

The choice of the right pedagogical method for the development of reading skills by the use of AHP decision making method

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Abstract— This article is part of a scientific research approach to identify a problematic related to an educational system [8], particularly in the primary school, in order to propose tangible and feasible solutions. It presents a variety of teaching methods used to learn reading in order to identify the criteria for choosing the most appropriate one.

The article focuses initially on the identification, categorization and prioritization of different criteria that come into play in learning to read. In a second step, it shows how to apply, on these criteria, the method AHP (Analytical Hierarchy Process) which is one of the methods MCDM / A (Multi-criteria decision-making and analysis) most used to facilitate the taking of multi-criteria and multi-objective decision.

At the end of this application, the article gives a classification of the various pedagogical methods studied (Syllabic Method, Global Method, Mixed Method and Montessori Method) and points out that, for a better efficiency, this study must be aggregated with another one which takes into account the profile of the learner.

Index Terms— AHP, Education, Global Method, ICT, MCDM/A, Mixed Method, Montessori Method, Pedagogy, Primary school, Reading Methods, Syllabic Method.

I. INTRODUCTION

LEARNING is a fundamental right and every individual must have the opportunity to access instruction that at least allows them to read, to understand a text, to write and to count. Unfortunately, we still find today that many people in underdeveloped and developing countries have not had the

chance for basic learning. Similarly, many of the elementary students complete their cycle without really mastering one or more of the above fundamentals.

Over the last decades, several studies have been carried out on a global scale and show a decline in relation to basic learning.

In this context we would like to explore a scientific and pedagogical approach and make a contribution to promote the

development of learning skills in primary education of the educational system in Morocco (and even elsewhere). And for this we are interested in the study of multiple pedagogical methods of reading acquisition, through defining the most appropriate method in relation to certain learning. The article is structured around a section that presents the problem of primary education especially in reading instructions and recalls the most used pedagogical methods to this aim [22]. It then puts in application the AHP (Analytical Hierarchy Process) decision making method, one of the MCDM / A (Multi-criteria decision -making and analysis) methods.

This implementation begins by a summary of the pedagogical methods and the calculation of the global weights [Anonymous, 2017] and continues with the steps to be followed to arrive to an outcome that makes it possible to verify the consistency of the previous results with the actual ones.

II. PROBLEMATIC

The majority of pupils reach the end of primary school without achieving the most basic goals in reading, writing and arithmetic particularly in Africa apart from some countries [3]. The UNESCO report [25] shows that less than half of children, in 21 out of 85 countries from which they conducted their statistical survey, acquire basic skills in terms of learning. 17 are sub-Saharan countries in Africa in addition to India, Mauritania, Morocco and Pakistan. Which ranks Morocco among the 21 worst educational systems in the world [25], and shows that our country is experiencing a major crisis in its primary learning system. And more specifically the last PIRLS study [29] (Progress in International Reading Literacy Study) which points to the low level of Moroccan schoolchildren where Morocco occupies the 48th place out of 50 countries studied in terms of reading and comprehension. The fact is that Morocco is among the countries that have made the most progress between 2011 and 2016. But still, its ranking is far from the acceptable level set by PIRLS.

According to the Human Development Index (HDI) [14], Morocco is ranked in the bottom ranks [13]; 124th (out of 177) and the 11th among the 14 Arab countries.

III. METHODS USED IN DEVELOPING READING SKILLS IN THE WORLD

This article focuses on the development of the reading skills that is part of the process research of authors' work to make their contribution to the improvement of learning especially for the primary cycle. The investigations in the literature [1], [2], [5], [7], [14], [20], [22], have revealed a non-exhaustive list of pedagogical methods used in the development of the reading skills: The Syllabic, the Global, the mixed, the Montessori, the phonics, the Boscher, the natural, the Ideo-Visual, the interactive, the Borel-Maisonnay

phonetic and gestural, the phonomimic method, the Alphas method, the Jean-qui-rit method, the Bordesoules.

The work presented in this article focuses on four main methods: syllabic and global methods (first current), mixed and Montessori methods (second current). The aforementioned methods constitute variants of the four.

And here is an explanatory table of the characteristics of several methods on reading acquisition process.

Table I explanatory table of the characteristics of several methods on reading acquisition process

Meth- od	Origin	Practice / Learning process of reading	Specificities	Variants
Syllabic	This synthetic method, which finds its origins in ancient Greece, was developed by the Alsatian pastor Stuber in 1762. It was one of the first methods of the modern school (19th century).	Its principle consists in deciphering the letters by learning the corresponding sounds. The child learns the letters by making a correspondence with their sounds. The combination of these letters, forms syllables which constitute words and those we can assemble in sentences. [1]	In order to achieve the expected results, this method requires time.	<ul style="list-style-type: none"> • Bosher, • Phonics, • Mixed,
Global	After the Abbot De Radonvilliers, it was Nicolas Adam, a French tutor, who developed the analytical basis of this method in 1787. And it is the Belgian physician and educator Ovide Decroly who structured it allowing its propagation at the beginning of the XXth century.	Global methods assume that the child perceives best, organized and meaningful sets (words or phrases) than meaningless elements (letters or syllables). It has been demonstrated experimentally that the visual perception of the child is global [2]. The child learns to read by photographing the word as a whole, "globally". This reinforces the three principles of Decroly's pedagogy: observation, expression, association.	This method encourages reading can sometimes be exhausting beyond a certain number of new words learned (via photographic memory). However, it induces the child to guess words and gives him the urge to read.	<ul style="list-style-type: none"> • Ideo-visual, • Natural, • Mixed,
Mixed	The two previous methods having their qualities and their flaws, a third didactical way has gradually come to light.	The mixed method aggregates the two previous methods global and syllabic. The child begins by memorizing a small number of words from short illustrated texts, this puts meaning and understanding in the foreground. This is the most widely answered method currently and is therefore highly criticized as it often produces failure [3].	This method begins with the use of the global method for learning basic words and then continues to a more synthetic practice.	
Montessori	It is a synthetic method developed by an Italian Dr. Maria Montessori from 1907.	The method makes it possible to apprehend the letters by the movement and allows the child to memorize the trace of a letter by printing it in his brain. The child learns the cards by touching them, cut in the cardboard, while pronouncing the sound associated with each letter. Later the child reproduces the writing of the letter on the sand. This allows him to strengthen his learning by associating symbol and sound (a synthesis activity).	This method uses touch and gesture, arouses the curiosity of the child and follows his interest and motivation. It encourages reading and develops his natural aptitude for initiative and curiosity.	<ul style="list-style-type: none"> • Borel-Maisonnay phonetic and gestural, • Alphas, • Jean-qui-rit, • Phno-mimic,

Phonomimic [6], [20]	Augustin Grosselin is the founder of this method of learning to read. Originally, it was intended to teach his own children to read. The method was then used by Marie Pape-Carpentier, founder of the Asylum rooms.	It is a process that associates 33 onomatopoeic gestures to the speech. To reinforce the assimilation of a word or an idea, this method proposes to use both the visual channel using gestures and the auditory sense via sound of the word. GROSSELIN, dans le Moniteur du 30 mars 1867, p. 387, 2e col.	It has been proven by the author himself that this method is also used for the deaf-mute audience.	<ul style="list-style-type: none"> • Jean-qui-Rit, • Borel-Maisonny phonetic and gestural
Jean-qui-rit	Developed by Marie-Brigitte Lemaire, this method was inspired by the phonomimic method and influenced by the phonetic and gestural method of Suzanne Borel-Maisonny. Jean-qui-Rit enriched this method by adding contributions from great teachers such as Mrs. Ward, Ms. Lubienska of Lenval, Ms. Bugnet.	It teaches the pupils to read and write by gestures, rhythm and singing by arousing an interest that is always renewed by new gestures and new sounds. It adds to a visual and auditory teaching, the development of motor intelligence by proposing action-gesture cards associating a gesture with a letter or a group of letters.	This method accentuating the total development of the child: physical and mental. It offers panoply of psychomotor exercises and the gestures are learned from the stories.	
Alphas [11]	It is a syllabic reading method created at the dawn of the year 2000 by Claude Huguenin and Olivier Dubois. It was originally created for children with learning difficulties.	An alpha corresponds to a letter of the alphabet. The name of each alpha begins with the letter it represents. To introduce them, the teacher tells a captivating story, whose heroes are the Alphas and have amazing characteristics: they have the form of the letters and a reason to emit their sound. This helps to prevent children from confronting the abstract and arbitrary world of letters.	It speaks to the imagination of the young learner. The learner builds an emotional relationship with the characters through a fantastic tale. It takes a fun learning approach.	
Ideo-Visual [4]	It was developed in France by Foucambert who considers the decoding as a concomitant act to the reading because it would constitute a handicap to the true reading.	For a child to learn to read, he must comprehend globally the words and sentences. This method gives primacy to meaning and relies on visual recognition and discovery of words by intuition based on assumptions to reach the meaning.	This method is focused on meaning and not on decryption. Goigaux joins Foucambert in saying that the visual memory of words is very important to learn to read.	
interactive		The method bases its approach on the interest that the learners might have in the content of the texts to be studied. When the child reads, he first decodes the words and then questions the meaning to better understand the syntax and discover the meaning of the statements. Where reading is considered as a skill to acquire by learning the technique, then practicing it till it becomes a learned skill.	The child performs two complementary operations in a combinatorial way: the deciphering and the construction of meaning. This method is usually based on reading albums (real books written by real authors) [32].	<ul style="list-style-type: none"> • Mixed

IV. APPLICATION OF MCDM/A METHODS FOR THE CHOICE OF THE APPROPRIATE LEARNING METHOD MCDM/A

The multi-criteria decision-making (MCDM) domain is divided into two sub-domains, Multi-Attribute Decision Making (MADM) and Multi-Objective Decision Making

(MODM) [9], [31], [28]. We are interested in the Analytic hierarchy process (AHP).

A. Summary: calculation of the overall weights of the criteria and sub-criteria

These tables include the global and local weights of criteria and sub-criteria obtained by the different treatments car-

ried out and shown in our previous article.

Table II: the global and local weights of the criteria and sub-criteria according to the Syllabic Expert

Syllabic Expert			
Criteria	Sub-criteria	Weight	
		Local	Global
Sensory organ C1[0.193]	Visual	0.267	0.052
	Auditory	0.669	0.129
	Kinesthetic	0.064	0.012
Acquisition mode C2[0.723]	Repetition	0.776	0.561
	Intuition	0.068	0.049
	Understanding	0.155	0.112
Energy C3[0.083]	Flow	0.5	0.042
	Effort	0.5	0.042

Table III: the global and local weights of the criteria and sub-criteria according to the Mixed Expert

Mixed Expert			
Criteria	Sub-criteria	Weight	
		Local	Global
Sensory organ C1[0.428]	Visual	0.58	0.248
	Auditory	0.349	0.149
	Kinesthetic	0.07	0.030
Acquisition mode C2[0.143]	Repetition	0.25	0.036
	Intuition	0.25	0.036
	Understanding	0.5	0.072
Energy C3[0.428]	Flow	0.334	0.143
	Effort	0.666	0.285

Table IV: the global and local weights of the criteria and sub-criteria according to the Montessori Expert

Montessori Expert			
Criteria	Sub-criteria	Weight	
		Local	Global
Sensory organ C1[0.458]	Visual	0.346	0.158
	Auditory	0.11	0.050
	Kinesthetic	0.544	0.249
Acquisition mode C2[0.416]	Repetition	0.4	0.166
	Intuition	0.4	0.166
	Understanding	0.2	0.083
Energy C3[0.126]	Flow	0.5	0.063
	Effort	0.5	0.063

Table V: the global and local weights of the criteria and sub-criteria according to the Global Expert

Global Expert			
Criteria	Sub-criteria	Weight	
		Local	Global
Sensory organ C1[0.143]	Visual	0.723	0.103
	Auditory	0.193	0.028
	Kinesthetic	0.083	0.012
Acquisition mode C2[0.428]	Repetition	0.091	0.039
	Intuition	0.454	0.194
	Understanding	0.454	0.194
Energy C3[0.428]	Flow	0.5	0.214
	Effort	0.5	0.214

The next Fig. 1 presents the hierarchy of criteria and sub-criteria [19] used to evaluate the pedagogical methods using the AHP method.

The hierarchy of criteria reveals 3 major classes that describe how the child perceives the information presented to him, the ways in which he can reinforce his learning and the energy he must put into it [10]:

- The « sensory organ » used by the child to acquire learning: vision (visual), hearing (auditory) and / or touch (Kinesthetic).
- The « acquisition mode » that allows him to consolidate his learning: repetition, intuition and / or understanding.

- The "energy" necessary to his learning: the flow (intensity or speed) and the effort (force) provided.

Sensory organ: this criterion has 3 sub-criteria:

- **Visual:** photographic memorization of the forms of words and / or sentences,
- **Auditory:** phonic correspondence following a logical progression of the letters' decryption,
- **Kinesthetic:** gestural mechanics that allows the child to feel what he reads to better remember.

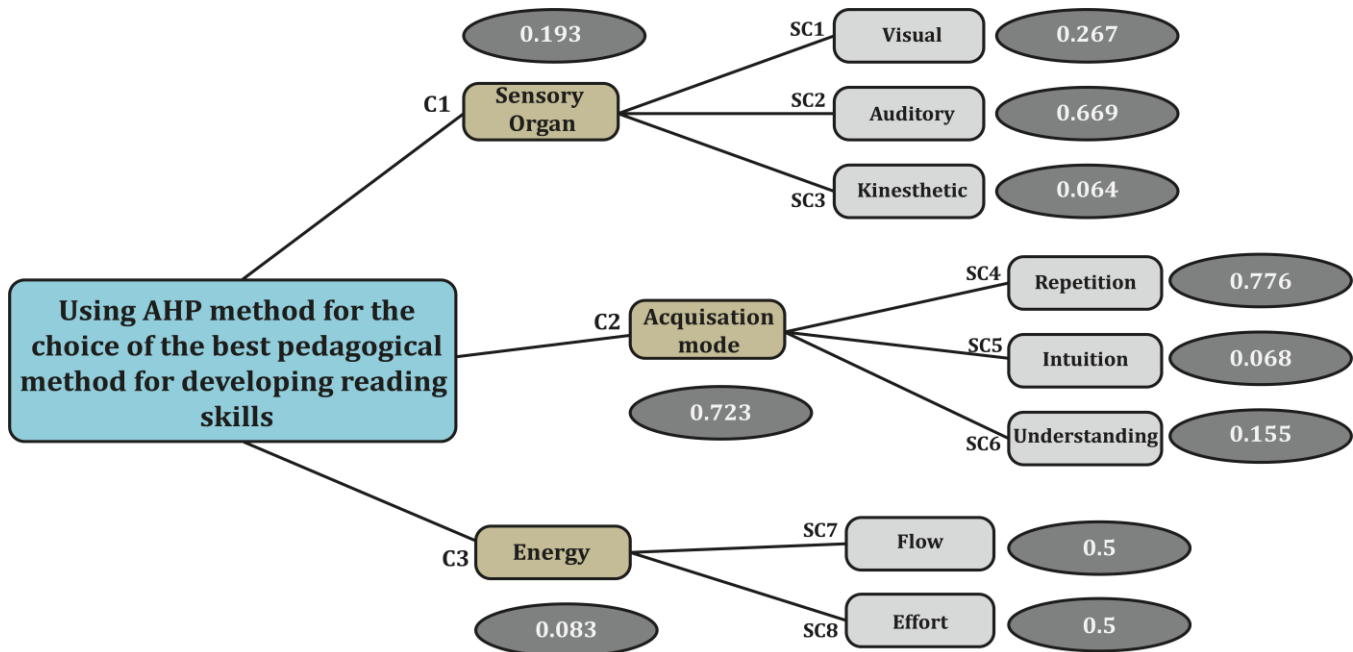


Figure 1 : hierarchy of criteria and sub-criteria used to evaluate the pedagogical methods and their weights

Acquisition mode: this criterion includes 3 sub-criteria:

- **Repetition:** a training session during which the child repeats the same letters or repeats the same gestures,
- **Understanding:** the child has a mental representation attached to the word he is about to read [12], [15],
- **Intuition:** in the context where there is emission of hypothesis or dependency of the context.

Energy: this criterion incorporates 2 sub-criteria:

- **Flow** (speed or **intensity**) of learning,
- **Mental and physical effort** provided by the child to assimilate the presented text.

B. Steps of an AHP analysis

1) Introduction to the AHP

Using the AHP method [18], [17] enabled us to determine for each teaching method, the preferences and weights of the criteria and sub-criteria.

The following steps are used during the decision-making process:

- Structuring the hierarchy of the problem;
- Construction of the judgment matrix;
- Building a priority vector of weights of criteria;
- Analysis of the consistency of judgments;
- Comparative study of alternatives.

2) The fundamental scale of absolute value

These preferences expressed by linguistic expressions or qualitatively will be quantified numerically according to the grid shown in VI. It is the scale initially proposed by Professor Saaty.

Table VI: the fundamental scale of absolute value

Digital scale	Reciprocal	Linguistic scale
1	1	equivalents
2	1/2	almost equivalents
3	1/3	slightly important
4	1/4	moderately important
5	1/5	generally more important
6	1/6	more important
7	1/7	much more important
8	1/8	extremely more important
9	1/9	infinitely more important

3) Table illustrating the comparisons of the criteria - Syllabic method

The experts are supposed to evaluate the comparison as equivalent, almost equivalent, slightly or moderately more important, more, much more, highly more, and infinitely more important.

The opinions were collected as shown in VII.

Table VII: : table of pairwise comparisons between subcriteria with their digital and verbal evaluation of the Syllabic method

Pairwise comparison of subcriteria	Criteria considered most important	Verbal assessment	Digital evaluation
Visual / Auditory	Auditory	slightly important	3
Visual / Kinesthetic	Visual	generally more important	5
Visual / Repetition	Repetition	generally more important	5
Visual / Intuition	Visual	infinitely more important	9
Visual / Understanding	Visual	generally more important	5
Visual / Flow	Visual	slightly important	3
Visual / Effort	Visual	slightly important	3
Auditory / Kinesthetic	Auditory	infinitely more important	9
Auditory / Repetition	Repetition	slightly important	3
Auditory / Intuition	Auditory	infinitely more important	9
Auditory / Understanding	Auditory	generally more important	5
Auditory / Flow	Auditory	generally more important	5
Auditory / Effort	Auditory	moderately important	4
Kinesthetic / Repetition	Repetition	generally more important	5
Kinesthetic / Intuition	Kinesthetic	almost equivalents	2
Kinesthetic / Understanding	Kinesthetic - Understanding	Equivalents	1
Kinesthetic / Flow	Flow	slightly important	3
Kinesthetic / Effort	Effort	generally more important	5
Repetition / Intuition	Repetition	infinitely more important	9
Repetition / Understanding	Repetition	much more important	7
Repetition / Flow	Repetition	generally more important	5
Repetition / Effort	Repetition	slightly important	3
Intuition / Understanding	Understanding	slightly important	3
Intuition / Flow	Flow	slightly important	3
Intuition / Effort	Effort	generally more important	5
Understanding / Flow	Flow	slightly important	3
Understanding / Effort	Effort	moderately important	4
Flow / Effort	Effort	presque équivalent	2

The same principle has been applied for the other methods, which allows us to elaborate the judgment matrices.

4) Comparison judgment matrix

The transcription of the values of the evaluations of the criteria comparison table into judgment matrices is shown for each method in VIII, IX, X, and, XI.

And they are obtained by using the equations (1, 2, 3).

The judgments are expressed according to the ratio w_i / w_j which indicates the importance of the attribute "i" with respect to "j".

$$A = \begin{pmatrix} w_1/w_1 & w_1/w_2 & \dots & \dots & w_1/w_p \\ w_2/w_1 & w_2/w_2 & \dots & \dots & \dots \\ \dots & \dots & \ddots & \dots & \dots \\ \dots & \dots & \dots & \ddots & \dots \\ w_p/w_1 & \dots & \dots & \dots & w_p/w_p \end{pmatrix} \quad (1)$$

Where $c_{jm} = w_j/w_m \forall j, m = 1, \dots, p$, we have :

$$A = \begin{pmatrix} c_{11} & c_{12} & \dots & \dots & c_{1p} \\ c_{21} & c_{22} & \dots & \dots & \dots \\ \dots & \dots & \ddots & \dots & \dots \\ \dots & \dots & \dots & \ddots & \dots \\ c_{p1} & \dots & \dots & \dots & c_{pp} \end{pmatrix} = (c_{jm})_{1 \leq j, m \leq p} \quad (2)$$

Knowing that: $c_{jm} = 1 \forall j = m$ et $c_{jm} = 1/c_{mj} \forall j, m$

The pair-wise comparisons are organized into a square matrix "A". The elements of the diagonal of the matrix are noted 1.

If the value of the element $c_{ij} > 1$ this means that the criterion in row "i" is considered more important than the one on column "j". And the ratio $\frac{1}{c_{ij}}$ is then placed at the intersection of column "i" and line "j".

For the syllabic teaching method:

$$A = \begin{pmatrix} 1 & 1/3 & 5 & 1/5 & 9 & 5 & 3 & 3 \\ 3 & 1 & 9 & 1/3 & 9 & 5 & 5 & 4 \\ 1/5 & 1/9 & 1 & 1/5 & 2 & 1 & 1/3 & 1/5 \\ 5 & 3 & 5 & 1 & 9 & 7 & 3 & 5 \\ 1/9 & 1/9 & 1/2 & 1/9 & 1 & 1/3 & 1/3 & 1/5 \\ 1/5 & 1/5 & 1 & 1/7 & 3 & 1 & 1/3 & 1/4 \\ 1/3 & 1/5 & 3 & 1/3 & 3 & 3 & 1 & 1/2 \\ 1/3 & 1/4 & 5 & 1/5 & 5 & 4 & 2 & 1 \end{pmatrix} = (c_{jm})_{1 \leq j, m \leq p}$$

This matrix ‘A’ is represented by VIII.

Table VIII: judgment matrix of the syllabic method

	Vi-sua l	Au-dito-ry	Kines-thetic	Repe-tition	Intui-tuition	Unders-tanding	Fl ow	Effor t
Visual	1	1/3	5	1/5	9	5	3	3
Auditory	3	1	9	1/3	9	5	5	4
Kines-thetic	1/5	1/9	1	1/5	2	1	1/3	1/5
Repeti-tion	5	3	5	1	9	7	3	5
Intuition	1/9	1/9	1/2	1/9	1	1/3	1/3	1/5
Unders-tanding	1/5	1/5	1	1/7	3	1	1/3	1/4
Flow	1/3	1/5	3	1/3	3	3	1	1/2
Effort	1/3	1/4	5	1/5	5	4	2	1

The same approach has been applied to the three other teaching methods.

Table IX: judgment matrix of the global method

	Vi-sua l	Au-dito-ry	Kines-thetic	Repe-tition	Intui-tuition	Unders-tanding	Fl ow	Effor t
Visual	1	5	7	5	1	3	3	1
Auditory	1/5	1	3	3	1/3	1/5	1/3	1/3
Kines-thetic	1/7	1/3	1	3	1/5	1/5	1/3	1/3
Repeti-tion	1/5	1/3	1/3	1	1/5	1/5	1/5	1/3
Intuition	1	3	5	5	1	1	3	1
Unders-tanding	1/3	5	5	5	1	1	3	1
Flow	1/3	3	3	5	1/3	1/3	1	1
Effort	1	3	3	3	1	1	1	1

Table X: judgment matrix of the mixed method

	Vi-sua l	Au-dito-ry	Kines-thetic	Repe-tition	Intui-tuition	Unders-tanding	Fl ow	Effor t
Visual	1	2	7	2	2	1	1/2	1/2
Auditory	1/2	1	6	2	1/3	1/5	1/3	1/2
Kines-thetic	1/7	1/6	1	1/7	1/7	1/8	1/7	1/7
Repeti-tion	1/2	1/2	7	1	1	1/2	2	2
Intuition	1/2	3	7	1	1	1/2	1	1/2
Unders-tanding	1	5	8	2	2	1	1	1/2
Flow	2	3	7	1/2	1	1	1	1
Effort	2	2	7	1/2	2	2	1	1

Table XI: judgment matrix of the Montessori method

	Vi-sua l	Au-dito-ry	Kines-thetic	Repe-tition	Intui-tuition	Unders-tanding	Fl ow	Effor t
Visual	1	1/3	1/3	3	1/3	1	1	3
Auditory	3	1	1	3	1/3	1/3	1	1
Kines-thetic	3	1	1	5	4	1	3	5
Repeti-tion	1/3	1/3	1/5	1	1/5	1/7	1	1
Intuition	3	3	1/4	5	1	1/3	3	4
Unders-tanding	1	3	1	7	3	1	3	3
Flow	1	1	1/3	1	1/3	1/3	1	1
Effort	1/3	1	1/5	1	1/4	1/3	1	1

	Vi-sua l	Au-dito-ry	Kines-thetic	Repe-tition	Intui-tuition	Unders-tanding	Fl ow	Effor t
Visual	1	1/3	1/3	3	1/3	1	1	3
Auditory	3	1	1	3	1/3	1/3	1	1
Kines-thetic	3	1	1	5	4	1	3	5
Repeti-tion	1/3	1/3	1/5	1	1/5	1/7	1	1
Intuition	3	3	1/4	5	1	1/3	3	4
Unders-tanding	1	3	1	7	3	1	3	3
Flow	1	1	1/3	1	1/3	1/3	1	1
Effort	1/3	1	1/5	1	1/4	1/3	1	1

5) Calculation of the priority vector

A normalized comparison matrix, such that the sum of the columns is equal to 1, is established in order to determine the relative weight of each criterion.

The weights of the attributes are measured with respect to each other according to the equation (3).

$$w = \begin{pmatrix} w_1 \\ w_2 \\ \vdots \\ w_n \end{pmatrix} \quad (3)$$

XIII summarizes the priority vectors of all pedagogical methods.

Table XII: priority vectors of all pedagogical methods

Criteria / Methods	W _{syllabic}	W _{Global}	W _{Mixed}	W _{Montessori}
Visual	0.15407	0.24397	0.14148	0.09885
Auditory	0.24370	0.06049	0.08252	0.11393
Kinesthetic	0.03467	0.04233	0.01786	0.23484
Repetition	0.33406	0.03124	0.14271	0.03994
Intuition	0.02084	0.18667	0.11301	0.17168
Understanding	0.03746	0.17897	0.17544	0.22177
Flow	0.07428	0.10820	0.15077	0.06527
Effort	0.10093	0.14813	0.17622	0.05373

6) Study of the coherence

The verification of the consistency of our matrices is done because there might be a possibility of uncertainty from the experts or them making poor judgments concerning the comparison of some elements.

The level of coherence is reasonably acceptable if one has a CR (Coefficient Ratio) less than or equal to 0.1 [17], [26].

Otherwise the answers of comparisons need to be reconsidered.

The calculation of the coherence ratio CR is done by the computation of the ratio CI (Consistency Index) on RI(Random Index).

We first determine the Random Index (RI).

In our case n = 8, the IR = 1.41, according to XII [30]:

Table XIII: the Random Index (RI) (SAATY, 2005)

Then, we calculate the consistency index using the following equation:

$$CI = \left(\frac{\lambda \max - n}{(n - 1)} \right) \quad (4)$$

Where **n** is the number of criteria and $\lambda \max$ the maximum eigenvalue of the judgment matrix.

In our study, and as shown in XIV, the **CR** is less than 10%, for the four teaching methods, for the criteria of the matrix, visual, auditory, kinesthetic, repetition, intuition, comprehension, speed and effort, which indicates that all matrices were compliant.

Table XIV: Calculated CR for all the pedagogical methods

Methods		Calculated CR									
Syllabic		0.0706									
N	1	2	3	4	5	6	7	8	9	10	
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49	
Global		0.0601									
Mixed		0.0974									
Montessori		0.0933									

C. Presentation of the results and alternatives:

We create the solution matrices, corresponding to each one of the 4 experts, by inserting the solutions in the first column and the decision criteria in the first row.

We give the example of the syllabic expert XV:

Table XV: solution matrix given by the syllabic expert

Subcriteria	Visual	Auditory	Kin��sth��sique	Repetition	Intuition	Understanding	Flow	Effort	
Weight	0.1541	0.2436	0.0346	0.3340	0.0208	0.0374	0.0742	0.1009	
Methods	The weight of methods at sub-criteria level								Weight of methods
Syllabic	0.0716	0.5915	0.0856	0.5396	0.0761	0.0603	0.2857	0.2	0.3837
Global	0.5497	0.0899	0.1508	0.0573	0.3734	0.3960	0.2857	0.2	0.1950
Mixed	0.2252	0.2199	0.0856	0.1314	0.1963	0.3960	0.1428	0.4	0.2050
Montessori	0.1533	0.0985	0.6778	0.2715	0.3541	0.1476	0.2857	0.2	0.21618

And having made the weighted average of the weight of the methods in relation to their matrices of solutions, we obtain the following table:

Table XVI: weighted average of the judgments of different experts

	Syllabic	Global	Mixed	Montessori
Expert Syllabic	0.3837	0.1950	0.2051	0.2169
Expert Mixed	0.2350	0.2861	0.2540	0.2249
Expert Global	0.1593	0.3489	0.2582	0.2336
Expert Montessori	0.1720	0.2836	0.2250	0.3193

XVII presents the ranking of pedagogical methods of developing reading skills:

Table XVII: ranking of pedagogical methods of developing reading skills

Ranking	Pedagogical methods
1	Global Method
2	Montessori Method
3	Syllabic Method
4	Mixed Method

V. CONCLUSION ET PERSPECTIVES

In this article we have considered several pedagogical methods (Syllabic, Global, Mixed, Montessori, Ideo-Visual, interactive, phonomimic, Alphas, Jean-qui-rit) of teaching and learning to read in order to evaluate them by applying a multi-criteria method which is the AHP method one of the MCDM methods. And which gave us a ranking of these pedagogical methods where the global method has distinguished from other methods on the basis of the values mentioned above.

This work is conducted in order to give primary learning its true value, which is currently experiencing some decline. Also to better identify the most appropriate learning method for a specific profile. Because, we noticed that from criteria related to the learning method, there are also criteria related to the learner which have an important impact.

We started to mix these two approaches [16], namely the method-oriented aspect and the profile-oriented aspect. And further research is underway by the authors to expand the work presented here by exploring other learnings types (calculation, comprehension, written and oral expression), including the integration of ICT (Information and communications technology) and multimedia in a context of collaborative learning.

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