

## **Learning disabilities and reading comprehension of students in primary school and the role of ICTS**

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### **ABSTRACT**

A reader, a text, and an activity are dynamically interlinked in various ways through the pre-reading, while-reading, and post-reading stages. This article aims to analyze the correlation between reading comprehension and learning disabilities in students in the early primary school grades, as well as ways to assess reading comprehension in this age group.

**Keywords:** learning disabilities, reading comprehension, reading comprehension assessment

### **INTRODUCTION**

The identities and abilities of readers, and the available texts and activities that readers engage in through these texts, are affected by the sociocultural context, which, in some cases, determines them. The sociocultural context interferes with the experiences of learners and vice versa.

A reader, a text, and an activity are dynamically interlinked in various ways through the pre-reading, while-reading, and post-reading stages. There is a distinction that applies to each one of these three "microsessions" regarding reading since it is essential to distinguish between what a reader reads while reading and what a reader takes from reading. A reading activity is a process of potential micro development. For instance, a reader who is introduced to a pre-reading microsession has a certain set of traits and characteristics, including cognitive, motor, linguistic, and non-linguistic skills, along with a specific fluency level. During the while-reading microsession, some of the reader's traits and characteristics, as above, may change. Similarly, during the post-reading microsession of the same reading event, some of the same, as above, or other, traits and characteristics of the reader may change again.

Numerous research studies that discuss reading comprehension have focused on specific factors (e.g. vocabulary knowledge), without clarifying the fact that the impact of a factor can reflect a relationship between a reader, a text, and an activity, or that a factor may change during the transition from pre-reading to while-reading.

A reading comprehension process also develops at a macro level. It changes over time, as a reader becomes more mature and develops cognitively, gains more and more experience by reading more challenging texts, and benefits from the process. Thus, a student in the early primary school grades has a lower reading comprehension ability than a student in the late primary school grades.

In this article, the aim has been set to analyze the correlation between reading comprehension and learning disabilities in students in the early primary school grades, as well as ways to assess reading comprehension in this age group.

## **HISTORICAL BACKGROUND - READING COMPREHENSION**

When official reading comprehension assessment was first introduced, there was not any distinction between reading comprehension assessments and IQ testing. For example, Freeman (1926; as it is cited in Beauvais, 2016) noted that Beauvais (1895) had used reading comprehension elements as part of the IQ test that he had developed.

Nowadays, based on scholars' views, reading comprehension can be regarded as a process where the central role of meaning is almost self-explanatory (Souza & Arehart, 2015), or as a process, during which, the superior role of decoding is emphasized (Landi & Ryherd, 2017).

## **CONCEPTUALIZATION – LEARNING DISABILITIES**

The term "learning disabilities" refers to an extensive category of special educational needs, which apply to a large number of learners, while they also affect parents and teachers, and in addition to these learning stakeholders, researchers across many disciplines. According to Panteliadou (2004), the "problems faced by students with Learning Disabilities are growing, and are both cognitive and socioemotional. Although the most common and serious problems refer to written word comprehension and production, disabilities also develop in understanding maths and science concepts. Students with Learning Disabilities also face serious problems in utilizing cognitive and metacognitive strategies, along with facing problems in implementing study strategies and following the teaching process, and experiencing increased stress and exam failure, as a result".

## **LEARNING DISABILITIES AND READING COMPREHENSION**

A learning disability, and anything resulting from it, can be defined and classified through a plethora of methods, according to the discipline, in the context of which, it is studied and described from a biological, cognitive, behavioral, or environmental point of view. The DSM-5 definition (APA, 2013) is used to define learning disability since it can better define and substantiate the term on an empirical level. There is a new shift, in terms of how learning disabilities are classified in the DSM-5, which allows the clustering of various sub-types of

learning disabilities, including the concepts of dyslexia and dyscalculia, under the same umbrella term. The DSM-5 can also identify how these types of learning disabilities overlap. More specifically, a learning disability in reading can be identified by the DSM-5 at the following levels: 1) word (dyslexia), 2) a higher level of text comprehension, and also special reading comprehension (Fletcher, Lyon, Fuchs & Barnes, 2018).

A learning disability is defined in the DSM-5 (APA, 2013), according to the context, in which, it is possible to analyze a learner's strengths and weaknesses. The DSM-5 implements an identification of differences in the strengths and weaknesses of individual learners and states that an intervention should correspond to the profile of an individual learner with specific character traits. More particular, in the DSM-5, a learning disability is pointed out as a failure of the working memory, executive function ("planning, organization, strategy implementation, and attention"), processing speed, and phonological processing. In more detail, students with learning disabilities develop them in vocabulary, grammar, and syntax learning, in terms of language development, and more precisely, in terms of how fast they can learn new words. Moreover, they face problems in using the right verbs both in spoken and written words (Cordewener, Bosman & Verhoeven, 2012), which technically limits the vocabulary (Henry, Messer & Nash, 2012). Also, students with learning disabilities typically develop a verbal memory deficit, especially in cases where keywords are not used (Cordewener, Bosman & Verhoeven, 2012). On the other hand, the level of their working memory skill corresponds to their age group (Alloway & Archibald, 2008). The impact of language deficits is also reflected in the IQ (intelligent quotient), since it appears to be lower than the expected average of that age group through various standardized verbal IQ measurement methods, and is within the average of non-verbal measurements.

Regarding the learning skill, students with learning disabilities have difficulty recognizing words, spelling, and decoding (Shaywitz & Shaywitz, 2016), which can be observed in reading, and more precisely, in reading fluency (De Oliveira et al., 2014). For example, it is reported that dyslexic students have a working memory deficit. Swanson (2012) carried out a series of meta-analyses that had extensive implications on how working memory is rendered among typical readers and those suffering from dyslexia. It is predicted that this verbal memory deficit can result in facing difficulties when it comes to comprehension and reading fluency (Pham & Hasson, 2014).

### **Factors affecting reading comprehension**

Before children learn to read, they should learn to speak; in other words, they need to acquire their mother tongue. There is a strong link between the acquisition of verbal language and building reading skills. There are two core approaches, in terms of how children acquire or learn a language. Skinner states that all languages, and especially the mother tongue, need to be learned by a child. In psychology, this approach is known as behaviorism, which stresses

the fact that language is a behavior that is shaped by a dependent response, and therefore, it can be learned.

Another view refers to the so-called "Universal Grammar hypothesis", which assumes that, even though human languages are superficially different, they share key similarities, and there are innate principles that are unique in language, in general; in other words, there is only one, universal, human language. Chomsky demonstrates that humans have a special, inherent ability for language acquisition, while complex syntax characteristics are "constructed" in the brain. According to Chomsky, children can acquire a language that has an innate mechanism, which helps humans develop language skills. The "innateness" view cannot be scientifically manipulated, which means that it cannot be challenged. There are several similarities among certain languages.

Further to that, some characteristics have an impact on how easy or difficult it is for children to learn to read. Reading skills comprise different elements. According to Porpodas (2002), these elements are the following: phonemic awareness, phonics, fluency, and vocabulary. Phonological awareness refers to the awareness that words are composed as a result of the combination of single sounds. Phonics refers to the association between a specific letter and its sound, exclusively within the context of its association with the written word. Phonemes are of special importance in opaque spelling systems, where children need to learn how to spell different words.

Vocabulary building and word learning play a paramount role in facilitating comprehension. Perfetti stipulated the "lexical quality hypothesis", which implies that reading skills are underpinned by reading words, including areas such as spelling, phonology, morphology, and meaning. The ability to recognize words is essential, to be able to understand sentences. The process of reading a text begins with the recognition of individual words, thus referring to processes and procedures that can turn visual input into language presentation. A reader should be able to blend the meaning of each phrase and evaluate the information available in the text, to understand the text. Furthermore, to carry out this evaluation, a reader should be able to make use of previous knowledge. This level of comprehension reflects the actual situation.

### **Factors affecting the text**

The text and its characteristics have a strong impact on comprehension, which does not only refer to the elicitation of the text's meaning. During the while-reading process, a reader constructs various representations of the text that play an essential role in comprehension. These representations include, for example, a precise formulation of the text, thus making up the text base, i.e. sets of ideas that reflect the meaning and a representation of the syntactic models that are incorporated into the text. In addition, the wide availability of computer devices both at home and school nowadays, along with the extensive use of electronic texts, have resulted in a broader definition of "text", also including electronic texts and multimedia,

other than traditional print texts. The special characteristics of an electronic text, and also the reason why these characteristics are reported in this study, lie with the fact that an electronic text can be particularly challenging to understand, which, means, for example, that a learner has to deal with the non-linear nature of the hypertext; however, it can also offer the opportunity to support the comprehension of complex texts, for instance, through hyperlinking to definitions or translations of difficult words, or paraphrasing compound sentences.

Generally speaking, a text may be "easy" or "difficult" to understand, as a result of the combined effect: a) factors that are inherent to the text, b) the relationship between the text and a reader's knowledge and skills, and c) reading activities, in which, a reader engages. For example, the content that is presented in the text is of critical importance for reading comprehension purposes.

A reader's knowledge interacts with the content of the text to be understood. In addition to the content, vocabulary load (i.e. whether it matches the reader's reading profile/age group, etc.), language structure of the text, its discourse style, and contextual type also interact with the reader's knowledge. When too many of these factors do not correspond to the reader's knowledge and experience, the text can be very difficult to understand, thus hindering any improvement in reading comprehension. On top of that, various activities are more suitable for some texts compared to others. For instance, electronic texts that contain hyperlinks make the definition of comprehension more complicated, because they require skills and competencies that go beyond those required to understand a traditional written text.

### **Comprehension levels**

As has been reported above, both the text's standards and the reader's level vary, and as a result, the comprehension level also varies. Therefore, there are four reading comprehension levels (Panteliadou, 2004): "1. information-finding level 2. overall comprehension level, 3. interpretive comprehension level, and 4. critical comprehension level".

In students with Learning Disabilities, especially in the early primary school grades, difficulties faced in the above comprehension levels, and thus in overall reading ability, are common (Aidinis, 2012).

Additionally, as Aidinis (2012) states, there is heterogeneity in the reading comprehension level of students with a learning disability since the above comprehension levels are inextricably linked to various parameters that can be attributed to language, such as: "a) perception, b) cognitive skill, c) learning, and d) motor development".

Torgesen & Wagner report that "the most severe reading problems of children with learning disabilities refer to the level of word processing (decoding) and poor use of phonological word structure" (Torgesen, 2002, as it is cited in Powell, 2018, p. 142). Regarding the latter, it is vital to recognize that phonological awareness refers to the fact that language is formed

from a multitude of sounds, and is consciously understood. The most important aspect of learning to read is the presence of phonological awareness, i.e. awareness of the fact that a word is formed by complex individual sounds and phonemes. A child with phonological awareness can proceed with: a) the verbal combination of sounds and production of words, b) isolating sounds, and c) analyzing words into sounds (Heward, 2011). Many students with learning disabilities have a reading problem ("dyslexia").

## **READING COMPREHENSION ASSESSMENT METHODS**

Concerning the assessment of reading comprehension difficulties, a typical test takes place that refers to understanding individual words, as well as understanding the meaning of the text overall. In a couple of cases, a key cause of poor reading comprehension is either a poor understanding of the semantic representations of words or the total absence of these semantic representations. In this case, a reading comprehension deficit is present either in the semantic memory, or it is a deficit that refers to word decoding, which results in poor use of the learner's working memory.

When it comes to assessing the comprehension of individual words, a learner's profile is extremely important, since the words, the semantics of which a child should know, is based on the basic vocabulary that refers to the learner's age group. In this way, regarding the assessment of the meaning of individual words, a learner should be able to semantically identify several words that correspond to a vocabulary that matches the learner's age group. The words should be presented individually and verbally, since, in this case, word meaning is assessed, rather than reading ability. It should be reported at this point, that the retention of word meaning does not depend on how this meaning is expressed (e.g. in writing or verbally), and therefore, the way is not important, through which, it is attempted to assess the acquisition, or not, of word meaning by the learner.

A point that needs the attention of the teacher who assesses reading ability in individual words, which are provided in writing, is to make sure that a learner can perform word decoding, thus ensuring the assessment of meaning comprehension, rather than word decoding.

Concerning comprehension, when it comes to the meaning of a text, i.e. its sentences and paragraphs, it is extremely important to recognize how comprehension is established on text syntax.

As is reported by Porpodas (2002, p. 466): It should be pointed out that "when we try to assess the comprehension of a set of structured linguistic information (e.g. contained in a text), we should bear in mind that what we try to do is to assess the internal subjective process, which cannot be readily externalized, but it is rather manifested exclusively by the memory function, and of course, it difficult to distinguish it from it. Perhaps, this is also a key

cause of the existing difficulty in accurately assessing comprehension. Various methods have been proposed so far, to assess comprehension, and the most popular is possibly the one where a reader expresses (either verbally or in writing) their subjective view and opinion on what they understood. However, regardless of the method used to assess comprehension, by implementing it, it is attempted to assess, on the one hand, how a reader perceives the semantic information of the text, and on the other hand, the degree of correlation of this information with a reader's broader context of cognitive structures".

The main methods that are used in the assessment of reading comprehension refer to "completing the information omitted in the text", "answering questions about the text", and "identifying meanings" (Porpodas, 2002, p. 466). In addition, the method of "free recall of information" is used, according to which, a learner reads a text, and after a short while (typically, after 2-3 minutes), they are asked to report what they recall from it or draw critical conclusions.

## **CONCLUSIONS**

Reading comprehension is a fairly complex process, and therefore, there is no consensus in the relevant literature, when it comes to identifying the key factors that determine it.

However, there is a tendency among researchers to agree on the fact that children should be systematically trained at school, for them to be able to develop phonological sensitization since both phonological sensitization and phonological awareness seem to be the solid foundations of reading comprehension.

Students with reading disabilities in the early primary school years have poor language and phonological performance (Narkon & Wells, 2013). It is characteristic that they have low word accuracy and word fluency levels. As a result of the heterogeneity of this population, a high level of difficulty is observed in phonological awareness and reading comprehension. Moreover, the difficulty is observed in the visual recognition of words (Krishnan et al, 2016), especially in multisyllabic ones. These students face a problem in morphology and vocabulary and a more specifically defined problem that refers to developing phonological awareness (Ramus et al, 2013).

Research shows that morphological awareness also affects reading skills. It emerges that both the age group and language itself determine the strength of the relationship between morphological awareness and reading comprehension, and this relationship gets stronger in the early primary school grades.

Last but not least, to further develop reading comprehension, metacognitive reading strategies can be implemented, which, however, only work when students are aware of the phonological and morphological components of the text that they are asked to read and understand.

Finally we underline the importance of the digital technologies in education domain and language comprehension that is very productive and successful, facilitates and improves the assessment, the intervention and the educational procedures via Mobiles which brings educational activities everywhere [26-43], various ICTs applications which are the core supporters of education [44-99], AI, STEM & ROBOTICS which raise educational procedures into new levers of performance [100-116], and games which transforms the education in a very friendly and enjoyable interaction [117-134]. Additionally the enhancement and combination of ICTs with theories and models of metacognition, mindfulness, meditation and emotional intelligence cultivation [135-203] as well as with environmental factors and nutrition [20-25], accelerates and improves more over the educational practices and results, especially in the language comprehension domain and its practices like assessment and intervention.

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