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Evaluation of the « Ecole et langues nationales en Afrique » program: Methodological Aspects and Interim Assessment

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Evaluation of the « Ecole et langues nationales en Afrique » program: Methodological Aspects and Interim Assessment

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Abstract

This eight-country evaluation seeks to measure how the ELAN Program methods of written language acquisition have an impact, during the first two years of primary school (Grade 1 and Grade 2), on oral and written language performance in African languages (one language per country) and in French. A second objective is to assess whether ELAN enables students to benefit from interlanguage transfers between L1 (African language) and L2 (French). Evaluation of 3,199 Grade 1 students, half of which are in ELAN experimental classes and the other half in control classes, is conducted three times over two years (beginning and end of Grade 1, end of Grade 2) using standardized tests that measure language skills in L1 and L2. The results of the first two sessions of six countries (Benin, Burundi, Cameroon, Mali, DR Congo, and Senegal) show that the experimental students made more significant progress than the control students in several skills related to writing proficiency. The evaluations at the end of Grade 2 will help confirm whether these results are accurate.

Key words: ELAN Program, evaluation, bilingual education, oral language, written language

JEL Classification: I21, Z13.

Original version: English

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1. Theoretical foundations and objectives of the ELAN-Africa Program evaluation

The evaluation of the « Ecole et langues nationales en Afrique (ELAN) » program[1] seeks to meet two complementary objectives. The first is to measure, in eight countries, what impact during the first two years of primary school (Grades 1 and 2) the ELAN Program methods for reading and writing acquisition have on both oral and written performance in African languages and in French. The program is expected to have a positive effect, in conformity with results of international research which, since the 1950s, has demonstrated the positive effects of bilingualism on children's cognitive development and the benefits provided by bilingual teaching programs on the introduced language, without negative effect on the main language of schooling (for a review, see Adesope, Lavin, Thompson, and Unglerleider, 2010; Bialystok, 2001; Cummins, 2000).

These expectations are also based on the encouraging results obtained in our studies on primary school bilingual educational programs established in New Caledonia between 2003 and 2012 (Kanak Languages and Culture program, 2003-2005 and ECOLPOM, 2009-2011) and in French Polynesia between 2005 and 2014 (Polynesian Languages and Culture program, 2005-2008; ECOLPOM, 2009-2011; ReoC3, 2011-2014). Indeed, the students having benefited for several years from a program that enhances the standing of the local language have, in the end, become as proficient in French as those of the control group—and much better than the latter in the local language (Nocus et al, 2007; Nocus et al, 2011; Nocus et al, 2012; Nocus et al, 2014). Thus, strengthening instruction of local languages (Drehu and Ajië for New Caledonia and Tahitian for French Polynesia) in primary schools has helped consolidate students' language skills in the local language and strengthen proficiency in written French, which is factor behind success in school.

The second objective is to assess whether this program enables students to benefit from interlanguage transfers between L1 (heritage language = African language) and L2 (second language = French). Referring to the findings of Bialystok, Luk, and Kwan (2005), we assume that learning reading and writing simultaneously in two languages (biliteracy) promotes both the development of metalinguistic skills, which we know are important for successful early writing proficiency (see Gombert et al, 2000), and interlanguage transfers.

It should be noted that the African languages targeted can be characterized as having a transparent alphabetic writing system (strict grapho-phonemic correspondence), whereas that of French is more opaque. Nevertheless, the African languages and French do share a certain number of phonemes and graphemes. Studies such as that of Mann and Wimmer (2002) show that spelling regularity in a language

[1] Scientific responsibility for the evaluation is held by I. Nocus (Université de Nantes, CREN) in collaboration with P. Guimard (Université de Nantes, CREN) and with support from A. Florin (Université de Nantes, CREN).

(German in their study) enables fast learning of grapho-phonemic correspondences and facilitates the understanding of the alphabetic principle, as the correspondences are regular. As a result, learning a language with a transparent writing system would seem to facilitate learning a language with an opaque writing system (English in the Mann and Wimmer study, 2002). Such interlanguage transfer effects in writing, between the local language and French, were systematically found in our own work in New Caledonia and French Polynesia (Nocus et al, 2007; Nocus et al., 2012; Nocus et al, 2014).

However, these positive effects require certain prerequisites: Cummins (2000) proposes a *hypothesis of developmental interdependence and of a double threshold of bilingual competence,* according to which the skills in the second language (L2) are partly determined by the skills already achieved in the heritage language (L1), at the time of exposure to L2. It is necessary to surpass an initial threshold of competence in L1 in order to prevent extensive exposure to L2 from leading to subtractive bilingualism. In addition, if a second threshold of language competence is surpassed in both L1 and L2, bilingualism has significant effects on cognitive skills and on success in school. Therefore, when the heritage language is not sufficiently practiced, students cannot reach the first threshold of competence that allows them to carry out demanding tasks on the cognitive level (school tasks). The second threshold thus requires that the two languages be practiced equally intensively.

2. ELAN-Africa Program evaluation methodology

2.1. Participants

The evaluation focused initially on a total sample of 3,199 CP1 or C1 students (equivalent of Grade 1 of primary school) to be monitored until the end of CP2 (Grade 2). Half of the sample are students in 10 experimental classes per country involved in ELAN; the other half are in control classes of these same countries. For each country, approximately 400 students (half the control group and half the experimental group) are evaluated by 10 evaluators trained in testing and in data entry.

2.2. General principles of the evaluation

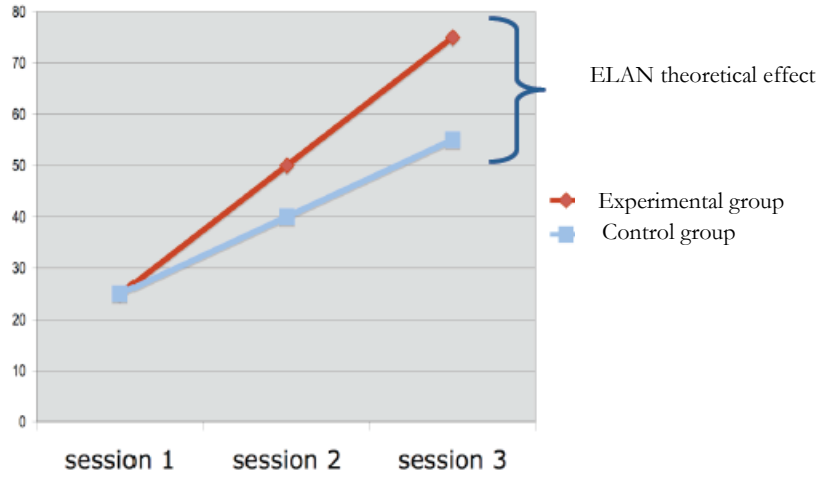
Evaluation of the ELAN-Africa Program is guided by several principles. First, one African language per country is targeted for the evaluation: Fon (Benin), Mossi (Burkina Faso), Kirundi (Burundi) Ewondo (Cameroon) Swahili (DR Congo), Hausa (Niger), Bambara (Mali), and Wolof (Senegal).

Secondly, the study is based on the comparison between a control group receiving "traditional" education and an experimental group benefiting from the ELAN Program. At the beginning of Grade 1, a survey questionnaire was distributed to families on the family and language environment of the child, in order to match the two groups according various factors (age, gender, socio-economic background, and family language practices).

Thirdly, a longitudinal evaluation protocol is employed, with the same students being evaluated three times over two years (beginning of Grade 1, end of Grade 1, and end of Grade 2). As in any longitudinal study, the initial number of participants decreases over time for various reasons: refusal by families, illness, hospitalization, relocation, or school drop-out. Decrease in this number can be a problem for statistical processing and was thus prepared for by recruiting a large number of students (cf. Section 2.1). Fourthly, the evaluation tools have been standardized for all the countries and are also bilingual: the instructions of some tests have been translated into L1, and some tests fully adapted into L1. The tests measure oral and written language skills in the two languages; they have been chosen in reference to the current cognitive approaches of reading (see next point). Furthermore, in each country the two groups (experimental and control) have been subject to the same tests, in individual testing of 40 minutes that can be divided into two sessions. Part of the tests in French comes from the EGRA (Early Grade Reading Assessment, Sprenger-Charolles, 2009). The tests take into account the specificities of the environment in which they are administered (choice of vocabulary, for example).

Finally, the results are processed statistically to test, first of all, whether the two groups are progressing significantly: this progress expresses the expected effect of the normal development of skills and of school education. Any positive effect from the ELAN Program must manifest itself as a gap in progress between the two groups, to the advantage of the experimental group, in the course of the evaluation sessions. (The two groups start off with the same initial competence level, since they are theoretically matched). This is shown in Figure 1. At the end of the study, multiple regression analyses will help test the impact of being part of the experimental program and of L1 oral and/or written level on French reading performance at the end of Grade 2.

Fig.1: Expected results



2.3. Choice and justification of the evaluation tests

A set of evaluation tools has been created to assess the effects of the ELAN Program on writing proficiency at the very beginning of primary school. It includes tests in French that are easy to adapt in African languages, in order to obtain a bilingual assessment (African language–French) that is standardized, adapted to the African context, inexpensive to administer, accessible for evaluators with little experience in evaluation, and above all valid psychometrically and in terms of the theoretical objectives targeted.

At the start of Grade 1, it was impossible to directly evaluate reading and writing skills in the beginning of the year. Several tests evaluating the skills with an impact on command of the basic mechanisms of writing were thus chosen: knowledge of the world of writing, knowledge of the letters of the alphabet, vocabulary, phonological skills, and oral comprehension.

The objective of the *knowledge of the world of writing* test is to evaluate the child's early implicit knowledge in writing: units of the written language (letters, words), beginning and end of a sentence, physical presentation and identification of errors in letters/writing. According to research on initial writing acquisition, learning writing in school is influenced by preschool learning, and it seems that part of the success in reading is determined before teaching begins (Snow et al., 1998). Learning to read and write is therefore based on a certain amount of early implicit knowledge on the characteristics of writing.

The second test evaluates *knowledge of the name of letters in French and in the African language*. The African languages targeted in ELAN are all alphabetic languages. A certain number of their letters are the same as in French, but they also have graphemes that are specific to them. Letters are graphic signifiers unique to alphabetic writing systems, whose main function is to represent phonemes in speech. Recognizing letters (their name) and their phonemic value (their sound) is thus essential to learning to read and write an alphabetic language (Adams, 1990). Recent studies show that knowledge of letters is already heavily involved in writing acquisition even before the formal learning of reading (Foulin, 2005; Treiman, 2006). In addition, the knowledge of the name of the letters helps pre-readers in initial development of spelling and in learning the sound of letters (Ellefson et al., 2009; Share, 2004). The level of identification of letters at the end of the pre-elementary period is also a powerful predictor of how the student will learn to read (Scarborough, 1998).

The third test evaluates the level of the students' *vocabulary*. There are many studies showing the interactive relationship between the level of vocabulary and the level attained in comprehension and written production (Gombert et al, 2000): vocabulary influences decoding and reading comprehension on the one hand, and knowing how to read develops vocabulary on the other.

The evaluation protocol also provides for two metalinguistic-type *phonological tests*, one on the syllable unit and the other on the phoneme unit. To learn how to read in an alphabetic writing system, children must

understand the alphabetic principle, i.e. that the letters (graphemes) of writing represent the oral sounds (phonemes). To do so, they must realize that spoken words are made up of phonological units and develop a phonological awareness of oral language (i.e., the ability to identify and consciously handle phonological units of spoken words, Gombert, 1990). Reading acquisition therefore requires both metalinguistic skills and knowledge of the letters of the alphabet. According to research on the role of phonological awareness in reading acquisition, there is a causal and reciprocal link between phonological awareness and reading skills. Consequently, children who have, early on, a good level of phonological awareness demonstrate good reading proficiency later (Casalis and Louis-Alexandre, 2000). Conversely, low-level reading skills seem to be associated with a low level of phonological awareness (Morais et al., 1979).

Finally, the evaluation tools also include an *oral comprehension* test. It is currently widely accepted that reading is based on broader skills (semantic, syntactic, morphological, and pragmatic processing) that underlie both oral and reading comprehension (Gombert et al, 2000). As such, a child with good word-identification ability understands a written text just as well as if it were spoken.

Even though reading implies identifying the words of an utterance and understanding them (Gough and Tunmer, 1986), only identification of written words was evaluated at the end of Grade 1. Evaluation of reading comprehension is scheduled for the end of Grade 2. Although recognition of words alone is not sufficient, it does affect reading as a whole because it is a prerequisite for comprehension (Demont and Gombert, 2004). For non-transparent writing systems, the ability to identify written words is based on a dual-route approach (Coltheart, 1978): a *non-lexical route*, which essentially involves grapho-phonemic decoding abilities (by associating parts) and a *lexical route*, which is essentially based on memory recall of the orthographic form of words already encountered (by calling on a mental lexicon). In this evaluation, the use of these two approaches is tested through a task of identifying written words, in which the student is asked to recognize a written word from among distractors that resemble it orthographically or phonologically. However, knowing how to read requires more than just being able to do what is required in this test: the word recognition must also be automated. It is for this reason that the evaluation includes a *speed reading* test (one-minute reading).

Finally, in the beginning of Grade 1, a survey questionnaire is distributed to the families in order to match the control group and experimental group on socio-economic and language aspects, as well as on the parents' representations of multilingualism. Indeed, many surveys show that performance variations during the school years are explained by differences linked to family characteristics. They also show that the importance paid by society or parents to the L1 and the degree of proficiency in that language strongly contribute to the child's degree of proficiency in the language of instruction (L2).

This questionnaire was developed for the needs of the study, based on questions asked in similar

contexts (Nocus et al, 2014) and on a few questions of the EGRA protocol (Sprenger-Charolles, 2009). Parents, assisted if necessary by the school principals or the evaluators, must answer 22 questions. This makes it possible to collect information on the family's socio-cultural or socio-economic situation, the degree of bilingualism in which the child is immersed, and the parents' representations with regard to the teaching of local languages at school. The questions also cover the parents' family and cultural language practices (importance of grandparents in handing down languages and cultures, bilingual language routines, media, etc.). The questionnaire is written in French and in L1, for better understanding; the parents can answer it in either of the two languages.

2.4. Procedure and guidance

To help carry out this evaluation successfully, two education professionals have been designated for each country as supervisors. Three training workshops, supervised by the CREN team, were held in Dakar, Senegal, from September 30 to October 5, 2013; in Porto-Novo from April 14 to 18, 2014; and in again in Dakar from April 26 to 30, 2015. They were attended by the 16 supervisors of the 8 participating countries. Their objective was to train the supervisors of the sub-Saharan Africa countries involved in the ELAN Program so that they could manage the evaluation in their countries. These supervisors also had the task of training and supervising evaluators and of inputting the data. In addition, the provisional French tool was analyzed and discussed with all participants in order to adapt it in L1.

At the time of the evaluations, counselors were designated in each country to visit the teams of supervisors and evaluators during the evaluation and data-entry phase. The specifications defining the missions of the counselors included the following points in particular:

- Vouch for the quality of the work carried out by the fieldwork teams (supervisors and evaluators), especially regarding the logistical preparations, relations with the principal and the teacher, the testing conditions, document recovery, and data entry.
- Support the teams for any difficulties encountered.
- Write a report on the mission, highlighting the successes and the difficulties identified, and making a few recommendations for the following evaluation phases.

The list of tests of each session is presented in Figure 2. In addition to the family questionnaire, several tests were proposed at the beginning of Grade 1, on vocabulary, knowledge of letters, phonology, oral comprehension, and knowledge of the world of the writing. At the end of Grade 1 or beginning of Grade 2, the tests and procedure are the same as at the beginning of Grade 1, but with the addition of word-reading tests (one-minute reading in French and in the African language, plus identification of written words in the two languages). At the end of Grade 2, the tests that turn out to have a ceiling effect

will be removed from the protocol, and tests of reading comprehension and spelling will be added.
In general, instructions are given in L1 when the test evaluates competency in L1, and the instructions are given in French when it evaluates French. As the test of familiarization with writing does not strictly speaking evaluate the level in one of the two languages, the instructions are given in the language in which the child is most at ease. For the oral comprehension tests in L1 and in French, the instructions and the text are given in each of the two languages. However, when the child responds correctly in the language which is not requested, his or her answer is considered correct. The test time is about 40 minutes and can be divided into two sessions. It varies according to the instructions to stop and the speed of the student's response.

Fig.2: List of tests per evaluation session

Beginning of Grade 1	**End of Grade 1 or beginning of Grade 2**	**End of Grade 2**
Vocabulary (L1 and L2) Knowledge of letters (L1 and L2) Syllable segmentation (L1 and L2) Identification of initial phoneme (L1 and L2) Oral comprehension (Ll and L2) Familiarization with writing	Vocabulary (L1 and L2) Knowledge of letters (L1 and L2) Syllable segmentation (L1 and L2) Identification of initial phoneme (L1 and L2) Oral comprehension (Ll and L2) Familiarization with writing 1-minute reading Reading of words	Vocabulary (L2) Knowledge of letters (L1 and L2) Syllable segmentation (L1 and L2) Identification of initial phoneme (L1 and L2) Oral comprehension (L2) 1-minute reading Reading of words Spelling Reading comprehension
Family survey Socio-familial and socio-linguistic characteristics		In black: the added tests

3. Initial results obtained at the beginning and end of Grade 1, beginning of Grade 2

Despite some logistical problems (for example: schools changed at the last minute, printing errors on some notebooks, testing locations not always suitable), the evaluation at the beginning of Grade 1 took place under good conditions. All the students accepted to take the test, and the evaluators applied the protocol in a satisfactory manner. Furthermore, logistics and data entry also enjoyed good conditions overall. Examination of the psychometric properties of the evaluations confirms this perception: the tests show little ceiling effect overall, the psychometric indices are good or very good for the vast majority of the tests, and the developmental trends are consistent with existing literature (e.g. identification of phonemes is more difficult than syllabic segmentation). The family survey enjoyed very

high response rates. Its results indicate very significant differences among countries in terms of socio-economic aspects and family language practices. It therefore ensues that the matching between the experimental and control groups on these indicators is far from systematic. These differences indicate that the countries have very different contexts and that it is not possible to compare the effects of the ELAN Program among countries.

Finally, it can be observed that, in some countries, the differences between the experimental group and the control group are to the advantage of the experimental group starting from this first evaluation. This may suggest either a very short-term effect of the ELAN Program or a sampling bias.

It is important to remember that the evaluation focused on a total sample of 3,199 students: 1,565 students for the experimental classes and 1,634 students for the control classes at the beginning of primary school Grade 1. The longitudinal data (beginning of Grade 1/end of Grade 1 or beginning of Grade 2) show an overall decrease in the sample size of around 11% between the first and second sessions. The total sample is thus 2,778 students, broken down into 1,386 for the control group and 1,392 for the experimental group.

Measurement of the short-term impact of the ELAN Program was possible only in the six countries (Benin, Burundi, Cameroon, Mali, DR Congo, and Senegal) where the second evaluation could be conducted at the end of Grade 1 (or beginning of Grade 2 for Benin and Cameroon). Longitudinal data are not available from the other two countries (Burkina Faso and Niger), because it was not possible to implement the second phase of the evaluation there. In Niger, not even the data collected in the beginning of Grade 1 can be used for now, due to a problem of data input. The results from Burkina Faso at the beginning of Grade 1 show that the experimental and control groups are comparable with regard to all sociological characteristics but that, in the two languages, cognitive and language performance of the experimental group is often superior to that of the control group.

The results of the short-term impact of the ELAN Program in each of the countries are summarized in the table below. It can generally be observed that, out of 64 cases of progress tested, 27 (or 42%) are significant and 37 (58%) are neutral (blank cells in the table). Among these 27 cases of progress, 18 (67%) are to the advantage of the experimental group (in dark gray in the table) and 9 (33%) to the advantage of the control group (in light gray in the table). Progress to the advantage of the experimental group concerns 61% of the tests in L1; it is slightly more pronounced for the tests of knowledge of the letters in L1, phonology in L1, and familiarization with writing tested in L1. In addition, 7 of the 9 "negative" relationships concern tests in French, in particular for oral comprehension (3 occurrences out of 7). Finally, the vocabulary in L1, which presents ceiling scores, is the only test for which no progress to the

advantage or disadvantage of the experimental group is observed.

Table 1: Summary of ELAN Program short-term impact, by country and by evaluation test

	Knowl. of letters		Phonology				Famil. with writing	Vocab.		Oral Comp.		Reading			
	L1	*L2*	*Syl L1*	*Syl L2*	*Pho L1*	*Pho L2*		*L1*	*L2*	*L1*	*L2*	*OMT L1*	*OMT L2*	*WWI L1*	*WWI L2*
Benin															
Burundi															
Cameroon	?														
Mali															
DRC		?													
Senegal															

: progress of experimental group □: neutral : progress of control group ?: data not interpretable or not available
Syl: syllabic segmentation task; Pho: initial phoneme removal task; OMT: One Minute [reading] Test; WWI: written word identification

The results obtained in the six countries for which longitudinal data are available are generally encouraging. They show that progress of the experimental group can be seen more in L1 competence and that the negative effects concern rather the tests in French. However, interpretation of progress, be it to the advantage of the experimental group or not, remains complex. There are several factors to take into account. On the one hand, the progress can be considered to depend in part on the culture of the bilingual education of each of the countries; indeed, the "negative" effects are found more in the countries that are starting bilingual education—in this case Benin, Cameroon, and Senegal. However, this is not the case of the DR Congo, where rather positive results were obtained even though that country is starting bilingual education. This is thus a point to go into more deeply. The progress should also be interpreted in the light of the quality of the socio-linguistic and socio-demographic matching of the two groups. The results of the family surveys show, from this point of view, that the groups are only partially matched; we cannot exclude the possibility that these differences help to explain the progress found. Extra analyses should therefore be considered in order to better verify the weight of these variables on the performance and progress of the students. The practices of bilingual education in the classroom and, more generally, the conditions in which these practices are implemented should also be considered. The information either obtained by the ELAN team in charge of the educational component of the program or collected during class visits and teachers training sessions would suggest hypotheses regarding the variations in progress observed. Finally, it should be noted that the results should be interpreted in the light of current knowledge on the factors involved in reading/writing, as this point

specifically comes within the scope of the activities of the CREN. At the present time, it is not yet possible to propose a coherent cognitive interpretation of the results. For example, although in the DRC the experimental group's progress in the precursors to writing in L1 (knowledge of letters and phonology) could be expected to promote their reading skills (OMT and WWI) in L1, the results do not indicate this relationship. Similarly, in Burundi, the experimental group showed better performance in reading than the control group. Yet, the two groups do not differ with regard to some predictors of reading, especially for phonology. These discrepancies can be explained by the fact that reading skills and some skills associated with such learning are not yet sufficiently developed at this stage of the experiment.

4. Interim conclusions and future prospects

In the final analysis, these results should be treated with caution. Furthermore, it is still too early to draw conclusions about the effects of the ELAN Program on students' learning. Various research indicates that the impact of educational programs on language proficiency is likely to vary over the course of time. The results of the end of Grade 2 will confirm whether or not the tendencies observed at the end of Grade 1 are accurate. In addition, the interlanguage effects will be studied following the last evaluation at the end of Grade 2. At this time, other indicators of writing proficiency (reading comprehension and spelling) will be introduced. It will also be important to examine the reasons for participating students having dropped out between the first and second sessions. It would also be useful to know, for all the countries, the rates at which students repeat Grade 1.

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