

Literacy, socioconstructivism and neuroscience



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Rayane Bezerra de França

Undergraduate student of the Course of Letters – Portuguese/English of the University of Pernambuco – UPE

E-mail: rayfranca1609@gmail.com

ABSTRACT

This article focuses on the socioconstructivist educational approach that underlies the didactics of many teachers from the most diverse fields of knowledge. However, it will only be detailed here its implications with regard to literacy. The research

that follows was based on a theoretical refinement in line with the neuroscientific perspective of how the human being learns to read and write. The result of the readings and inferences consists, widely and often, in the theories of Vygotsky and Piaget continue to be misinterpreted and transmuted to the scope of education, when they discuss precisely issues related to the biological and psychic development of the child, excluding propositions about the methodological natures of the process of reading and writing.

Keywords: Literacy, Socioconstructivism, Neuroscience.

1 INTRODUCTION

For at least more than two decades, the news about Education has been evidencing the precariousness of the performance of Brazilian students in the most varied international and national tests. An example of this condition is Brazil's position in the latest survey by the Program for International Student Assessment (PISA). As for reading skills, the country is in the 57th position, in Science in the 66th and in Mathematics in the 70th out of a total of 79 countries evaluated. The magazine ISTOÉ, in 2018, published an article that had the title "Brazil completes 20 years without advancement in high school", the news portal Folha de São Paulo published in December 2019 an article entitled "Elite students in Brazil perform worse in reading than poor in other countries", the large audience platform G1 also reported the result of the study done by MEC that stated that out of every 10 students 7 have insufficient level in Portuguese and mathematics in high school. Frequently encountering news like this requires academics and even the entire Brazilian population to pay greater attention to what may be happening in the educational area.

For this reason, the topic that will be addressed in the following pages is of such relevance. Sticking to common sense is not the duty of the university class. Therefore, statements such as "Education is in this situation, because teachers earn bad salaries!" and "Not enough is invested in education." are too small to conclude precisely the problem of current education. I emphasize that they can be causes for the decline, but it is essential that it be analyzed in the light of the scientific method and not of popular opinion.



Understanding the reason for such performance of Brazilian students with regard to reading and writing is fundamental, because these skills are one of the bases for cognitive development, for the production of knowledge and for professional excellence. Thus, entering the universe of literacy is essential for understanding these low indices, since, when we present serious problems of interpretation, for example, the main hypothesis is that there were failures in the principle of acquisition of the alphabetic code.

2 ACQUISITION OF READING AND WRITING

In the mid-1980s, the Brazilian curriculum changed its guidelines to the implementation of new educational approaches. By approach, it is understood that it is the assumptions that contribute to the foundation of the methods. From these, there is a set of mechanisms/tools that can be used to structure pedagogical practice. This first explanation is very necessary to understand what underlies the laws that govern education in Brazil.

At first, I will discuss the methods that teachers use to teach students to read and, in the second instance, I will highlight the presence of these methods in official documents.

There are two methods of literacy, synthetic and analytical or global. They underlie the conceptions of teaching-learning. The synthetic methods, suggested by Philip Gough, ¹can be summarized by the expression "from the parts to the whole" or *bottom-up* and support the idea that one learns to read and write gradually, starting from the letters, phonemes and syllables to reach the last stages of reading: words, sentences, texts and the semantic-discursive level. Analytical methods, which emerged between the sixteenth and eighteenth centuries in Europe, reveal that reading happens through direct visual recognition of words. For this reason, global methods are also called ideographic, ideovisual or iconographic. It would be a kind of significant whole initially to be worked on in the classroom and then to enter into the parts that constitute that whole ("from the whole to the parts").

The synthetic methods are subdivided into syllabation, spelling and phonic methods, which differ in the first phase of presentation. Respectively, there is the exposition of the syllables, to the end to read small texts, or letters, or even the introduction to phonemes and their visual correspondents. The analytical methods branch into methods of wording, whose first phase seeks to present a significant word (for Paulo Freire, for example, this is the generative word), of sentencing that presents a significant sentence, or the teacher can still use texts/tales to motivate the children, followed by the "observation of the words of the text and their meanings". These global methods were inspired by the studies carried out by the Argentine psychologists Emilia Ferreiro and Ana Teberosky, which are shown today in the theory of the Psychogenesis of Written Language (1979). In addition to this theory, the

¹ Professor Emeritus of Psychology, University of Texas. He proposed the *bottom-up* reading model in his work entitled "One Second of Reading" that became popular in the 1970s.



Whole Language movement² was also influenced by Piaget's Constructivism (a perspective based on the understanding of hereditary biological maturation) and Vygotsky's Sociointeractionism (adaptation of the conception of language under the gaze of dialectical Marxism). However, all these researches were constituted more in theories of cognitive development than in psychological theories of education or even teaching methodologies.

As for the pedagogical practices themselves, there was a kind of rereading of the studies already mentioned, merging theoretical fields in order to change the current exercise, which until then was and is considered as "traditional" and "inefficient". In a synthetic way, teachers began to see the student as the subject of their own learning and no longer as a patient being. Social interaction has also come to be valued as a means for authentic and constructive learning. Synthetic methods, therefore, were abandoned in order to implement "innovative" pedagogies. By way of information, what is now considered Socioconstructivism presupposes the theoretical junction of Piaget's genetic epistemology, the Psychogenesis of Written Language, Sociointeractionism, the Whole Language movement, which instituted the dynamics of literacy³ (focus on the social function of language, juxtaposing itself with the student's reality) and enunciative/discursive linguistics.

There is not explicitly, in the BNCC (National Common Curricular Base), for example, a method by which children should be literate, but in the Pro-literacy Program of the MEC (Ministry of Education) activities are suggested in which students should formulate hypotheses about writing systems. In addition, other official documents such as the PCNs (National Curricular Parameters) and the materials that aim to guide the pedagogy of the teacher in the classroom bring with them the socioconstructivist ideals⁴.

As for reading materials, for example, the recommendation made by BNCC is that:

In spite of the reading and production shared with the teacher and colleagues, still, the genres proposed for reading/listening and oral, written and multisemiotic production, in the first initial years, will be simpler, such as lists (call, ingredients, purchases), tickets, invitations, photocaption, headlines and readings, lists of class rules, etc., because they favor a greater focus on spelling, becoming more complex as one progresses in the initial years. In this sense, the field of daily life stands out, in which genres more familiar to students circulate, such as cantigas de roda, recipes, game rules, etc. (BNCC, 2017, p. 89).

However, these proposals for readings have proved ineffective. In the PISA test, for example, it was found that students who read fiction perform better than those who read informative texts or those suggested by BNCC. This is the case of Portugal, where it is observed the work with fictional

² Literacy philosophy that believes that language should not be divided into letters and combinations of letters and "decoded". Instead, it should be seen as a complete system of meaning-making, with words functioning in relation to each other in context.

³ According to Magda Soares (2003), "Letrar is more than literacy, it is teaching to read and write within a context where writing and reading have meaning and are part of the student's life."

⁴ Katia Simone Benedetti, pp. 66-71.



books since early childhood education, since when reading a fictional narrative it is necessary to memorize a series of elements so that there is a comprehensive progression of reading.

With regard to the validity of global methods and the socioconstructivist approach to teaching, neuroscience attests that such technologies are opposed to the way our brain sees the process of reading and writing. Already beforehand, such exercises are not natural to man as is the case of orality. In fact, "reading-writing is a cultural object that was created and developed from the readaptation of neurobiological networks intended for other adaptive functions of our species." Therefore, its acquisition does not occur in the same way as that of speech. The learning of spoken language is already predetermined by the nervous system.

With regard more precisely to the brain regions that relate to the act of reading, the research carried out with the help of functional neuroimaging "revealed the existence of three important cortical centers": the frontal lobe, the parieto-temporal and occipite-temporal junctions.

The path of reading in the human brain begins in the eye, in the center of the retina, an area called the fovea. It is at the left occipite-temporal pole (located at the back of the brain) that the process of letter recognition begins. It is about 200 milliseconds after neurons break down words into letters that the auditory and pronunciation regions of the language's acoustic images are activated. The region that performs such coding is called *planum temporale*. At the end, the semantic cortical areas are lit to form the meaning of what is being read, thus developing the lexical pathways of reading. The conclusion is natural: the human being reads from the parts to the whole.

The fact that unknown and rare words are pronounced gradually before being acoustically recognized reveals why the global approach to literacy is so harmful to students' reading performance: they become justly unable to access the acoustic image (pronunciation) of unknown words through the graphophonemic reading strategy (because the global approach does not consolidate it, rather, it reinforces the ideovisual strategy that is, in fact, a pseudo-reading, a divination). Global approaches, prioritizing meaning, the semantic and discursive aspect of language, are contrary to the neurobiological process of reading. It is imperative, therefore, that the process of literacy is adequate to this neurobiological reality of the brain, which is definitely not the case with the socioconstructivist approach. (BENEDETTI, 2020, p.139-140).

According to Capovilla, there are two main disadvantages of the global socioconstructivist approach: reading becomes inaccurate causing confusion when you have words with similar writings (precisely because it is an ideographic strategy) and, when faced with unknown and irregular spellings, reading does not thrive. Thus, the best way to become literate is to form a phonological awareness. As for writing, Abbott and Berninger state that there are three tools necessary for the formation and development of this competence: calligraphy, graphic coding and composition. The first reinforces motor coordination skills, the second allows the understanding of the phoneme-grapheme relationship and the third concerns the textual production itself, from the elaboration of notes to future dissertations.



It is worth mentioning that the global way of reading words is used, however, when one is already a fluent reader, never as a first step in the cases of languages in which the symbols represent the sounds of speech, such as Portuguese and Italian, also called "superficial spelling" languages, in which words are usually read as they are written. About this Ramon & Leonor states:

The learner of reading uses the phonological system to decode new or irregular words, but with the increase in ability, the brain becomes able to recognize spelling patterns in order to process them quickly, using the second way, global perception. Phonological decoding can become an optional part of fluent reading [...] (COSENZA; WAR, 2011, p. 104).

Nevertheless, in Brazil, the analytical method of literacy and the pedagogies that imply in the "discoveries" of information by the student are still overvalued. However, it has already been proven that explicit and targeted teaching is ideal. This finding is present in the scientific publication made by the journal *Review of Educational Research* entitled "The Effectiveness of Direct Instruction Curricula: A Meta-Analysis of a Half Century of Research". Research attests that when students receive well-planned instruction and learn increasingly from easier to more complex levels, they tend to establish longer-lasting and more efficient learning links. In this perspective, incoherent elaborations are avoided, since the learner will receive correct information about the object of study. And once the basic knowledge is incorporated, he will be able to elaborate his criticisms and to better relate what he has learned with his preambular knowledge.

The questions that follow in relation to the current situation are: why is a demonstrably inefficient method still used? The answer given by the scientists who led the research converges to the maxim that is presented in all teacher training courses, students would be suffering a kind of "oppression" when subjected to direct instruction or even becoming incapable of thinking critically. However, when basic knowledge is held, it is that a being becomes capable of formulating criticisms.

In addition, according to Bernardin, organizations that operate at the global level, such as UNESCO, the OECD, the Council of Europe, the Brussels Commission, etc., have been moving for some time towards the implementation of non-cognitive and multidimensional teaching, focusing on the socialization of students and the premise that there are different types of knowledge. In addition to applying pedagogies where the learner is at the center. According to the French professor, the practices adopted are based on political theories and distance themselves from the real objective of education, only intending to "modify attitudes on an international scale", through psychological manipulation techniques. These attitudes converge to a political ideal. In view of the above, Dewey⁵ in "The School and Society" states:

⁵ American philosopher who became known for his theories belonging to the philosophical current of progressive education. He postulated about the accomplishment of tasks by the student that were associated with the practice. The pedagogical practice, according to him, should always start from questions and not from a "ready" knowledge. For this reason it also influenced Constructivism.



The introduction of active occupations, the study of nature, elementary science, art, history; the relegation of purely symbolic and formal disciplines to a secondary position; the modification of the moral atmosphere of the schools... They are not simple accidents, but they are necessary facts for social evolution as a whole. All that remains is to reconnect all these factors, to give them their full significance, and to surrender the complete possession of our schools, without compromise, to the ideas and ideals that flow from them. (DEWEY, 1889).

In view of the above, the global or analytical method of literacy endures for the same reasons as pedagogical models opposed to direct instructions. They reaffirm and promote the expansion of a global agenda based on the insertion of historical-dialectical materialism in the educational sphere. They are based on qualitative research in the areas of social sciences, dispensing with the most recent empirical studies involving the dynamics of brain functioning. When it comes to literacy, we talk about the process of learning to read and write: how the human brain behaves when reading and writing. Thus, there is a scientific description about such actions that are commonly obscured.

For such conducts, the consequences of the lack of teaching of the alphabetic code and the graphophonemic relationship are drastic. According to Benedetti, the increase in the incidence of mirrored writing and exchange of letters, for example, happens precisely because the training of calligraphy is marginalized, which among other benefits solves the problems of symmetry with which we are already born. This is because *the movements of writing activate the ventral visual pathway and the dorsal pathway, responsible for the adaptation of eye movements to the shapes and characteristics of the letters, preventing non-recognition.*

In addition, the lack of identification of the stressed syllable is very common, for reasons that socioconstructivist teaching, according to Capovilla, does not allow "students to understand the syllabic and morphological structure of words", being impossible to "understand the logic of accentuation". Other problems, such as difficulty in segmenting certain linguistic expressions, spelling errors and limited vocabulary along with the difficulties of expanding them, highlight the most common mismatches and escape correction during the process of learning the written language.

3 METHODOLOGY

This work followed a methodological line based on bibliographic research, turning to authors who transit the stage of education and who raise questions and propositions divergent from the names that still exist, such as those mentioned: Vigotsky, Piaget, Emília Ferreiro, Magda Soares, among other authors who are in the areas of educational sciences big names and, sometimes, the only ones consulted. The information described here was carefully collected from materials that followed the scientific method to the letter, using only experimental research. Finally, the present article aims to present new conceptions about literacy practice in the most credible way possible.



4 RESULTS AND DISCUSSION

As already detailed along these lines, the current methodological proposal of teaching reading and writing has led to and still causes serious disorders that surround the learning of young people, which is not limited only to the Portuguese Language, for example, but also reaches other areas of knowledge, because after all the sciences involve language and its nuances.

It is important to highlight that the theories described and analyzed should not be ignored by education professionals, but rather understood according to the scientific circle in which they were produced. I tried to raise issues that are commonly forgotten during the training of teachers and, with this, I hope to foster discussions on the subject based on research of scientific fact.

In the end, it was possible to ascertain how harmful analytical methods are to the population of future readers and writers, while the phonic method is insistently inferiorized for reasons of ignorance of its benefits or for political reasons. I end this article with the speech of Professor Carlos Nadalim, "One of the great mistakes is to believe that children are able to read and write through a psycholinguistic game of divinations. The simple conviviality with written texts does not allow children to build hypotheses."

5 FINAL CONSIDERATIONS

I hope that the data mentioned will serve as a warning to future and even current teachers who somehow want to provide the best possible education to their students. I want the academies in general to update their curricula in the pedagogical fields and embark on the road of scientific knowledge, in order to enable every interested Brazilian true and enriching content.

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