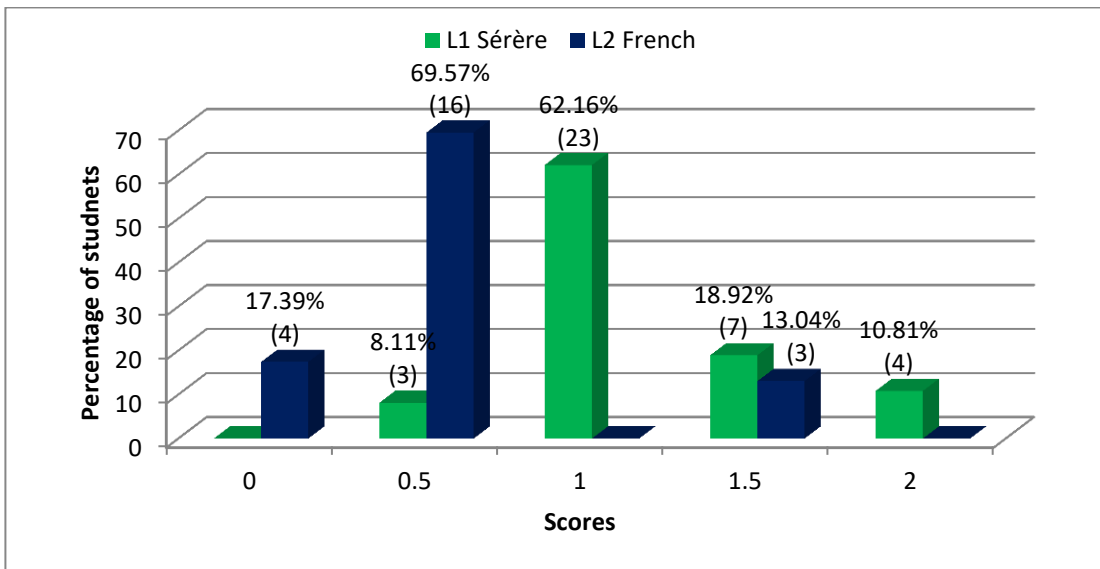


Figure 46: Distribution of grade-6 students according to their M scores in Q2

As shown in figure 47, the distribution of scores for grade-6 students along possible scores for Q3 in M is not far different from Q2: 64.86% (24) of learners who took M tests in L1 Sérère obtained a score of 1 point and 29.73% (11) got the 0.5-mark; the best score for the participants in the experimental group was 1.5 points, attained by 5.41% (2) of them. Regarding students who were given the M test in L2 French, there were 60.87% (14) who obtained 0.5 points, and 30.43% (7) who could not score any point; only 5.41% (2) of the learners in the experimental group obtained 1.5 points.

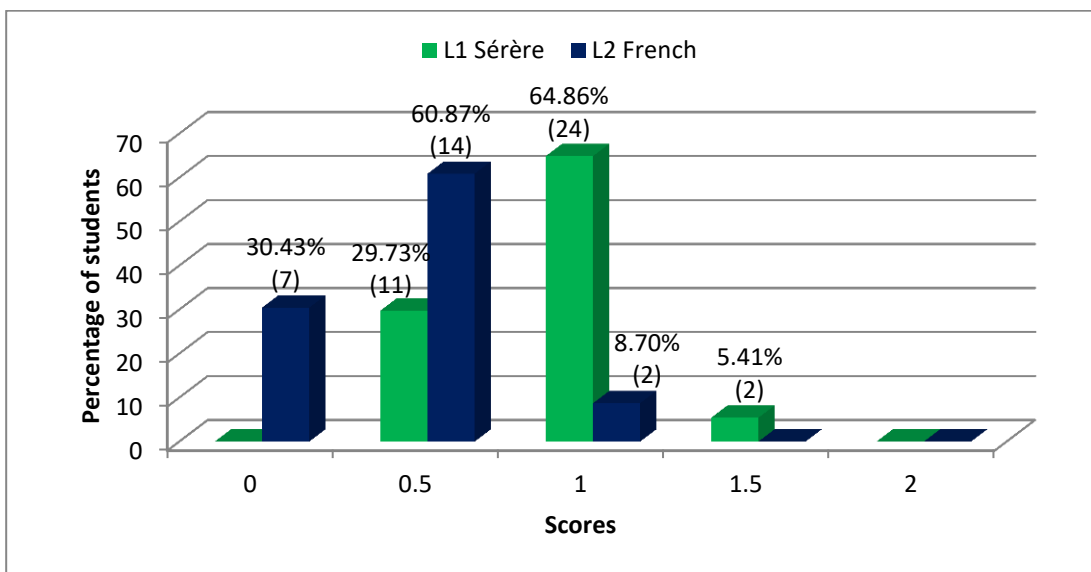


Figure 47: Distribution of grade-6 students according to their M scores in Q3

Mean scores for both the experimental and the control group in each of the three quadrants were calculated (see figure 48). As it can be observed, students who received the M test in L1 Sérère obtained better results than their mates who took it in L2 French all along Cummins' matrix. It should be also said that both groups at grade 6 experienced a decrease of mean scores as the language of the problem-solving task incorporated complex grammar structures and technical lexicon and the context became further from their familiar one: Participants in the experimental group diminished their mean score in .46 points from Q1 (mean=1.62, SD=.57) to Q2 (mean=1.16, SD=.39) and .28 points from the previous one to Q3 (mean=.88, SD=.27); learners in the control group underwent a lowering of their

mean scores of .55 points from Q1 (mean=1.09, SD=.78) to Q2 (mean=.54, SD=.42) and .15 points from the last one to Q3 (mean=.39, SD=.30).

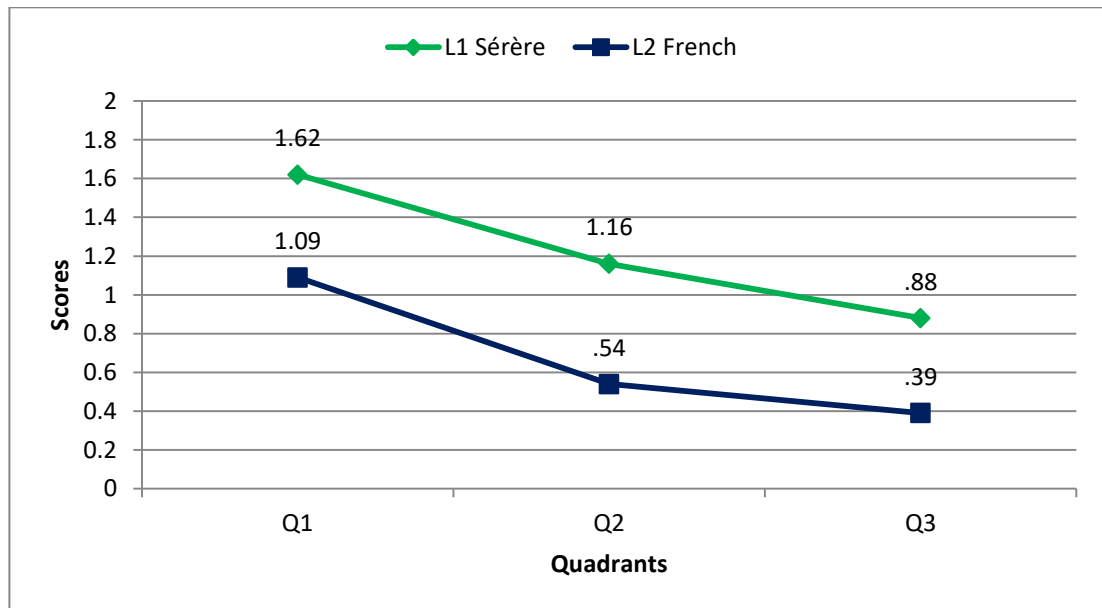


Figure 48: Grade 6: Students' mean scores along Cummins' matrix in the M test

Results from one-way-ANOVA conducted on results obtained in M by grade-6 students (see table 52) concluded that there was at least one statistically significant difference between the six conditions ($F=26, p=.000$) and rejected the null-hypothesis ($H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6$) and therefore accepted the alternative hypothesis ($H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \neq \mu_6$). A post-hoc analysis was applied in order to identify specific differences.

		N	Mean	SD	F	p
L1 Sérère	Q1	37	1.62	.57	26	.000
	Q2	37	1.16	.39		
	Q3	37	.88	.27		
L2 French	Q1	23	1.09	.78		
	Q2	23	.54	.42		
	Q3	23	.39	.30		

Table 52: Grade 6: Results from one-way-ANOVA in all quadrants of M

According to results from HSD Tukey (see table 53), significant differences were found in Q1 ($p=.001$) between students at grade 6 who received the M test in L1 Sérère (mean=1.62, SD=.57) and those who were given it in L2 French (mean=1.09, SD=.78), the divergence between both groups being .53 points and rejecting the null-hypothesis ($H_0:\mu_1=\mu_4$) in favour of the alternative one ($H_1:\mu_1\neq\mu_4$). It was also the case in Q2 ($p=.000$) between grade-6 students in the experimental group and those in the control with a mean score difference of .61 points, thus rejecting the null-hypothesis ($H_0:\mu_2=\mu_5$) and confirming the alternative one ($H_1:\mu_2\neq\mu_5$). Finally, the .49-point difference which separated the mean score obtained by grade-6 students who received the M test in L1 Sérère and those who took it in L2 French in Q3 also yielded significant ($p=.002$) and so, the null-hypothesis ($H_0:\mu_3=\mu_6$) was discarded and the alternative one accepted ($H_1:\mu_3\neq\mu_6$).

With respect to the continuum, the HSD Tukey analysis confirmed statistically significant differences ($p=.001$) when contrasting the mean scores that grade-6 students in the experimental group obtained in Q1 and Q2 of the M test, with a mean score divergence of .46 points, thus refusing the null-hypothesis ($H_0:\mu_1=\mu_2$) in favour of the alternative one ($H_1:\mu_1\neq\mu_2$). However, this was not the case with the .28 points which differed between mean scores in Q2 and Q3 which were not statistically significant ($p=.110$) and thus, the null-hypothesis could not be rejected ($H_0:\mu_2=\mu_3$). Concerning grade-6 participants in the control group, statistical significant differences were confirmed ($p=.002$) when contrasting mean scores obtained in Q1 and Q2, with a difference of .54 points, thus rejecting the null-hypothesis ($H_0:\mu_4=\mu_5$) and confirming the alternative one ($H_1:\mu_4\neq\mu_5$). Nevertheless, the .15-point difference between mean scores obtained in Q2 and Q3 was not considered statistically significant ($p=.886$) and, consequently, the null-hypothesis ($H_0:\mu_5=\mu_6$) could not be discarded.

Contrast	Mean difference ⁸⁷	p
Q1 L1 Sérère (experimental group) vs Q1 L2 French (control group)	.53	.001
Q2 L1 Sérère (experimental group) vs Q2 L2 French (control group)	.61	.000
Q3 L1 Sérère (experimental group) vs Q3 L2 French	.49	.002
Q1 L1 Sérère (experimental group) vs Q2 L1 Sérère (experimental group)	.46	.001
Q2 L1 Sérère (experimental group) vs Q3 L1 Sérère (experimental group)	.28	.110
Q1 L2 French (control group) vs Q2 L2 French (control group)	.54	.002
Q2 L2 French (control group) vs Q3 L2 French (control group)	.15	.886

Table 53: Grade 6: Results from post-hoc analysis in M according to scores in quadrants

7.8 Summary

In order to analyse the effect of the language of tests, students were divided into an experimental group if they received L and M tests in L1 Sérère or into a control group if they received them in L2 French. As shown by results, a large number of participants at grades 3 and 6 obtained scores equal or above the established academic-skill threshold in both tests when they received them in L1 Sérère. Moreover, as a result of the analysis conducted through one-way ANOVA on the data obtained, it was confirmed that the mean score difference between that obtained by participants in the experimental group and that obtained by participants in the control group was statistically significant in all cases (L and M tests given to both grade 3 and grade 6).

⁸⁷ Mean differences are presented in absolute values.

Concerning the female population in the present study, the study focused first, on the comparison with their current situation (females who received tests in L2 French) and second, on a possible gender difference (males in the experimental group). A meaningful number of females at grades 3 and 6 reached scores higher than the level of three points in L and M when tests were given in L1 Sérère rather than when they were given them in L2 French. Moreover, mean scores obtained by females who received both tests in L1 Sérère were considered statistically significant by the HSD Tukey test as compared to their female peers in the control group. When females in the experimental group were compared to their male peers who also received tests in L1 Sérère, their number equal or above the level of three points was not higher (with the exception of grade 6 in the L test).

Furthermore, the mean score differences between both genders were not considered statistically significant with the exception of that obtained in the L test by participants at grade 3. It should be considered in the present study individual differences in which: However, as shown by students' results in the scales of the different possible scores, some females in the experimental group outperformed males in that same group: The percentage of females who reached the best marks was higher than that of males (except grade 3 females who took the L test).

With regards to Cummins' matrix, mean score differences between participants were analysed depending on the language they took L and M (L1 Sérère or L2 French) as well as the progress of each group (experimental and control) along the matrix according to the language and context characteristics of each quadrant (Q1, Q2 and Q3). As shown by results, those students at grade 3 and grade 6 obtained better scores in all quadrants when the language of tests was L1 Sérère. After an HSD Tukey was applied, all mean score differences between the experimental and the control groups in each quadrant were considered statistically significant except that of Q3 when grade 3 students took the L test.

The statistical analysis also revealed that there appeared one significant difference along Cummins' matrix when grade 3 students took both the L and M tests in L1 Sérère, but no statistically significant differences were found when they were given in L2 French. That was not the case at grade 6 when the mean score differences along Cummins' matrix were not considered statistically significant for

students who were given the L test in L1 Sérère, a fact which also happened when students received it in L2 French. With respect to the M test, when grade-6 participants took the M test in L1 Sérère, at least one mean score difference along Cummins' matrix was considered statistically significant, and it was also true for participants who received the M test in L2 French. It should be said that, in general, the number of students at grade 3 and grade 6 in the experimental group tended to diminish from high scores to lower scores as language complexity increased and the context distanced from their own background along the continuum; however, it was not always the case for participants in the control group, for example, when those at grade 6 took the L test.

In chapter 8, the results above described are discussed and linked to previous studies in order to accept or reject the predictions related to the established research questions in the present study. Those pedagogical implications related to the findings above described are also explained in the following chapter.

8. DISCUSSION

8.1 Introduction

The objective of chapter 8 is to give possible answers to the research questions established in the present study and discuss their respective hypothesis (see section 5.2) from results obtained after analysis of L and M tests given to participants at grade 3 and grade 6 in the experimental group (tests given in L1 Sérère) and the control group (tests given in L2 French). Thus, the students' academic outcomes depending on the language in which they received the tests after 3 and 6 years of exposure to L2 French at school is explained in section 8.2, with a special interest for the female population in section 8.3. Taking into consideration that participants in the present study were mainly exposed to an academic type of L2 French, their results of L and M tests designed according to the features of each quadrant along the continuum in Cummins' matrix (see section 6.5.1) are discussed in section 8.4.

8.2 Research question 1a

Research question 1a (does the language of tests have an effect on academic achievement of L1-Sérère students of primary education who live in rural areas of Senegal after 3 and 6 years of academic exposure to L2 French?) aimed at analysing if the language of tests (L1 Sérère or L2 French) had an effect on results obtained by minority language students who live in rural Senegal and whose mother tongue is different to the language in which they are taught and assessed at school. In section 6.3.1, it was predicted that the language of tests would be a relevant factor in students' achievement in M and L tests after three and six years of academic exposure to L2 French. Thus, those students who took tests in L1-Sérère would obtain better scores than those who received them in L2 French. It was also specified that the language effect would be more decisive for those students at grade 3 due to the fact that they had been exposed to academic L2 French three years less than those at grade 6.

As suggested by the results in the present study, the language of tests implied an effect on grade-3 and grade-6 students' academic achievement concerning the quantity of students who benefited as well as the quality of their

output (see sections 7.2 and 7.3). As shown, the number of participants equal or above the level of three points was far larger when tests of *leçons* (L) and Mathematics (M) were given in L1 Sérère rather than when they were given in L2 French. This fact was similar to results in the study PASEC (2014) in which a larger number of Burundian students at grade 2 who received literacy and Mathematics tests in L1 Kirundi reached the established threshold as compared to Senegalese students who took them in L2 French. Therefore, results in the present study suggest that L1 Sérère as the language of tests increased the opportunities of success at school for a large number of students; on the contrary, L2 French diminished those possibilities in the same way as it did in the study Jangandoo (2013) in which most primary students in Senegal who received tests of reading comprehension and Mathematics in L2 French failed to succeed, especially those at earlier grades.

The findings described above are in line with Levin and Shohamy's (2008) research in which the authors claimed that the language of tests could determine academic outcomes of minority language students after analysing the effect of language on Ethiopian students' academic results. They also support authors such as Heugh, (2006), Benson (2008), Smits et al., (2008), Skutnabb-Kangas and Dunbar (2010), Skutnabb-Kangas (2008) and Brock-Utne (2014), who argued that a European language at school represents a barrier to academic achievement of children living in Sub-Saharan Africa (see chapter 2). In addition, taking into account that participants in the present study attended a submersion programme in which they were instructed in L2 French during 3 or 6 years, the findings seem to reject the theory of maximum exposure of submersion programmes in Senegal (see section 3.5.4) and hence support Heugh (2006) and Heugh (2011b) who claimed that students in the Sub-Saharan context require between six and eight years of academic exposure to the L1 with the L2 as a subject before the latter becomes the language for testing and instructing at school.

As shown by the results in the present study, the language of tests was also crucial with respect to the quality of academic achievements. Thus, grade-3 and grade-6 participants who received tests in L1 Sérère obtained significantly better mean scores in both L and M than their peers who took tests in L2 French.

Moreover, participants' achievement along the scale of scores has shown that the number of learners who reached high scores (5 and 6 points) in L and M tests were those in the experimental group. The mark of 6 points was attained in most cases by a percentage of participants who took tests in L1 Sérère but never by those who took them in L2 French. As an example, in the M test taken by grade-3 participants, 3.07 points differed between mean scores obtained by students in the experimental group and those in the control group; among the former, 9.26% (5) obtained a mark of 6 points. These results are in line with pilot experiences carried out in Sub-Saharan Africa, for instance, in Niger and Mali (see sections 3.5.3) in which students who attended a bilingual school (a local L1 and L2 French) obtained high academic scores when the language of tests was a local L1. It should also be taken into account PASEC (2014) in which, similar to the present study, there were significantly more grade-2 and grade-6 Burundian students who obtained the top mark in Mathematics as compared to participants from Senegal. Therefore, in line with authors such as Shohamy (2006), Heugh (2006), Brock-Utne and Alidou (2006), Smits et al. (2008), Rea-Dickins et al. (2010), Diallo, I. (2011) and Brock-Utne (2013), results in the present study suggest that the use of the students' L1 in tests could help them to obtain better academic achievement and consequently increase their self-esteem and lessen grade repetition and dropout rates.

As observed in the results of the present study, participants at grade 3 in the experimental group were those who took the least advantage of L1 Sérère as language of the L test in both quantity and quality. A possible explanation for that may be due, first, to the nature of the subject and second, to absence of backwards transfer from L2 French to L1 Sérère. That is to say, L is a subject which requires students to understand the teachers' speech and memorize content from class-notes, an especially complex task in a submersion context (see section 2.2). Thus, due to the low proficiency in L2 French (see results of grade-3 students in the control group), grade-3 students in the experimental group could not transfer content learnt at school to L1 Sérère because they had not stored it in their Common Underlying Proficiency, an idea which matches to that of Skutnabb-Kangas and Dunbar (2010) when claiming that in submersion programmes, students do not acquire the L2 as academic language adequately due to a lack of transfer of

language skills from the L1. However, with three more years of exposure to L2 French, grade-6 students could store *some academic content*⁸⁸ and transfer it to L1 Sérère which was added to their indigenous knowledge learnt in their community. This fact, which supports Cummins' (2001) argument that transfer of academic skills might happen in a double direction, added to the advantages of L1 Sérère as language of tests, increased the chances of success in the L test for grade-6 participants in the experimental group. Similar phenomena showing backwards transfer were observed in other studies carried out in Sub-Saharan Africa. Hovens (2002) found out that Nigerien learners who had never received instruction at school in their L1 could read in that language due to transfer from L2 French to a local L1; however students did not reach high scores in L1 tests because of the poor quality of that transfer. Similarly, Martín-Chazeaud (2014) mentioned that L1 Diola students in Senegal tried to use the L2 French script to write in their mother tongue. Unfortunately, as Benson (2004a) claimed, this backwards transfer is not really useful for students in Sub-Saharan Africa such as participants in the present study because it implies a delay in both the acquisition of L2 French and the learning process. Perhaps, if they had been taught through L1 Sérère from grade 1 together with L2 French as a subject in order to transfer academic and linguistic skills from L1 Sérère to L2 French and not suddenly as MOI as it is done in current submersion programmes, as Heugh (2006) and Heugh (2011b) suggest, students would have obtained better results in L and M tests.

In the case of the M test, the mean score was above the level of three points for participants at both grade 3 and at grade 6 when they took tests in L1 Sérère. Different than the L test, what was really necessary in the M test for participants was to understand the language in order to reason out a situation and give a possible solution. Findings in the present study show a similar fact as explained in PASEC (2014): Students at grade 3 could interpret the M test in L1 Sérère and give a solution, perhaps, due to the fact that they had to deal with some of the

⁸⁸ The use of the words "some academic content" is employed because transfer from L2 French to L1 Sérère during lessons seemed to be uncomplete due to the low proficiency of students in L2 French as show the results obtained by the control group. It was also claimed by Heugh (2006) and (2011b) who argued that the expected achievement in the L2 for students in submersion models such as the participants in the present study, was 20% (see section 3.2.2). It was also noticed in Hovens (2002).

mathematical skills involved in the daily activities of their community. This fact might counterbalance the absence of transfer of academic content which cannot take place due to their low proficiency in L2 French. These abilities acquired within their communities which students stored in their Common Underlying Proficiency, added to the benefit of L1 Sérère as the language of tests, could raise participants' opportunities to succeed in the M test, a fact which is in line with Giuliano Sarr's (2013) study in which children in Senegal engaged in discussions better when they engaged in conversations which dealt with their indigenous knowledge in L1 Fula rather than in L2 French. With three more years of exposure to L2 French, as shown by results, students at grade 6 in the experimental group could not obtain the marks of 5.5 or 6 points even though the benefit of L1 Sérère as language of the M test or mathematical skills they used daily among their community. This fact might be due to the demands of language and content which participants did not master in L1 Sérère, perhaps because they could not transfer the most complex terms from L2 French to L1 Sérère which they could not understand during the lesson as suggest the fact that the best mark for only 4.35% (1) of students in the control group was 4 points. However, it should be mentioned that, as shown by the scale of distribution of possible scores in M, some participants who received tests in L2 French could attain the level of three points, a fact which only happened in very few occasions at grade 3, suggesting an increase in their level of L2 French.

Data in the present study confirms the hypothesis for research question 1a (see sections 5.2.1 and 5.2.2): The language of tests has an effect on academic results of minority language learners in rural Senegal. As shown, grade-3 and grade-6 participants who were given tests in L1 Sérère outperformed their peers who were given L and M tests in L2 French due to the fact that the official language for testing (L2 French) represented a barrier which impeded them understanding properly what they were asked and, therefore, students were unable to show their capabilities. According to findings in the present study, it was also argued that grade-6 students were successful when they took tests in L1 Sérère perhaps due to full comprehension of the language of tests and also to the retrieval of knowledge stored in their Common Underlying Proficiency acquired at school (some transfer from L2 French) and within their community (indigenous knowledge) although in M,

the absence of L1 Sérère at school was noticed because they could not obtain the highest marks. However, this was not the case for grade 3 participants in the L test possibly due to their low proficiency in L2 French, which did not allow transfer to L1 Sérère; however, in the M test, skills developed in daily activities within their community could counterbalance the absence of transfer and grade-3 students could obtain high results.

8.3 Research question 1b

Taking into account that participants in the present study obtained better scores in L and M tests when they were given in L1 Sérère as argued in section 9.2, the goal of research question 1b (if the language of tests has an effect on academic achievement of L1-Sérère students of primary education who live in rural areas of Senegal after 3 and 6 years of academic exposure to L2 French, is there any relevant advantage for the female population?) was to determine if that benefit was especially relevant for the female population. In section 5.2.2, it was hypothesized that first, females who received tests in L1 Sérère at both grade 3 and grade 6 would outperform their female peers who took them in L2 French; second, that females who had tests in L1 Sérère would have better scores than males in each respective grade.

The results described above (see sections 7.4 and 7.5) suggest that females at grade 3 and grade 6 took advantage from the language of tests when these were given in L1 Sérère, as shown in the large number of female participants who attained the level of three points as compared to their female peers who received tests in L2 French, especially in the case of M. It should be considered that female participants in the control group represented the current situation in the target area of the study.

However, this advantage is not only shown in the quantity of participants who succeeded, but also in the quality of academic achievement as shown by the mean scores obtained. For instance, grade-3 females in the experimental group had 1.10 points higher in L tests than their female peers in the control group. With respect to grade-6 females, those who received L tests in L1 Sérère also obtained 1.86 points of advantage in comparison to those who received tests in L2 French. Of

special concern was the M test at grade-3: The language of tests resulted in an advantage of 3.25 points in favour of those females who took the test in L1 Sérère. These results are consistent with Benson (2001b), who argued that the use of the females' L1 at school could help increase their self-esteem and self-motivation since, as shown in the present study, when females were given the opportunity to solve a task in L1 Sérère, they could show their real capabilities.

When tests of L and M were given in L1 Sérère, females obtained scores which were not statistically different than their male peers, a fact which was also true when they received both tests in L2 French. This fact implied that tests in L1 Sérère were beneficial to both females and males due to the fact that the comprehension of tests and the possibilities of giving a correct answer increased considerably. Only in the L test at grade 3 in the experimental group, males obtained a significantly higher mean score than that of females. Perhaps, the explanation for that exception can be rooted in Benson (2001b), Stromquist (2001) and Van Der Slik et al. (2015), who claimed that some female disadvantages in academic achievement were attributed to sociocultural circumstances rather than linguistic factors, for instance household responsibilities and parents privilege for males at school (see section 3.3.1). As a way of explanation, taking into consideration that L tests required attending school regularly and memorizing from teachers' speech and class-notes, grade 3 female participants presented gaps of academic content in L2 French which could not be transferred to L1 Sérère; however, with three more years of exposure to L2 French, grade-6 females could progress faster and obtain similar scores to those of males, a fact which reminds us of Van Der Slik et al.'s (2015) study in which African women scored higher than males in literacy tests. The results in the present study are in line with Benson (2001b), who claimed that females in Sub-Saharan Africa are wrongly tagged of being incompetent at school when in fact they have to cope with household charges and school duties at the same time. The idea that both females and males benefited equally from tests given in L1 Sérère is reinforced by the fact that females' scores when they received tests in L2 French were also not considered statistically significant as compared to males who also took tests in L2 French.

When considering females' individual achievement and the number of participants along the established scales of possible scores in M and L, some differences can be noticed. The subgroup with the largest number of participants who obtained the lowest scores in both M and L was that of females who took tests in L2 French, especially those at grade 3. This situation was reversed when the language of tests was L1 Sérère: Females could increase considerably their academic achievement as shown by the number of them who obtained scores of 5 and 6 points. Moreover, if females' results in the experimental group are compared to those of males in the same group, there were different cases in which some females slightly outperformed males; for example, there were more females than males at both grade 3 and grade 6 who attained the score of 6 points in the M test. With these ideas in mind, despite the fact that mean score differences were not statistically significant, it could be said that L1 Sérère as language of tests especially benefited female participants as compared to males. These results remind us of the case of Burundian females in PASEC (2014) who obtained better results than their male peers in both language and literacy since they had been taught in L1 Kirundi during four years. These results also support Benson (2001b; 2005a), who argued that tests in females' mother tongue can have positive effects on females' academic results.

Data obtained in the present study supports the hypothesis to research question 1b (see sections 5.2.1 and 5.2.2): L1 Sérère as language of tests has a positive effect on females' academic results settled in rural Senegal. As results have shown, the language of tests is a crucial factor for females' academic success since they obtain better results when they received tests in L1 Sérère than in L2 French. The use of local languages for testing would have several benefits for the female population as compared to their current situation in submersion programmes.

In section 6.3.1, it was also predicted that females would outperform males when tests were given in L1 Sérère at both grade 3 and grade 6. Although this idea was not confirmed by the results obtained in the present study since L1 Sérère seemed to benefit both genders equally in tests (with the exception L tests taken by grade 3 participants) it could be said that the results in the present study suggest not only the use of L1 Sérère in tests in order to improve the academic achievement

of both genders, but also to counterbalance the situation that females are living in schools of rural Senegal.

8.4 Research question 2

The goal of research question 2 (does the language of tests make a difference for L1-Sérère primary students along a continuum from *Basic Interpersonal Communicative Skills* towards *Cognitive/Academic Language Proficiency* and from a *familiar* to a *non-familiar context*?) was to analyse further the conclusions from research question 1a and, thus, determine more precisely whether the language of tests (L1 Sérère or L2 French) had an effect on results of academic tasks designed along a continuum of increasing language complexity while decreasing context familiarity along the three quadrants of Cummins' matrix: Q1, Q2 and Q3 (see section 6.5.1).

In section 5.2.3, it was expected that participants at grade 3 and grade 6 who received L and M tests in L1 Sérère outperformed those who received tests in L2 French in Q1 since they are familiarised with their background and receive its input in L1 Sérère. Concerning Q2 and Q3, it was hypothesized that grade-3 and grade-6 students in the experimental group would not obtain better results than those of their peers in the control group since they had only been exposed at school to L2 French and therefore have learnt academic content which they do not master in L1 Sérère.

In order to discuss the results described in sections 7.6 and 7.7 about grade-3 and grade-6 students' scores obtained in M and L tests in the three quadrants of Cummins' matrix, the time that participants had been exposed to L2 French at school as language MOI should be considered.

As results in the present study show, mean scores obtained in each quadrant of L and M tests by grade-3 participants in the experimental group were significantly higher than their peers in the control group all along Cummins' matrix. As an example, the best mean score per quadrant obtained by students who received tests in L1 Sérère was 1.15 in L and 1.83 in M compared to .54 and .27, respectively, obtained by those who took them in L2 French. This fact suggests that, after three years of exposure to academic L2 French, transfer of content from L2

French to L1 Sérère was unlikely to happen among ITM children living in rural Senegal not only in questions with a CALP tendency (Q2 and Q3), but also with BICS (Q1). This evidence points to the fact that, in the context of the present study, ITM students require a longer exposure to L2 French for the acquisition of BICS than the two-year period suggested by Cummins (2008b). Moreover, it is in agreement with Skattum (2009) who claimed that students in francophone Sub-Saharan Africa show little signs of basic language after two years of exposure to L2 French (section 3.4.2).

A possible reason for the success of grade-3 students who received tests in L1 Sérère might be rooted on two different factors: First, the advantages of L1 Sérère as language of tests and second, the students' indigenous knowledge which could counterbalance the absence of transfer. However, that effect could not be possible in Q3 in the L test because they did not master academic and complex language in L1 Sérère as shown by their mean score in the target quadrant since it was not significantly different to the one obtained by those who received it in L2 French. These ideas are in agreement with Halaoui (2003) who claimed that tasks should be adapted to the students' realities in order to heighten quality in the education of Sub-Saharan students (section 2.2). Moreover, they are also in line with Mohanty (2009), Mohanty et al. (2009), Brock-Utne and Alidou (2006), Skutnabb-Kangas and Dunbar (2010), Garcia (2015) and Brock-Utne (2016) who argued that the cultural background of minority language students living in developing countries should be considered at schools since it provides support to the use of their L1, a fact which increases their chances of success in tests (section 2.3). The findings in the present study also call to mind mother-tongue-based MLE experiences in which the students' indigenous knowledge was embedded into the school curricula within academic content such as the Plus Project in India (section 4.4.3), the PRP project in Zambia (section 4.4.2) or the *Pédagogie Convergente* in Mali (section 4.4.4) among others in which students enrolled showed good academic results.

Further analysis of the results in the present study showed that grade-3 participants who received tests in L1 Sérère obtained mean scores which decreased from Q1 to Q3 in both L and M tests as the type of language became more complex

and the context less familiar. In other words, in the distribution of students in the scale of scores for each quadrant of 0 to 2 points, their numbers tended to increase in scores of 1 and 0 points as CALP grew and the content of the test became less familiar to them. These findings are in line with Soares de Sousa et al.'s (2010) study in which grade-2 bilingual children who obtained higher scores when spelling in L2 English than in L1 IsiZulu partly because of absence of literacy instruction in L1 IsiZulu (section 3.4.1). Moreover, they also remind us of Ngcobo et al. (2016) who claimed that it was harder for first-year university students to deal with academic terms in L1 IsiZulu than L2 English because they had never received previous instruction in their mother at school tongue and therefore transfer was difficult to occur (section 3.3.2).

In the present study, it was shown that after six years of exposure to L2 French, grade-6 participants who took L and M tests in L1 Sérère obtained higher mean scores than those who took them in L2 French in all quadrants along Cummins' matrix despite the fact that they had only received instruction in the ILWC at school. The reason for the success of grade-6 participants in the experimental group could be rooted not only on the advantage of L1 Sérère as language of tests and to the indigenous knowledge acquired within their community as happened with grade-3 students, but also to some transfer of content learnt at school from L2 French to L1 Sérère (as shown by the mean scores obtained by participants in the control group and the number of them who reached scores of 2 points in Q3 in the L test). Besides, it should be noticed that students at grade 6 in the experimental group, although they obtained better scores, they draw a pathway along the continuum with similar features to that of the control group: In the L test, no significant differences were found between the mean scores obtained along the continuum by participants who received it in L1 Sérère; in the M test, they obtained a mean score above the level of 1 point which decreased in Q2 and Q3 when no significant differences were found. Interestingly, it was also true for participants who took L and M tests, respectively, in L2 French, a fact which was not observed among participants at grade 3 and which suggests not only the transfer of some content learnt at school from L2 French to L1 Sérère as explained in section 8.2, but also a transfer of indigenous knowledge from L1 Sérère to L2 French

(Cummins, 2008b). All that store of learning would be collected and saved into the students' Common Underlying Proficiency (Cummins 1979a; 1986; 2005). In other words, there seems to be a close relationship of bidirectional transfer between L1 Sérère and L2 French which might happen and which might increase as students attain a better command of the official language MOI.

This phenomenon of bidirectional transfer was not only noticed on results obtained by students who received tests in L1 Sérère, as explained earlier, but also on results obtained by participants who received them in L2 French as shown by their results in Q1: A mean score above the level of 1 point and 39.13% (9) of them who obtained 2 points might imply a transfer of indigenous knowledge from L1 Sérère to L2 French. That is to say, students have stored in their Common Underlying Proficiency both indigenous knowledge and some content acquired at school, but it was the language of tests which made the difference: L1 Sérère allowed students in the experimental group to understand what they were asked and to express what they knew even in the most academic task whereas L2 French did not allow these processes (see García, 2009; Shohamy, 2011). Those findings are in agreement with Cummins' (1979; 1980) theories of the Interdependence and Threshold Hypotheses (section 3.4.1) and confirm such ideas in the rural context of Senegal since the absence of L1 Sérère linguistic and academic skills at school did not allow their transfer to L2 French even after six years of exposure to the language of school. Furthermore, results are also in agreement with Skutnabb-Kangas (2009c) who claimed that the absence of an adequate development of CALP in the L1 did not allow students to strengthen their capacity for reasoning out in the L2.

This fact reminds us the case of students participating in the assessment of pilot bilingual programmes in Senegal SNERS in which students at grade 4 attending a traditional school obtained better results in a L2 French test than those who attended a pilot bilingual school because they immediately received instruction in L2 French from grade 1, thus reducing the possibility of acquiring L1 skills. Consequently, taking into account Heugh (2006; 2011b), Shohamy, (2007b), Makalela (2016) and García's (2017) ideas about the need of the L1 in the classroom for minority language students' success in the academic context and therefore, in

tests, it is suggested here that academic content and linguistic skills acquired at school might be stored in the students' Common Underlying Proficiency together with their indigenous knowledge for an adequate transfer to L2 French provided that they had the opportunity to develop content and linguistic skills in L1 Sérère with L2 French learnt as a subject or in a translanguaging space (section 3.2.2).

It should also be said that, despite the fact that grade-6 students seemed to increase their proficiency in L2 French in both L and M tests, their proficiency was not high enough since they did not reach their peers' scores when they received them in L1 Sérère, perhaps because L2 French still represented a barrier to them in all quadrants of Cummins' matrix (Cummins, 2001; Shohamy, 2006; Skutnabb-Kangas, 2009a; Skutnabb-Kangas and Dunbar, 2010). Consequently, as results in the present study show, Cummins' (2008b) approach that CALP was acquired between 5 or 7 years of exposure to an L2 seems to be lengthened in the target context of the present study and therefore is in agreement with Levin and Shohamy (2008) who claimed that minority language participants in their study did not obtain the same results as natives did in tests of Mathematics and L2 Hebrew because they required between 7 and even 11 years of exposure to the language MOI in order to acquire a CALP type of language (section 3.4.2).

Contrary to the initial hypothesis in section 5.2.3, the language of tests made a difference in all the quadrants of Cummins' matrix for students at both grade 3 and grade 6. First, it was argued that both grade-3 and grade-6 participants who received tests in L1 Sérère would obtain better results in Q1 than those who were given them in L2 French due to the fact that they are familiar with their indigenous knowledge in L1 Sérère, a fact which seems to be confirmed according to the results obtained in the present study. However, the hypothesis concerning Q2 and Q3 that grade-3 participants in the experimental group would have results similar to those in the control group was not confirmed by the findings obtained due to a possible counterbalancing effect of the students' indigenous knowledge. Finally, the prediction that students at grade 6 in the experimental group would not advantage those learners in the control group along Cummins' matrix was rejected because, after six years of exposure to L2 French, participants in the experimental group obtained higher scores than those in the control group in all the quadrants.

8.5 Pedagogical implications

As findings in the present study have shown, there is a need for participants in the present study to receive tests at school in L1 Sérère for their personal enrichment and community development (Jandhyala, 2001; Hovens, 2002; Halaoui, 2003). The fact that L1 Sérère as language of tests favoured the comprehension of the task as well as the capacity to give a correct answer but L2 French hindered it was also noticed by the school directors interviewed. For instance, one of them stated that “*Si les consignes étaient en sérère, la compréhension serait facilité [...] le français est une barrière linguistique qui limite les enfants et donc, ils ne peuvent pas accéder à plus d’information*”⁸⁹.

Shohamy (2006; 2007b) claimed that the real *power of tests* (section 2.4.1) should be used to promote social justice; the author argued in favour of multilingual school where tests would be given to students in different languages; that is to say, students could receive academic tests in L1 Sérère, L2 French or any other minor local language. That way, as Cummins (2013) asserted, *collaborative relations of power* would be established within the classroom and the whole education system in order to narrow the social gap existing between the low SES communities who speak a local language and the ruling class who are proficient in L2 French. As explained in section 3.5.4, the Senegalese government increased the number of schools around the country for children to have access to formal education and decrease the number of out-of-school children and dropout. However, official national tests, such as the one at the end of primary education CFEE, are still designed in L2 French despite the fact that there are a few successful students each year (see section 4.7). Probably, as confirmed by the school inspector in the interview, if children were given the opportunity to receive those tests in their local language, or at least, to have it translated orally, a larger number of them would be successful. Moreover, it would increase their motivation to enrol in secondary education, a fact especially affecting females.

Taking into account that one of the goals of education in Senegal is the acquisition of L2 French, what the rulers of that country seem to neglect is, perhaps,

⁸⁹ If instructions in tests were in Sérère, their comprehension would be eased [...] French is a language barrier which limits children and therefore, they cannot have access to further information.

the main point to attain that objective: The level of development that students have of their L1 is fundamental at the time that they start learning an L2 (Cummins, 1979a; 1986; 2001; 2005). In other words, the situation of L2 French representing a barrier should be transformed into a language which leads to the enrichment of students' knowledge by easing access to sources of information and to the international context. Perhaps, as Cisse (2005) claimed, what is really needed in the Senegalese education system is a general introduction of local languages at schools during the whole primary education and not only trials of pilot projects (section 3.2.2), a situation which was equally noticed in the interview by one of the school directors saying that "*on entend toujours parler d'écoles pilotes, mais à chaque fois c'est un éternel recommencement*"⁹⁰, and confirmed by the school inspector also interviewed claiming that "*tout est volonté politique*"⁹¹.

Sérère is a language which has got an established script and grammar manuals, but these are absolutely absent at compulsory schools. The script and grammar rules of Sérère could be brought into the classrooms of the target area by creating material for the children with the purpose of learning academic content and developing reading and writing abilities in their own language which could be transferred from L1 Sérère to L2 French in a similar way as it has been done in other developing countries (see section 3.5). Moreover, as shown in the present study, the context in which the students live within their communities should be considered as a relevant starting point for them to develop their linguistic and academic skills in L1 Sérère while progressively embedding content with a CALP language for later transferring them to L2 French (Halaoui, 2003; Skutnabb-Kangas, 2009c). Bearing in mind that parents surveyed in the present study expressed that 50% (13) of them could not read in L2 French and 42.3% (11) could not write in that language, the presence of L1 Sérère in the classroom added to scaffolding activities based on their own background could help them raise their involvement into the learning process of their children.

It should not be forgotten that an adequate education programme also requires teachers to follow up training to first, become proficient in one or more

⁹⁰ We always hear about pilot schools, but it is each time an eternal restart.

⁹¹ All is related to a political will.

Senegalese languages and second, to learn strategies for the promotion of transfer of content and linguistic abilities from a local L1 to L2 French, apart from attending regular workshops in which they could share experiences and explain their difficulties. The introduction of a local language as MOI at Senegalese schools is, according to Rea-Dickins et al. (2010), a tool to change the current teacher-centred pedagogical approach to a student-centred in which children would actively participate in the learning process, especially relevant for the engagement of females in school activities as shown in the present study. Furthermore, as it was said in the three interviews carried out in the present study and confirmed by the questionnaire to teachers, most of them would volunteer to receive a training course with the purpose of using a local language as MOI and creating pedagogic strategies for the promotion of transfer of academic and linguistic skills, as one of the school directors interviewed claimed *“les enseignants de cette école sont disposés à subir une formation en langue sérère pour leur permettre de faciliter les enseignements et les apprentissages qui est notre mission à tous”*⁹².

Following the example of pilot projects in developing countries (see section 3.5) and focusing on the target area of the present study, as Heugh (2006; 2011b) suggested, students could use L1 Sérère as MOI all along primary education while learning L2 French as a subject until the last grade of primary education followed by a progressive shift to L2 French during lower secondary education (section 3.2.2), giving them also the choice to learn reading and writing skills in another major Senegalese language such as Wolof or Fula.

However, as argued by García (2009), García (2012) and García and Hesson (2015), that type of monolingual approach in which languages are seen as separate units does not take into account the fact that, in a target area such as the one in the present study, although Sérère is the lingua franca, there are other minority languages such as Fula, Wolof or Bambara. This might represent one of the major dilemmas for the introduction of local languages in education in Senegal as expressed by the school inspector during the interview:

⁹² The teachers in this school are ready to go through a training programme in Sérère in order to make easy the teaching and the learning which are our mission.

“Il y a un problème qu’on a soulevé dans les écoles expérimentales. Le petit sérère qui est en milieu Wolof ou en milieu Peul, si par exemple, on l’oblige à apprendre dans une autre langue locale, les parents ne sont pas d’accord parce que l’enfant, quand il rentre à la maison il parle sa langue maternelle, mais quand il va à l’école il parle la langue du milieu, et des fois cela pose problème”⁹³.

A possible solution might be García (2009), García and Hesson (2015), Esteve and González-Davies (2016), Makalela (2016) and Brock-Utne’s (2016) idea about the creation of a translanguaging space at schools in which students could make use of their whole linguistic repertoire to understand, learn and express their knowledge in tests and school tasks in which academic content was embedded within their cultural context. Moreover, teachers could become researchers themselves in the classroom on pedagogic strategies to promote transfer of language skills and academic content from local languages to L2 French, progressively increasing the use of the ILWC and guiding them to distinguish the situation when to use one language or when to use the other (Wei and García, 2016). By means of a translanguaging space all local languages would be accepted in the way towards L2 French acquisition and no-child would be hindered access to education or to success in tests because of a language barrier, therefore increasing the quality of education in Senegalese schools.

The findings in the present study should encourage policy makers in Senegal to be concerned about the importance of the use of local languages in public schools, and more precisely in primary education as one of the tools for the academic success of children and consequently for the development of the country. Not until they become aware of the importance of using African languages in schools as tools to acquire L2 French and also in tests in order to give opportunities of success to local communities in order to attain social justice, the gap existing

⁹³ There is a problem we have raised in experimental schools. A young Sérère child who lives in a Wolof or Fula context, for example, he/she is forced to learn in another local language, parents do not agree because the child, when he comes back home, he/she speaks his/her mother tongue, but when he/she is at school, he speaks the main local language of the target area, and sometimes it can be a problem.

between high and low SES and males and females is a fact which may continue to exist.

8.6 Summary

According to the results obtained in the present study, L1 Sérère as language of tests might have a positive effect in the quantity and quality of students' academic achievement as compared to the current official language of instruction, L2 French: There were more students at grades 3 and 6 who succeeded and their scores in both L and M were higher.

Moreover, as suggested by results in the L test, grade-3 participants in the experimental group could not benefit as much as those at grade-6 from L1 Sérère as language of tests because transfer of content was unlikely to occur due to their low level of L2 French, as shown by scores obtained by grade-3 participants in the control group. However, as explained in sections 8.2 and 8.4, that lack of transfer was perhaps counterbalanced in the M test by the fact that students dealt with some mathematical skills in the tests the same as they use in their daily routines and therefore a large number of them could attain the academic skill-threshold. At grade 6, it seems that participants could transfer some academic content since their level of L2 French was higher as it is deduced from results of participants in the control group. That idea, added to the knowledge acquired within their community and the benefit of L1 Sérère as language of tests, allowed a large number of students in the experimental group to reach the level of three points and obtain a mean score also above that threshold. As argued in section 8.4 and suggested by grade-6 participants' results in L and M for both the experimental and the control groups, there might be the possibility of a bidirectional transfer between L1 Sérère and L2 French related to the different features of each quadrant.

With regards to the female population, as shown by results, L1 Sérère as language of tests advantaged them at grade-3 and grade-6 as compared to those who were given the tests in L2 French, in both quantity and quality and especially in M, when they dealt in tests with similar skills as in their daily routine. When females' scores in the experimental group were compared to their male peers who also received L and M tests in L1 Sérère, the fact that there were no statistically

significant differences between their mean scores suggested that L1 Sérère as language of tests advantaged both genders equally. However, considering that females at grade 3 and those at grade 6 who were given L and M tests in L2 French were those who had the lowest results but when they received them in L1 Sérère, there were more females than males who obtained scores of 6 and 5 points, it could be said that L1 Sérère as language of tests favoured the female population and could help to counterbalance the effects of social situation on their school results (see section 3.3.1).

Chapter 9 is an explanation of the conclusions in the present dissertation. After a brief description of the motivations and the purposes of the present study, the following chapter contains a review about the design of tests and of the data collection procedure. After that, the most relevant findings and the possible implications that it might have in the target area of the study are highlighted.

9. CONCLUSIONS

The present dissertation is a study on the effect of the language of tests (L1 Sérère vs L2 French) on academic results of children living in rural Senegal. The main feature is that these students have never received formal instruction at school through L1 Sérère but have uniquely been exposed to L2 French as MOI during three (grade 3) or six (grade 6) years. Taking into account the socio-cultural circumstances of the Sub-Saharan context, a special focus is given to the female population in the target area of the present study and the possible benefits that the use of L1 Sérère might have as language of tests.

My first motivation to carry out research related to the language in which students are taught and assessed at schools in Senegal appeared when I noticed, during one of my different stays in the Sub-Saharan country, that most children and teenagers had several gaps when they tried to have a simple conversation in L2 French. Then, I immediately started wondering what the reason was for such a lack of proficiency if they had received instruction in L2 French during several years and all the official tests and documents at the administration were given in that language. Then, I became interested on the idea that authors such as Skutnabb-Kangas (2008a; 2009b), Mohanty (2009), Benson (2008), Rea-Dickins et al. (2010), Heugh (2011b) or Brock-Utne (2013; 2014; 2016) had about the unfair situation lived by children in developing countries when attending a submersion type of school programme in which they are assessed and instructed in a language foreign to them. That is the main reason which pushed me to carry out research in Senegal: My masters' thesis among secondary students and speakers of Diola (Martín-Chazeaud, 2014), and the present study, with primary students, speakers of Sérère.

Following previous studies which aimed at analysing the effect of the language of tests on minority language students, mainly Levin and Shohamy (2008) and Martín-Chazeaud (2014), and also inspired on different assessments of mother-tongue-based MLE pilot projects in Sub-Saharan Africa such as Hovens (2002), Hamidou et al. (2010), Brock-Utne (2013) or PASEC (2014), two different types of tests were designed: *Leçons* (L) and Mathematics (M). The former implied six

multiple choice questions with four possible answers each and the second three mathematical problem-solving tasks.

The special feature in both tests is that each pair of multiple-choice questions in the L test and each problem-solving task in the M test were designed according to an increasing degree of language complexity and context familiarity following a continuum. This thought came up to my mind when considering Cummins' (1982) idea of tasks designed according to a matrix with three quadrants, each of them with a different degree of linguistic demands and embedded context. Therefore, taking into consideration the relevance that the socio-cultural background has for the education of ITM children and Coyle, Hood and Marsh's (2010) idea about the route of scaffolding tasks along three quadrants of Cummins' matrix in the CLIL classroom, I adapted it to the situation of the participants in the present study. Moreover, both tests differed in their nature: Despite the fact that both required comprehension of the language, the L test demanded understanding the teachers' speech or class-notes during lessons whereas the M test was more focused on reasoning out a given situation. All tests were designed according to the curricula for primary education in Senegal and following the advice of foreign and local experts on education. They were piloted and adjusted if necessary prior to the data collection procedure. The data obtained were analysed both by descriptive and inferential analysis.

Results obtained in the present study confirmed the hypothesis to research question 1a and showed that the language of tests might influence the academic results obtained by young children living in rural Senegal in both quantity and quality of the outcomes: In both L and M tests, the use of L1 Sérère as language of tests allowed a larger number of students at grade 3 and grade 6 to obtain scores equal or higher than the established academic-skill threshold (level of three points over six) and to obtain higher scores in average than those participants who received them in L2 French, the current language of tests at school. Moreover, as suggested by the results obtained, it was argued that Cummins' (1979a; 2001; 2005) theories of the *Threshold* and *Interdependence Hypothesis* occurred in the target context of the present study since most participants who received tests in L2 French, especially those at grade 3, could not obtain results above the level of three

points due to the fact that they had never developed academic and linguistic skills in L1 Sérère at school to be transferred to L2 French which did not allow them to understand both the language of tests and that of the lesson taught.

As shown by results obtained from research question 2 and contrary to expectations in the initial hypothesis, the advantage of participants in the experimental group was significantly true in almost all quadrants of Cummins' matrix for students at both grade 3 (except the mean score in Q3 of L) and grade 6 in both L and M tests. Interestingly, it seemed that after three years of exposure to L2 French at school, the success of participants at grade-3 in the experimental group relied not only on L1 Sérère as language of tests but also on their skills developed in their daily activities as well as on their indigenous knowledge acquired within their communities, both counterbalancing the deficient transfer of academic content from L2 French to L1 Sérère due to their poor mastery of the language MOI, as suggested by results of participants in the control group. Moreover, as shown by data from Q1 in both L and M tests, it was noticed that participants at grade 3 in the rural context of Senegal required more than three years of exposure to L2 French in order to acquire a BICS type of language, a length of time which was longer as the one suggested by Cummins (2008b) for minority language students in education systems of Western countries.

After six years of school attendance, grade-6 participants in the experimental group seemed to transfer some academic concepts from L2 French to L1 Sérère in Q2 and Q3 which they could have understood during lessons, a fact contrary to grade-3 participants. That content learnt at school might be stored together with the knowledge acquired through their L1 within their community in their Common Underlying Proficiency which, added to the benefit of L1 Sérère as language of tests, gave significant advantage to participants in the experimental group. Unexpectedly, the findings for Q1 in M for participants at grade 6, when the type of language was BICS and the context of the task was familiar to the students, might imply a transfer of indigenous knowledge and skills acquired within the community in daily activities from L1 Sérère to L2 French, a fact which supported Cummins' (2001) idea that transfer of content could happen in a bidirectional sense.

The hypothesis to research question 1b was confirmed by the results obtained. Taking into consideration Benson (2001b; 2005a), Stromquist (2001) and Romaine's (2013) argument about the social role of females in the rural communities of Sub-Saharan Africa and their consequent poor achievement at school (section 3.3.1), the present study suggests that, by receiving tests in L1 Sérère, the female population was benefited as compared to their current situation. That is to say, in the present study, the number of females at grade 3 and grade 6 who reached the level of three points in both L and M tests was higher and obtained higher scores when they received the tests in L1 Sérère than when they took them in L2 French. Moreover, despite the fact that L1 Sérère as language of tests seemed to benefit equally both genders as suggested by statistical analysis, in some particular cases females could be capable of outperforming males who also received tests in L1 Sérère as shown by individual scores. These findings are therefore in agreement with experts about female education in the Sub-Saharan context such as Benson (2001) who argued that the presence of the students' mother tongue at primary schools, and more specifically in tests, could benefit females while engaging them more actively in the process of learning, increasing their self-esteem and motivation for, perhaps, a larger presence of them in secondary education.

As seen in section 8.5, the findings of the present study might have different implications with regards to the education of rural children in Sub-Saharan Africa, speakers of a language which is not the official one, and more precisely, in Senegal. Authorities in the country ought to pay some attention to the language fact and start investing in a general introduction of local languages in education with a pedagogic material based on the students' background and with adequately trained teachers rather than spending funds in an education of poor quality which does not reach children and which keeps on recording high grade repetition and dropout rates. Furthermore, the fact that rural children could receive tests in their L1 might enlarge their opportunities of academic success and thus widen social justice by giving them similar opportunities to those of high SES students for whom L2 French is a language of daily communication. In fact, if the main goal of the education system in Senegal is students to acquire a high level of L2 French, a language which

opens them the gates of international communication and that of sources of information, the development of linguistic skills in a local L1 is essential to them.

The gender gap and the socio-cultural circumstances of females should not be avoided. In line with other studies carried out in the Sub-Saharan context, results obtained in the present study have shown that the female population could benefit especially from the use of L1 Sérère as language of tests, and perhaps, as language MOI, not only in the number of those who succeed at school, but also in the quality of their outcomes. The role of females in the Sub-Saharan society is relevant, therefore the fact that they could reach an education of quality is beneficial not only for them, but it is also an advantage for the whole community. Possible education programmes which regard the students' L1 as MOI should consider the fact of enlarging the number of female teachers with the purpose of ensuring first, gender equality in Senegalese schools and second, the fact that female children really benefit from that programme.

10. LIMITATIONS AND FURTHER RESEARCH

The present study was limited first by the fact that secondary schools directors of the target area did not consent their schools to participate in the research because they claimed that they should receive money for that; consequently, students at grade-9, as it was initially expected, could not take part in the data collection procedure, a fact which gives evidence of the difficulty of collecting data in a context such as the target one in the present study. Further research should enlarge the study to higher grades than primary education with the purpose of analysing if the use of the students' L1 as language of tests is also beneficial after more years of exposure to L2 French at schools. Moreover, other academic subjects should be considered when designing tests for studies with the same purpose as the present and maybe, a test of L2 French proficiency ought to be employed in order to determine a more accurate level of proficiency of the students in that language.

The present study has carried out research among Sérère speakers of rural Senegal, without the possibility to obtain data among speakers of Diola as it was initially planned due to political riots in Southern Senegal. Future research on that topic should consider other local languages as well as urban contexts with the purpose of generalizing the results obtained. Moreover, taking into account the complex linguistic situation of Senegal, future research ought to consider more specifically the notion of familiar language (see footnote 1 in section 2.1) and include those students whose language spoken by their relatives is different than the local vernacular one with the purpose of analysing if the language of their environment as language of tests has also an effect on students' academic achievement compared to L2 French.

The fact that there is little research concerning Sub-Saharan Africa and the effect of the students' L1 in tests compared to an official language MOI, especially concerning the female population, has also limited the scope of the present study. Thus, a large number of studies in which the present one is based is research which took place in a context different than the one in the present study, are assessments of pilot educational projects in developing countries or even rescindable reports about the right of children to receive education in a language they master.

Therefore, it should be said that there is a need for research on the use of the students' L1 not only in tests, but also as language MOI, through observations in the classroom which could analyse both the students and teachers' engagement in the process of learning, paying special attention to the female population and analyse deeply if the L1 as language of tests and also language MOI could help to diminish the gender gap related to academic results.

Bearing in mind the possibility of a close relationship of bidirectional transfer between L1 Sérère and L2 French which might correlate with the level of proficiency that students have of the official academic language, as suggested by data gathered in the present study, further research should focus on that phenomenon and analyse if the level that Sub-Saharan students have of an ILWC as L2 correlate with the amount of content and linguistic skills which transfer between languages. The results of such study could therefore be taken into consideration when designing the curricula of a possible mother-tongue-based MLE programme and determine possible pedagogical strategies employed by teachers to promote the development of the two languages.

Taking into account the results in the present study showing that students who took tests in L2 French did not succeed and Shohamy's (2001; 2006; 2007b) idea about the power of tests (section 2.4.1), further research should focus on comparing results in a local L1 and L2 French of participants with a low SES and those of a high SES, together with questionnaires about their use and attitude towards L2 French and a local language and their future expectations.

Finally, it should be considered the possibility of carrying out an experiment by submitting participants to a pre-test measuring the effect of the language (a local L1 and L2 French) previous to a treatment in which they would receive instruction in a local L1 and a post-test. Such a research would not only analyse the students' academic results according to the language of tests, but also that of the language MOI. Observation should be required in order to determine the teachers' type of pedagogical strategies and the students' participation in the communication process with special concern on the female population.

REFERENCES

- Abidogun, B.G. and Abedule, O. I. (2013). *Contributions of Mother Tongue Education in Early Childhood Education*. Paper presented at the 1st Annual International Interdisciplinary Conference, Azores, Portugal. Retrieved 2/2/16
<https://eujournal.org/index.php/esj/article/download/1337/1346>
- Agence Nationale de la Statistique et la Démographie (ANSD, 2014). *Recensement Générale de la Population et de l'Habitat, de l'Agriculture et de l'Élevage*. Retrieved 15/4/2016
<http://www.ansd.sn/ressources/RGPHAE-2013/ressources/doc/pdf/2.pdf>
- Anders-Baer, L., Magga, O.H., Dunbar, R. And Skutnabb-Kangas, T. (2008). *Forms of Education of Indigenous Children as Crimes Against Humanity?* Expert paper on Indigenous Children Education and Indigenous Languages. United Nations Economic and Social Council. Retrieved 18/10/2016
http://www.un.org/esa/socdev/unpfii/documents/E_C19_2008_7.pdf
- Associates in Research and Education for Development (ARED, 2014). *La Promotion et l'Utilisation des Langues Locales dans l'Enseignement Primaire au Sénégal: Résumé du Rapport d'Évaluation d'Impact du Modèle ARED*.
- Bamgbose, A. (2011). African Languages Today: The Challenge of and Prospects for Empowerment under Globalization. In Bokamba E.G., Shosted. R.K., and Tesfaw Ayalew, B., *Selected Proceedings of the 40th Annual Conference on African Linguistics* (pp. 1-14). Sommerville, MA: Cascadilla Press.
- Bee Chin, Ng and Wigglesworth, G. (2007). *Bilingualism: An Advanced Resource Book*. New York: Routledge Applied Linguistics.
- Benson, C. (2001a). *Final Report on Bilingual Education: Results of the External Evaluation of the Experiment in Bilingual Schooling in Mozambique (PEBIMO) and some Results from Adult Literacy Experimentation* (New Education Division Documents No. 8). Stockholm: Swedish International Development Cooperation Agency. Retrieved 23/12/2015
http://www.sida.se/contentassets/15fd7e3869e442d9a8f4537df5727f5d/education--a-way-out-of-poverty_620.pdf
- Benson, C. (2001b). Bilingual Education in Africa: An Exploration of Encouraging Connections Between Language and Girls' Schooling. In Melin, M. (Ed.), *Education - A Way Out of Poverty: Research presentations at the Poverty Conference 2001* (pp. 80-96), (New Education Division Documents No. 8). Stockholm: Swedish International Development Cooperation Agency. Retrieved 23/12/2015

<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.201.8131&rep=rep1&type=pdf#page=81>

- Benson, C. (2004a). *The Importance of Mother Tongue-Based Schooling for Educational Quality: Commissioned Study for EFA Global Monitoring Report 2005, The Quality Imperative*. Paris: UNESCO. Retrieved 11/11/2015
<http://langpolicy.saschina.wikispaces.net/file/view/The+Importance+of+Mother+Tongue+in+Language+Instruction.pdf>
- Benson, C. (2004b). Do We Expect Too Much of Bilingual Teachers? Bilingual Teaching in Developing Countries. *International Journal of Bilingual Education and Bilingualism*, 7 (2-3), 204-221.
- Benson, C. (2005a). *Girls, Educational Equity and Mother Tongue-based Teaching*. Bangkok: UNESCO Asia and Pacific Regional Bureau for Education. Retrieved 23/12/2015
<http://unesdoc.unesco.org/images/0014/001420/142049e.pdf>
- Benson, C. (2005b). Bilingual Schooling as Educational Development: From Experimentation to Implementation. In Cohen, J., McAlister, K.T., Rolstad, K., and McSwan, J. (Eds.), *Proceedings of the 4th International Symposium on Bilingualism*. Somerville, MA: Cascadilla Press. Retrieved 23/12/2015 <http://www.lingref.com/isb/4/019ISB4.PDF>
- Benson, C. (2008). *Language "Choice" in Education* (Project for the Study of Alternative Education in South Africa (PRAESA) Occasional Papers No 30). Cape Town: PRAESA. Retrieved 12/11/2016
<http://www.praesa.org.za/wp-content/uploads/2016/09/Paper30-1.pdf>
- Benson, C. (2013). Towards Adopting a Multilingual Habitus in Educational Development. In Benson, C. and Kosonen, K. (Eds.). *Language Issues in Comparative Education* (pp. 283-299). Rotterdam: Sense Publishers.
- Benson, C. (2014). School Access for Children from Non-Dominant Ethnic and Linguistic Communities. Paper Commissioned for *Fixing the Broken Promise of Education for All: Findings from the Global Initiative on Out-of-School Children*. Montréal: UNESCO Institute for Statistics. Retrieved 23/12/2015 <http://allinschool.org/wp-content/uploads/2015/01/OOSC-2014-Ethnic-linguistic-minorities-final.pdf>
- Benson, C. (2017). Multilingual Education for All: Applying an Integrated Multilingual Curriculum Model to Low-Income Contexts. In Coleman, H. (Ed.), *Multilingualisms and Development* (pp. 101-113). London: British Council.
- Bialystok, E. (2007). Acquisition of Literacy in Bilingual Children: A Framework for Research. *Language Learning*, 57(1), 45-77.

- Brodal, K. (2009). *Le Français des Étudiants de Dakar: Usages et Attitudes Linguistiques* (Unpublished master's thesis). Département des Études Classiques et Romanes, Université d'Oslo. Retrieved 15/11/2015
<https://www.duo.uio.no/bitstream/handle/10852/24431/BrodalxIngvildxmasteroppgavexV09.pdf?sequence=1>
- Brock-Utne, B. (2001). Education for All – In Whose Language? *Oxford Review of Education*, 27(1), 115-134.
- Brock-Utne, B. (2002). *Language, Democracy and Education in Africa* (Discussion paper No 15). Uppsala: University Printers.
- Brock-Utne, B. (2010). Research and Policy on the Language of Instruction Issue in Africa. *International Journal of Educational Development*, 30(6), 636-645.
- Brock-Utne, B. (2013). Language and Liberation: Language of Instruction for Mathematics and Science: A Comparison and Contrast of Practices Focusing on Tanzania. In Benson, C. and Kosonen, K. (Eds.), *Language Issues in Comparative Education* (pp. 77-93). Rotterdam: Sense Publishers
- Brock-Utne, B. (2014). Language of Instruction in Africa: The Least Important and Most Appreciated Issue. *International Journal of Educational Development in Africa*, 1(1), 4-18.
- Brock-Utne, B. (2016). The Ubuntu Paradigm in Curriculum Work, Language of Instruction and Assessment. *International Review of Education*, 62(1), 29-44.
- Brock-Utne, B. and Alidou, H. (2006). Active Students: Learning through a Language They Master. In Alidou, H., Boly, A., Brock-Utne, B., Diallo, Y.S., Heugh, K. and Wolff, H.E. (Eds.), *Optimizing Learning and Education in Africa – the Language Factor* (pp. 101-117). Paris: Association for the Development of Education in Africa (ADEA). Retrieved 5/12/2015
http://www.adeanet.org/adeaPortal/adea/downloadcenter/Ouga/B3_1_MTBLE_en.pdf
- Calvet, J. L. (1999). *La Guerre des Langues et les Politiques Linguistiques*. Paris : Hachette Littératures.
- Chabata, E. (2013). The Language Factor in the Development of Africa: A Case Study for the Compilation of Specialised Dictionaries in Indigenous African Languages. *South African Journal of African Languages*, 33(1), 51-58.
- Chimbutane, F. and Benson, C. (2012). Expanded Spaces for Mozambican Languages in Primary Education: Where Bottom-Up Meets Top-Down. *International Multilingual Research Journal*, 6(1), 8-21.

- Cisse, M. (2005). Langage, État et Société au Sénégal. *Revue Électronique Internationale des Sciences du Langage Sudlangues*, 5, 99-133. Retrieved 8/2/2016
<http://www.sudlangues.sn/spip.php?article94>
- Cisse, M. (2011). Langues et Glottopolitique au Sénégal. *Ethiopiennes, Revue Negro-Africaine de Littérature et de Philosophie*, 87. Retrieved 8/2/2016
<http://ethiopiennes.refer.sn/spip.php?article1793>
- Clasby, E. (2012). The Current Education System in Senegal: A Closer Look at the Advantages and Disadvantages of Attending a Private Catholic Institution in Dakar. *Independent Study Project (ISP) Collection*, 1259. Retrieved 6/3/2016
http://digitalcollections.sit.edu/cgi/viewcontent.cgi?article=2263&context=isp_collection
- Collier, V. P. (1995). Acquiring a Second Language for School. *Directions in Language and Education*, 1(4), 3-14. Retrieved 8/2/2016
http://www.usc.edu/dept/education/CMMR/CollierThomas_Acquiring_L2_for_School
- Consortium pour la Recherche Economique et Sociale (CRES, 2012). *Evaluation des 10 ans du PDEF*.
- Coyle, D. (2005). *CLIL: Planning Tools for Teachers*. The University of Nottingham School of Education. Retrieved 6/11/2016
<http://www.slideshare.net/gorettiblanch/theoretical-clil-framework>
- Coyle, D., Hood, P. and Marsh, D. (2010). *CLIL: Content and Language Integrated Learning*. Cambridge: Cambridge University Press.
- Crétois, L. (1977). *Dictionnaire Sereer – Français*. Dakar: Centre de Linguistique Appliquée.
- Cummins, J. (1979). Linguistic Interdependence and the Educational Development of Bilingual Children. *Review of Educational Research*, 49(2), 222-251.
- Cummins, J. (1980). The Cross-Lingual Dimensions of Language Proficiency: Implications for Bilingual Education and the Optimal Age Issue. *Tesol Quarterly*, 14(2), 175-187.
- Cummins, J. (1979-1980). The Language and Culture Issue in the Education of Minority Language Children. *Interchange*, 10(4), 72-88.
- Cummins, J. (1981). The Role of Primary Language Development in Promoting Educational Success for Language Minority Students. In *Schooling and Language Minority Students: A Theoretical Framework* (pp. 3-49). Los Angeles, CA: Evaluation, Dissemination and Assessment Center, California State University. Retrieved 3/12/2015
https://www.researchgate.net/publication/269101664_The_Role_of_Primary_Language_Development_in_Promoting_Educational_Success_for_Language_Minority_Students

- Cummins, J. (1982). Test, Achievement and Bilingual Students. *Focus*, 9, 2-7. Retrieved 10/10/2015 <http://files.eric.ed.gov/fulltext/ED238907.pdf>
- Cummins, J. (1986). Empowering Minority Students: A Framework for Intervention. *Harvard Educational Review*, 56(1), 656-675.
- Cummins, J. (1999). *BICS and CALP: Clarifying the Distinction*. Educational Resources Information Center (ERIC) Document Reproduction Service No 438 551. Retrieved 3/12/2015 <http://eric.ed.gov/?id=ED438551>
- Cummins, J. (2001). Bilingual Children's Mother Tongue: Why Is It Important in Education? *Sprogforum*, 19, 15-20.
- Cummins, J. (2005). *Teaching for Cross-language Transfer in Dual Language Education: Possibilities and Pitfalls*. Paper presented at the TESOL Symposium on Dual Language Education: Teaching and Learning in Two Languages in the EFL Setting. Istanbul, Turkey: Bogazici University.
- Cummins, J. (2008a). Teaching for Transfer: Challenging the Two Solitudes Assumption in Bilingual Education. In Cummins, J. and Hornberger N.H. (Eds), *Encyclopedia of Language and Education*, 2nd edition, volume 5. New York, NY: Springer, pp. 65-75.
- Cummins, J. (2008b). BICS and CALP. Empirical and Theoretical Status of the Distinction. In Street B. and Hornberger, N.H. (Eds), *Encyclopedia of Language and Education*, 2nd edition, volume 2. New York: Springer, pp. 71-83.
- Cummins, J. (2009a). Fundamental Psychological and Sociological Principles Underlying Educational Success for Linguistic Minority Students. In Skutnabb-Kangas, T., Phillipson, R., Mohanty, A. K. and Panda, M. (Eds.), *Social Justice through Multilingual Education* (pp. 19-35). Bristol: Multilingual Matters.
- Cummins, J. (2009b). Pedagogies of Choice: Challenging Coercive Relations of Power in Classroom and Communities. *International Journal of Bilingual Education and Bilingualism*, 12(3), 261-271.
- Cummins, J. (2013, December 13). *Multilingual Education (MLE) for Social Justice: From Coercive to Collaborative Relations of Power* [Audiovisual podcast]. Retrieved 9/5/2017 <https://www.youtube.com/watch?v=oCTy2TRIJZc>
- Diallo, Y. S. (2006). Publications in African Languages and the Development of Bilingual Education. In Alidou, H., Boly, A., Brock-Utne, B., Diallo, Y.S., Heugh, K. and Wolff, H. E. (Eds.), *Optimizing Learning and Education in Africa – The Language Factor* (pp. 126-138). Paris: Association for the Development of Education in Africa (ADEA). Retrieved 5/12/2015 http://www.adeanet.org/adeaPortal/adea/downloadcenter/Ouga/B3_1_MTBLE_en.pdf

- Diallo, I. (2005). Historical Perspective of Language Planning and Language Policy in Senegal. In Cunningham, D. and Hatoss, A. (Eds.), *An International Perspective on Language Policies, Practices and Proficiencies* (pp. 181-198). Belgrave: Fédération Internationale de Professeurs de Langues Vivantes. Retrieved 2/2/2017
<https://core.ac.uk/download/pdf/11036717.pdf>
- Diallo, I. (2011). 'To understand Lessons, Think through Your Own Languages.' An Analysis of Narratives in Support of the Introduction of Indigenous Languages in the Education System in Senegal. *Language Matters: Studies in the Language of Africa*, 42(2), 207-230.
- D'Emilio, L. (1996). *Voices and Processes towards Pluralism: Indigenous Education in Bolivia* (New Education Division Documents No. 9). Stockholm: Swedish International Development Cooperation Agency. Retrieved 12/1/2016
http://www.sida.se/contentassets/f603da28b635471892dfeb0cfa874d0a/voices-and-processes-toward-pluralism-indegenous-education-in-bolivia_618.pdf
- Dumatog, R.C. and Dekker, D. E. (2003). *First Language Education in Lubuagan, Northern Philippines*. Paper presented at the Conference on Language Development, Language Revitalization and Multilingual Education in Minority Communities in Asia, Bangkok, Thailand. Retrieved 13/12/2015
<https://www.sil.org/resources/archives/4909>
- Durgunoğlu, A. Y., (2002). Cross-Linguistic Transfer in Literacy Development and Implications for Language Learners. *Annals of Dyslexia*, 52, 189-204.
- Esteve, O. and González-Davies, M. (2016). Estratègies de Transferència Interlingüística en l'Aprenentatge de Llengües Addicionals: Un Enfocament Plurilingüe Integrador. In Pereña. M. (Ed.), *Ensenyar i Aprendre Llengües en un Model Educatiu Plurilingüe: Metodologies i Estratègies per al Desenvolupament de Projectes Educatius i per a la Pràctica Docent* (pp. 13-29). Barcelona: Horsori Editorial.
- Ethnologue (2015). In Lewis, M. P., Simons G. F. and Fenning, C.D. (Eds.), *Languages of the World* (18th ed). Dallas, TX: SIL International. Retrieved 23/1/2016
<https://www.ethnologue.com/>
- Fall, I. M. (2007). *Textes Constitutionnels du Sénégal de 1959 à 2007*. Centre de Recherche, d'Étude et de Documentation sur les Institutions et les Législations Africaines (CREDILA). Dakar: Université Cheick Anta Diop, Faculté des Sciences Juridiques et Politiques.

- Fall, M. (2014). *From Home to School: Bridging the Literacy Gap in L1 Wolof Child Learners of L2 French in Senegal* (Unpublished doctoral dissertation). University of British Columbia, Vancouver.
- Faye, P. (2013). Les Langues Nationales dans le Système Éducatif Formel au Sénégal: État des Lieux et Perspectives. *Glottopol 2: Les Langues des Apprenants dans les Systèmes Éducatifs Post-Coloniaux*. Retrieved 12/9/2016
http://glottopol.univ-rouen.fr/numero_22.html#numero22_12th 12th September 2016.
- Fazio, L. and Lyster, R. (1998). Immersion and Submersion Classrooms: A Comparison of Instructional Practises in Language Arts. *Journal of Multilingual and Multicultural Development*, 19(4), 303-317.
- Fe y Alegría (2009). *Expandiendo Las Oportunidades Educativas de Calidad en América Latina: Nueve Experiencias para el Diálogo y la Acción*. Lima: Federación Internacional Fe y Alegría. Retrieved 25/11/2015
https://www.entreculturas.org/files/documentos/estudios_e_informes/acta_seminario_lima_todos.pdf?download
- Fredua-Kwarteng, Y. and Ahia, F. (2005a, January 8). Ghana Flunks at Maths and Science: Analysis (1). *GhanaWeb*. Retrieved 8/9/2016
<https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Ghana-Flunks-at-Math-and-Science-Analysis-1-73002>
- Fredua-Kwarteng, Y. and Ahia, F. (2005b, February 23). Ghana Flunks at Maths and Science: Analysis (2). *GhanaWeb*. Retrieved 8/9/2016
<https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Ghana-Flunks-Math-and-Science-Analysis-2-75906>
- García, O. (2009). Education, Multilingualism and Translanguaging in the 21st Century. In Mohanty, A., Panda, M. and Skutnabb-Kangas, T. (Eds.), *Multilingual Education for Social Justice* (pp. 140-158). New Delhi: Orient Blackswan. Retrieved 4/2/2017
<https://ofeliagarcia.org.files.wordpress.com/2011/02/education-multilingualism-translanguaging-21st-century.pdf>
- García, O. (2012). Theorizing Translanguaging for Educators. In Celic, C. and Seltzer, K. *Translanguaging: A CUNY-NYSIEB Guide for Educators* (pp. 1-6). New York: Research Institute for the Study of Language in Urban Society. Retrieved 3/2/2017
<https://ofeliagarcia.org/publications/>

- García, O. (2015). Language. In Stone, J., Rutledge, M. D., Rizova, P., Smith, A.D., and Hou, X. (Eds.), *The Wiley Blackwell Encyclopedia of Race, Ethnicity and Nationalism* (pp 1-4). Retrieved 4/2/2017
<https://ofeliagarciaidotorg.files.wordpress.com/2011/02/garcialanguageencyrceethnatdec2015-copy.pdf>
- García, O. (2017). Problematizing Linguistic Integration of Migrants: The role of Translanguaging and Language Teachers. In Beacco, J. C., Krumm, H. J., Little, D., and Thagott, P. (Eds.), *The Linguistic Integration of Adult Migrants / L'Intégration Linguistique des Migrants Adultes. Some Lessons from Research / Les Enseignements de la Recherche* (pp. 11-26). Berlin: De Gruyter Mouton. Retrieved 15/3/2017
<https://ofeliagarcia.org/publications/>
- García, O. and Hesson, S. (2015). Translanguaging Frameworks for Teachers: Macro and Micro Perspectives. In Yiakoumetti, A. (Ed.), *Multilingualism and Language in Education: Current Sociolinguistic and Pedagogical Perspectives from Commonwealth Countries* (pp. 221-242). Cambridge: Cambridge University Press. Retrieved 3/2/2017
<https://ofeliagarciaidotorg.files.wordpress.com/2011/02/garciahesson2015.pdf>
- García, O. and Wei, L. (2015). Translanguaging, Bilingualism, and Bilingual Education. In Wright, E. W., Bolin, S. and García, O. (Eds.), *The Handbook of Bilingual and Multilingual Education* (pp. 223-240).. Oxford: Blackwell Handbooks in Linguistics.
- García, O. and Woodley, H. H. (2015). Bilingual Education. In Bigelow, M. and Enns-Kananen, J. (Eds.), *The Routledge Handbook of Educational Linguistics* (pp. 132-144). New York, NY: Taylor and Francis. Retrieved 3/2/2017
<https://ofeliagarciaidotorg.files.wordpress.com/2014/11/bilingual-education.pdf>
- Giuliano Sarr, K. (2013). We Lost Our Culture With Civilisation: Community Perceptions of Indigenous Knowledge and Education in Senegal. In Benson, C. and Kosonen, K. (Eds.), *Language Issues in Comparative Education* (pp. 114-131). Rotterdam: Sense Publishers.
- Halaoui, N. (2003). *Relevance of Education: Adapting Curricula and Use of African Languages*. Paris: Association for the Development of Education in Africa (ADEA). Retrieved 25/2/2016
http://www.adeanet.org/portalv2/adea/biennial2003/papers/5A_Nazam_ENG_final.pdf
- Hallberg, D. (2010). Sociocultural and Cognitivist Perspectives on Language and Communication Barriers in Learning. *World Academy of Science, Engineering and Technology*, 3(12), 172-181. Retrieved 12/11/2015

- <http://waset.org/publications/13753/socioculture-and-cognitivist-perspectives-on-language-and-communication-barriers-in-learning> 12th October 2015.
- Hamidou, A., Mijinguini, A., Amani, L., Salley, J. (2010). *African Experiences, Country Case Studies: Bilingual Education in Niger*. Paris: Association for the Development of Education in Africa (ADEA). Retrieved 5/12/2015
http://www.adeanet.org/adea/downloadcenter/CD/10_Niger_en.pdf%20CD.pdf
- Heugh, K. (2006). Theory and Practice – Language Education Models in Africa: Research, Design, Decision-Making, and Outcomes. In Alidou, H., Boly, A., Brock-Utne, B., Diallo, Y.S., Heugh, K. and Wolff, H. E. (Eds.), *Optimizing Learning and Education in Africa – the Language Factor* (pp. 56-84). Paris: Association for the Development of Education in Africa (ADEA). Retrieved 5/12/2015
http://www.adeanet.org/adeaPortal/adea/downloadcenter/Ouga/B3_1_MTBLE_en.pdf
- Heugh, K. (2011a). Cost Implications of the Provision of Mother-Tongue and Strong Biligual Models of Education in Africa. In Ouane, A. and Glanz, C. (Eds.), *Optimising Learning, Education and Publishing in Africa: The Language Factor. A Review and Analysis of Theory and Practice in Mother-Tongue and Bilingual Education in Sub-Saharan Africa* (pp. 255-289). Hamburg: UNESCO. Retrieved 25/11/2015
<http://unesdoc.unesco.org/images/0021/002126/212602e.pdf>
- Heugh, K. (2011b). Theory and Practice - Language Education Models in Africa: Research, Design, Decision-Making and Outcomes. In Ouane, A. and Glanz, C. (Eds.), *Optimising Learning, Education and Publishing in Africa: The Language Factor. A Review and Analysis of Theory and Practice in Mother-Tongue and Bilingual Education in Sub-Saharan Africa* (pp 105-156). Hamburg: UNESCO. Retrieved 25/11/2015
<http://unesdoc.unesco.org/images/0021/002126/212602e.pdf>
- Hovens, M. (2002). Bilingual Education in West Africa: Does it Work? *International Journal of Bilingual Education and Bilingualism*, 5(5), 249-266.
- Huguet, A., Vila, X., and Llorca, E. (2000). Minority Language Education in Unbalanced Bilingual Situations: A Case for the Linguistic Interdependence Hypothesis. *Journal of Psycholinguistic Research*, 29 (3) 313-333.
- Inspections de l'Éducation et de la Formation de Bakel (2014). *Statistiques CFE*. Retrieved 23/3/2016
<http://bakelinfo.com/pdf/CDD%203%20JUIN%202014%20STATISTIQUES%20CFEE.pdf>
- Institute for Development in Economics and Administration (IDEA, 2008). *Enseignement Bilingue: Étude des Résultats et Recherche Action. Rapport Pays: Sénégal*.

- Jandhyala, T. (2001). Education and Poverty. In Melin, M. (Ed.), *Education - A Way Out of Poverty: Research presentations at the Poverty Conference 2001* (pp. 12-23), (New Education Division Documents No. 8). Stockholm: Swedish International Development Cooperation Agency. Retrieved 23/12/2015
http://www.sida.se/contentassets/15fd7e3869e442d9a8f4537df5727f5d/education--a-way-out-of-poverty_620.pdf
- Jangandoo (2013). *Évaluation des Apprentissages: Présentation des Principaux Résultats de la Région de Dakar*.
- Jhingran, D. (2009). Hundreds of Home Languages in the Country and Many in Most Classrooms: Coping with Diversity in Primary Education in India. In Skutnabb-Kangas, T., Philippon, R., Mohanty, A. and Panda, M. *Social Justice through Multilingual Education* (pp. 263-280). Bristol: Multilingual Matters.
- Klaus, D. (2003). The Use of Indigenous Languages in Early Basic Education in Papua New Guinea: A Model for Elsewhere? *Language and Education*, 17(2), 105-111.
- Kostoulas, A. (2013). *Four Things You Probably Didn't Know about Likert Scales*. Retrieved 14/11/2015 <http://achilleaskostoulas.com/tag/likert-scales/>
- Krause, L.S. and Prinsloo, M. (2016). Translanguaging in a Township Primary School: Policy and Practice. *Southern African Linguistics and Applied Language Studies*, 34(4), 347-357.
- Larané, A. (2017). *11 Janvier 1994: Dévaluation du Franc CFA*. Retrieved 3/3/2017
https://www.herodote.net/11_janvier_1994-evenement-19940111.php
- Leclerc, J. (2017). *L'Aménagement Linguistique dans le Monde : Burundi*. Université Laval. Retrieved 15/2/2017 <http://www.axl.cefan.ulaval.ca/>
- Levin, T. and Shohamy, E. (2008). Achievement of Immigrant Students in Mathematics and Academic Hebrew in Israeli School: A large-scale Evaluation Study. *Studies in Educational Evaluation*, 34, 1-14.
- Liddicoat, J. A. and Curnow, T. J. (2014). Students' Home Language and the Struggle for Space in the Curriculum. *International Journal of Multilingualism*, 11(3), 273-288.
- Mackenzie, P. J. (2009). Mother Tongue First Multilingual Education among the Tribal Communities in India. *International Journal of Bilingual Education and Bilingualism*, 12(4), 369-385.
- Magga, O.H., Nicolaisen, I., Trask, M., Skutnabb-Kangas, T., Dunbar, R. (2005). *Indigenous Children's Education and Indigenous Languages*. Expert paper written for the United Nations Permanent Forum on Indigenous Issues. Retrieved 14/10/2016
http://www.tove-skutnabb-kangas.org/pdf/PFI_Expert_paper_1_Education_final.pdf

- Makalela, L. (2016). Bilingualism in South Africa: Reconnecting with Ubuntu Translanguaging (pp 1-13). In García, O., Lin, A. and May, S. (Eds.), *Encyclopedia of Language and Education: Bilingual and Multilingual Education* (pp.1-13). New York: Springer International Publishing.
- Martín-Chazeaud (2014). *Don't forget my L1, I Want to Succeed* (Unpublished Master's thesis). Universitat de Barcelona.
- Math Resources Dictionary (2016). Retrieved 18/11/2016 <http://www.mathresources.com>
- Mazunya, M. and Habonimana, A. (2010). *Les Langues de Scolarisation dans l'Enseignement Fondamental en Afrique Subsaharienne Francophone: Cas du Burundi*. Paris: Agence Universitaire de la Francophonie. Retrieved 17/1/2017
http://www.elan-afrique.org/sites/default/files/fichiers_attaches/rapport_lascolaf_cas_burundi.pdf
- McNamara, T. and Shohamy, E. (2008). Language Tests and Human Rights. *International Journal of Applied Linguistics*, 18(1), 89-95.
- Menken, K. (2008). High-Stakes Tests as De Facto Language Education Policies. In May, S. and Hornberger, N. (Eds.), *Encyclopedia of Language and Education: Language Testing and Assessment* (pp. 401-414). New York: Springer International Publishing.
- Menken, K. and Kleyn, T. (2010). The Long Term Impact of Subtractive Schooling in the Educational Experiences of Secondary English Language Learners. *International Journal of Bilingual Education and Bilingualism*, 13, 399-417.
- Ministère de l'Éducation Nationale (1979). *Decret n°79-1165 du 20 Décembre 1979 Portant Organisation de l'Enseignement Élémentaire. Rapport de Présentation*. Retrieved 28/1/2016
http://sen-exercice.com/doc/enseignants/programme/Programme_enseignement1377016875.pdf
- Ministère de l'Éducation Nationale (2008). *Étude sur l'Expérimentation de l'Enseignement Bilingue au Sénégal: Rapport*.
- Ministère de l'Éducation Nationale (2013). *Programme d'Amélioration de la Qualité, de l'Équité et de la Transparence. Secteur Éducation Formation 2013 – 2025*.
- Ministère de l'Éducation Nationale and Direction des Examens et Concours (2015). *Statistiques CFEÉ 2015: National*.
- Ministère de l'Éducation Nationale and Institut National d'Étude et d'Action pour le Développement de l'Éducation (2007). *Évaluation des Apprentissages Projet SNERS IV: Rapport d'Évaluation du Rendement Scolaire au CP, CE2, CM2 en Français*.

- Ministère de l'Enseignement and Institut National d'Étude et d'Action pour le Développement de l'Éducation (2012). *Rapport Consolide SNERS V*.
- Ministère de L'Éducation Nationale, de l'Enseignement Technique et de la Formation Professionnelle (2000). *Inticateurs 2000* (4th ed). Reterieved 11/3/2016
http://www.men.gouv.sn/root-fr/upload_pieces/Indicateurs-education-2000.pdf
- Ministère de L'Éducation Nationale, de l'Enseignement Technique et de la Formation Professionnelle (2011-2012). *Annuaire Statistique National Année Scolaire 2011/2012*. Retrieved 12/3/2016
http://www.men.gouv.sn/root-fr/upload_pieces/annuaire%202011-2012.pdf
- Ministère de L'Éducation Nationale, de l'Enseignement Technique et de la Formation Professionnelle and Conférence des Ministres de l'Éducation des Pays Ayant le Français en Partage (CONFEMEN) (2004). *Le Redoublement: Pratiques et Conséquences Dans l'Enseignement Primaire au Sénégal*. Retrieved 15/3/2016
http://www.confemen.org/wp-content/uploads/2012/06/rapport_Senegal_2004-2.pdf
- Mohanty, A. (2006). Multilingualism of the Unequals and Predicaments of Education in India: Mother Tongue or Other Tongue. In García, O., Skutnabb-Kangas, T., and Torres-Guzman, M. (Eds.), *Imagining Multilingual Schools: Languages in Education and Globalization* (pp. 262-283). Clevedon. Multilingual Matters.
- Mohanty, A. (2009). Multilingual Education for Indigenous Children: Escaping the Vicious Cycle of Language Disadvantage in India. In Clare Stark (Ed.), *Globalization and Languages – Building on Our Rich Heritage* (pp. 132-146). Paris: UNESCO. Retrieved 17/12/2015
<http://unesdoc.unesco.org/images/0018/001831/183170E.pdf>
- Mohanty, A., Mishra, M. K., Reddy, N. U. and Gumidyala, R. (2009). Overcoming the Language Barrier for Tribal Children: MLE in Andhra Pradesh and Orissa, India. In Skutnabb-Kangas, T., Philippson, R., Mohanty, A. and Panda, M. (Eds.), *Social Justice through Multilingual Education* (pp. 283-300). Bristol: Multilingual Matters.
- Montgomery, M. R. and Hewett, P. C. (2005). *Poverty and Childrens' Schooling in Urban and Rural Senegal* (Policy Research Division Working Papers No. 196). New York: Population Council. Retrieved 5/2/2017
<https://pdfs.semanticscholar.org/75ea/2d93728635224eace08d92e22b65416864cb.pdf>
- Mwinsheikhe, H. (2007). *Revisiting the Language of Instruction Policy in Tanzanian Secondary Schools: A Comparative Study of Biology Classes Taught in Kiswahili and English* (Unpublished doctoral dissertation). University of Oslo.

- Ndaruhutse, S., Brannelly, L., Lathman, N., and Penson, J. (2008). *Grade Repetition in Primary Schools in Sub-Saharan Africa: An Evidence Base for Change*. Reading: CfBT Education Trust. Retrieved 4/4/2016
<http://cdn.cfbt.com/~media/cfbtcorporate/files/research/2008/r-grade-repetition-primary-schools-sub-saharan-africa-2008.pdf>
- Ndiaye, R., (1994). *Le Peuple Sérère en Marche: Repères Historiques et Socio-Culturels*. Lormont: Association Culturelle pour la Renaissance de la Langue Sereer.
 Retrieved 22/1/2016
http://www.enda-sigie.org/bases/sigie/ressources/edocs-ndi_pplseer-bordeau-1994.pdf
- Ndiaye, R. N. (2012). *The Road to Perpetual Stagnation: An Overview to Senegalese Education System Since 1960* (Unpublished master's thesis). Ohio State University, Columbus.
 Retrieved 30/3/2017
- Ndiaye, S. (2006). *Former un Enseignant Motivé et Compétent*. Dakar: Les Nouvelles Éditions Africaines du Senegal.
https://etd.ohiolink.edu/rws_etd/document/get/osu1330996419/inline
- Ngcobo, S., Ndaba, N., Nyangiwe, B., Mpungose, N., Jamal, R. (2016). Translanguaging as an Approach to Address Language Inequality in South African Higher Education: Summary Writing Skills Development. *Critical Studies in Teaching and Learning*, 4(2), 10-27.
- Orekan, G. (2011). Mother Tongue Medium as an Efficient Way of Challenging Educational Disadvantages in Africa: The case of Nigeria. *Scottish Language Review*, 23, 27-38.
- Panda, M., and Mohanty, A. (2009). Language Matters, So Does Culture beyond the Rhetoric of Culture in Multilingual Education. In García, O., Skutnabb-Kangas, T., and Torres-Guzman, M. (Eds.), *Imagining Multilingual Schools: Languages in Education and Globalization* (pp. 301-319). Clevedon: Multilingual Matters.
- Paxton, M. I. J. (2009). 'It's Easy to Learn When You Using Your Home Language But with English You Need to Start Learning Language First before You Get to the Concept': Bilingual Concept Development in an English Medium University in South Africa. *Journal of Multilingual and Multicultural Development*, 30(4), 345-359.
- Programme d'Analyse des Systèmes Éducatifs de la CONFEMEN (PASEC, 2007). *Évaluation PASEC Sénégal*. Retrieved 11/4/2016
http://www.confemen.org/wp-content/uploads/2012/06/Rapport_PASEC_Senegal_version_janvier_2010-2.pdf

- Programme d'Analyse des Systèmes Éducatifs de la CONFEMEN (PASEC, 2014). *Performances des Systèmes Éducatifs en Afrique Subsaharienne Francophone: Compétences et Facteurs de Réussite au Primaire*. Retrieved 3/3/2016
http://www.elan-afrique.org/sites/default/files/fichiers_attaches/resume-francais_rapport_pasec.pdf
- Radio France Internationale (2014, December 3). *Sénégal: Les Langues Nationales Font Leur Entrée au Parlement*. Radio France Internationale Afrique. Retrieved 30/11/2015
<http://www.rfi.fr/afrique/20141203-senegal-langues-nationales-font-leur-entree-parlement/>
- Rea-Dickins, Guoxing, Y. and Afitska, O. (2010). The Consequences of Examining through an Unfamiliar Language of Instruction and Its Impact for School-Age Learners in Sub-Saharan Africa. In Taylor, L. and Weir, C. J. (Eds.), *Language Testing Matters: Investigating the Wider Social and Educational Impact of Assessment* (pp. 190-214). Cambridge: Cambridge University Press.
- Recueil de Textes Relatifs aux Droits de l'Enfant au Sénégal. *LOI N° 91-22 du 16 février 1991 Portant Orientation de l'Éducation Nationale, Modifiée*. Retrieved 15/3/2016
<http://www.unesco.org/education/edurights/media/docs/7e634d754261abefab501f386836f84bb36fcaa4.pdf>
- Renaudier, M. (2012). *Dérivation et Valence en Serer: Variété de Mar Lobj (Sénégal)* (Unpublished doctoral dissertation). Université Lumière Lyon 2.
- République du Sénégal. Secrétariat Générale du Gouvernement (2005). *Decret N 2005-990 du 21 Octobre 2005 Relatif à l'Ortographe et à la Séparation des Mots en Sérère*. Retrieved 22/1/2016 <http://www.jo.gouv.sn/spip.php?article4800>
- Réseau Africain de Formation à Distance and Ministère de l'Éducation Nationale. *Site d'Aide à la Préparation du Certificat de Fin d'Études Élémentaires (CFEE) et à l'Entrée en Sixième*. Retrieved 10/11/2015 <http://cm2.examen.sn/>
- Roche, S. (2016). Education for All: Exploring the Principle and Process of Inclusive Education. *International Review of Education*, 62(2), 131-137.
- Romaine, S. (2013). Keeping the Promise of the Millennium Development Goals: Why Language Matters. *Applied Linguistics Review*, 4(1), 1-21.
- Sampa, F.K. (2003). *Country Case Study: Republic of Zambia. Primary Reading Programme (PRP): Improving Access and Quality Education in Basic Schools*. Paris: Association for the Development of Education in Africa (ADEA). Retrieved 7/12/2015
http://www.adeanet.org/adea/biennial2003/papers/5B_Zambia_ENG_final.pdf

- Sarr, I. (2014). Language Imperialism and the Fate of Minority Languages: Indoctrination through the So-Called Wolofisation of the Senegalese Society. *Journal of Foreign Languages, Cultures and Civilisations*, 2(1), 93-104. Retrieved 2/2/2016
http://jflcc.com/journals/jflcc/Vol_2_No_1_June_2014/6.pdf
- Sarr, I. and Thiaw, I. (2012). Culture, Médias et Diversité Ethniques. La Nation Sénégalaise Face à la Wolofisation. *Revue Électronique Internationale des Sciences du Langage Sudlangues*, 18, 1-17.
- Schepens, J. J., Van Der Slik, F., Van Hout, R. (2015). L1 and L2 Distance Effects in Learning L3 Dutch. *Language Learning*, 66(1), 224-256.
- Setati, M. and Adler, J. (2000). Between Languages and Discourses: Language Practices in Primary Multilingual Mathematics Classrooms in South Africa. *Educational Studies in Mathematics*, 43, 243-269.
- Shohamy, E. (1998). Critical Language Testing and Beyond. *Studies in Educational Evaluation*, 24(4), 331-345.
- Shohamy, E. (2001). Democratic Assessment as an Alternative. *Language Testing*, 18(4), 373-391.
- Shohamy, E. (2006). Imagined Multilingual Schools: How Come We Don't Deliver? In García, O., Skutnabb-Kangas, T., and Torres-Guzman, M. (Eds.), *Imagining Multilingual Schools: Languages in Education and Globalization* (pp. 171-183). Clevedon. Multilingual Matters.
- Shohamy, E. (2007a). Language Tests as Language Policy Tools. *Assessment in Education*, 14(1), 117-130.
- Shohamy, E. (2007b). Tests as Power Tools: Looking Back, Looking Forward. In Fox, J., Wesche, M., Doreen, B., Cheng, L., Turner, C. E. and Doe, C. (Eds.), *Language Testing Reconsidered* (pp. 141-152). Ottawa: University of Ottawa Press.
- Shohamy, E. (2008). Language Policy and Language Assessment: The Relationship. *Current Issues in Language Planning*, 9(3), 363-374.
- Shohamy, E. (2011). Assessing Multilingual Competencies: Adopting Construct Valid Assessment Policies. *The Modern Language Journal*, 95(3), 418-429.
- Shohamy, E. (2013). The Discourse of Language Testing as a Tool for Shaping National, Global and Transnational Identities. *Language and Intercultural Communication*, 13(2), 225-236.
- Skattum, I. (2009). French or National Languages as Means of Instruction? Reflections on French Domination and Possible Future Changes. In B. Brock-Utne and G. Garbo (Eds.),

- Language and Power: The Implications of Language for Peace and Development* (pp. 172-181). Dar es Salaam: Mkuki na Nyota Publishers.
- Skattum, I. (2010). L'Introduction des Langues Nationales dans le Système Éducatif au Mali: Objectifs et Conséquences. *Journal of Language Contact*, 3, 247-270.
- Skattum, I. and Brock-Utne, B. (2009). Languages and Education in Africa: A Transdisciplinary Discussion. In Brock-Utne, B. and Skattum, I. (Eds.), *Languages and Education in Africa: A Comparative and Transdisciplinary Analysis* (pp. 15-54). Oxford: Symposium Books.
- Skutnabb-Kangas, T. (2008a). Language Rights and Bilingual Education. In Cummins, J., and Hornberger, N. (Eds.), *Encyclopedia of Language and Education: Bilingual Education* (2nd edition). New York: Springer, pp. 117-131.
- Skutnabb-Kangas, T. (2008b). *Minorities and Access to Education*. Invited Notes for the (UN) Forum on Minority Issues. Retrieved 15/10/2015
[http://www.tove-skutnabb-kangas.org/pdf/Minorities_and_Access_to_Education_Invited_notes_for_the_\(UN\)_Forum_on_Minority_Issues_September_2008_Dr_Tove_Skutnabb-Kangas.pdf](http://www.tove-skutnabb-kangas.org/pdf/Minorities_and_Access_to_Education_Invited_notes_for_the_(UN)_Forum_on_Minority_Issues_September_2008_Dr_Tove_Skutnabb-Kangas.pdf)
- Skutnabb-Kangas, T. (2009a). Linguistic Genocide: Tribal Education in India. In Mishra, M.K. (Ed.), *National Folklore Support Center*, 32, 4-6. Retrieved 14/10/2015
http://www.tove-skutnabb-kangas.org/pdf/Tove_Skutnabb_Kangas_India_tribal_education_and_participating_in_crimes_against_humanity.pdf
- Skutnabb-Kangas, T. (2009b). *The Stakes: Linguistic Diversity, Linguistic Human Rights and Mother-Tongue-Based Multilingual Education – or Linguistic Genocide Against Humanity and an Even Faster Destruction of Biodiversity in our Planet*. Paper presented at the Bamako International Forum on Multilingualism. Retrieved 14/10/2015
http://www.tove-skutnabb-kangas.org/pdf/Tove_Skutnabb_Kangas_Keynote_presentation_at_Bamako_International_Forum_on_Multilingualism_Bamako_Mali_19_21_Jan_2009.pdf
- Skutnabb-Kangas, T. (2009c). *Why Mother-Tongue-Based Multilingual Education (MLE)?* Kathmandu: Education Program for All Non-Nepali Speaking Students of Primary Schools of Nepal. Retrieved 14/10/2015
http://www.tove-skutnabb-kangas.org/pdf/Tove_Skutnabb_Kangas_Why_mother_tongue_based_multilingual_education_MLE.pdf
- Skutnabb-Kangas, T. and Dunbar, R. (2010). *Indigenous Children's Education as Linguistic Genocide and Crime against Humanity? A Global View*. In Marsi, V. O. (Ed.) (Journal of

- Indigenous Peoples' Rights No. 1/2010). Guovdageaidnu/Kautokeino: Gáldu, Resource Centre for Rights of Indigenous Peoples.
- Skutnabb-Kangas, T. and McCarty, T. (2008). Key Concepts in Bilingual Education: Historical, Epistemological and Empirical Foundations. In Cummins, J., and Hornberger, N. (Eds), *Encyclopedia of Language and Education: Bilingual Education* (2nd edition). New York: Springer, pp. 3-18.
- Skutnabb-Kangas, T. and Phillipson, R. (2008). A Human Rights Perspective on Language Ecology. In Creese, A., Martin, P. and Hornberger, N. (Eds), *Encyclopedia of Language and Education: Ecology of Language* (2nd edition). New York: Springer, pp. 3-14.
- Smits, J., Huisman, J., Kruijff, K. (2008). *Home Language and Education in the Developing World. Overcoming Inequalities: Why Governance Matters*. Education for All Global Monitoring Report 2009. Paris: UNESCO. Retrieved 10/12/2015
<http://unesdoc.unesco.org/images/0017/001787/178702e.pdf>
- Smiths, S. and Roodt, G. (2003). An Evaluation of Response Scale Formats of the Culture Assessment Instrument. *SA Journal of Human Resource Management*, 1(2), 60-75.
- Soares de Sousa, D., Greenop, K. And Fry, J. (2010). The Effects of Phonological Awareness of Zulu-Speaking Children Learning to Spell in English: A Study for Cross-Language Transfer. *British Journal of Educational Psychology*, 80, 517-533.
- Solano-Flores, G., Trumbull, E., Nelson-Barber, S. (2002). Concurrent Development of Dual Language Assessments: An Alternative to Translating Tests for Linguistic Minorities. *International Journal of Testing*, 2(2), 107-129.
- Stromquist, N. (2001). Literacy and Gender: When Research and Policy Collide (pp 24-42). In Melin, M. (Ed.), *Education - A Way Out of Poverty: Reseach presentations at the Poverty Conference 2001*. Stockholm: Swedish International Development Cooperation Agency. Retrieved 15/12/2015
http://www.sida.se/contentassets/15fd7e3869e442d9a8f4537df5727f5d/education--a-way-out-of-poverty_620.pdf
- The World Bank (2008). *Transition in Secondary Education in Sub-Saharan Africa: Equity and Efficiency Issues* (The World Bank Working Paper No. 125). Washington, DC: The World Bank. Retrieved 12/1/2016
<http://siteresources.worldbank.org/INTAFRREGTOPSEIA/Resources/No.2Transitions.pdf>
- Traoré, S. (2001). *La Pédagogie Convergente: Son Expérimentation au Mali et Son Impact sur le Système Éducatif*. Geneva: UNESCO Bureau International d'Éducation. Retrieved 16/2/2016 <http://www.ibe.unesco.org/publications/innodata/inno06f.pdf>

- Trudell, B. (2010). When 'Prof' Speaks, Who Listens? The African Elite and the Use of African Languages for Education and Development in African Communities. *Language and Education*, 24(4), 337-352.
- Trudell, B. (2016). *The Impact of Language Policy and Practice on Children's Learning: Evidence from Easter and Southern Africa*. Nairobi: United Nations International Children's Emergency Fund (UNICEF) Eastern and Southern Africa Regional Office. Retrieved 25/1/2017
[https://www.unicef.org/esaro/UNICEF\(2016\)LanguageandLearning-FullReport\(SingleView\).pdf](https://www.unicef.org/esaro/UNICEF(2016)LanguageandLearning-FullReport(SingleView).pdf)
- Tsung, L. T. H., and Cruickshank, K. (2009). Mother Tongue and Bilingual Minority Education in China. *International Journal of Bilingual Education and Bilingualism*. 12(5), 549-563.
- United Nations (UN). *The Millennium Development Goals and Beyond 2015*. Retrieved 3/12/2015 <http://www.un.org/millenniumgoals/>
- United Nations (UN, 1989). *Conventions on the Rights of the Child*. Retrieved 17/10/2015 <http://www.ohchr.org/EN/ProfessionalInterest/Pages/CRC.aspx>
- United Nations (UN, 2004). *Human Development Report: Cultural Liberty in Today's Diverse World*. Retrieved 17/11/2015
http://hdr.undp.org/sites/default/files/reports/265/hdr_2004_complete.pdf
- United Nations (UN, 2008). *Declaration on the Right of Indigenous People*. Retrieved 17/10/2015 http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf
- United Nations (UN, 2015). *Universal Declaration of Human Rights*. Retrieved 12/12/2015 http://www.un.org/en/udhrbook/pdf/udhr_booklet_en_web.pdf
- United Nations Educational, Scientific and Cultural Organisation (UNESCO). *The Six EFA Goals*. Retrieved 3/12/2015
http://portal.unesco.org/en/ev.php-URL_ID=22012&URL_DO=DO_TOPIC&URL_SECTION=201.html
- United Nations Educational, Scientific and Cultural Organisation (UNESCO) Institut for Statistics. Data on Education in Senegal. Retrieved 16/7/2016
<http://data.uis.unesco.org/#>
- United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2000). World Education Forum. *The Dakar Framework for Action*. Retrieved 18/10/2015
<http://unesdoc.unesco.org/images/0012/001211/121147e.pdf>
- United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2010). *Reaching the Marginalized. Education for All Global Monitoring Report 2010*. Paris: UNESCO Publishing. Retrieved 5/2/2016

- <http://unesdoc.unesco.org/images/0018/001866/186606E.pdf>
- United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2010-2011). *World Data on Education: Senegal*, (7th ed.) Retrieved 7/11/2015
http://www.ibe.unesco.org/fileadmin/user_upload/Publications/WDE/2010/pdf-versions/Senegal.pdf
- United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2011). *Regional Overview: Sub-Saharan Africa*. Retrieved 20/10/2015
<http://unesdoc.unesco.org/images/0019/001913/191393e.pdf>
- United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2012). *Opportunities Lost: The Impact of Grade Repetition and Early School Leaving*. Global Education Digest 2012. Montréal: UNESCO Institute for Statistics. Retrieved 10/11/2015
<http://www.uis.unesco.org/Education/Documents/ged-2012-en.pdf>
- United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2014a). *The Right to Education: Law and Policy Review Guidelines*. Paris: UNESCO. Retrieved 18/10/2015
<http://unesdoc.unesco.org/images/0022/002284/228491e.pdf>
- United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2014b). *Teaching and Learning: Achieving Quality for All. Education for All Global Monitoring Report 2013/14*. Paris: UNESCO Publishing. Retrieved 3/3/2016
<http://unesdoc.unesco.org/images/0022/002266/226662e.pdf>
- Valdés, G. (1992). Bilingual Minorities and Language Issues in Writing: Towards Profession-Wide Responses to a New Challenge. *Written Communication*, 9(1), 85-136.
- Valdés, G. (2005). Bilingualism, Heritage Language, and SLA Research: Opportunities Lost or Seized? *The Modern Language Journal*, 89(3), 410-426.
- Van Der Slik, F., Van Hout, R., Schepens, J.J. (2015). The Gender Gap in Second Language Acquisition: Gender Differences in the Acquisition of Dutch among Immigrants from 88 Countries with 49 Mother Tongues. *PLOS ONE*, 10(11), 1-22.
- Versluys, E. (2008). Multilingualism and the City: The Construction of Urban Identities in Dakar (Senegal). *City and Society*, 20(2), 282-300.
- Vuzo, Mwajuma (2007). *Revisiting the Language of Instruction Policy in Tanzanian Secondary Schools: A Comparative Study of Geography Classes Taught in Kiswahili and English (Unpublished doctoral dissertation)*. University of Oslo.
- Wei, L. and García, O. (2016). From Researching Translanguaging to Translanguaging Research. In Kendall, K., Lai, Y. and May, S. (Eds), *Encyclopedia of Language and Education*:

Research Methods in Language and Education (pp. 1-14). New York, NY: Springer International Publishing.

Wolff, H. E. (2006). Background and History – Language Politics and Planning in Africa. In Alidou, H., Boly, A., Brock-Utne, B., Diallo, Y.S., Heugh, K. and Wolff, H. (Eds.), *Optimizing Learning and Education in Africa – the Language Factor* (pp. 26-55). Paris: E. Paris: Association for the Development of Education in Africa (ADEA). Retrieved 5/12/2015

http://www.adeanet.org/adeaPortal/adea/downloadcenter/Ouga/B3_1_MTBLE_en.pdf

Zavala, V., Robles, A. M., Trapnell, L. Zariquiey, R., Ventiades, N. and Ramírez, A. (2007). *Avances y Desafíos de la Educación Intercultural Bilingüe en Bolivia, Ecuador y Perú: Estudio de Casos*. Lima: Cooperative for Assistance and Relief Everywhere (CARE) International. Retrieved 12/2/2016

<http://www2.minedu.gob.pe/digesutp/formacioninicial/wp-content/uploads/2010/07/avancesydesafiosdelaEIB2007.pdf>

APPENDICES

Appendix 1

The UNs' *Eight Millennium Development Goals*.

<http://www.un.org/millenniumgoals/>

1. Eradicate extreme poverty and hunger.
2. Achieve universal primary education.
3. Promote gender equality and empower women.
4. Reduce child mortality.
5. Improve maternal health.
6. Combat HIV/AIDS, malaria and other diseases.
7. Ensure environmental sustainability.
8. Global partnership for development.

Appendix 2

UNESCO's six *Education for All* goals

<http://portal.unesco.org/en/ev.php->

[URL_ID=22012&URL_DO=DO_TOPIC&URL_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=22012&URL_DO=DO_TOPIC&URL_SECTION=201.html)

1. Expanding and improving comprehensive early childhood care and education, especially for the most vulnerable and disadvantaged children.
2. Ensuring that by 2015 all children, particularly girls, children in difficult circumstances and those belonging to ethnic minorities, have access to, and complete, free and compulsory primary education of good quality.
3. Ensuring that the learning needs of all young people and adults are met through equitable access to appropriate learning and life-skills programmes.
4. Achieving a 50 per cent improvement in levels of adult literacy by 2015, especially for women, and equitable access to basic and continuing education for all adults.
5. Eliminating gender disparities in primary and secondary education by 2005, and achieving gender equality in education by 2015, with a focus on ensuring girls' full and equal access to and achievement in basic education of good quality.
6. Improving all aspects of the quality of education and ensuring excellence of all so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skills.

Appendix 3

Different types of academic programmes according to the amount of minority language students' L1 instruction (Skutnabb-Kangas and Dunbar, 2010)

Type	Sub-type	Language(s)	Description
Monolingual	Submersion (or sink-or-swim)	L2	<ul style="list-style-type: none"> • Minority language students are forced to accept a foreign language as MOI. • The teacher may not know the students' L1. • Learners' mother tongue skills are not well developed. • The L2 is not properly acquired due to an absence of transfer of language skills from the L1.
	Mainstream	L2	<ul style="list-style-type: none"> • The main language is the MOI. • There may a foreign language as a subject. • This model is addressed to majority students.
Bilingual	Segregation programme	L1/(L2)	<ul style="list-style-type: none"> • Minority language students are taught through a low status L1 and with inadequate material. • The L2 (official language) is scarcely present. • Teachers are not well trained. • Learners attain poor academic skills.
	Early-exit transitional	L1/L2	<ul style="list-style-type: none"> • The L1 is used as MOI during the 1st to 3rd year of primary education. • From the 4th year, the language MOI is shifted from the L1 to the L2.
	Late-exit transitional	L1/L2	<ul style="list-style-type: none"> • The L1 is MOI until the 6th year of primary education. • ITM students start secondary education with the official language as MOI.
	Additive	L1/L2	<ul style="list-style-type: none"> • Both the L1 and the L2 are used by multilingual teachers as MOI. • The L1 is mainly used with increasingly amounts of L2. • The L1 is always present as MOI throughout the whole academic system.

Table 54: Academic programmes according to the amount of minority language students' L1 presence

Adapted from: Skutnabb-Kangas and Dunbar (2010)

Appendix 4

Questionnaire given to parents

NOM Âge Sexe : H / F

Choisissez la réponse la plus approprié pour vous:

1. Êtes-vous allé à l'école ? _____. Jusqu'en quelle classe? _____
2. En quelle langue est le plus facile pour vous de s'exprimer?
 Sérère Wolof Français Autre: _____
3. Savez-vous lire en français ? Oui, beaucoup Assez Peu Pas du tout
4. Savez-vous écrire en français ? Oui, beaucoup Assez Peu Pas du tout
5. Savez-vous écrire en sérère? Oui, beaucoup Assez Peu Pas du tout
6. Savez-vous lire en sérère? Oui, beaucoup Assez Peu Pas du tout
7. Combien d'enfants avez-vous ? Filles : _____ Garçons : _____
8. Quelle langue(s) parlez-vous avec vos fils?
Sérère: toujours souvent quelques fois rarement jamais
Wolof: toujours souvent quelques fois rarement jamais
Français: toujours souvent quelques fois rarement jamais
Autre: toujours souvent quelques fois rarement jamais
9. Quelle langue(s) parlez-vous avec vos filles?
Sérère: toujours souvent quelques fois rarement jamais
Wolof: toujours souvent quelques fois rarement jamais
Français: toujours souvent quelques fois rarement jamais
Autre: toujours souvent quelques fois rarement jamais
10. Quelle langue parlez-vous avec les autres villageois?
Sérère: toujours souvent quelques fois rarement jamais
Wolof: toujours souvent quelques fois rarement jamais
Français: toujours souvent quelques fois rarement jamais
Autre: toujours souvent quelques fois rarement jamais
11. Est-ce que vos fils s'absentent à l'école ?
 Oui, beaucoup Assez Peu Pas du tout
Pourquoi?

12. Est-ce que vos filles s'absentent à l'école ?

Oui, beaucoup Assez Peu Pas du tout

Pourquoi?

13. Quand ils manquent à l'école, quelle est la cause principale?

14. Aimeriez-vous que les professeurs utilisent le sérère pour enseigner à vos enfants?

Oui, beaucoup Assez Peu Pas du tout

Pourquoi?

15. Croyez-vous que si le sérère était utilisé pour enseigner, vos enfants seraient plus motivés pour étudier ? Oui, beaucoup Assez Peu Pas du tout

Pourquoi?

16. Selon vous, quelle est la meilleure langue pour que vos enfants apprennent les leçons à l'école?

Sérère Wolof Français Autre: _____

Pourquoi?

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Appendix 5

Parents: Results of the questionnaire

1a. Have you ever attended school?

	Yes	No
%	65.4	34.6
N	17	9

1b. If so, until which grade?

	grade 2	grade 3	grade 6	grade 8	grade 9
%	11.5	23.1	15.4	3.8	7.7
N	3	6	4	1	2

2. What is the easiest language for you to express?

	Sérère	Wolof	French	Other	Non-answered
%	92.3	7.7	0	0	0
N	24	2	0	0	0

3. Can you read in French?

	Yes, a lot	Quite	A little	Not at all	Non-answered
%	23.1	7.7	19.2	50	0
N	6	2	5	13	0

4. Can you write in French?

	Yes, a lot	Quite	A little	Not at all	Non-answered
%	26.9	3.8	26.9	42.3	0
N	7	1	7	11	0

5. Can you read in Sérère?

	Yes, a lot	Quite	A little	Not at all	Non-answered
%	0	7.7	7.7	84.6	0
N	0	7	2	22	0

6. Can you write in Sérère?

	Yes, a lot	Quite	A little	Not at all	Non-answered
%	0	7.7	26.9	65.4	0
N	0	2	7	17	0

7. How many children have you got?

	Boys	Girls
mean	2.73	2.69
SD	1.66	2.13

8. Which language do you speak to your male children?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	96.2	0	0	0	3.8	0
	N	25	0	0	0	1	0
Wolof	%	3.8	0	0	0	96.2	0
	N	1	0	0	0	25	0
French	%	0	0	0	0	100	0
	N	0	0	0	0	26	0
Other	%	0	0	0	0	100	0
	N	0	0	0	0	26	0

9. Which language do you speak to your female children?

No-female children: 2 participants

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	91.6	4.2	0	0	4.2	0
	N	22	1	0	0	1	0
Wolof	%	4.2	0	0	0	95.8	0
	N	1	0	0	0	23	0
French	%	0	0	0	0	24	0
	N	0	0	0	0	100	0
Other	%	0	0	0	0	24	0
	N	0	0	0	0	100	0

10. Which language do you speak to other citizens in your village?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	92.3	0	7.7	0	0	0
	N	24	0	2	0	0	0
Wolof	%	0	7.7	0	0	92.3	0
	N	0	2	0	0	24	0
French	%	0	0	0	0	100	0
	N	0	0	0	0	26	0
Other	%	0	0	0	0	100	0
	N	0	0	0	0	26	0

11. Do your male children miss school?

	Yes, a lot	Quite	Sometimes	A little	Not at all	Non-answered
%	0	0	0	69.2	30.8	0
N	0	0	0	18	8	0

12. Do your female children miss school?

No female children: 2 participants

	Yes, a lot	Quite	Sometimes	A little	Not at all	Non-answered
%	0	0	0	75	25	0
N	0	0	0	18	6	0

13. Would you like children could read and write in Sérère at school?

	Yes, a lot	Quite	A little	Not at all	Non-answered
%	96.2	0	0	1	0
N	25	0	0	3.8	0

14. If Sérère was used as a language to teach at school, do you think your children would have better results?

	Yes, a lot	Quite	Sometimes	A little	Not at all	Non-answered
%	100	0	0	0	0	0
N	26	0	0	0	0	0

15. In your view, what is the best language for your children to learn lessons at school?

	Sérère	Wolof	French	Sérère and French	Other	Non-answered
%	80.8	3.8	7.7	7.7	0	0
N	21	1	2	2	0	0

Appendix 6

Questionnaire given to students

Nom Âge Sexe: H / F Redoublant : Oui / Non

Choisissez la réponse la plus approprié pour vous:

1. En quelle langue est le plus facile pour vous de s'exprimer?

Sérère Wolof Français Autre: _____

2. Quelle langue(s) parlez-vous avec votre mère?

Sérère: toujours souvent quelques fois rarement jamais
Wolof: toujours souvent quelques fois rarement jamais
Français: toujours souvent quelques fois rarement jamais
Autre: toujours souvent quelques fois rarement jamais

3. Quelle langue(s) parlez-vous avec votre père?

Sérère: toujours souvent quelques fois rarement jamais
Wolof: toujours souvent quelques fois rarement jamais
Français: toujours souvent quelques fois rarement jamais
Autre: toujours souvent quelques fois rarement jamais

4. Quelle langue(s) parlez-vous avec vos frères?

Sérère: toujours souvent quelques fois rarement jamais
Wolof: toujours souvent quelques fois rarement jamais
Français: toujours souvent quelques fois rarement jamais
Autre: toujours souvent quelques fois rarement jamais

5. Quelle langue est parlée dans votre village?

Sérère: toujours souvent quelques fois rarement jamais
Wolof: toujours souvent quelques fois rarement jamais
Français: toujours souvent quelques fois rarement jamais
Autre: toujours souvent quelques fois rarement jamais

6. Au collège/lycée, en quelle langue vous vous dirigez à vos camarades pendant les cours?

Sérère: toujours souvent quelques fois rarement jamais
Wolof: toujours souvent quelques fois rarement jamais
Français: toujours souvent quelques fois rarement jamais
Autre: toujours souvent quelques fois rarement jamais

7. Et avec ces mêmes camarades pendant la récréé?

- Sérère:** toujours souvent quelques fois rarement jamais
Wolof: toujours souvent quelques fois rarement jamais
Français: toujours souvent quelques fois rarement jamais
Autre: toujours souvent quelques fois rarement jamais

8. Et avec les amis hors du collège/lycée?

- Sérère:** toujours souvent quelques fois rarement jamais
Wolof: toujours souvent quelques fois rarement jamais
Français: toujours souvent quelques fois rarement jamais
Autre: toujours souvent quelques fois rarement jamais

9. Avec vos professeurs pendant les cours, en quelle langue vous vous dirigez à eux?

- Sérère:** toujours souvent quelques fois rarement jamais
Wolof: toujours souvent quelques fois rarement jamais
Français: toujours souvent quelques fois rarement jamais
Autre: toujours souvent quelques fois rarement jamais

10. Et pendant la récréé, en quelle langue leur parlez-vous?

- Sérère:** toujours souvent quelques fois rarement jamais
Wolof: toujours souvent quelques fois rarement jamais
Français: toujours souvent quelques fois rarement jamais
Autre: toujours souvent quelques fois rarement jamais

11. Et hors du collège/lycée?

- Sérère:** toujours souvent quelques fois rarement jamais
Wolof: toujours souvent quelques fois rarement jamais
Français: toujours souvent quelques fois rarement jamais
Autre: toujours souvent quelques fois rarement jamais

12. Savez-vous écrire en langue sérère?

- Très bien, je connais les normes d'orthographe.
 Assez bien, mais je fais quelques erreurs.
 Peu, je fais souvent des erreurs.
 Pas du tout, je ne suis pas capable d'écrire en langue sérère.

13. Savez-vous lire en langue sérère?

- Très bien, je peux lire et comprendre un texte.
 Assez bien, je peux lire et comprendre un texte, mais avec quelques difficultés.
 Peu, je peux lire et comprendre un texte, mais avec de grandes difficultés.
 Pas du tout, je ne suis pas capable de lire ni écrire en langue sérère.

14. Aimerez-vous que les professeurs utilisent le sérère pour enseigner?

- Oui, beaucoup Assez Peu Pas du tout

Pourquoi? _____

15. Pour pouvoir résoudre un problème de mathématiques, en quelle langue vous pensez qu'est plus facile pour vous de le comprendre?

- Si il est écrit en sérère Si il est écrit en Français
 Si il est écrit en wolof Si il est écrit dans une autre langue: _____

Pourquoi? _____

16. Croyez-vous que si les matières au collège/lycée seraient en sérère au lieu du français, votre moyenne serait plus haute?

- Oui, beaucoup plus Assez Peu Pas du tout

Pourquoi? _____

17. Est-ce que vous manquez souvent à l'école ?

- Oui, beaucoup Assez Peu Pas du tout

18. Quand vous manquez à l'école, quelle est la cause principale?

- Aider la famille avec le travail de la maison
 Aider la famille dans le travail en brousse ou dans la rizière
 Je ne comprends pas les leçons et je m'ennuis à l'école
 Je ne suis pas intéressé dans les études
 Autre _____

19. Et si les professeurs vous enseignaient en sérère, est que vous manqueriez moins à l'école?

- Oui, beaucoup moins Assez moins Un peu moins Ça n'a rien à voir

Pourquoi? _____

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Appendix 7

Grade-3 students: Results of the questionnaire

1. What is the easiest language for you to express?

	Sérère	Sérère and Wolof	Wolof	French	Other	Non-answered
%	95.5	4.5	0	0	0	0
N	83	4	0	0	0	0

2. Which language(s) do you speak with your mother?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	98.9	1.1	0	0	0	0
	N	88	1	0	0	0	0
Wolof	%	0	1.1	2.2	0	96.6	0
	N	0	1	2	0	86	0
French	%	0	0	0	0	100	0
	N	0	0	0	0	89	0
Other	%	0	0	0	0	100	0
	N	0	0	0	0	89	0

3. Which language(s) do you speak with your father?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	97.8	1.1	0	0	1.1	0
	N	87	1	0	0	1	0
Wolof	%	1.1	1.1	1.1	0	96.6	0
	N	1	1	1	0	86	0
French	%	0	0	0	0	100	0
	N	0	0	0	0	89	0
Other	%	0	0	0	0	100	0
	N	0	0	0	0	89	0

4. Which languages do you speak with your brothers?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	98.9	1.1	0	0	0	0
	N	88	1	0	0	0	0
Wolof	%	0	1.1	0	0	98.9	0
	N	0	1	0	0	88	0
French	%	0	1.1	0	0	98.9	0
	N	0	1	0	0	88	0
Other	%	0	0	0	0	100	0
	N	0	0	0	0	0	0

5. Which language is spoken in your village?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	94.4	5.6	0	0	0	0
	N	84	5	0	0	0	0
Wolof	%	0	5.6	1	1.1	92.1	0
	N	0	5	1.1	1	82	0
French	%	0	1.1	0	0	98.9	0
	N	0	1	0	0	88	0
Other	%	0	0	2.2	1.1	96.6	0
	N	0	0	2	1	86	0

6. At school, in which language do you address to your classmates during lessons?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	50.6	15.7	0	0	33.7	0
	N	45	14	0	0	30	0
Wolof	%	1.1	18	0	0	0	80.9
	N	1	16	0	0	0	72
French	%	24.7	16.9	0	1.1	57.3	0
	N	22	15	0	1	51	0
Other	%	1.1	1.1	0	1.1	0	96.6
	N	1	1	0	1	0	86

7. And with those same classmates during break time?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	88.8	11.2	0	0	0	0
	N	79	10	0	0	0	0
Wolof	%	0	7.9	0	0	92.1	0
	N	0	7	0	0	82	0
French	%	1.1	3.4	0	0	95.5	0
	N	1	3	0	0	85	0
Other	%	0	0	0	0	100	0
	N	0	0	0	0	89	0

8. And with your friends outside the school?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	87.6	11.2	0	0	1.1	0
	N	78	10	0	0	1	0
Wolof	%	0	10.1	0	0	89.9	0
	N	0	9	0	0	80	0
French	%	2.2	3.4	0	0	94.4	0
	N	2	3	0	0	84	0
Other	%	0	0	0	0	100	0
	N	0	0	0	0	89	0

9. At school, in which language do you address to your teachers during lessons?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	7.9	9	5.6	0	76.4	1.1
	N	7	8	5	0	68	1
Wolof	%	4.5	3.4	16.9	5.6	68.5	1.1
	N	4	3	25	5	61	1
French	%	73	9	0	0	16.9	1
	N	65	8	0	0	15	1.1
Other	%	0	0	0	1.1	97.8	1.1
	N	0	0	0	1	87	1

10. And during break time, in which language do you speak to them?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	18	28.1	2.2	0	47.2	4.5
	N	16	25	2	0	42	4
Wolof	%	3.4	42.7	0	4.5	47.2	4.5
	N	3	38	0	4	42	4
French	%	32.6	25.8	0	1.1	36	4.5
	N	29	23	0	1	32	4
Other	%	1.1	2.2	0	0	92.1	4.5
	N	1	2	0	0	82	4

11. And outside the school?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	22.5	30.3	0	1.1	41.6	4.5
	N	20	27	0	1	37	4
Wolof	%	3.4	51.7	0	1.1	39.3	4.5
	N	3	46	0	1	35	4
French	%	13.5	27	4.5	1.1	49.4	4.5
	N	12	24	4	1	44	4
Other	%	0	0	0	1.1	94.4	4.5
	N	0	0	0	1	84	4

12. Can you write in Sérère?

	Very well	Quite well	A little	Not at all	Non-answered
%	0	0	0	95.5	4.5
N	0	0	0	85	4

13. Can you read in Sérère?

	Very well	Quite well	A little	Not at all	Non-answered
%	0	0	23	73	1.1
N	0	0	25.8	65	1

14. Would you like to read and write in Sérère at school?

	Yes, absolutely	Quite	A little	Not at all	Non-answered
%	73	1.1	0	14.6	11.2
N	65	1	0	13	10

15. Would you like teachers used Sérère at school to teach?

	Yes, absolutely	Quite	A little	Not at all	Non-answered
%	77.5	3.4	1.1	11.2	6.7
N	69	3	1	10	6

16. In your view, what is the language a mathematical problem-solving task should be expressed in order to understand it adequately and solve it?

If the mathematical problem-solving task is expressed in...

	Sérère	Wolof	French	French and Sérère	French and Wolof	Sérère and Wolof	Another	Non-answered
%	80.9	6.7	2.2	2.2	1.1	2.2	0	4.5
N	72	6	2	2	1	2	0	4

17. And questions for other subjects, in order to understand them and giving an answer? If questions are expressed in...

	Sérère	Wolof	French	French and Sérère	French and Wolof	Sérère and Wolof	Another	Non-answered
%	74.2	6.7	12.4	1.1	0	2.2	0	3.4
N	66	6	11	1	0	2	0	4

18. Do you believe that subjects, if they were taught in Sérère rather than in French, your marks would be higher?

	Yes, absolutely	Quite	A little	Not at all	Non-answered
%	76.4	10.1	0	0	13.5
N	68	9	0	0	12

19. Do you miss school?

	Yes, a lot	Quite	A little	Not at all	Non-answered
%	23.6	13.5	25.8	20.2	16.9
N	21	12	23	18	15

20. When you miss school, what is the main cause?

	To help in the household	To help in agriculture	To help in agriculture and household	I do not understand lessons and get bored	I am not interested in studying	Other	Non-answered
%	25.8	13.5	2.2	2.2	0	52.8	3.4
N	23	12	2	2	0	47	3

21. If teachers taught in Sérère, would you feel more motivated to attend school?

	Yes, absolutely	Quite	A little	Nothing to do with that	Non-answered
%	78.7	9	7.9	0	4.5
N	70	8	7	0	4

Appendix 8

Grade-6 students: Results of the questionnaire

1. What is the easiest language for you to express?

	Sérère	Sérère and Wolof	Wolof	French	Other	Non-answered
%	96.7	1.7	0	1.7	0	0
N	58	1	0	1	0	0

2. Which language(s) do you speak with your mother?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	98.3	1.7	0	0	0	0
	N	59	1	0	0	0	0
Wolof	%	0	1.7	1.7	0	96.7	0
	N	0	1	1	0	58	0
French	%	0	0	0	1.7	98.3	0
	N	0	0	0	1	59	0
Other	%	0	0	0	1.7	98.3	0
	N	0	0	0	1	59	0

3. Which language(s) do you speak with your father?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	98.3	1.7	0	0	0	0
	N	59	1	0	0	0	0
Wolof	%	0	1.7	1.7	0	96.7	0
	N	0	1	1	0	58	0
French	%	0	0	0	1.7	98.3	0
	N	0	0	0	1	59	0
Other	%	0	0	0	1.7	98.3	0
	N	0	0	0	1	59	0

4. Which languages do you speak with your brothers?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	95	5	0	0	0	0
	N	57	3	0	0	0	0
Wolof	%	0	2.3	1.7	1.7	93.3	0
	N	0	2	1	1	56	0
French	%	0	1.7	0	3.3	95	0
	N	0	1	0	2	57	0
Other	%	0	0	0	0	1.7	98.3
	N	0	0	0	0	1	59

5. Which language is spoken in your village?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	93.3	6.7	0	0	0	0
	N	56	4	0	0	0	0
Wolof	%	0	5	6.7	0	88.3	0
	N	0	3	4	0	53	0
French	%	0	1.7	5	0	93.3	0
	N	0	1	3	0	56	0
Other	%	0	0	0	5	95	0
	N	0	0	0	3	57	0

6. At school, in which language do you address to your classmates during lessons?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	26.7	8.3	0	6.7	55	3.3
	N	16	5	0	4	33	2
Wolof	%	0	10	0	0	86.7	3.3
	N	0	6	0	0	52	2
French	%	53.3	15	0	5	23.3	3.3
	N	32	9	0	3	14	2
Other	%	1.7	1.7	3.3	0	90	3.3
	N	1	1	2	0	54	2

7. And with those same classmates during break time?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	48.3	21.7	0	3.3	23.3	3.3
	N	29	13	0	2	14	2
Wolof	%	1.7	20	1.7	0	73.3	3.3
	N	1	12	1	0	44	2
French	%	21.7	10	5	0	60	3.3
	N	13	6	3	0	36	2
Other	%	1.7	5	1.7	0	88.3	3.3
	N	1	3	1	0	53	2

8. And with your friends outside the school?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	90	6.7	0	0	3.3	0
	N	54	4	0	0	2	0
Wolof	%	0	10	0	0	90	0
	N	0	3	0	0	54	0
French	%	5	5	0	0	90	0
	N	3	3	0	0	54	0
Other	%	0	0	0	0	100	0
	N	0	0	0	0	60	0

9. At school, in which language do you address to your teachers during lessons?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	3.3	3.3	0	0	93.3	0
	N	2	2	0	0	56	0
Wolof	%	0	11.7	0	0	88.3	0
	N	0	7	0	0	53	0
French	%	86.7	6.7	0	0	6.7	0
	N	52	4	0	0	4	0
Other	%	0	1.7	0	0	98.3	0
	N	0	1	0	0	59	0

10. And during break time, in which language do you speak to them?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	18.3	13.3	15	0	53.3	0
	N	11	8	9	0	32	0
Wolof	%	10	13.3	16.7	0	60	0
	N	6	8	10	0	36	0
French	%	43.3	26.7	0	0	30	0
	N	26	16	0	0	18	0
Other	%	0	0	0	0	100	0
	N	0	0	0	0	60	0

11. And outside the school?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	38.3	20	0	0	41.7	0
	N	23	12	0	0	25	0
Wolof	%	23.3	23.3	0	0	53.3	0
	N	14	14	0	0	32	0
French	%	16.7	13.3	1.7	5	63.3	0
	N	10	8	1	3	38	0
Other	%	0	0	0	1.7	98.3	0
	N	0	0	0	1	59	0

12. Can you write in Sérère?

	Very well	Quite well	A little	Not at all	Non-answered
%	0	1.7	0	95	3.3
N	0	1	0	57	2

13. Can you read in Sérère?

	Very well	Quite well	A little	Not at all	Non-answered
%	0	0	21.7	75	3.3
N	0	0	13	45	2

14. Would you like to read and write in Sérère at school?

	Yes, absolutely	Quite	A little	Not at all	Non-answered
%	83.3	1.7	1.7	11.7	1.7
N	50	7	1	7	1

15. Would you like teachers used Sérère at school to teach?

	Yes, absolutely	Quite	A little	Not at all	Non-answered
%	76.7	1	0	21.7	0
N	46	1.7	0	13	0

16. In your view, what is the language a mathematical problem-solving task should be expressed in order to understand it adequately and solve it?

If the mathematical problem-solving task is expressed in...

	Sérère	Wolof	French	Other	Non-answered
%	90	1.7	3.3	0	5
N	54	1	2	0	3

17. And questions for other subjects, in order to understand them and giving an answer?

If questions are expressed in...

	Sérère	Wolof	French	Other	Non-answered
%	93.3	1.7	5	0	0
N	56	1	3	0	0

18. Do you believe that subjects, if they were taught in Sérère rather than in French, your marks would be higher?

	Yes, absolutely	Quite	A little	Not at all	Non-answered
%	85	3.3	3.3	5	3.3
N	51	2	2	3	2

19. Do you miss school?

	Yes, a lot	Quite	A little	Not at all	Non-answered
%	10	3.3	61.7	21.7	3.3
N	6	2	37	13	2

20. When you miss school, what is the main cause?

	To help in the household	To help in agriculture	To help in agriculture and household	I do not understand lessons and get bored	I am not interested in studying	Other	Non-answered
%	6.7	18.3	3.3	1.7	1.7	68.3	0
N	4	11	2	1	1	41	0

21. If teachers taught in Sérère, would you feel more motivated to attend school?

	Yes, absolutely	Quite	A little	Nothing to do with that	Non-answered
%	86.7	1.7	11.7	0	0
N	52	1	7	0	0

Appendix 9

Questionnaire given to teachers

Nom: École: Âge:

Choisissez la réponse la plus approprié pour vous:

1. Quelle est votre première langue?

Sérère Wolof Français Autre: _____

2. Au collège/lycée, en quelle langue vous vous dirigez à vos élèves pendant les cours?

Sérère:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Wolof:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Français:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Autre:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais

3. Et en quelle langue vous vous dirigez à eux pendant la récré?

Sérère:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Wolof:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Français:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Autre:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais

4. Et hors du collège/lycée?

Sérère:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Wolof:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Français:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Autre:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais

5. Et avec vos collègues professeurs pendant que vous travaillez?

Sérère:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Wolof:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Français:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Autre:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais

6. Et avec ceux-ci hors du collège/lycée?

Sérère:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Wolof:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Français:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais
Autre:	<input type="checkbox"/> toujours	<input type="checkbox"/> souvent	<input type="checkbox"/> quelques fois	<input type="checkbox"/> rarement	<input type="checkbox"/> jamais

7. Savez-vous écrire en langue sérère?

- Très bien, je connais toutes les normes d'orthographe.
- Assez bien, mais je fais quelques erreurs.
- Peu, je fais souvent des erreurs.
- Pas du tout, je ne suis pas capable d'écrire en langue sérère.

8. Savez-vous lire en cette langue?

- Très bien, je peux lire et comprendre un texte.
- Assez bien, je peux lire et comprendre un texte, mais avec quelques difficultés.
- Peu, je peux lire et comprendre un texte, mais avec de grandes difficultés.
- Pas du tout, je ne suis pas capable de lire ni écrire en langue sérère.

9. Est-ce que vous utilisez le sérère pendant vos cours?

- Oui, beaucoup Assez Peu Pas du tout

Pourquoi?

10. Si les énoncés des examens, tels des problèmes de mathématiques ou des questions d'histoire et géographie, étaient écrits en langue maternelle, croyez-vous que les élèves auraient plus de chances de les résoudre que s'ils étaient en français?

- Oui, beaucoup Assez Peu Pas du tout

Pourquoi?

11. Au moment de réaliser un examen, en quelle langue pensez-vous que vos élèves auraient une plus grande facilité à s'exprimer?

- Sérère Wolof Français Autre: _____

Pourquoi?

12. Si la langue est importante pour transmettre des connaissances à vos élèves, quelle serait-il, selon vous, la meilleure langue pour cet objectif?

- Sérère Wolof Français Autre: _____

Pourquoi?

13. Si on vous proposait de participer à un projet pour l'introduction des langues nationales dans l'éducation, aimeriez-vous faire partie des professeurs du programme?

Oui, beaucoup Assez Peu Pas du tout

Pourquoi?

14. Pour ce projet, il serait nécessaire d'aller à un cours de formation régulier pour maîtriser la langue nationale et apprendre des stratégies pédagogiques pour que la langue des élèves soit une base d'apprentissage des connaissances ainsi qu'un moyen pour acquérir le français. Serait-vous disposé(e) à y assister?

Oui, beaucoup Assez Peu Pas du tout

Pourquoi?

15. Vous croyez que l'introduction de la langue maternelle dans l'éducation serait positive dans les résultats scolaires de vos élèves?

Oui, beaucoup Assez Peu Pas du tout

Pourquoi?

MERCI DE VOTRE COLLABORATION!!

Appendix 10

Teachers: Results of the questionnaire

1. What is your mother tongue?

	Sérère	Wolof	Fula	Mandinka	Non-answered
%	26.9	42.3	23.1	7.7	0
N	7	11	6	2	0

2. In which language do you address to your students while you lecture?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	0	3.8	11.5	7.7	76.9	0
	N	0	1	3	2	20	0
Wolof	%	0	15.4	26.9	7.7	50	0
	N	0	4	7	2	13	0
French	%	80.8	15.4	3.8	0	0	0
	N	21	4	1	0	0	0
Other	%	0	0	3.8	7.7	88.5	0
	N	0	0	1	2	23	0

3. In which language do you address to them during break-time?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	0	7.7	7.7	7.7	76.9	0
	N	0	2	2	2	20	0
Wolof	%	3.8	34.6	19.2	7.7	34.9	0
	N	1	9	5	2	9	0
French	%	46.2	38.5	11.5	0	3.8	0
	N	4	10	3	0	1	0
Other	%	0	0	3.8	3.8	92.3	0
	N	0	0	1	1	24	0

4. And, outside the school?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	11.5	11.5	0	0	76.9	0
	N	3	3	0	0	20	0
Wolof	%	30.8	23.1	11.5	0	34.6	0
	N	8	6	3	0	9	0
French	%	15.4	34.6	15.4	7.7	26.9	0
	N	4	9	4	2	7	0
Other	%	0	0	7.7	7.7	84.6	0
	N	0	0	2	2	22	0

5. And with your teacher colleagues while you are working?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	0	0	0	3.8	96.2	0
	N	0	0	0	1	25	0
Wolof	%	3.8	26.9	11.5	19.2	38.5	0
	N	1	7	3	5	10	0
French	%	80.8	15.4	3.8	0	0	0
	N	21	4	1	0	0	0
Other	%	0	0	0	7.7	92.3	0
	N	0	0	0	2	24	0

6. And with those outside the school?

		Always	Often	Sometimes	Rarely	Never	Non-answered
Sérère	%	2.7	2.7	0	3.8	80.8	0
	N	2	2	0	1	21	0
Wolof	%	26.9	34.6	15.4	3.8	19.2	0
	N	7	9	4	1	5	0
French	%	11.5	38.5	26.9	0	23.1	0
	N	3	10	7	0	6	0
Other	%	0	0	7.7	7.7	88.5	0
	N	0	0	2	2	23	0

7. Can you write in Sérère?

	Yes, a lot	Quite	A little	Not at all	Non-answered
%	3.8	7.7	23.1	65.4	0
N	1	2	6	17	0

8. Can you read in that language?

	Yes, a lot	Quite	A little	Not at all	Non-answered
%	11.5	7.7	23.1	57.7	0
N	3	2	6	15	0

9. Do you use Sérère during your lessons?

	Yes, a lot	Quite	A little	Not at all	Non-answered
%	11.5	7.7	42.3	38.5	0
N	3	2	11	10	0

10. If tests such as mathematical problem-solving tasks or questions of other subjects were expressed in the students' mother tongue, do you think students would have higher chances to solve them as compared to French?

	Yes, a lot	Quite	A little	Not at all	Non-answered
%	3.8	76.9	15.4	1	0
N	1	20	4	3.8	0

11. When taking an exam, in which language would be the easiest for students to express themselves?

	Sérère	Wolof	French	Other	Non-answered
%	61.5	23.1	3.8	11.5	0
N	16	6	1	3	0

12. If language is relevant to transfer knowledge to your students, in your view, what is the best language for such a purpose?

	Sérère	Wolof	French	Other	Non-answered
%	42.3	38.5	11.5	7.7	0
N	11	10	3	2	0

13. If you were asked to take part into a project about the introduction of national languages into education, would you like to be one of the teachers involved?

	Yes, a lot	Quite	A little	Not at all	Non-answered
%	69.2	11.5	3.8	15.4	0
N	18	3	1	4	0

14. For that project, it would be necessary to attend a regular teachers' training programme in order to master the local language and to learn pedagogical strategies to make of students' mother the base for acquisition of content and the way to acquire French. Would you attend to that project?

	Yes, a lot	Quite	A little	Not at all	Non-answered
%	73.1	11.5	15.4	0	0
N	19	3	4	0	0

15. Do you think that the introduction of the students' mother tongue in education would be positive on students' academic results?

	Yes, a lot	Quite	A little	Not at all	Non-answered
%	3.8	88.5	7.7	0	0
N	1	23	2	0	0

Appendix 11

Languages in Senegal with the status of *national* according to the Senegalese Constitution of 2001 (*Ministère de l'Éducation Nationale, 2008*)

Diola (also Jola or Joola), Pulaar (also Pular, Peul or Fula), Malinké (also Maninka), Sérère (also Sereer or Seereer), Soninké (or Soninke), Wolof, Saafi, Bainouk (or Gunnuun), Badiaranké (or Kanjad), Ndut, Jalonké, Bédik (or Ménik), Bambara (or Barmannan), Coniagui (or Konaagiou or Weng), Bassari (or Oniyan), Léhar (or Laalaa), Palor, Bayotte (or Bayot), Papel (or Pepel), Khassonké (or Xasonke), Jaxanke (or Jaxante), Ramme (or Ramanan) and Kwatai (*Ministère de l'Éducation Nationale, 2008*).

Appendix 12

Data gathered from the UNESCO Institut for Statistics corresponding to figures in chapter 4

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Females	2.29	2.20	2.31	2.72	2.87	3.64	3.24	3.25	5.86	8.26
Males	2.28	2.10	2.21	2.72	2.72	3.24	2.86	2.95	5.31	7.45
Both genders	2.29	2.15	2.26	2.72	2.80	3.44	3.05	3.10	5.58	7.85

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014
Females	9.72	9.92	11.16	11.95	13.36	14.39	15.06	n.d.	16.31
Males	8.78	8.84	9.87	10.51	11.96	12.60	13.47	n.d.	15.45
Both genders	9.25	9.37	10.51	11.22	12.65	13.48	14.26	n.d.	15.37

Table 55: Pre-primary education: Gross-enrolment ratio (corresponding to figure 4)
Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Gross-enrolment ratio	59.30	62.97	66.00	64.92	68.07	69.96	70.90	74.76	76.90	78.74
Net-enrolment ratio	49.72	53.67	55.98	54.76	57.41	n.d.	n.d.	64.12	62.69	63.76
Out-of-school children	50.28	46.33	44.02	45.24	42.17	n.d.	n.d.	35.39	37.31	36.24

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Gross-enrolment ratio	78.83	82.33	82.70	82.20	81.92	80.98	81.16	81.48	80.88	82.17
Net-enrolment ratio	65.88	68.32	69.03	69.14	69.77	70.03	71.65	70.49	71.12	71.45
Out-of-school children	33.84	31.32	30.61	30.43	29.78	29.50	26.79	27.96	27.16	27.01

Table 56: Enrolment at primary education (corresponding to figure 5)
Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Females	52.53	56.61	60.17	58.67	63.19	65.71	67.29	71.61	74.83	77.21
Males	65.94	69.21	71.72	71.06	72.87	74.14	74.45	77.86	78.95	80.23

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Females	77.21	78.20	82.36	83.68	83.91	84.16	83.54	84.31	n.d.	84.31
Males	80.23	79.45	82.29	81.73	80.53	79.72	78.47	78.07	n.d.	77.52

Table 57: Female and male gross-enrolment ratio at primary education (corresponding to figure 6)

Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Females	13.97	13.37	13.27	14.53	13.50	13.68	13.58	13.65	12.80	11.81
Males	13.94	13.46	13.41	14.24	13.72	14.11	13.70	13.89	13.07	11.90
Both genders	13.95	13.42	13.35	14.37	13.62	13.91	13.65	13.77	12.94	11.86

Year	2005	2006	2007	2008	2009	2010	2011	2012
Females	11.81	10.48	10.48	7.59	7.38	6.20	2.90	3.36
Males	11.90	10.79	10.79	7.78	7.62	6.31	3.09	3.49
Both genders	11.86	10.63	10.63	7.68	7.50	6.26	2.99	3.42

Table 58: Percentage of grade repeaters at primary education (corresponding to figure 7)

Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

Years	1996	1997	1998	1999	2000	2001	2002	2003	2004
Grade 1	8.93	9.10	10.25	12.00	8.76	10.56	9.98	9.66	9.00
Grade 2	10.89	9.42	10.04	10.60	11.40	10.39	11.71	11.18	10.36
Grade 3	11.96	11.85	10.44	11.70	12.10	12.31	11.44	12.37	11.52
Grade 4	12.11	12.00	11.80	13.40	12.00	12.78	12.69	12.14	12.13
Grade 5	15.29	14.94	14.67	15.40	14.78	15.21	15.12	15.51	13.94
Grade 6	28.30	28.07	26.95	27.22	28.84	26.68	24.80	26.66	25.46

Years	2005	2006	2007	2008	2009	2010	2011	2012
Grade 1	7.98	5.09	4.63	3.96	3.69	2.68	1.19	1.39
Grade 2	9.81	9.80	n.d.	7.50	7.20	6.89	4.47	5.20
Grade 3	10.41	9.01	n.d.	5.68	5.48	4.16	2.09	2.15
Grade 4	11.22	10.79	n.d.	8.50	8.32	7.82	5.00	5.37
Grade 5	13.54	11.44	n.d.	7.25	6.92	5.40	2.42	2.48
Grade 6	22.11	22.88	22.88	16.43	16.60	13.61	3.23	4.72

Table 59: Percentage of repeaters at grades 1 to 6 (corresponding to figure 8)
Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

Year	1996	1997	1998	1999	2000	2001	2002	2003
Females	57.76	59.16	n.d.	n.d.	41.22	44.37	31.63	28.55
Males	44.22	45.83	n.d.	n.d.	33.49	37.60	25.66	27.07
Both genders	50.53	52.14	n.d.	n.d.	37.11	40.84	28.54	27.79

Year	2004	2005	2006	2007	2008	2009	2010	2011
Females	38.44	46.86	n.d.	40.48	41.21	38.94	40.43	36.26
Males	34.15	46.19	n.d.	42.63	43.58	41.92	41.20	41.03
Both genders	36.25	46.51	n.d.	41.58	42.40	40.43	40.80	38.63

Table 60: Percentage of cumulative dropout rate at primary education (corresponding to figure 9)

Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Females	13.58	13.34	13.55	15.01	15.77	16.19	17.61	19.53	22.69	25.43	28.47	n.d.	36.07
Males	21.49	21.43	21.38	22.55	23.64	23.89	25.15	27.31	30.27	32.86	36.28	n.d.	43.61
Both genders	17.56	17.41	17.49	18.80	19.73	20.07	21.41	23.45	26.51	29.17	32.41	n.d.	39.86

Table 61: Percentage of students who have completed primary education (corresponding to figure 10)

Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Females	14.89	16.03	n.d.	n.d.	17.12	15.57	14.80	11.49	12.57	12.61
Males	14.54	15.81	n.d.	n.d.	16.19	15.29	13.49	11.35	12.18	12.17
Both genders	14.67	15.89	n.d.	n.d.	16.55	15.40	14.01	11.40	12.35	12.36

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014
Females	12.89	14.74	14.74	14.96	15.89	14.59	16.46	n.d.	19.16
Males	12.40	14.24	14.23	15.09	15.92	14.94	16.54	n.d.	18.98
Both genders	12.61	14.45	14.45	15.03	15.91	14.77	16.50	n.d.	19.07

Table 62: Gross-enrolment ratio at lower secondary education (corresponding to figure 11)

Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Number of students	30.10	41.60	44.02	48.03	46.78	50.37	45.31	50.35	45.05	47.30

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of students	69.43	55.93	67.90	60.82	68.38	55.29	52.88	33.89	34.40	37.87

Table 63: Percentage of grade repeaters at lower secondary education (corresponding to figure 12)

Adapted from: UNESCO Institute for Statistics (<http://data.uis.unesco.org/#>)

Appendix 13

Number of primary students (%) successful at the CFEE

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Number of students	39.10	41.60	44.02	48.03	46.78	50.37	45.31	50.35	45.05	47.30

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of students	69.43	55.93	67.90	60.82	68.38	55.29	52.88	33.89	34.40	37.87

Table 64: Number (%) of successful primary students at the CFEE (corresponding to figure 13)

Adapted from: Inspections de l'Éducation et la Formation de Bakel (2014) and Ministère de l'Éducation: Direction des Examens et Concours (2015)

Appendix 14

Tests given to students at grade 3

Grade 3: Leçon (L) test for the experimental group

Kaa nu mbar o njil o doonagol o faax ole no laamitnahik kene mbideena to a niirel.

1. Xaar refunqel yongan?

- a. O mbiñ ñoo, dɔg yook ndaxar maak, me maak we njeetaay taa kaa jofna no saatefee.
- b. O mbiñ ñoo, dɔg yook ndaxar maak, me rewu we njawtaa yaa da njegna xew.
- c. Baak koo naa na coxtaa xatimxa maak.
- d. Ndaxar oo naa na layanaa maak.

2. An refu o kiin oxe waxoor na saate fee?

- a. O qooxoox, yaam kaa qookaa kaaf ngir a ñoowin a in.
- b. Medse, yaam kaa ci'aa a in a dakayerel yaa i njir na.
- c. O yaal saate, o ten oxe na sadkandaa o ñuxurum too a jeetayaa fo yaal caate ke mbiduuna.
- d. Oxe moy na o maak no saate fee, ten refu oxe moyna o nogoy, too a and wiin mayu.

3. A mban nuun a tɛp a moyaa may na qaaj saax nuun?

- a. No ke fogna no o nqool desambar fop, yaa a butaan ale waajoox na.
- b. Ya a saxad kaaf a fagna.
- c. No ke fogna no o nqool awril fop, yaa a butaan ale ɓaatoux na.
- d. No ke fogna no ndiing ne.

4. Na pexey num Muusa and tu me njeery ne wat taa?

- a. Nqes, na bat ale ikol, ta ga njeey ne sutooxaa.
- b. No kirand ne, yaa ta xaadaa mbind naa, a ganjeey ne mud kaa.
- c. No yeng ole, ta gauo xoor ole moyna meleɗaa.
- d. Ta suusaa nqeqñ ne na inoora kili no o mbiñ olenoj.

5. Xar axu ñaal fo xa yeŋ axe a njeg?

- a. Yaam lanq ke kaa mbiliroxaa o ndootodi.
- b. Yaam njeey ne kaa wilirooxaa lanqke o ndootooli.
- c. Yaam o ngol kaa wilirooxaa lanqke o ndootooli.
- d. Yaam xa qoor axe kaa mbar o melecaa yo ayen, me refee ñal.

6. Xar refu caq nduuflex?

- a. Yaa ndaxar a jegna xa piy.
- b. Yaa a naf a qas andefna no nduuflex ne sax na.
- c. Yaa o rim ole no ndaxar ne aferaa ojegfa mbay foteɓ.
- d. Yaa nduuflex ne jegna piɗ

Grade 3: Leçons (L) test for the control group

Vous devez choisir la réponse correcte parmi les quatre possibles de ces questions qui sont écrites et lues:

1. Qu'est-ce qu'un arbre à palabre ?

- a. C'est un lieu, sous l'ombre d'un grand arbre, où les anciens discutent la vie social du village.
- b. C'est un lieu, sous l'ombre d'un grand arbre, où les femmes cuisinent pendant les cérémonies.
- c. C'est un baobab qui donne de grands fruits.
- d. C'est un arbre qui parle aux anciens.

2. Qui est-ce la personne responsable du village ?

- a. L'agriculteur, car il cultive du mille pour pouvoir nous nourrir.
- b. Le médecin parce qu'il nous donne des médicaments en cas de maladie.
- c. Le chef du village, car c'est lui qui prends les décisions et se réunit avec d'autres chef de villages environnants.
- d. Le plus ancien du village, car c'est le plus âgé et il connaît beaucoup de personnes.

3. Dans quelle période il y a des pluies abondantes dans votre région?

- a. Tout au long du mois de décembre, quand la température est plus basse.
- b. Quand les récoltes de mille sont finies.
- c. Pendant le mois de d'avril, quand la température est élevée.
- d. Pendant l'hivernage.

4. Dans quelle situation Moussa sait où est l'est?

- a. Dans le chemin de l'école le matin, il regarde le soleil qui se lève.
- b. Le soir, quand il rentre à la maison, il observe le soleil qui se couche.
- c. La nuit, il regarde l'étoile qui brille le plus.
- d. Il ressent le vent qui vient toujours de la même direction.

5. Pourquoi se produisent les jours et les nuits ?

- a. Parce que La Terre tourne autour d'elle-même.
- b. Parce que le soleil tourne autour de La Terre.
- c. Parce que la lune tourne autour de La Terre.
- d. Parce que les étoiles doivent briller la nuit mais pas le jour.

6. Qu'est-ce que c'est la germination?

- a. Quand un arbre a produit un fruit.
- b. Quand il y a de nouvelles feuilles dans une plante.
- c. Quand la graine d'un arbre commence à avoir des petites racines.
- d. Quand une plante produit une fleur.

Grade 3: Mathematics (M) test for the experimental group

A xene mbindeen a too a niire lo. Ndesine yo me dara refer na ten refu ke heblileena no luurefna. Mbi yoo a liip ake nenu mbugtuuna. Mbind yo a pangan ale na liip na ndook ale ta wareena o fi. Jam fa mayutoo njookoo njal.

1. Ye Madam Ndon a ret na na marse, a jika o fof kilo betik maalo, kilo dik liip fo kilo tadik soblen. Dimle i Madam Ndon tewago an kilo podnum no o ñoow a bisu no mbind naa.
2. Xa elew na ikol ne Kawlax a inooxa ndax ngir a mbi'o mbuud. A njikooxa yo a biye qarɓaxay betu tadik a luu ref na teen a jar xa terem xarbeendik. Liip yo ke da njegna ya no mbuudne a cinj yaa de ñaknayo teen xa terem teemed nahik.
3. Ngir ta fi' o qol o kaare'u, o qooxoox a jika meetar teemed fo meetar qarɓeendik giryaas. Ye ta jalna giryaas fee baa cut, a sogu andee a yoqa o saax olaa fihandeeena. Meetar podnum giryaas a waru baat o jik ngir falel ke te fi' a waag o cut.

Grade 3: Mathematics (M) test to the control group

Vous devez résoudre ces trois problèmes qui sont lus. Dessinez dans l'espace réservé ce qui est proposé pour chacun et faites toutes les opérations mathématiques dont vous avez besoin. Écrivez le résultat dans l'espace destinée à ce but. Bonne chance et merci de votre collaboration.

1. Madame Ndong est partie au marché et a acheté un sachet de cinq kg de riz, deux kg de poisson et trois kg d'oignons. Aide Mm Ndong à trouver le nombre de kg de nourriture qu'elle a ramené à la maison.

2. Les élèves d'une école de Kaolack décident d'organiser une fête. Ils ont vendu quatre-vingt billets à cent francs chacun. Calcule les gains de la manifestation s'ils ont eu deux-mille francs de dépenses.

3. Pour clôturer une parcelle en forme carrée, un cultivateur a acheté cent-vingt mètres de grillage. Quand il a eu utilisé tout le grillage, il se rend compte qu'il lui manque un côté de la parcelle. Calcule le nombre de mètres qu'il doit encore acheter pour finir son travail?

Appendix 15

Tests given to students at grade 6

Grade 6: Leçons (L) test for the experimental group

Ka nu mbaro o njil o doonagol o faax nolaamit nahik kene mbideena too a niirel.

1. A soƨangaa yee Malik na Senegal a genu, tam a waru o ref...

- a. Na Afrik batan, na saate laa jas noor na fa Somali.
- b. Na Afrik o bemb ñamaak Roog, a matir lool fa Namibi.
- c. Na Afriik a ndeer, paam Burkina Faso.
- d. Na Afrik mudan, farnafa Oseyaan Atlaantik a jasnoor fo a saax a betak.

2. Muse Ndoŋ a lafa suk na Siin fa Saalum, wum ndefu xa piñ xeenee?

- a. Na mbeel, alaa foofi le jem na, kaa ta jaareel liɓ, a naqeel, o jem.
- b. No peel maak.
- c. No pee kaanfef na muvefnakam Senegaal
- d. Oxe moy na o maak no saate fee, ten refu oxe moyna o nogoy, too a and wiin mayu.

3. Na keen a lum i soƨaa foofi laa hageerna boull?

- a. Yaay fa leng oxe soƨaa foofi no puus, a bek aden no firigo ngir ta fi galas.
- b. No jawand ole, o wenjawaa maalokam a kaleera ta jeg a bo a laa na sutooxaa.
- c. Yaay fa leng a yofo afnir ole na kaleera le me maalo fe jawteel, to a juga yiit xa toq xa mayu foofi no o afnir ole.
- d. Mi xey waafkaa fofi na ngas alaa, ummagin xa xa bindoŋ axe.

4. Na keenalum a poli jegtu o njiriiñ?

- a. Yaa o difiis oxe liiɓ na ngir a diis ndobin.
- b. Ya i liiɓ na a sumaan ale na ɓay ale.
- c. Ya i liiɓ na cik wel ke na marse fee.
- d. Ya i yee waafofi na ngas ale.

5. Wum ndefu andiloor sax soumon fo monmon na putaan fo a sumaan na bek saax?

- a. A teɓ, o metel fo a yelefel a sumaan mbaɔ a putaan fo ngeñ ne.
- b. Fasoŋ taxar ke jegna.
- c. Peelke ɓeerna na den.
- d. Mumiinke fo taxar ke.

6. Xar refu kaa nandonaye ka xomo kaɓaa?

- a. Ka kaɓkeer na nen fidel.
- b. Ka jegna o njiriiñ a ñuf fidel nen foofi.
- c. Ka yooɓ o kaɓ fidel ne petrole fo gaas.
- d. Ndal njeey naa na cooxta kuraŋ.

Grade 6 : Leçons (L) test for the control group

Vous devez choisir la réponse correcte parmi les quatre possibles de ces questions qui sont écrites et lues:

1. Si Malik habite au Sénégal, il se trouve...

- a. En Afrique de l'est, dans un pays frontalier avec la Somalie.
- b. En Afrique du sud, très près de la Namibie.
- c. Au centre de l'Afrique, à côté du Burkina Faso.
- d. En Afrique de l'ouest, sur la côte de l'océan Atlantique et frontalier avec cinq pays.

2. Monsieur Ndong navigue en pirogue sur le Sine et sur le Saloum, que sont ces lieux ?

- a. Des bras de mer, l'eau y est salée, on y pêche des poissons et on y extrait du sel.
- b. Des grands lacs.
- c. Des fleuves qui traversent tout le Sénégal.
- d. Des rizières où se trouve la plus grande production de riz du Sénégal.

3. Dans quelle situation on trouve la condensation de l'eau?

- a. Une maman remplit de sachets d'eau pour les mettre dans le frigo et faire de la glace.
- b. Dans la cuisine, on prépare du riz dans une marmite, il y a de la vapeur qui sort.
- c. Une maman relève le couvercle d'une marmite où le riz cuit, il y a plein de gouttes d'eau sur le couvercle.
- d. Je vais chercher de l'eau au puits, je remplis un bidon.

4. Dans quelle situation est utile une poulie ?

- a. Quand le tailleur prend des mesures pour confectionner un ensemble.
- b. Quand on mesure la température de l'air.
- c. Quand on pèse les marchandises au marché.
- d. Quand on puise de l'eau du puits.

5. Quelles sont les caractéristiques du climat d'une région ?

- a. La pluie, la température et le vent.
- b. Les types d'arbres qu'il y a.
- c. Les fleuves qui la traversent.
- d. La faune et la flore.

6. Qu'est-ce qu'un produit inflammable?

- a. Un produit qui ne prend pas feu comme le fer.
- b. Un produit utile pour éteindre un feu comme l'eau.
- c. Un produit qui prend feu très facilement comme l'essence et le gaz.
- d. Une plaque solaire qui produit du courant.

Grade 6: Mathematics (M) for the experimental group

A xene mbindeen a too a niire lo. Ndesine yo me dara refer na ten refu ke heblileena no luurefna. Mbi yoo a liip ake nenu mbugtuuna. Mbind yo a pangan ale na liip na ndook ale ta wareena o fi. Jam fa mayutoo njookoo njal.

1. Madam Ndoj a jika o fof kilo lej maalo no marsefaa. Keene taxa te rabid xaterem teemeed tadik. Dimle i Madam Ndoj tewaago an podnum a rabid ka no o saaku laa yipna kilo xarɓaxay beetik maalo.
2. Xa elew axe no ikol ne Kawlax a mbugayo a mbi xew o jik wand. Xa xiir xa ɗa' biye na njikwel: teemeed fo qarbeen diik ngor maak we oluu refnateen anjar xateerem qarbeen dik fo' a biye teemed tadik fo' qarɓaxay beetik ngir xa caaf axeto abiye luu refnateen a njar xarɓaxay. Liip yo kexoteena no jeg ole no mbuudne a fodna a ciin laa andoona ye ke fieena no waaf le a foda na june foteemed dik.
3. Ngir o ɗiŋ o qol aa caare na, o qooxoox jikka giriyaas no kaa fodna nen xa terem cuneteemeed nahik fo cuni qarɓaxay nanik fo cuni nahik to o meetar olen giriyaas oxe jaara xa terem teemeed tadik. A soɓangaa yee o don maax olaa o yaajel lum a foda no meetar nahik, nam o cikdel um o qol ole a waru o fod.

Grade 6 : Mathematics (M) test for the control group

Vous devez résoudre ces trois problèmes qui sont lus. Dessinez dans l'espace réservé ce qui est proposé pour chacun et faites toutes les opérations mathématiques dont vous avez besoin. Écrivez le résultat dans l'espace destinée à ce but. Bonne chance et merci de votre collaboration.

1. Madame Ndong a acheté un sachet de un kg de riz au marché. Pour cela, elle a payé trois-cents francs. Aide Mm Ndong à trouver le prix d'un sac de cinquante kg de riz.
2. Les élèves d'une école de Kaolack décident d'organiser une fête. Deux types de billets sont vendus: cent-vingt pour les adultes à raison de cent francs le ticket et trois-cents cinquante billets pour les enfants à raison de cinquante francs le ticket. Calcule la recette totale de la manifestation si les dépenses pour d'organisation s'élèvent à six mille francs.
3. Pour clôturer une parcelle en forme carrée, un cultivateur a acheté du grillage pour une valeur totale de quatre cents quarante-quatre mille francs à mil cinq-cents francs le mètre. Si le cultivateur a prévu de conserver un espace où il n'y aura pas de grillage pour un portail de quatre mètres, calcule le périmètre du jardin et combien mesure chaque côté de la parcelle.

Appendix 16

Chance factor: Probability of right answers at random in the L multiple-choice test

$$P(x = k) = \binom{6}{k} \left(\frac{1}{4}\right)^k \left(\frac{3}{4}\right)^{6-k}$$

Number of right answers (k)	Probability (%)
0	11.21
1	19.63
2	21.96
3	13.55
4	18.69
5	12.62
6	2.34

Table 65: Probability of right answers at random in the L multiple-choice test

Appendix 17

Examples of the interviews

Example 1

Researcher: *Est-ce que les élèves arrivent réellement à comprendre les leçons avec seul le français comme langue d'enseignement?*

Do pupils really understand lessons only with French as language of instruction?

Interviewee 1: *Dans les petites classes, surtout le CI (cours d'initiation) et le CP (cours préparatoire), les premières années, c'est vrai que l'enfant comprend que quelques mots en français. Si à l'école élémentaire, les premières années, on n'introduit pas ces langues locales ou ces langues environnementales, alors l'enfant a des blocages de compréhension. Si bien que quand on explique aux élèves, même au niveau des grandes classes, même au CM2 (cours moyen deuxième année), parfois il y a des contextes que l'enfant ne comprends pas, mais si on lui explique en langue environnementale, alors l'enfant il comprend.*

In young classrooms, especially at grade 1 and grade 2, the first years, it is true that the child understands only some words in French. If in the elementary school, during the first years, local languages or familiar languages are not introduced, then the child has got a block of comprehension. To the extent that when we explain to students, even at older classrooms, even at grade 6, sometimes there are contexts which the child does not understand; but, if we explain it in the familiar language, then the child understands.

Researcher: *Alors, vous croyez que si la langue maternelle des élèves serait utilisée comme langue d'enseignement à l'école, les élèves auraient de meilleurs résultats?*

Then, do you believe that, if the students' mother tongue was used as language MOI at school, children would have better results?

Interviewee 1: *Effectivement, ils ont beaucoup de blocages parce que les expressions ne sont pas de leurs langues et parfois ils ne peuvent pas les comprendre. Si on introduit les langues locales ça aiderait beaucoup les enfants à la compréhension. Quand les enfants ne comprennent pas, ils ne peuvent pas faire l'exercice. Ils ne comprennent pas l'exercice parce qu'ils ne comprennent pas la consigne. Quand ces deux faits ne sont pas dans leur langue, parfois ils ne peuvent pas les comprendre.*

Indeed! They have several blocks because expressions are not in their own language and sometimes they cannot understand them. If local languages were introduced it would help a lot in children's comprehension. When children do not understand, they cannot carry out the task. They do not understand the exercise because they do not understand the order. When these two facts are not in their language, sometimes they cannot understand.

Example 2

Researcher: *Si les consignes de problèmes de mathématique ou les question de leçons pendant les examens seraient en sérère, est-ce que les moyennes des élèves seraient plus hautes?*

If the language of mathematical problem-solving tasks or lesson questions during exams were in Sérère, would students' scores be higher?

Interviwee 2: *Par exemple, dans mon école, si ces contextes et ces consignes seraient en sérère, je pense que les enfants auraient une compréhension plus rapide pour pouvoir solutionner ces énoncés.*

For example, in my school, if those contexts and those orders were given in Sérère, I believe that students would understand quicker in order to solve those instructions.

Researcher: *Dans le cas des professeurs, est-ce qu'ils seraient disposés à suivre une un programme de formation pour une éducation bilingue?*

In the case of teachers, would they be ready to follow up a training programme for bilingual education?

Interviwee 2: *Effectivement, au niveau de mon école et dans la plupart des écoles de la zone, les enseignants sont disposés à subir une formation en langue nationales pour leur permettre de faciliter les enseignements et apprentissages qui sont notre mission à tous. Pour enseigner l'enfant, tu vises d'abord la compréhension de l'élève. Si l'enfant ne comprend pas ce que tu lui apprends, il y a toujours un blocage. C'est un éternel recommencement.*

Indeed! In my school and in the majority of the schools in this area, teachers are ready to follow a training programme in national languages to make easier the teaching and the learning which are our mission to all of us. In order to teach the child, you must focus first on the comprehension of the student. If the child does not understand what you are teaching, there is always a block. It is an eternal starting over.

Appendix 18

Consent form given to the directors of the schools involved in the data collection

M. Alexandre Martín Chazeaud remercie le directeur/trice, professeurs et élèves de l'école à _____ de leur collaboration dans la recherche doctorale en linguistique appliquée pour l'université de Barcelone (Espagne) et s'engage à garder l'anonymat des personnes qui ont participé à celle-ci.

De même, je soussigné(e) monsieur/madame le/la directeur/trice de l'école, autorise à ce que les épreuves réalisées soient utilisées pour telle finalité.

Le directeur

