

Effectiveness of the Teaching Methods of Elementary Reading on Pupils' Academic Performance

Corneille Luboya Tshiunza^{1,*}, Simon Kaukungwa Shilongo¹, Guillaume Bofio Bina²

¹School of Education, Central China Normal University, Wuhan, China

²School of Psychology and Educational Sciences, National Pedagogical University, Kinshasa, DR Congo

Abstract In most of developing countries, many graduated pupils of primary school have very lower skills in reading. For example in Democratic Republic of Congo (DR Congo), 50% of pupils of elementary degree of primary school have learning difficulties, especially in reading. It has proved the importance of teaching methods on the pupils' performance in reading. This comparative quantitative and quasi-experimental study conducted with 360 pupils from eight primary schools, aims to test the effectiveness of four teaching methods used with TDM and ICT in teaching reading in order to determine what a teaching method contributes to higher performance of pupils in reading or what among four methods would be most suitable. The findings could help teachers to select the best method to adopt in their teaching.

Keywords Teaching Method, Elementary Reading, Teaching of elementary reading, Global, Syllabic, Mixed and Inducto-Deductive Methods

1. Introduction

Several studies on the effectiveness of teaching methods, for example the "Follow Through" project brought back by Slavin (2002), the studies of Evans and Carr (1985), Stallings, Cory, Fairweather, and Needels (1978) on impact of Direct Instruction on student academic achievement; the experiment of Zahorik, Molnar, Ehrle, and Halbach (2000); the study conducted by Molnar, Smith, Zahorik, Halbach, Ehrle, Hoffman, and Cross (2001) reported on the National Reading Panel and the meta-analysis of Borman, Hewes, Overman, and Brown (2002). All of these studies showed the relationship between the effectiveness of the teaching methods and the pupils' academic performance in primary schools.

In most developing countries as DR Congo, the level of reading of pupils is low in the elementary phase of schooling. The success mean from the International Test-PASEC-RD Congo (2010 in RD. Congo-MINEPSP, RESEN, 2014) on the reading ability of pupils in the second year was 50%. The main question arising from these revelations is: why are there such remarkable weaknesses in reading? This situation can be attributed to several factors, many of which relate to the teaching methods. The reading skills are supposed to have been acquired already in the first two years of primary education; this is also the phase where most cases of learning

disorders, in particular dysgraphia, dysorthography and dyslexia, are detected.

This study focused on the teaching methods of reading in elementary school. With regard to the teaching of reading, DR Congo's National curriculum of Primary Education (PNEP, 2014) recommends four possible teaching methods and educational equipment for the teachers. The purpose of this quantitative and quasi-experimental study was to test the theory of the positive effects of an effective teaching method by comparing the effectiveness of different teaching methods used in elementary reading on the pupils' academic performance, while controlling the socio-professional characteristics of the teachers, the socio-economic characteristics of the parents and the targeted population of second year pupils in primary school. The four teaching methods are: (i) the global method, (ii) the syllabic method, (iii) the mixed method (global and syllabic) and (iv) the inductive-deductive method. Teachers have the liberty of choosing one of these teaching methods based on the educational tools available. It should be noted that currently in DR Congo (Kinshasa); certain viable schools are equipped with Information and Communication Technology (ICT) equipment for teaching.

This study sought to answer the following research questions: What teaching method is most effective for teaching reading to pupils in primary schools? Is there a statistically significant difference in the pupils' academic performance based on the various teaching methods for elementary reading? The study attempted to test the following two statistical assumptions:

* Corresponding author:

corneilleluboya@outlook.fr (Corneille Luboya Tshiunza)

Published online at <http://journal.sapub.org/edu>

Copyright © 2017 Scientific & Academic Publishing. All Rights Reserved

Null hypothesis (H₀):

There is no statistically significant difference in the pupils' academic performance in elementary reading when taught using the various teaching methods (global, syllabic, mixed and inducto-deductive) with either traditional didactic equipment (TDE) or information and communication technology (ICT) equipment. Where $M1=M2=M3=M4=M5=M6=M7=M8$.

Alternative hypothesis (H₁):

There is a statistically significant difference in the pupils' academic performance in elementary reading when taught using the various teaching methods (global, syllabic, mixed and inducto-deductive) with either traditional didactic equipment (TDE) or information and communication technology (ICT) equipment. Where $M1 \neq M2 \neq M3 \neq M4 \neq M5 \neq M6 \neq M7 \neq M8$.

2. Theoretical Perspectives

Teaching Method or Method of Teaching

In education, the teaching method is understood as a rational and logical way used to help the pupils to learn something. According to Ibeki (2007:194), the teaching method is the general, structured and logical approach which dominates during a lesson with the purpose to help pupils acquire knowledge. It is structured and organized diagrammatically and composed of different stages in order to attain the intended goal. It is also described as "logical" because it must have a scientific foundation and a coherent sequence.

The use of a good teaching method is associated with multiple benefits. Such benefits include: facilitating a teacher to progress easily while avoiding fumbling in his or her lesson; improving the outcomes in a given class; saving time as well as energy; and effectively achieving the set objectives. However, despite these multiple benefits, the choice of method depends on the nature of the pupils who form a class (age, capacities or average intellectual level, pre-assets, etc.), the discipline of teaching, the assigned time, the climate of the class and the requirements particular to the method used.

Elementary Teaching of Reading

To read is to extract from a graphical language the pronunciation and the significance which corresponds with it. It is also to transform the graphical signs into phonetics by associating directions and mental and somatic faculties. Actually teaching reading consisted of four components of language such as reading, speaking, writing and listening into other subjects of the curriculum (Irwin, 1967). Kemba, (2005: 28) states that in teaching of reading the "connections are made between disciplines, such as science and language arts, and taught through conceptual themes, such as inventors or the weather". The contemporary perspective of reading is that the pupil is an active learner. Learners interact with new

information based on their previous knowledge and experiences. They build their own knowledge base by deriving their own meanings from information, connecting new concepts and skills to what they already know. Children do not always understand what precision in meaning demands and are also unable to call to mind what words they require in speech and writing and apply them correctly (Irwin, 1967).

In DR Congo, elementary reading is a set of principles which organize the orientation and implementation of the teaching of reading at the beginning of primary school. It is the kind of reading taught in the first phase of the first three years of primary school. In the elementary phase, the emphasis is usually on the following: French alphabet in two groups: vowels and consonants, and in six groups: (1) the generating letter "e"; (2) letters of group "c" (c, o, a, d, g); (3) letters of group "l" (i, f, b, h, k, t); (4) letters of group "i" (i, u, j, p, s, r, z, o, u, z); (5) letters of group "n" (n m v w, y); (6) capital letters (according to their form: A, M, NR – I, F, J, H, K, T, Z – Q, L - D – Q, E – P, B, R – O, C – U, Y – V, W). In addition, pupils also have to study the sounds, words, syllables, and the formulation of simple sentences on several topics, such as family, parts of the human body, study of a local area, the school, clothing, events, food, the dwelling, fauna, flora, transport, communication, games, colours and the market (DR Congo' National Curriculum of Primary Education, 2014).

Theoretical Models of the Teaching Methods of Elementary Reading

With regard to the teaching of elementary reading, this study confirmed that most of the teachers are still confined to the didactic models elaborated and suggested by the official methodological directives of Ministry of education. The debates focus on the polarity between "global methods" and "syllabic methods". In the first case, the pupils memorize all the words, whilst in the second, the pupils need to memorize letters associated with sounds and syllables, and interpret the words starting from these units. In DR Congo four didactic models have been described and distinguished.

The Inducto-deductive Method involves two processes. The first is the inductive process, which includes concrete examples, observable cases, rules and general principles. The second process is the deductive process which includes the rules or general laws stated which lead to experiments and applications. It is generally about using the general rule of the formula and the general principle to arrive at the concrete examples or observable cases.

The Global Method moves from the complex and comprehensible elements (sentences, words) to the simple and non-comprehensible elements (syllables, letters, words or sounds). This method is also called "analytical" because it mainly focuses on examining pupils in detail. Sometimes it is referred to as "ideo-visual" because it goes primarily from the idea presented by the child to the knowledge of the real image of the object (Claparède, 1908; Wallon 1952, 1953; Hamaïde, 1946; Seger, 1926, 1939; Foucambert, 1986;

Beaume, 2006).

However, the Phonetic or Syllabic Method is also referred to as the method of epilation. The method is associated with the verb "to spell" and therefore mainly focuses on the letters, syllables and sentences. It is described as "epilation" because it helps pupils to learn letter by letter. It is known as "phonetics" because it is the starting point in the study of sounds (Bryant, 1990; Joshi, Leong and Kaczmarek, 2003).

The Mixed Method (Global and Syllabic) is called "semi-global or semi-syllabic method" and combines the advantages of the two methods. The mixed method presents many varieties in its application. The semi-global method resembles the global method because it starts from sentences and recognized words. It resembles the synthetic or syllabic method because the pupil learns each letter in turns without delaying. Thus, the child can acquire the skills of reading, writing, calculation, and resolution of problems and the aptitude to continue to learn. This method requires the child to observe things, facts and phenomena and describe them, judge them and reason, i.e., to act and to think by combining the four categories of language (reading, verbal expression, writing and oral comprehension) (Brighelli, 2005).

In DR Congo, teachers generally use these various methods together with traditional didactic equipment (TDE) which can be natural or artificial, manufactured or bought, coming from plants, animals or from decorative and coloured images. Some teachers in schools equipped with ICT use technological equipment such as television, video-projectors and computers. The two alternative tools (TDE and ICT) associated with the four methods mentioned above make a combination of eight methods. This study attempted to test the effects of these eight methods on students' academic performance.

Legrain (2003) displays the results of Mingat's (Institute for Research in the Sociology and Economics of Education, Dijon) study, which sought to determine the importance of various factors on academic success. Indeed, these results showed 70% of the causes of the variation in the degree of success. 50% of the variations in success were allotted to the particular characteristics of the pupil. The remaining 20% were distributed between logistics and means (5%) and the methods of teaching used by the teachers (15%).

With regard to logistics and training, Marty (1996) carried out a research related to the practices of reading and writing in primary school using new technologies. Marty observed that in Parisian schools, pupils carry out the tasks of reading and writing in front of computers, with the guidance of adults and in co-operation with peers. She concludes that the child can develop new linguistic competences within the school framework through the use of information and communication technologies (ICTs) and through interaction with more experienced adults and other pupils.

Audran (2001: 385) considers the reciprocal influences related to the use of new ICTs by the actors in the school. He found that the ICTs are used in class by the teachers, on the one hand to complement the traditional methods; while on

the other hand, they use ICTs for their own personal benefit.

Several studies show that ICT increases motivation in training. The most quoted motivational aspects of ICT in education research are, as Karsenti, Brodeur, Deaudelin, Larose, and Tardif (2002) point out: (i) they are more compatible with modern equipment or mediums; (ii) there is a possibility of greater autonomy in learning; (iii) the nature of the training is more personalised; and finally (iv) there is a possibility of regular and faster feedback (Karsenti, Fortin, Larose and Clément, 2002).

Balanskat, Blamire & Kefala (2006) conducted a study carried out in national, international, and European schools, with the aim of gathering evidence regard to the advantages and benefits of ICT in school achievements. The findings showed a positive impact on student performance in primary school, particularly in English language, although the effects are less significant in the sciences. ICT also develop some writing skills: spelling, grammar, punctuation, editing and re-drafting. Still new technologies encourage independent and active learning, and students' responsibility for their own learning (Pedretti, Mayer-Smith and Woodrow, 1998; Passey, 1999; Ofsted, 2002; Lewin et al, 2000).

The four abovementioned methods can also be effective when used together with either traditional didactic equipment or technological equipment. The latter also has its effects on the output of the pupils due to their nature. Traditional didactic equipment (TDE) and ICTs have therefore proven to be equally effective.

It should also be stressed that certain variables, such as age may influence pupils' performance. Gilly (1965) highlights the influence of age on school performance and concludes that the younger children do have the chances to achieve the higher performance but the pupils who were normal or old age of schooling were achieved the higher performances. With regard to the gender of pupils, Fouedjio (2008) study found that girls improved in their reading scores by 65%, while boys' performance scores improved by only 30%. This seems to suggest that boys are more gifted in mathematical disciplines and girls are better with the languages or arts.

3. Methodology

Research Design

This study was inspired and based on the epistemological paradigm of positivism and the quantitative approach (Tashakkori & Teddlie, 2010; Creswell, 2014). The study is the second level of research in education, using quantitative and quasi-experimental methods to compare the impact of the four teaching methods when used with either TDE or ICT on the elementary reading of pupils from eight primary schools.

Participants

We decided on a nonprobability sample taking into account the nature of this study (Babbie, 1990; Fink, 1995). The data collected from the annual reports of inspection of

national schools. Firstly, we compiled extracts of the purposive sample, composed of eight primary schools in various educational provinces (Kinshasa East, West and Central in DR Congo), taking into account the methods used in the teaching of elementary reading in second year of school. Secondly, we looked at the attendance registers of the eight schools chosen to constitute the sample. The inclusion or exclusion criteria of pupils were as follows: (i) being a registered pupil and regularly attending a selected class in the schools participating in this study; (ii) having French language as mother tongue; and (iii) having a normal IQ (DSM-IV) based on the intelligence test of Cattell (1937) Version 2a and the Catch Test of Florence Goodenough (1926), which constitutes the average speed to detect the level of the intelligence of children from 3 to 14 years. Below is the summary of results of the test done on selected pupils by school.

The initial sample consisted of 480 pupils from the eight targeted schools, i.e., 60 pupils per school. However, only 360 pupils (45 pupils per school) who had the required IQ (between 110 and 121) were retained (Horn, J., 2001). Overall, the school performance mean of the pupils oscillated between 60% and 68% per class or school, which was higher than the mean envisaged by the national criteria (50%). The girls accounted for 49.2% of the sample compared to 50.8% for the boys, while the pupils' age mean in the study sample was 7.13 years. The pupils' IQ general mean on the Cattell 2A Test was 112.77. However, for the Catch Test the mean was 113. We used the nonparametric test of Wilcoxon to compare the difference between the IQ obtained from the two tests by study subject ($T = 183$; $NR = 5$; $\alpha = 0.05$; $Tob = 183$; $T \alpha = (.05) = T \text{ obs.}$). Therefore there was no difference. The following can be noted from this summary table:

Table 1. Sample and its Characteristics, by School and Method

School (Method)	No. of pupils (n=360)	Age (years)	Result (1st Year)	Cattell Test (2a) (Average)	Catch Test (Average)	IQ Criteria DSM-IV
Bobokoli (Global TDE)	45	6-9	54 – 78	109,68	111,02	Valid
Alingba (Syllabic TDE)	45	6-8	58 – 74	105,63	111,40	Valid
Ste Famille (Inducto-deductive TDE)	45	7-8	56 – 82	120,50	117,60	Valid
Bonsomi (Mixed TDE)	45	6-9	52 – 71	117,08	115,21	Valid
Boboto (Global ICT)	45	6-9	56 – 80	111,05	110,09	Valid
Moke (Syllabic ICT)	45	6-8	60 – 84	110,11	112,82	Valid
St George (Inducto-deductive ICT)	45	6-9	59 – 78	110,81	114,21	Valid
Raphael (Mixed ICT)	45	6-8	60 – 82	117,32	110,81	Valid
<i>Mean (M)</i>	<i>45</i>	<i>7.13</i>	<i>60</i>	<i>112.77</i>	<i>113</i>	<i>Valid</i>

Variables and Measurement

The Independent Variables were four teaching methods of elementary reading. The combination of these four methods with traditional didactic equipment (TDE) and information and communication technology (ICT) produced eight alternative teaching methods of elementary reading.

The Dependent Variables selected were the scores of 360 pupils sampled from the elementary reading test. To lay out these scores, we compiled a test adapted to the pupils' level from the three lessons taught in each class and school. This reading test followed three guidelines:

- The goals (general objectives, intermediaries and integration) of this discipline in second year in the National Program are aimed at inculcating in the pupils the skills of reading to make them able to: (i) understand an oral message and react to it; (ii) express orally, in a national language or French simply and correctly; and (iii) express by gestures, acts, behaviours and attitudes what is known by another person and to answer questions in French orally.
- The scientific requirements of teaching of reading: “the teaching of reading rests on the integration of the four components of language (reading, verbal expression,

writing and oral comprehension)” (Irwin, 1967).

- The operational objectives of the three lessons taught in classrooms.

The reading test used contained items with the same characteristics (images, colours and words), and spaces to write and pronounce the words, sounds and syllables. Pupils were required to read by completing the sentences with letters, sounds and words. Three lessons were taught on each topic per group. The topics included the human body, means of communication and means of transport. The items of tests were also adapted to the three types of lessons taught in class (lessons of acquisition, lessons of fixing and lessons of control). The three levels of the objectives of integration were considered in the design of this testing (fundamental structures, vocabulary and oral expression and pronunciation).

Research Procedure

We prepared 24 preparation cards (three per class or school). In advance, we prepared the objectives, didactic equipment (TDE and ICT), and the conditions and evaluation criteria to be used at the end of each lesson. The preparation cards were controlled by the school principals and the full-time teaching staff.

We taught and tested the elementary reading in French as a discipline. During the different lessons we only spoke French, and the pupils were required to speak in French only. During teaching, as during the test, we exploited maximum spontaneity, auditory and visual perception, action, and oral and gestural expression. We resorted to conversation (dialogue), which has the advantage of giving the language to the active character. We made each pupil speak frequently. We frequently intervened to correct the pupils' mistakes in oral expression. Our test was based on pronunciation, accent, intonation and correct expression. The purpose of the three lessons and tests in each class was focused on: acquisition, fixing, and the control of the teaching methods of elementary reading.

Our planning of experimental operations was as follows: IQ evaluation: 40 minutes (i.e., 30 minutes for the Cattell test and 10 minutes for the Catch test). The teaching of lessons was programmed for about one lesson per week for 30 to 40 minutes per lesson. Administration of three copies of tests took place after each experimental meeting, and each test was rated on a scale of 0-100 scores (50% success mean). The three tests were duplicated, distributed and supervised. The application of these three tests was preceded by some instructions and each test lasted 20 minutes. The research activities lasted three months.

Data Analysis Procedure

The collected quantitative data were subjected to statistical analysis taking into account the eight methods used. We used the Statistical IBM SPSS (Version 22) to analyse the data and followed six stages: (i) We chose the threshold of significance, $\alpha = 0.05$ (5%); (ii) we chose the use of the Analysis of variance, Chi-Square to compare the eight averages and OLS Regression; (iii) we used the T Test to compare the means of the groups' outcomes; (iv) the scores of the three tests were added in order to calculate the global

mean score so that after having tested their correlations; (v) we compared the two values (if p-value was lower than 0.05, we rejected H_0 and if p-value was higher, we accepted H_0); and (vi) we made the experimental decision by stating the practical consequences of the statistical decision. The decision made formed the recommendations or conclusions of this research.

Ethical Considerations

We took ethical measures to protect the participants of this study. With the aim to solicit the pupils' confidence, we guaranteed a climate of discipline and of co-operation during simulation of the didactic lessons in class. We made efforts to ensure success of the first contacts (taking photos of the pupils' faces and memorizing the names of the majority of the pupils). We also used positive psychological reinforcements (praises) and other encouragements. During the evaluations, the copies of tests were managed and corrected by guaranteeing the anonymity of the pupils. To avoid the effects of stereotyping in the correction, we alternated the classes and the respective copies. A break was given in order to avoid the effects of tiredness. The correction was done according to a scale established at the time of the composition of the tests.

4. Results

After survey, management and analyses of data, expected results are presented according to our research questions as follows:

Effectiveness of the methods on pupils' academic performance

The table below shows the summaries of the descriptive statistics, the homogeneity of the variances and results of the analysis of the variances.

Table 2. Results of descriptive statistics

Methods	N	Mean	SD	Standard Error	OR (95%)	
					Lowest	Highest
With TDE						
Global Method (M1)	45	73,10	18,814	2,805	67,44	78,75
Syllabic Method (M2)	45	63,95	14,083	2,099	59,72	68,18
Inducto-deductive Method (M3)	45	61,33	12,430	1,853	57,59	65,06
Mixed Method (M4)	45	67,36	15,652	2,333	62,66	72,07
With ICT						
Global Method (M5)	45	79,88	17,491	2,607	74,63	85,14
Syllabic Method (M6)	45	71,97	16,505	2,460	67,01	76,93
Inducto-deductive Method (M7)	45	65,07	14,483	2,159	60,72	69,42
Mixed Method (M8)	45	75,50	16,322	2,433	70,59	80,40
Total	360	69,77	16,778	2,884	68,03	71,51

The means of the pupils' performance varied from 61.33 for the inducto-deductive method taught with TDE to 79.88 for the global method taught with ICT. On the whole, the performance mean of one method was 69.77 scores on 100 points. The standard deviations are notably similar, with the lowest variability for the inducto-deductive method and the highest variability for the global method.

Figure 2 shows that the majority of pupils (95%) performed better using the global method. The mean value of the population ranged between 74.63 and 85.14 scores. The most restricted interval was the pupils' performance using the inducto-deductive method. Several teaching methods produced similar performances possibly because, except the global method mean (with TDE and ICT), the mean intervals of the other methods were overlapping.

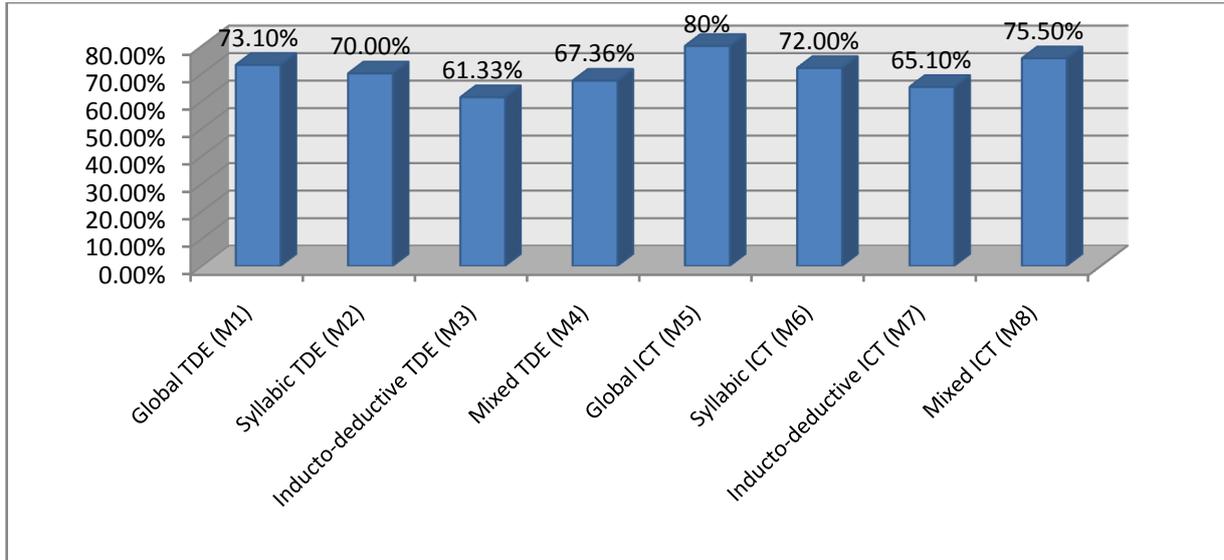


Figure 1. Means of pupils' performance by teaching method

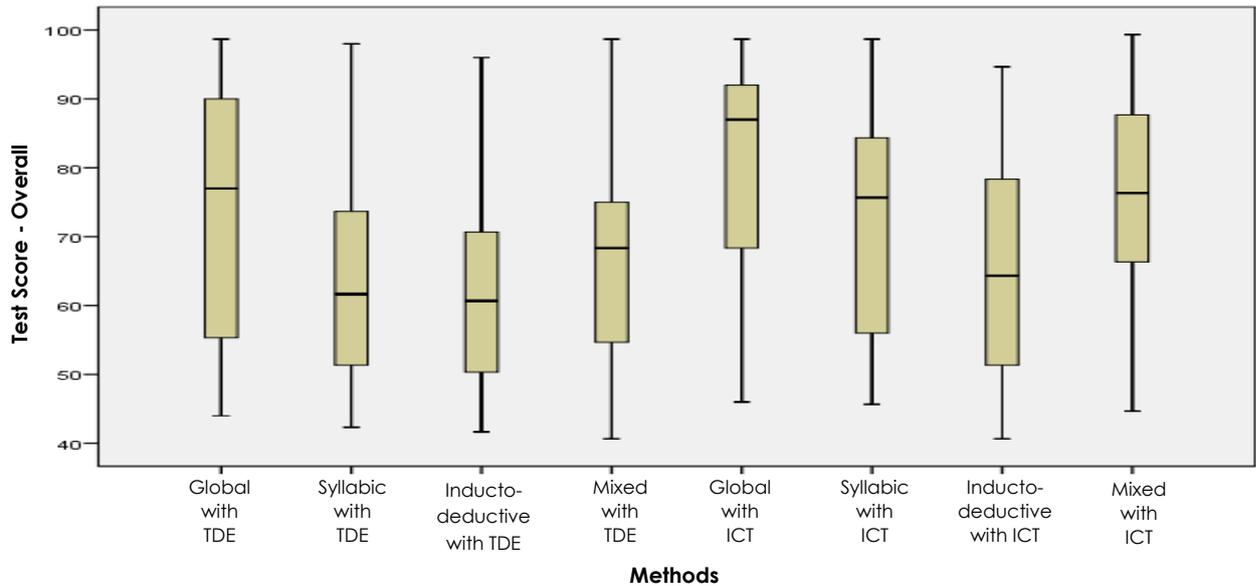


Figure 2. Overall test scores of the different methods

Table 3. Results of the ANOVA

ANOVA	Sum of the squares	ddl	Mean square	F	Sig. (p-value)
Inter-groups	12782.246	7	1826.035	7.281	0.000
Intra-groups	88276.464	352	250.785		
Total	101058.710	359			

The last column of the above table indicates that the probability of finding the value of F (7,281) was smaller than 0.0001, i.e., less than 0.01%. This seems to confirm that the assumption of insignificance is true. However, we have sufficient evidence to reject the “insignificance” assumption and to say that it is not probable that the four methods with two alternative tools (TDE and ICT) would produce the same effects. In other words, there are significant differences in the pupils' academic performances in elementary reading using these eight different teaching methods.

Results of Multiple Comparisons

We detected the following differences by comparing the different groups' means in pairs by using T Test students.

Table 4. Multiple comparisons of first group (Four methods with TDE)

Group means compared	T Test Student	DI	p-Value
M1=73.10 > M2=63.95	t=2.611	81.526	0.011*
M1=73.10 > M3=61.33	t=3.502	76.264	0.001*
M1=73.10 > M4=67.36	t=1.572	88	0.120
M2=63.95 > M3=61.33	t=0.936	88	0.352
M2=63.95 < M4=67.36	t=-1.088	88	0.280
M3=61.33 < M4=67.36	t=-2.026	83.706	0.046*

We noted that only three group means compared were statistically significant, i.e., global TDE and syllabic TDE (0,011); global TDE and inducto-deductive TDE (0,001); and inducto-deductive TDE and mixed TDE (0,046).

Table 5. Multiple comparisons of second group (Four methods with ICT)

Groups means compared	Test T Student	dl	p-Value
M5=79.88 > M6=71.97	t=2.207	87.705	0.030*
M5=79.88 > M7=65.07	t=4.376	85.042	0.000*
M5=79.88 > M8=75.50	t=1.230	88	0.222
M6=71.97 > M7=65.07	t=2.109	86.539	0.038*
M6=71.97 < M8=75.50	t=-1.019	88	0.311
M7=65.07 < M8=75.50	t=-3.206	86.773	0.002*

A comparison of the four methods (implemented with ICT) revealed that from the six groups that were compared, the differences in the means of four groups were statistically significant. These were: global ICT and syllabic ICT (0,030); global ICT and inducto-deductive ICT (0,0001); syllabic ICT and inducto-deductive ICT (0,038); and inducto-deductive ICT and mixed ICT (0,002).

According to the multiple comparisons considered, on four main comparisons between the two alternative tools (TDE and ICT), only two groups were statistically significant. The inducto-deductive method with TDE and ICT (0,015) and the mixed method with TDE and ICT (0,018). However, it should be noted that the scores separating the four main comparisons were for the global method (6.8 scores), for the syllabic method (8 scores), for the inducto-deductive method (3.7 scores), and for the mixed method (8.14 scores).

Table 6. Multiple comparisons of first and second groups (Four methods with TDE and ICT)

Group Means Compared	Mean Difference	T Test Student	DI	p-Value
M5=79.88 > M1=73.10	6.8	t=1.772	88	0.080
M5=79.88 > M2=63.95	13.9	t=4.760	84.167	0.000*
M5=79.88 > M3=61.33	18.6	t=3.578	79.410	0.000*
M5=79.88 > M4=67.36	12.5	t=2,032	86.936	0.001*
M6=71.97 > M1=73.10	1.1	t=-0.302	88	0.764
M6=71.97 > M2=63.95	8.0	t=2.480	85.874	0.015*
M6=71.97 > M3=61.33	10.6	t=3.456	81.763	0.001*
M6=71.97 > M4=67.36	4.6	t=1.359	88	0.178
M7=65.07 < M1=73.10	8.0	t=-2.269	82.59	0.026*
M7=65.07 > M2=63.95	1.1	t=0.371	88	0.711
M7=65.07 > M3=61.33	3.7	t=1.315	88	0.192
M7=65.07 < M4=67.36	2.3	t=-0.722	88	0.472
M8=75.50 > M1=73.10	2.4	t=0.646	88	0.520
M8=75.50 > M2=63.95	11.6	t=3.594	86.152	0.001*
M8=75.50 > M3=61.33	14.2	t=4.633	82.192	0.000*
M8=75.50 > M4=67.36	8.14	t=2.413	87.846	0.018*

The table 7 shows that the model of regression was very good (0.96) and the data were adjusted accordingly. As a whole, the parameters can be predicted as 92%. Two variables predicted the performance of teaching methods in elementary reading, i.e., the age of the pupils ($t=-2.260$ and $p=0.024$) and the degree of success ($t=61.189$ and $p=0.000$).

The performance on the visual language in elementary reading using the four methods was based on the official age of school attendance (global 0,002; syllabic 0,000; inducto-deductive 0,045 and mixed 0,023). However, during the use of the global method, the female pupils performed better in the visual language. Moreover, except for the inducto-deductive method, the other three methods (global 0,033; syllabic 0,000; and mixed 0,044) had an effect on the degree of the performance of the pupils on visual language.

The official age of school attendance also had an effect on oral language (accent and intonation) performance when using the global (0,030) and syllabic (0,010) methods. The

use of these methods also improved the oral language performance for more girls (global 0,005 and syllabic 0,048). Nevertheless, all the four methods improved the degree of performance in oral language (global 0,000; syllabic 0,000; inducto-deductive 0,011; and mixed 0,008).

It can be noted that the official age of school attendance was a factor in the comprehension performance of the pupils when using the inducto-deductive (0,050) and mixed (0,046) methods. The use of these two methods also affected the quality of pupils' performance in auditory comprehension (inducto-deductive 0,007 and mixed 0,025). Lastly, the official age of school attendance affected the performance of oral expression (pronunciation) during the use of three out of the four methods (global 0,030; syllabic 0,010 and mixed 0,049). However, only the use of the global method had an effect of the oral expression of female pupils (0,047). Three methods predicted the quality of performance in oral expression (global 0,000; syllabic 0,049 and mixed 0,008).

Table 7. Results of OLS regression of the methods on the variables gender, age and degree of success

Regression Model	Coefficients (β)	T	p-Value	R (R-2)
Gender of pupils	0.029	1.883	0.061	0.957 (0.916)
Age of pupils	-0.035	-2.260	0.024	$p = 0.000$
Degree of success	0.952	61.189	0.000	

Table 8. Results of OLS Regression on the degree of success, age and gender

Logistical Regression	Age	P-value	Gender	P-value	Degree of success	P-value
Visual or identification language						
Global		0.002*		0.069	Fail	0.033*
Syllabic	Younger	0.000*	Male	0.002*	Satisfactory	0.000*
Inducto-deductive	Normal	0.045*	Female	0.108	Distinction	0.062
Mixed	Older	0.023*		0.203	High Distinction	0.044*
					Excellent	
Oral language (accent and intonation)						
Global		0.030*		0.005*	Fail	0.000*
Syllabic	Younger	0.010*	Male	0.048*	Satisfactory	0.000*
Inducto-deductive	Normal	0.078	Female	0.120	Distinction	0.011*
Mixed	Older	0.049*		0.205	High Distinction	0.008*
					Excellent	
Auditory Comprehension						
Global	Younger	0.624	Male	0.070	Fail	0.452
Syllabic	Normal	0.582	Female	0.081	Satisfactory	0.066
Inducto-deductive	Older	0.050*		0.072	Distinction	0.007*
Mixed		0.046*		0.062	High Distinction	0.025*
					Excellent	
Oral expression (pronunciation)						
Global		0.030*		0.047*	Fail	0.000*
Syllabic	Younger	0.010*	Male	0.109	Satisfactory	0.049*
Inducto-deductive	Normal	0.068	Female	0.502	Distinction	0.068
Mixed	Older	0.049*		0.321	High Distinction	0.008*
					Excellent	

5. Discussion

What are the research findings?

From a national perspective, any teacher has the freedom to choose any method from among the four teaching methods depending on their preference and experience. This study helps teachers to reflect and develop an experimental attitude in the choice of teaching methods for elementary reading. During the study, some of the detected causes of failure in the teaching of elementary reading were endogenous causes (e.g., dyslexia, dysgraphia, dysorthography, etc.) and exogenous causes (e.g., overpopulation of the classes; school absenteeism due to sickness or non-payment of schooling fees; lack of monitoring and moral support of pupils by the parents; non-conducive family environment; conditions of teaching; sociocultural and socio-economic factors of the pupils and parents).

However, when those exogenous factors are minimised by experimental approach, the pupils' weakness in reading could also be explained by bad choice of method made by the teacher from the possible alternatives proposed by the National curriculum, official directives and instructions. The choice of teaching methods should therefore take into account the experimental study, the age group and the gender of the class. This study focused on pupils' performance using the four teaching methods of elementary reading with two alternatives (TDE and ICT).

This quantitative and quasi-experimental study show the presence of significant differences in four teaching methods of elementary reading in the pupils' academic performance in second year of primary school. These differences are also present in the two alternative tools used with these methods, traditional didactic equipment (TDE) and information and communication technologies (ICTs). Based on the means of the different teaching methods for both TDE and ICT, the global method had the highest effect, followed by the mixed method, then the phonics (or syllabic) method and finally the inducto-deductive method.

Statistically, among four methods used with TDE, the global method was found to be equal to the mixed method but higher than the syllabic and inducto-deductive methods. No difference was observed in the inducto-deductive, global, syllabic and mixed methods. The mixed method was higher than the inducto-deductive method. The results of these four methods used with ICT were the opposite of those observed using TDE, except for the syllabic method which statistically proved its superiority above the inducto-deductive method.

What are the finding of this study compared to other studies?

It is worth mentioning that there was a statistically significant difference in performance between the two alternatives (TDE and ICT) used with the inducto-deductive method and the mixed method. In other words, the inducto-deductive and mixed methods with ICT had greater effect on the performance of the pupils. Several studies show that ICT improves motivation in training. Similarly, Karsenti

et al. (1999) points out that the use of ICT is more focused on working with a new system or medium; has the possibility of greater autonomy for learning, has the advantages of being more personalised and giving regular and faster feedback (Karsenti, Fort, Larose & Clément, 2002).

Compared to the variables such as age, gender and degree of success of these methods, overall, the normal school-going age in the country for second level (7 years) in this experience had a significant effect on the pupils' performance and degree of success using the four methods. This result is related to those of Gilly (1965). Moreover, the pupils who are delayed are generally classified negatively, while those who take the lead are generally classified positively. The performance of the pupils in visual language in elementary reading during the use of these four methods was also affected by the age of pupils. However, girls were stronger in visual language during the use of the global method. Moreover, except for the inducto-deductive method, the other three methods predicted the quality of the performance of the pupils on visual language.

Oral performance (accent and intonation) using the global and syllabic methods were affected by the age of the pupils. The use of these two methods also improved the performance of girls in oral language. Nevertheless, all the four methods had an effect on the quality of performance in oral language. Fouedjio (2008) arrived at the similar conclusion. This seems to suggest that girls are more gifted in the languages or arts disciplines, while boys are more gifted in the mathematical disciplines.

The performance of the pupils in auditory comprehension using the inducto-deductive and mixed methods is also affected by the respective official age of school of the pupils in the particular school. In addition, the use of these two methods affected the quality of performance of the pupils in auditory comprehension. However, the performance in oral expression (pronunciation) was affected by the respective official age in the different schools during the use of these methods, except for the inducto-deductive method. Only the use of the global method had an effect on the performance of girls in oral expression. The use of all the four methods affected the quality of performance in oral expression.

Why some methods are more effective than others?

The study established the superiority of the global method above the other methods on the one hand, and the predictive effect of the respective official age on the quality of academic success using the methods on the other hand. This calls for reinforcement of the policy with respect to allowed school ages and the orientation of teachers in the choice of methods in elementary reading. In this study, emphasis was also placed on the importance of equipment or modern teaching tools (ICT) to improve the effectiveness of the methods used in elementary reading. The present study is in line with the studies carried out in national, international, and European schools, with the aim of gathering evidence regarding the advantages and benefits of ICT in school achievements. The study sought to measure the impact of

ICT on student performance by trying to establish a link between the use of ICT and students' results in examinations. The findings are interesting. ICT has shown a positive impact on student performance in primary school, particularly in English language, although the effects are less significant in the sciences (Balanskat, Blamire & Kefala, 2006).

The global method used with TDM or ICT proved its superiority (effectiveness) in comparison with other methods. These results are justified in sense that half of the children in the elementary grades of primary schools in RD Congo (50%) has difficulties of training of reading in French. This method proved its effectiveness from the children in training difficulties (Wallon 1952; Jalley, 2007). The method seems more adapted to the psychology of the pupils in normal training or in difficult of training. It exploits well the total or global perception as well as the spontaneity of the pupils. It seems obvious when we surveyed 78% of the pupils in elementary grades of primary schools in RD Congo (between 6 and 7 years) are among the age between the conception and the stabilization of global perception or overview (Claparède, 1908; Wallon 1952; Simon, 1954). It is about the age of the growth of the analytical or global intellectual faculties manifested by the activities of overview, of ideographic visual, ideo-visual, natural-visual or any other intelligence visual of development of child psychology. The global method used, therefore, is adapted to their physical development or their mental growth.

Although the debates of teaching methods of reading carried out generated controversy among the specialists, however, some specialists of methods of reading and child psychology state that the global method is among the best reputed pedagogic strategies of teaching-learning of reading (Claparède, 1908; Wallon 1952, 1953; Hamaïde, 1946; Segers, 1926, 1939 Foucambert, 1986). Decroly (cited by Wallon 1952) explain that global activity of human perception makes the bridge between instinctive activity and upper intelligent activity. It works spontaneously in the children and allows important acquisitions such as language, knowledge on physical or materiel, living and social environment and adaptation to the series of author forms of activities related to cognitive, conative and motor human aspects. The specialists of this method estimate, for example, that mothers often use this method unconsciously to educate their children before school age or over school time to make them acquire various important techniques, notably language. It is necessary to add that the global method is applicable not only in introductory learning techniques (reading, writing, orthography) but also in the branches of knowledge relating to nature and human being (natural science, history, geography) and in the expression of this knowledge in the mother tongue or in acquisition of another second language (Beaume, 2006; Jalley, 2007; Dehaene, 2013).

In additional, the syllabic method used with TDM comes second in position following by the mixed methods and inductive-deductive; while the mixed method with ICT is placed in second position by its effectiveness. Using ICT, the mixed

method increases its effectiveness more than the other methods. It is observed that the mixed method at the same time draws its effectiveness with the enrichment brought by the advantages from the combination of the other methods used. It is held in a precarious balance between global visual approach and synthetic method (Brighelli, 2005).

Moreover, the ICTs with its effects encourage and motivate the pupils in the learning of reading. They support and maintain the length of attention of the pupils by the images and bright colors used in its demonstrations. The ICTs used with teaching methods made leaning activities less boring and more interesting. The pupils are motivated to read or to pronounce aloud what they perceive. These similar conclusions were drawn by several studies at the usage of ICT in teaching-learning in primary or secondary school. ICTs allow for higher quality lessons through collaboration with teachers in planning and preparing resources (Ofsted, 2002). Students learn new skills: analytical, including improvements in reading comprehension (Lewin, 2000). ICTs also develop some writing skills: spelling, grammar, punctuation, editing and re-drafting (Lewin, 2000). Still new technologies encourage independent and active learning, and students' responsibility for their own learning (Passey, 1999). ICTs prove that students who used educational technology felt more successful in school. They are more motivated to learn more and have increased self-confidence and self-esteem. It is also confirmed that many students found learning in a technology-enhanced setting are more stimulating and much better than in a traditional classroom environment (Pedretti et al, 1998).

What are the limitations of the study and research perspectives?

This study focuses only on 360 pupils of elementary grades of primary school hiving French as mother tongue. Therefore, it may not produce the same effects when generalized, but it helps as a reference point to enhance and enrich the national debate on the effectiveness of teaching methods in elementary reading. It would be unrealistic to think that there exists only one teaching method applicable everywhere. This study can however be regarded as a starting point. It should also be kept in mind that when used in isolation (without TDM and ICT), each teaching method may have only marginal effect. It is, therefore, the combination of methods that strengthens the teaching of reading. More longitudinal studies on teaching methods of reading need to be conducted on the same or higher level.

6. Conclusions

In conclusion, we reiterate that modification of teaching practices is essential to ensure the academic success of pupils. However, in the light of the results presented in this study, each method must be consequently and judiciously selected by the teacher. The method is of major importance in the teaching and learning, because each lesson requires a suitable method.

The method used by the teacher to conduct his or her lessons can stimulate the efforts of the learners and help them to learn, but can also be responsible for the failure of learners. When the teaching method is not effective, it will be difficult for learners to acquire the necessary skills for reading, writing and oral expression, or to facilitate the future learning of several types of reading (quiet reading, loud reading, expressive reading and explanation).

The success of a teaching method depends largely on its user, who must use his teaching experience and his personal qualities such as: the art of public speaking, constant effort to seek comprehension or clarity, experimenting, tips, etc. The teacher's scientific competence also has positive effects on the practical teaching of communication. These are useful measures to circumvent difficulties and improve pupils' performance. A teaching method can be recommended only after having checked its effectiveness on the field and under the necessary experimental conditions.

This study recommends the use of the four teaching methods (specially global and mixed methods) with the two alternative tools (TDE and ICT) taking into account the gender (girls or boys), age (younger, normal and older) and degree of success (satisfactory, distinction, higher distinction or excellent) of the class. Also, the reading aspects to be developed should be considered, e.g., visual language or identification; oral language (accent and intonation); auditory comprehension; and oral expression (pronunciation). This study can sensitize the main actors in education to this reality.

REFERENCES

- [1] Audran J. (2001). Les outils technologiques de communication, catalyseurs ou révélateurs dans la formation? Le cas d'une liste de diffusion professionnelle. Les interactions entre formation et évaluation, actes du 14 colloque ADMEE, Université de Provence.
- [2] Babbie, E. (1990). *Survey research methods*. (2nd ed.). Belmont, California: Wadsworth Publishing Company.
- [3] Balanskat, A., Blamire, R., and Kefala (2006). *The ICT Impact Report: A review of studies of ICT impact on schools in Europe*. Brussels: European Schoolnet.
- [4] Beaume, E. (2006). La méthode globale, in Beaume, E. (2006). *Les Actes de Lecture*, n°95, septembre 2006, http://www.lecture.org/revues_livres/actes_lectures/AL/AL95/page91.PDF.
- [5] Borman, Hewes, Overman & Brown (2002). *Comprehensive School Reform and Student Achievement a Meta-Analysis*. Center for Research on the Education of Students Placed at Risk (CRESPAR), Johns Hopkins University: Baltimore MD.
- [6] Brighelli, JP. (2005). *La Fabrique du crépin: la mort programmée de l'école*, Paris: Jean-Claude Gawsewitch Editeur.
- [7] Bryant G.P. (1990). *Phonological skills and learning to read*, Lawrence Erlbaum, Hillsdale, NJ.
- [8] Claparède E. (1908). *Exemple de perception synchrétique chez un enfant*, tome 7, Genève: Archives de psychologie.
- [9] Creswell, J.W. (2014). *Research design: Qualitative, quantitative and mixed methods approaches* (4th ed.). California: SAGE.
- [10] Dehaene, (2013). Les quatre piliers de l'apprentissage, ou ce que nous disent les neurosciences, *Paris Tech Review*, 7 novembre.
- [11] Evans, M.A., & Carr, T.H. (1985). Cognitive Abilities, Conditions of Learning, and the Early Development of Reading Skill. *Reading Research Quarterly*, Spring.
- [12] Fink, A. (1995). *How to sample in surveys*. (Vol. 6). London: Sage.
- [13] Foucambert J. (1977). La manière d'être lecteur: apprentissage et enseignement de la lecture de la maternelle au CM2, in Foucambert J. (1986). *L'acte de Lire*, *Revue française de pédagogie*, volume 39, 1977. p. 59-61.
- [14] Fouedjio F. (2008). Travail des enfants de 5-14 ans et rendement scolaire au Cameroun, Yaoundé: Institut Sous-Régional de Statistique et d'Economie Appliquée.
- [15] Gilly, M. (1965). Mois de naissance et réussite scolaire. *Enfance*, 18(4), 491-503. Goodenough, F.L. (1926). A new approach to the measurement of intelligence of young children. *Pedagogical Seminary*, 33, 185-211.
- [16] Hamaïde, A (1946). *La méthode Decroly*, 4th éd. Paris-Bruxelles: Delachaux & Nestlé.
- [17] Horn, J. (2001). Raymond Bernard Cattell (1905-1998). *American Psychologist*, 56(1), 71-72.
- [18] Ibeki, L.G. (2007). *Notions générales de pédagogie*, T1, Kinshasa, Pédagogie de Pointe.
- [19] Irwin, M.I. (1967). *An experiment in reading improvement for a class of seventh grade pupils in a Jamaican junior secondary school*. West Indies: University of the West Indies.
- [20] Jallev E. (2007). *Critique de la raison en psychologie - La psychologie scientifique est-elle une science ?* Paris-Bruxelles: Le Harmattan.
- [21] Joshi, R.M. Leong, C.L., Kaczmarek, B.L.J. (2003). Literacy acquisition: the role of phonology, morphology and orthography, IOS Press Ohmsha, Nato Science Series, Washington, Dc.
- [22] Karsenti, T., Brodeur, M., Deaudelin, C., Larose, F., & Tardif, M. (2002). Intégration des TIC dans la formation des enseignants: le défi du juste équilibre, Toronto: Rapport de recherche.
- [23] Karsenti, T, Fortin, T., Larose, F., & Clément, M. (2002). Les TIC et le défi de la formation pratique dans le cadre de la Réforme de l'éducation. In F. Larose and T. Karsenti (dir.), *La place des TIC en formation initiale et continue: Bilan et perspectives*. Sherbrooke/Paris: Éditions du CRP/Le Harmattan (forthcoming).
- [24] Legrain, H. (2003). *Motivation à apprendre - Mythe ou réalité?: Points d'étape des recherches en psychologie*. Paris: Le Harmattan.
- [25] Lewis, R.B. (2000). Project LITT (literacy instruction through technology): Enhancing the reading skills of students

with learning disabilities through hypermedia-based children's literature. Final report. San Diego, CA: San Diego State University, *Department of Special Education*.

- [26] Marty R. (1996). Définition et syntaxe des symboles en sémiotique peircienne. In Mucchielli A. (Dir.), *Dictionnaire des méthodes qualitatives en sciences humaines et sociales*, pp.242-243. Paris: Armand Colin.
- [27] Molnar, A., Smith, P., Zahorik, J., Halbach, A., Ehrle, K., Hoffman, L.M., & Cross, B. (2001). Evaluation Results of the Student Achievement Guarantee in Education, (SAGE), University of Wisconsin, Milwaukee.
- [28] Ofsted (2002). *ICT in Schools Effect of government initiatives*, London, Office for Standards in Education Alexandra, <http://homepages.shu.ac.uk/~edsjlc/ict/ofsted/papers/ict%20in%20schools%20-%20effect%20of%20government%20initiatives.pdf>.
- [29] Passey, D. (1999). Strategic evaluation of the impacts on learning of educational technologies: Exploring some of the issues for evaluators and future evaluation audiences, *Education and Information Technologies*, 4, 3, p. 221-248.
- [30] Kemba A.N. (2005). *Guide to Teaching Reading at the Primary School Level*, Paris: UNESCO. <http://unesdoc.unesco.org/images/0014/001411/141171e.pdf>.
- [31] Pedretti, E., Mayer-Smith, J. and Woodrow, J. (1998). Technology, text and talk: Students' perspectives on teaching and learning in a technology enhanced secondary science classroom. *Science Education*, 82(5), 569-589.
- [32] RDC-MNESP. (2014). Loi-cadre no. 14/004 du 11 Février 2014 de l'enseignement national, Kinshasa: JOR.
- [33] RDC-MINESP (2014). *National curriculum of Primary Education*. Kinshasa: ELISCO.
- [34] RD. Congo-MINEPSP (2014). *Rapport d'état du système éducatif: Pour une Éducation au Service de la Croissance et de la Paix*. Dakar: Unesco - IPE Pôle de Dakar.
- [35] Resing, W.C.M., & Blok, J.B. (2002). The classification of intelligence scores: Proposal for an unambiguous system. *The Psychologist*, 37, 244-249.
- [36] Slavin, R.E. (2002). Evidence-Based Education Policies: Transforming Educational Practice and Research. *Educational Researcher*, 31(7), 15-21.
- [37] Segers, J.-E., (1939). *La psychologie de la lecture et l'initiative à la lecture par la méthode globale*. Anvers: Boekhandel, 1-VF1
- [38] Segers, J.-E. (1926). Perception visuelle chez l'enfant, In Pierre Janet, Georges Dumas, *Journal de psychologie normale et pathologique*. Paris: PUF.
- [39] Simon J. (1954). Contribution à la psychologie de la lecture, *Enfance*, tome 7, n° 5, 1954. p. 431-447.
- [40] Stallings, J., Cory, R., Fairweather, J., & Needels, M. (1978). Early Childhood Education Classroom Evaluation, Sacramento, California: Office of Program Evaluation and Research Department of Education State of California.
- [41] Tashakkori, A. & Teddlie, C. (2010). *SAGE handbook of mixed methods research in social science and behavior research*. Thousand Oaks, CA: Sage.
- [42] Wallon H. (1952). Rapport de la psychologie et de la pédagogie chez Decroly. *L'Ère Nouvelle*, 77-72, 58-64.
- [43] Wallon H. (1953). *L'œuvre de D' O. Decroly, Enfance*, 1968, 1-2, 91-101.
- [44] Zahorik, J., Molnar, A., Ehrle, K., & Halbach, A. (2000). *Effective teaching in reduced-size classes*. Milwaukee: Center for Education Research, Analysis, and Innovation, University of Wisconsin Milwaukee.