Neuropsychology in literacy action proposed by the Paulo Freire method

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ABSTRACT

The present article was proposed with the objective of evaluating, through neuropsychological constructs, cognitive processes and strategies that corroborate the effectiveness of the Paulo Freire method, and there is a concern about the number of students enrolled in the educational program who have given up on their schooling process, since Paulo Feure's method is available to intervene and reduce the rates of the illiterate contingent. The method was designed to teach literacy and/or facilitate reading and writing in young people and adults. The methodology consists of the correlation between neuropsychological concepts with the Paulo Freire method to verify the reason for its effectiveness through a literature review of authors such as: Abramovay (2015), Catânia (1999), Eysenck (2017), Mendonça (2007), Paulo Freire (1967), going through the practice of the authors of this work, with the objective of understanding and elucidating the cognitive processes and strategies that favored the success of Paulo's method in the literacy action of adults, with the intention of contributing to the composition of training materials for literacy teachers of Youth and Adult Education (EJA). Therefore, the following were described: Paulo Freire's sociolinguistic method, the neuropsychological explanation of the learning contained in the method and the importance of these contributions to the continuing education of EJA literacy teachers. Paulo Freire's method privileges the mnemonic system so that students can be taught to read and write more quickly and fluidly and has in its essence to make the learner an active and participatory being in the construction of his own knowledge, integrating "learning how to do something" with which he "already knows how to do it". It promotes knowledge "about what it already knows how to do" by composing a knowledge continuum in new information, both in terms of "what to do" and "doing", thus weaving a network of practical meanings for knowledge. Many learners know how to "do something" but need to "learn about something they do." The search for PG, already known in sound and its meaning, leaves the iconic and echoic memory free of competing stimuli, contributed to the decoding present in the method, together brings the phonological and orthographic neighborhood, which also privilege memorization; Consequently, it facilitates reading and graphic mastery of the writing of the mother tongue without overloading the attentional system, thus expanding the student's learning capacity. The task of finding PG in newspapers, magazines, song lyrics, labels and poems by the learners, makes it promote an exploratory process that activates the structure of the visuospatial sketch, both in the Visual Cache and in the Inner Scribe. In this way, the mnemonic capacity is enhanced in an interaction with the associative capacity produced by the central executive. The high level of immediate recall of sentences is substantially beyond the capacity of the phonological loop, however, it can be explained by the proposed capacity of four chunks of the episodic buffer that is activated when the method presents in sentence form within the context in sentences, providing an increase in the mnemonic capacity of the learner, going from 4 to 16 recalled units. which favors learning.

Keywords: Method, Paulo Freire, Neuropsychology, Memory, Learning.

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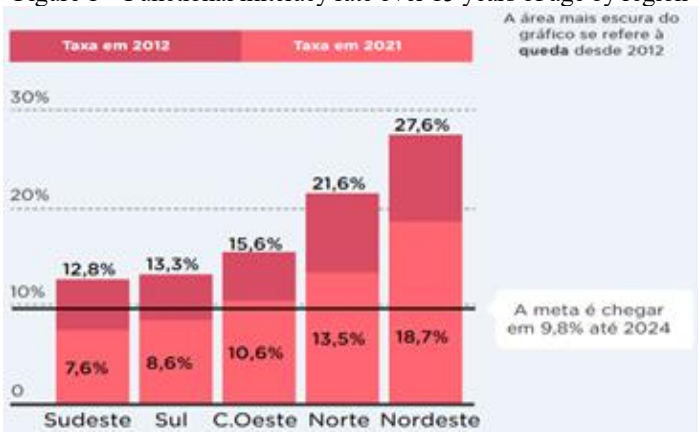
INTRODUCTION

Brazil is currently experiencing an educational crisis, with an illiteracy rate of 5.6% in 2022, which corresponds to 9.6 million people who cannot read and write, according to IBGE[6]. Another concern is functional illiteracy, which the NEXO – [7]Public Policies website (2023) presents an important comparative table for understanding this indicator divided by states. The Northeast is the largest region of functional illiteracy, reaching 27.6% of students who do not know how to read and write in an expected way for school level and age, see Figure 1:

Figure 1 – Functional illiteracy rate over 15 years of age by region



Source: Taken from the NEXO website https://pp.nexojornal.com.br/Dados/2023/05/19/A-alfabetiza%C3%A7%C3%A3o-e-o-illiteracy-functional-in-Brazil.

In view of the above-mentioned scenario, it is necessary to plan strategically in an emergency manner in order to change this condition. In an attempt to monitor educational development, an important tool was created to measure Brazilian educational development, the Basic Education Development Index (Ideb), created in 2007 by the National Institute of Educational Studies and Research Anísio Teixeira (Inep), formulated to measure the quality of national learning and assist educational professionals in setting goals for the improvement of teaching from 2012 onwards. In addition to this action, QEdu was born[8], a website that provides educational data with information on Brazilian Basic Education to monitor the development and improvement of indicators, for which it establishes challenges to be achieved in the country, in the states, in the municipalities and by school.

The IDEB challenge at the Brazilian level for 2021 was 4.9, where it reached 3.9. This indicator shows that the educational intervention projects have not been successful in advancing the educational development of Brazilian students.

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[6] IBGE, 2022 (ibge.gov.br). Available https://agenciadenoticias.ibge.gov.br/agencia-noticias/2012-agencia-de-noticias/noticias/37089-em-2022-analfabetismo-cai-mas-continua-mais-alto-entre-idosos-pretos-e-pardos-e-no-nordeste#:~:text=A%20taxa%20de%20analfabetismo%20das,da%20s%C3%A9rie%2C%20iniciada%20em%202016.tag . Accessed November 05, 2023.

[7] NEXO – Public Policies (2023). Available< https://pp.nexojornal.com.br/Dados/2023/05/19/A-alfabetiza%C3%A7%C3%A3o-e-o-analfabetismo-funcional-no-Brasil >. Accessed November 05, 2023.

[8] QEdu, 2023. Available <https://qedu.org.br/brasil. Accessed on 11/05/23

QEdu also brings a comparison with international assessments made in a sample format with students aged 15 and over, coordinated by the Organization for Economic Co-operation and Development in 2018 (OECD). Compares adequate learning in science, math, and Portuguese, as shown in Figure 2:

Figure 2 - International Evaluations

Source: taken from the QEdu website

There is concern about the number of students enrolled in the educational program who have given up on their schooling process, since Paulo Feure's method is available to intervene and reduce the rates of the illiterate contingent.

Nowadays Paulo Freire's works are widely disseminated, but do the teachers of Youth and Adult Education (EJA) master Paulo Freire's literacy method? Is your method being applied today to reduce the number of illiterate people? How does neuropsychology analyze the method and its effectiveness? These are unsettling questions, but they need to be answered.

The objective of this work was to understand through the neuropsychological constructs that consisted of a literature review of authors such as: Abramovay (2015), Catânia (1999), Eysenck (2017), Mendonça (2007), Paulo Freire (1967), going through the practice of the authors of this work, with the objective of understanding and elucidating the cognitive processes and strategies that favored the success of Paulo's method in the literacy action of adults and how the strategies applied facilitated reading and writing, with the intention of contributing to the composition of training materials for literacy teachers of Youth and Adult Education (EJA). Therefore, Paulo Freire's sociolinguistic method, the neuropsychological explanation of the learning contained in the method and the importance of these contributions to the continuing education of EJA literacy teachers were described.

We will now make a recapitulation of the method so that the reader can understand how Paulo Freire's method is in practice and what are the important points of the method explained by neuropsychology and the contributions.

PAULO FREIRE'S SOCIOLINGUISTIC METHOD

Beck (2016) brings in his article the work of Paulo Freire and describes his method in a succinct and easy-to-understand way. It states that the Patron of Brazilian Education developed a method of literacy based on the life experiences of people who were in the process of literacy. He came to break traditional methodological actions such as booklets and proposed a more active and participatory way of teaching.

The booklets taught, for example, "the ox drools" and "grandma saw the grape" without contextualizing these words with the world of the learner. Paulo Freire taught with the so-called "generative words (PG)". These words were taken from the reality of the learner who created a state of co-participation during the school education process. This condition gave the students a critical sense, appreciation and autonomy, a scarce state at the time of the illiterate Brazilian citizen.

Paulo Freire's Method consists of a literacy proposal for adults developed while he was director of the Department of Cultural Extensions at the University of Recife, in the state of Pernambuco. He organized and guided a group of students to test the method in the city of Angicos, in the state of Rio Grande do Norte. The program managed to get 300 people to read and write in 40 hours of applying the method. When thinking about this feat, it is important to highlight the relevant effectiveness of the method, the feasible relationship with neuropsychology. It was possible to re-read the method, explaining the reasons for its success. Let's see in practice how the method works and its peculiarities.

Steps, steps, and definitions

Paulo Freire's sociolinguistic method (Freire, 1967, p. 111) is divided into three phases: investigation, thematization and problematization. Mendonça, (2007, p. 105) corroborates and describes the method based on 5 stages: encoding, decoding, analysis and synthesis, in the fixation of reading and writing. Together with its corresponding activities at the following levels: pre-syllabic, syllabic and alphabetic

In the investigation stage, the student and teacher do not subject themselves, but in sharing, they seek in the vocabulary universe of the learner and the society where he lives, the central words and themes of his biography. It consists of exploring all the non-formal knowledge of the learner, acquired through the practice of their mother tongue and the relationship with the experiences lived.

In the research phase, a survey of 500 words from the learner's universe is carried out and the identification of the generative words (PG) of high vocabulary frequency, under the following criteria: a) phonetic richness; b) phonetic difficulties, in a gradual sequence from minor to major difficulties; c) pragmatic content of the word, i.e., in the plurality of the word's engagement in a given social, cultural, and political reality, which may be: "packaging", "brick", "cement" or "ladder".

The PG describes and searches together with the students for the importance of this word in the social, family and economic context.

The codification is made from the representation of the aspect of reality brought by orality, drawing, music, mime, dramatization. Permeated by geographical, historical and social variations. The exercise in this step is to find the described whole word (PG) and its initial letter.

In the decoding, the reality that gives shape and originates the thematization will be reread. Initially, it brings to the student "how that word", so often used in its context, is implied in the socio-political meaning. This action aims to produce relevant topics of interest to students. Thus, weaving social meaning, awareness, and the ability to question the world and circumstances around you.

During the process, didactic activities will be used at the pre-syllabic level, having the generative word (PG) such as "LADDER", which must be identified in its sound and spelling. To do this, it will be offered as an exercise to find the whole word and the initial letter of the PG within the aforementioned context, using song lyrics, poetry, labels, pamphlets, newspaper, magazines and book pages.

The analysis and synthesis phase consists of the presentation of the syllable families of PG, by means of a new word discovery form. The student is asked to identify the syllables of the PG among other syllables, both in uppercase letters and cursive letters (Figure 3). Subsequently, new words will be identified (Figure 4).

Figure 3 – Analysis of the Generating Word (PG)

ES-CA-DA

SA – LO – OS – VA – **ES**	*es - is - os - us - as*
CA – EM – **CA** – CO – QUE	*ca - ce - cu - co - ci*
DA – LA – DO – VE – CA	*de - do - da - di - du*
A I O U E	*a o u i e*

Source: extracted from the book Literacy: sociolinguistic method

In this phase of analysis and synthesis, the student who is already able to identify letters and syllables of the PG on the discovery form, moves on to the synthesis phase. Thus, it will be possible to make compositions of new words, with the exploration of the initial (ES), medial (CA) and final (DA) syllables, with the objective of forming words. Syllabic dominoes are suggested as a good option (Figure 5).

After the student identifies the letters and syllables of the PG on the discovery sheet, they can go to the synthesis phase. In this phase, the learner will compose new words, such as putting syllables together and composing words on the blackboard. You can also read them later, with the

student asking you to copy each one of them in the notebook. The compositions from the discovery sheet will be described in figure 4, see how it works:

Figure 4: New Word Discovery Sheet
HORSE CALLUS COW MOON HOUSE DICE
CABBAGE HURTS BAG GOES TO SCHOOL FALLS
Source: extracted from the book Literacy: sociolinguistic and adapted method

In this phase of analysis and synthesis in the discovery stage, the exploration of initial, medial and final syllables for the composition of words through the use of syllabic dominoes continues (Figure 5). After the learner masters this step, he will go to the composition of new words, consequently he will be ready for the didactic activities of the syllabic level.

Figure 5: Syllabic dominoes

In the stage of reading and writing, the student will be asked to read and write the compound words in the synthesis of syllables, in the activities of dictation of words and sentences, word search exercise, crossword, oral and written transcription of the student's dialect to the standard dialect and in the interpretation, production of sentences and texts with meaning.

At the end, comes the problematization stage, which consists of questioning between the student and the teacher the "why" of each situation. This is how the questioning behavior originates, capable of overcoming the learner's magical vision, replacing it with a critical vision of the world. This movement aims to encourage the learner to seek transformative answers from the context experienced, create conditions for overcoming obstacles and promote autonomy.

In short, the Paulo Freire method stimulates students' literacy through mediation that provides discussion about their own life experiences and the words present in the realities lived. From there, the generating word is identified, decoded for the acquisition of comprehension of letters, syllables and the word in an integral way. Subsequently, with the understanding of the written word, the decoding phase brings the immersion of the word within the context for the understanding of the

world and its systems. Thus, it develops the critical sense that helps in the acquisition of autonomy of the citizen learner.

REREADING OF THE PAULO FREIRE METHOD BY NEUROPSYCHOLOGY

Learning and memory

Learning involves the integration of cognitive, metacognitive, affective, motivational, and behavioral factors into the action of learning. From the point of view of self-regulated learning, it defines the student as the protagonist of their own learning, strengthening their ability to learn and control their psychological processes in the school stages (BORUCHOVITCH AND GOMES, 2019) that must be cultivated within schools.

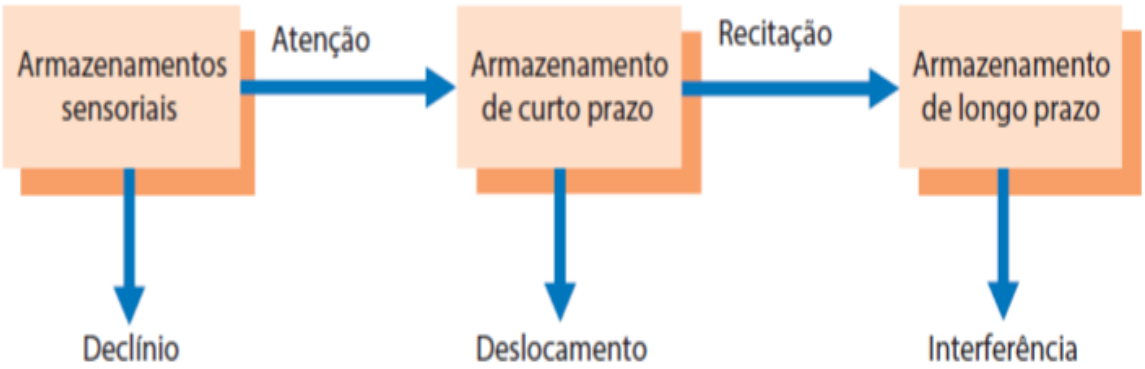
At the same time, memory is substantially important for learning in daily human activities. Without it, it would not be possible to follow conversations, remember phone numbers, write essays on exams, recognize people's faces, or understand what we read in books or in any other means of communication.

Eysenck (2017, p. 209) argues that learning and memory involve a series of stages. In the first stage there are processes that occur during the presentation of the learning material, such as: encoding, storage and recall. Encoding involves the perception of stimuli received by the sense organs that transform them into information. The ability to extract the stored information from the mnemonic system is retrieval. As a result of encoding, the information is stored within the mnemonic system for the retrieval of this data.

Memory and its subtypes

Eysenck (2017, p. 210) classifies memory into sensory, short-term and long-term, in terms of its capacity and duration. To explain the types and their mechanisms, he uses the multi-storage model Atkinson and Shiffrin (1968), where he describes the basic architecture of the memory system (see Fig. 6):

Figure 6 - Multi-storage memory model proposed by Atkinson and Shiffrin



Source: Memory multistorage model, as proposed by Atkinson and Shiffrin (1968).

According to the multi-storage model, environmental stimulation is initially processed by sensory storages. These stores are specific to each modality (e.g., vision, hearing). The information is kept for a short time in the sensory storages and some of it, when given attention, is thus processed within the short-term storage system. Some information processed in short-term storage is transferred to long-term storage when revisiting occurs. There is a direct relationship between the amount of recitation in short-term storage and the potency of the memory trace stored in long-term memory. (EYSENCK, 2017, p. 210)

Sensory Storages

Sensory stores are short-lived mnemic reserves, and the most studied, most prominently, are the iconic and echoic memory.

Visual storage (iconic memory) contains visual information for a short time of 500 ms or for a slightly longer period of time. It is useful and contains mechanisms responsible for visual perception with operation on the icon, concomitantly leaving visual information available for a longer time, such as at the time of reading.

The author brings an important piece of research data for the understanding of learning in the literacy process and iconic memory. It states that visual or iconic memory is considerably disturbed when the participant engages in tasks that require attention concomitantly (PERSUH et al., 2012). This data contributes to the understanding of the mnemonic facilitation of Angicos students during the literacy process made by Paulo Freire by sparing divided attention during the process. The words presented were already known, in terms of sound and their meaning, thus leaving the memory free of stimuli with concomitant or divided attention demand.

Auditory or echoic memory retains information for a few seconds, approximately 2 seconds. At the time of exposing this verbal information to the learner, attention is necessary so that this information stays for a few seconds, concomitantly so that they can give meaning to what they are

hearing. Possibly the same phenomenon happens with echoic memory (auditory information) when reading aloud. While the student listens to himself, the memory will search for information already processed and stored to assist in understanding and facilitating learning.

Short-term memory

Eysenck (2017, p. 210) says that short-term memory has very limited capacity and says that the maximum number of items evoked is approximately seven (Miller, 1956). However, the author points to the increase in this memory capacity when using "*chunks*", which are stored units formed by the integration of smaller fragments of information. For example, in the memorization of the CPF number, there is facilitation when memorization is done in three numbers, and this memorization space is called "*span"* or "*chuncks*".

Corrêa, 2010, p. 217, provides important information to clarify issues involving short-term memory:

> He observed that the memory capacity of young adults was around seven units, called "chunks," regardless of whether the units were numbers, letters, words, or other units. Further research revealed that the capacity depends on the category of the chunks: about seven units for digits, six for letters, and five for words, depending even on the characteristic of the chunks within a category. For example, the capacity is lower for long words than for short words. The memory capacity for verbal contexts (digits, letters, words, etc.) depends heavily on the time it takes to speak the contents aloud and on the lexical function (i.e., whether the contents are words known to the person or not) (Miller, 1956). An easy-to-understand example of chunks is the ability to recall long sequences of binary numbers, as they can be encoded in decimal form. For example, the sequence 0010 1000 1001 1100 1101 1010 could be more easily remembered as 2 8 9 C D A. In general, this only works for someone who can convert binary numbers to hexadecimal numbers (chunks are then said to be "meaningful"). (CORRÊA, 2010, p. 217)

Several other factors also affect the measurement of a person's memory capacity. Because of this, it is difficult to establish short-term memory capacity (MCP) by a number of chunks. Cowan (2001) proposed that memory activity has a capacity of four *"chunks*" in young adults, and is smaller in children and older adults (this statement became known as the "golden number four").

Short-term memory has been replaced by working memory or working memory, and has been highlighted in this study.

WORKING MEMORY

Short-term memory (PCM) is useful in everyday life because it enables mnemonic actions, such as remembering a phone number for the seconds after dialing it. Eysenck (2017) cites:

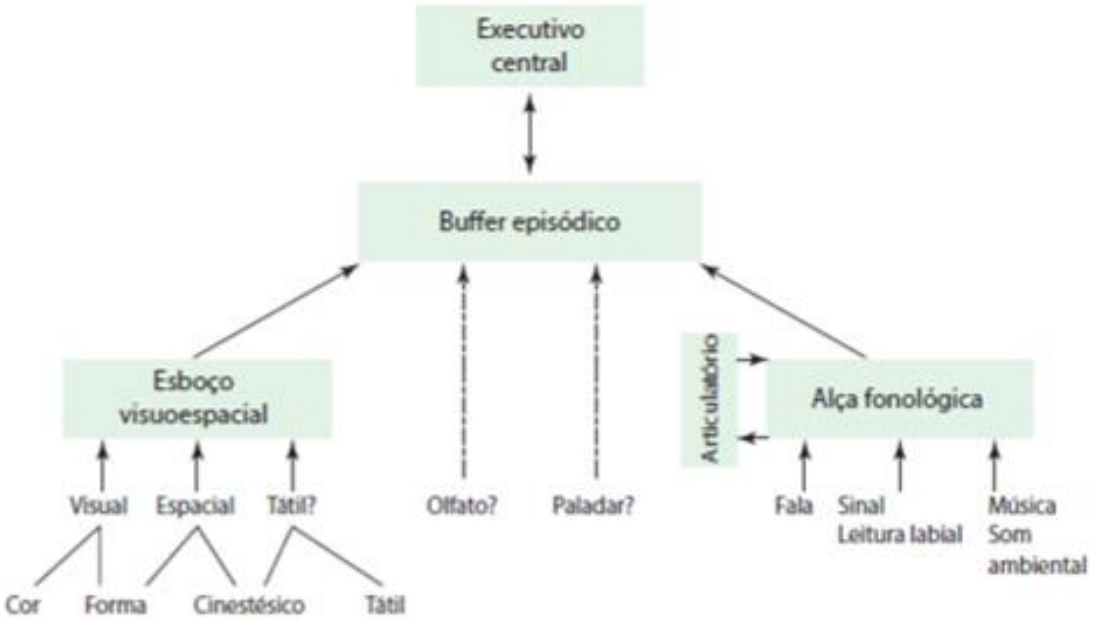
> Alan Baddeley and Graham Hitch (1974) (...) they argued that, in general, we use short-term memory when performing complex tasks. With such tasks, we run various processes. However, you also have to briefly store information about the outcome of initial processes in short-term memory as you move on to later processes. For example, this happens very often in mental arithmetic. One of Baddeley and Hitch's central insights was that short-term

> memory is essential in the performance of numerous tasks that are not explicitly memory tasks. (EYSENCK, 2017, p. 215)

The MCP is inserted inside the Working Memory (MT) or Working Memory. This line of thought promotes the replacement of the concept of short-term storage, short-term memory, by the concept of working or working memory. Memory, then, is not a single skill or function, but a "complex combination of mnemonic subsystems" (BADDELEY, 1992, p. 5).

Baddeley, (2012, p. 22) brings the working memory composed of central executive, phonological loop, visuospatial sketch and episodic buffer. The phonological loop is the structure that processes and stores auditory information briefly in phonological form. The specialized visuospatial sketch for the processing of spatial and visual information for temporary storage. In the episodic buffer, it expresses the temporary storage of the integrated information from the visuospatial sketch and the phonological loop. Here are Baddeley's models:

Figure 7 - Baddeley's working memory model showing the flow of information from perception to working memory



Source: Baddeley (2012). ©Annual Reviews 2012. With permission from Annual Reviews.

Eysenck (2017, p. 220) argues that the central executive is an important component for the proper functioning of working memory. The structure has a limited capacity, resembles that of attention, and copes with any task with cognitive demands.

The phonological loop and visuospatial sketch are subordinate systems used by the central executive for specific purposes. The phonological handle preserves the order in which words are presented, while visuospatial sketching stores and manipulates spatial and visual information.

The previous three components have limited capacity and can function relatively independently of each other. Two essential assumptions: the first, if the two tasks use the same

component, they cannot be successfully performed simultaneously; the other, if the two tasks use different components, it should be possible to perform them both at the same time and separately.

Phonological loop

Eysenck (2017, p. 216) describes that the phonological loop is composed of two systems: passive phonological storage, directly related to speech perception; and an articulatory process, linked to speech production (i.e., recitation) that gives access to phonological storage. See this description in figure 8:

Figure 8 - Phonological loop system as imagined by Baddeley (1990).

Source: Baddeley (2012). ©Annual Reviews 2012. With permission from Annual Reviews.

Research reveals that there are complex underlying processes of the phonological loop that need clarification for an understanding of their action relationships involving memory. The following quote clarifies these processes:

> Acheson et al. (2010) identified that the effect does not only involve the phonological loop – semantic processes also play a role. Schweppe et al. (2011) pointed out that the working memory model is underspecified. The emphasis of research has been on similarity at the phonemic level (phonemes are the basic units of sound). However, it is not clear whether the effect of phonological similarity depends more on acoustic similarity (similar sounds) or on an articulatory similarity (similar articulatory movements). (EYSENCK, 2017, p. 215)

The author states that in the tasks of remembering words, the number of words immediately recalled in the correct order is greater with short words than with long words (Baddeley, 2012). This phenomenon is by virtue of the neighborhood effect and not by the length of the word. Jalbert et al. (2011) argues that the orthographic neighborhood of a word consists of words of the same length that differ by only one letter. When an experiment was carried out addressing the orthographic neighborhood, the difference in word length disappeared in the effect of positive responses, i.e., the increase in the ability to memorize words lies in the similarities between them and not in their size.

This point is important for the clarification of the mnemonic facilitation of Paulo Freire's method, which searches for words common to the student, and does not overload the attentional system. The way in which the decoding is done brings the orthographic neighborhood, thus privileging the ability to memorize, consequently promoting the facilitation of the literacy process.

Eysenck (2017) describes the importance of the phonological loop for everyday life and that the act of remembering words is useful to us in language learning, both for passive phonological storage, directly related to speech perception, and for the articulatory process linked to speech production (i.e., recitation), which is responsible for giving access to phonological storage.

The tasks with Generative Word (PG) proposed by Paulo Freire are known in the articulatory process, that is, the learner already knows how the word is pronounced, thus enhancing the memory of the spelling of the dictated word by not having to divide attention, consequently relieves the nervous system for new learning.

Visuospatial sketching

The visuospatial sketch is a cognitive structure responsible for temporary storage with the manipulation of visual patterns and spatial movement. That is, visual processing involves remembering "what" and spatial processing involves remembering "where." The visuospatial sketch is the structure that assists us in orientation during locomotion when it involves the search for places, objects, words, and other actions.

Eysenck (2017, p. 219) cites Logie (1995), where he describes the visuospatial sketch as having two components: the *Visual Cache* (store of information about visual form and color) and the *Inner Scribe* (processor of spatial information and movement). These two structures are involved with the repetition of information in the *visual cache* and the transfer of information from the *visual cache* to the central executive. This structure directly assists in the recognition of letters, syllables, words, sentences, and the manipulation of information.

In the exploratory process of the Paulo Freire method, the selected PG is identified by the learner in newspapers, magazines, song lyrics, labels and poems. This action will use the structure of the visuospatial sketch in both the Visual *Cache* and the *Inner Scribe*. The action of identifying letters, syllables, and words in the identification process involves interaction with the structure of the central executive.

Central executive

The central executive is another fundamental component present in the most diverse complex cognitive activities, such as solving problems, performing two tasks at the same time, and processing decision-making. This structure does not store information, but manipulates it. It has an action that

involves four processes: the focusing of attention or concentration, the division of attention between two streams of stimuli, the shift in attention between tasks, and the articulation with long-term memory.

Eysenck (2017, p. 220) states that the brain location of the Central Executive is in the prefrontal cortex and actively participates in central executive functions. However, executive processes do not depend solely on the prefrontal cortex, but on several other brain structures.

Episodic buffer

As pointed out by Baddeley (2012), the function of the episodic buffer or episodic retainer is responsible for the integration of information about episodes or events of the multidimensional code, combined with visual, auditory and other variables. The system interconnects the components of the working memory system, and links working memory to perception and long-term memory. This action suggests that the capacity of this system is approximately four *chunks* (integrated units of information) and that it stores verbal information from the phonological loop and the visual/spatial information from the visuospatial outline.

An important piece of research mentioned by the author is that, in immediate recall, the average recall of "unrelated" words is about five words. When it is presented in "sentence form", that is, in sentence form, this capacity increases, reaching an average of 16 words or more (Baddeley et al., 1987). This high level of immediate sentence recall is substantially beyond the capacity of the phonological loop. However, it can be explained by the proposed capacity of the four *chunks* of the episodic buffer. This corroborates to explain the potential of Paulo Freire's method. If the word is presented in a single and isolated way, the mnemonic system has a capacity of 4 items. If it is presented in the form of a sentence, that is, within the context in the form of sentences, this capacity goes from 4 to 16 recalled units, consequently the mnemonic amplification occurs, which possibly facilitates the process of written mastery of the mother tongue by the method.

The explanation for the ability to produce immediate recall of sentences up to 16 words in length comes from the capacity of the episodic buffer, and from the central executive functioning efficiently to integrate or order *(chunks*) information from the sentences. In essence, information is integrated within the episodic buffer with the assistance of the central executive (baddeley and wilson, 2002).

When thinking about the content of continuing education for teachers, I see the importance of knowing how brain processing is done and how this knowledge can help in the creation of strategies that stimulate the nervous system for learning in a faster, more efficient and motivating way.

Neuropsychology has a lot to contribute, as it can bring the brain functioning of a person absent of neurological difficulties, as well as abnormalities that constitute disorders that involve the

learning process. By knowing important predictors during the students' schooling process, it is possible to identify them in order to stimulate and create new brain pathways through sensory strategies that facilitate memory and learning, just as Freire's method did.

RESULTS AND DISCUSSION

Paulo Freire's method has in its essence to make the learner an active and participatory being in the construction of his own knowledge, integrating "learning how to do something" with which he "already knows how to do it". It promotes knowledge "about what it already knows how to do" by composing a *knowledge continuum* in new information, both in terms of "what to do" and "doing", thus weaving a network of practical meanings for knowledge. Many learners know how to "do something" but need to "learn about something they do."

The search for PG, already known in sound and its meaning, leaves the iconic and echoic memory free of competing stimuli, contributed to the decoding present in the method, together brings the phonological and orthographic neighborhood, which also privilege memorization; Consequently, it facilitates reading and graphic mastery of the writing of the mother tongue without overloading the attentional system, thus expanding the student's learning capacity.

The task of finding PG in newspapers, magazines, song lyrics, labels and poems by the learners, makes it promote an exploratory process that activates the structure of the visuospatial sketch, both in the *Visual Cache* and in *the Inner Scribe*. In this way, the mnemonic capacity is enhanced in an interaction with the associative capacity produced by the central executive.

The high level of immediate sentence recall is substantially beyond the capacity of the phonological loop, however, it can be explained by the proposed capacity of four *chunks* of the episodic buffer that is activated when the method presents in sentence form within the context in sentences, providing an increase in the learner's mnemonic capacity, from 4 to 16 recalled units.

FINAL THOUGHTS

Finally, with the data obtained through neuropsychological explanations, it was possible to better understand Paulo Freire's method and how he privileges the mnemonic system so that students can be taught to read and write more quickly and fluidly.

It is extremely important that teachers can go through a training process to know the details of the method based on neuropsychological clarifications, and be stimulated again to apply it in schools that offer, not only Youth and Adult Education, but also all school follow-up, in order to reduce the rates of the contingent of students who have not yet been literate.

The question arises, does the teacher who applies and creates methods to assist students in school learning know "how the learner's brain learns" in its multiple facets, and how to find a path that is more appropriate for students who cannot keep up with the content of the school year?

In an attempt to help answer the aforementioned question, we add that there is a need to bring neuroscience and education closer together. Currently, there are important neuropsychological findings involving memory, information processing, attention, executive function and learning that can be incorporated into the teachers' training curriculum to contribute to the good educational development of Brazil.

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