Schema Theory and Cognitive Aspects of Reading

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Abstract: This article emphasizes the importance of previous knowledge of the reader in the interpretation of a text, describing cognitive science and demonstrates how prior knowledge and its relevance to reading are articulated. It deals with reading strategies and their relationship with mental models related to schema theory. The methodology of bibliographic review was adopted for the study. It is concluded that the previous knowledge of the reader will provide a broader conception of a particular text, because in using prior knowledge the reader will establish an integrated relationship with the text that will allow the capture of its meaning.

I. INTRODUCTION

Reading is an important instrument for the social and cognitive life of people, which qualifies their insertion in the social, political, economic and cultural spheres. The act of reading can be understood as a process in which the interpretation of the text goes beyond what is printed, relating to the hypotheses formulated by the reader based on his prior knowledge, which directs him to the peculier understanding of a text.

Previous knowledge can be used to facilitate continuing education, in order to understand what is implied in the written or oral texts, since they do not express everything the writer / speaker wants to communicate. Previous knowledge is understood as a more general category, which includes linguistic, textual, sociolinguistic, pragmatic and encyclopedic knowledge, among other possible types of knowledge (Schoonen, 2019). Memory is an active record of experiences accumulated throughout our lives that are reflected in the way we interpret events, making at all times mental schemas that organize the knowledge obtained.

In schema theory, learning is the accumulation and organization of knowledge structures. Each structure exists as an object, idea or event, and also as a set of attributes that connect to the other structures of knowledge. Schemas are nothing more than a process by which the reader or interlocutor relates information received between his previous knowledge and the information itself. A schema can be considered as a main processing unit that constitutes representative mental structures on concepts common to all of us. There is a strong relationship between schemas in the processes of understanding, because the individual will try to fit new information into a generic schema that is constructed throughout its history (Brewer, 2000)

Knowledge of the world, experiences, memories and individual analysis of the context are very involved in the process of identifying schemas present in the daily life, often not perceived by the individual. The thoughts and speeches are conditioned to mental schemes that guide us in order to express ourselves and communicate with others, allowing a better understanding of the world.

In this context, this research had as general objective to investigate the cognitive aspects of reading with emphasis on previous knowledge and schema theory; as specific objectives, to carry out a brief description of cognitive science, to demonstrate how to articulate prior knowledge and its relevance to reading and to approach reading strategies and their relationship with mental models related to schema theory.

The methodology adopted was a bibliographical review, which according to Villas, Macedo-Soares and Russo (2008) is a research in material already published, where it was sought information already consolidated for the proof of the ideas exposed. The study is relevant because it describes the cognitive aspects that involve reading and shows the importance of stimulating it in the most diverse literary genres so that a person can develop his / her own reading schemas from an early age, stimulating and enabling a differentiated approach in the learning process. The topics raised and analyzed in the scientific literature were: previous knowledge, reading and information, reading strategies and cognitive science.

II. COGNITIVE SCIENCE

Cognitive science is an area of interdisciplinary research that covers fields such as: biology, chemistry, genetics, physics, mathematics, computer science, artificial intelligence, linguistics, neurosciences, information systems, cognitive psychology, among others (Carolyn & Paul Li, 2013). Four theories that depict nature and cognitive development are: Piaget's, Neo-piagetian's, Vygotsky's, and the information processing approach.

a) For Piaget human cognition is a form of biological adaptation in which knowledge is gradually built from the development of cognitive structures that are organized according to the stages of development of intelligence. Thus, cognitive development accompanies the growth of human beings throughout their life, varying and changing according to age.

b) According to Mascolo (2015) neo-piagetian theorists emphasize cognitive abilities, how to process and coordinate elements that make it possible to differentiate information in the determination of sub-objectives to reach a goal. They include the concept of mediation and interaction in problem solving.

c) Vygotsky's theory believes that knowledge is built up during the interactions of individuals in society, triggering learning. The process of mediation is established when two or more people cooperate in an activity, making possible a re-elaboration.

d) The theory of information processing approaches studies of mind and intelligence in terms of mental representations and their processes underlying observable behavior. These researchers consider knowledge as an information processing system.

2.1 Prior Knowledge

As a child, all individuals are influenced by words, actions and gestures and learn to decode words through literacy, becoming, for the most part, able to read.

Each person carries with them experiences, daily activities, social, political, economic and cultural relationship, determining factors in the moment of reading a particular text. The prior knowledge of certain factors will relate the individual to the understanding, determining the understanding of reading. In order to understand the word it is necessary first to understand the world, because by using its previous knowledge the reader will establish an integrated relationship with the text that will allow him to attribute its meaning.

According to Hulstijn (2006), reading is, in essence, looking at one thing and seeing another. The reading is not through direct access to reality, but through intermediation of other elements of reality. In this way, the knowledge gained may increase according to the need or the desire to seek new information on a subject. For Alfaki (2014) the text is not something ready, closed and finished; is a process that is completed in the interaction of the reader with the text. And to better understand a text, the reader must seek in his memory the prior knowledge of everything that refers to the subject. According to Van Dijk and Kintsch (1983), important strategies of cognitive processing are propositional strategies, those of local coherence, macro strategies and schematic or superstructural strategies, as well as stylistic, rhetorical, verbal and conversational.

By using the cognitive process, the reader performs an activity of producing meaning, becoming autonomous and creative. To transform individuals into high-level readers, we must encourage children to read diverse textual genres: advertising, poetic, narrative and informative, among others.

2.2 Reading and Prior Knowledge

Reading is considered, from the perspective of common sense, as a simple junction of the letters of the alphabet for word formation, an automatic, mechanical act. Reading can no longer be seen as a simple means of decoding the message, since it is an essential element in the advance of a developing society. Understanding texts gives people access to new experiences and new information that help them broaden their intellectual and social knowledge. Reading is not just about identifying single words. As its purpose is the understanding of the object read, the identification of words is a necessary but insufficient condition. Reading is not simply the ability to decode words, but to extract the meaning, the implicit and explicit from the written text. It is a selective process and, at the same time, a game of psycholinguistic divination.

In this way the reading becomes a cognitive process that depends on the participation of the reader, who enters the scene with his previous knowledge and participates in the construction of meanings; process in which the text becomes the mediator of communication between the author and reader.

The reader will always be the operator of the text, the one who, with his personal effort, performs the reading, makes the actual text gives life to him, since the author, no matter how he plans his text, can never predict the real impact he will have on the reader.

Short and Harste (1996) state that the reading process is, in its essence, considered active because it includes prediction, elaboration of hypotheses and predictions about the text; the reader looks at visual, graphic and sound and raises a number of hypotheses.

When reading a text, the reader brings with it a very personal conception of the world, characteristic of itself; thus, this vision of the world of the reader will allow confrontation or conjunction of ideas in front of the one made explicit by the author, since both are inserted in the possible universes of meaning that are their own.

In Alfaki's (2014) vision, reading leads the reader to search in his past for knowledge relevant knowledge to the understanding of the text, an activity that provides clues and suggests paths, but although it is an interactive process that encompasses several levels of knowledge (linguistic, textual and understanding of the world), does not make clear all that could be made explicit.

As far as the information professional is concerned, the moment of reading becomes unique and it depends on the elaboration of a concept that will be part of the representation of a document in the information system. At this point, the minimum deviation of attention in reading may result in the creation of a misleading descriptor, which may compromise the retrieval of information.

In the process of reading and understanding a text, the reader must use all his prior knowledge acquired throughout his life.

2.3 Reading strategies

Reading is a cognitive process dependent on the understanding of the reader, who must use the ability to decode, to search in his memory knowledge already acquired, of inference and above all to reflect on the new information acquired and to process them in memory.

Regardless of the reading goal and the type of task, readers use reading strategies, operations used to address the text, which can be cognitive (unconscious operations) and metacognitive (controllable, because they start from common sense). It is the strategies that particularize the construction of the sense of reading, since reading requires the activation of different competences and appropriate schemes. It is the knowledge of each reader working actively and determining how the text will be understood.

The comprehension of a text can vary greatly from individual to individual, as it depends on the level of knowledge that the reader has stored in his memory (prior knowledge). The capacity for textual comprehension is directly related to the capacity of the reader to create mental models based on the stated and undeclared meaning of the author of the text. Thus, the construction of mental models favors the understanding of the words we read and their combinations, making possible the understanding of the meaning of a text in a given context (Kusiak, 2016).

Schemas constitute the organization of world knowledge in our memory, because they are interconnected segments, not happening in isolation. Important means in the processing of information until it becomes knowledge, the schemas make an intimate relation between previous knowledge, obtained in experiences lived and the information received. This process will result in the interpretation, which varies from person to person, precisely because of the differences in the history of each individual. (Wagonor, 2017).

It was Barlett, who introduced the term "schema" to mean "an active organization of past reactions or experiences" (1932, p.201). Later in the early 1980s, scholars like Rumelhalt (1980), Carrell (1981) and Hudson (1982) used this term when discussing the vital role of background knowledge in reading comprehension. According to Rumelhart (1980, P.34) schema is "a data structure for representing the genetic concepts stored in memory" while Anderson and Pearson (1984, p.42) define it as "an abstract knowledge structure".

Schemas are cognitive structures of semantic memory that relate to the representation of knowledge and comprise a series of interrelated concepts based on previous experiences and organized hierarchically, containing general components of a level, which can be divided into more specific constituents.

The most commonly used mental models are:
a) schemas - cognitive structures that interrelate with the cluster of knowledge recorded in a temporal or casual sequence, in which are kept the sets of characteristics of the objects and the beings that surround us;
b) plans - a set of knowledge on how to act to achieve predetermined purposes;
c) scripts - stereotyped and predetermined actions applied in pre-established circumstances.
d) superstructures or textual schemas - a set of acquired knowledge to the extent that we read different texts and relate them to each other.

These mental models are culturally determined and apprehended during our experience in society. The theory of schemas is based on the principle that each act of understanding involves the reader's world knowledge and that the coherent interpretation of a text is developed through the interactive process of combining textual information with the information that the reader brings with it to the text. Understanding the message of a text requires the reader to collect information from both the text and from the knowledge already acquired, interweaving them to constitute a reading schema.

Processing a text requires the reader to identify the genre, the formal and topic structure, which are important for activating schemas and therefore understand the text. It is worth noting that in the context of reading, there is the real intention of the author and the proper understanding of the reader.

Reader and writer accumulate different life experiences, knowledge of different worlds, which is why the reader may find that he interpreted the text following the author's thinking, but often not every message may have been deciphered by the reader, as usually occurs in stories in comics and cartoons. One of the reasons leading to misinterpretation of a particular text is related to the fact that the schemas are often specific to particular cultures and are not part of the cultural knowledge of the reader. It should also be considered that there may be ambiguity in relation to an established concept. Each reader can interpret the concepts used by the author according to the culture or region in which it is inserted and that differ from those of the author and those of other readers.

III. CONCLUSION

The research explored the cognitive aspects of reading, making it clear that understanding a text is much more than decoding words, and that mental schemas of reasoning and prior knowledge facilitate their understanding. Reading can be understood as a dynamic process that does not depend only on linguistic processes, but requires the cognitive actions of the reader. It is necessary for the reader to formulate reading schemes to process the new information obtained at each new reading.

Every reader goes through a learning process, and a mature reader must keep his mental processes clear and defined to be used to capture the author's intention. Using your previous knowledge, the reader will establish an integrated relationship with the text to be able to give it meaning. The more knowledge the reader has, the better your understanding. Reading implies where we want to go and how far we can go.

A person's prior knowledge gives him or her a broader conception of a given text. Strategies are unconsciously made to retrieve in memory the knowledge stored there. Knowing something before you even learn or do it, regardless of the way you have learned, will facilitate learning and aid reading comprehension.

It should be remembered that this study did not pretend to exhaust the subject, which is quite broad and complex, but only to verify how the cognitive aspects of reading, prior knowledge and schema theory in the scientific literature were being approached. Further studies should be carried out to deepen the subject.

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