READING COMPREHENSION OF FRESHMEN STUDENTS: COMPARING PRINTED AND DIGITAL TEXTS

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This study aims to evaluate the reading comprehension of 80 freshman psychology students. 79% of them were female. 69,1% study at night. The age varied between 17 to 56 years old (M=24,05, SD=7,13). 59,3% of the students had less than 22 years old and 30,9% had more than 25. The students were evaluated about the differences of comprehension of a journalistic text when read on a paper or in the Internet. Three questions were answered about texts after reading each text. The expected score of the printed text was 15 points and 13 points were expected to the digital one. The score in the printed text varied from 1 through 13 points (M= 7,60, SD=2,66) and in the digital text from 2 through 13 (M= 8,32, SD=2,25). The results showed that printed texts are hard to be comprehended. When digital texts are read, people comprehend it correctly. Differences to genre (t=2,83, p=0,032, α=0,05) and to age (t=1,972, p=,053, α=0,05) were showed in the digital comprehension.

Keywords: digital comprehension; comprehension evaluation; university students

Theoretical Review

Researchers and specialists in reading have always been concerned with identifying the first steps followed by individuals to surpass the initial learning stages and use reading as a basic instrument for learning [1]. In order to achieve such a goal it is necessary to link the characteristics of the learning process to the active participation of the reader, who interacts with the text, selecting, processing and interpreting, as well as being able to review, summarize and broaden information, integrating it to previous knowledge [2,3,4].

Comprehension is thus considered a vital ability at any level of development, and which presupposes an interaction between the subject and the text [5,6]. Such interaction can be divided into four levels. The literal level constitutes a step in which there is comprehension of explicit text content; inferential when deductions take place; critical in which analysis of textual content is conducted; and creative when there is an elaboration and application of the information [7]. One of the forms through which comprehension can be

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evaluated is reading and interpretation. By using questions one can assess the level of reading comprehension of a reader [8].

There is a classification of individual comprehension by *frustration level*, with a comprehension percentage of up to 44% of the total text, indicating that the reader has achieved little success; *instructional level,* with a *comprehension* percentage between 44% and 57%, indicating sufficient comprehension, although additional external assistance is necessary (from the teacher, for example); and the *independent level,* with a comprehension percentage above 57% of the text, which is equivalent to a level of reader autonomy [9].

Due to the utilization of electronic multimedia, the nature of reading comprehension competence is currently undergoing a process of redefinition [10]. Since the 90's, the concept of *literacy* has been expanded. It is no longer comprised of reading, writing and calculus only, but it has come to include abilities associated with other media and technologies, such as, *media literacy* – the ability to access, analyze, evaluate and communicate messages through different means [11,12].

As far as electronic forms of reading are concerned, they must be conceived in new manners [13]. In the printed text, physical space is determined by the page, which contains content that is stable and controlled solely by the author. In the electronic text, space is dynamic, virtual, fluid and temporary, allowing a greater mutability of the text. The electronic text cannot be considered superior to the printed one, but, due to its characteristics, it is a differentiated option to create and communicate messages [14].

As a consequence, crucial transformations are taking place in the creation of texts, with their dynamic and creative models, in the reading strategies and the formation of new readers. [15]. Readers must make the task of reading through electronic media a feasible one. Young people are using electronic media in communication more often than the traditional media, and this has brought about a need for research on how the process of understanding messages and texts through electronic media takes place. [16].

Studies conducted on reading comprehension of electronic texts have reveled that it is necessary for the reader to be able to identify the structure that is typical of the media in which the text is presented. Furthermore, in order to effectively understand, the reader must differentiate the textual structures of different media, recognize and identify the intention of the author in several elements, linguistic as well as graphic, and understand when omission of content occurs. [17].

Wayne analyzed the effect of the reading of the same text, presented on printed, linear electronic form and as hypertext, onto the immediate retention of content of 267 college freshmen [18]. The students were divided in three groups and exposed to the three different forms of text presentation. After reading the material for a period of time, they were evaluated on its content by means of a multiple-choice test. The group, who had read the printed version of the text, achieved the greatest scores, with women achieving higher scores than men. The results obtained were compared with the use of ANOVA and considering the three forms of presentation of the material. The comprehension of texts presented through computers (linear and hypertext) was found to be significantly lower than that of the printed text.

In Brazil, a study was conducted to assess the reading comprehension performance of 80 elementary school students, from 1st to 4th grade [19]. Two reading programs based on children literature were compared, one in the traditional printed booklet format and a computerized one. Initial and final evaluations were

conducted by applying a reading comprehension test with Cloze Technique format. The experimental groups were evaluated with both traditional format and computerized tests and the control groups, with the traditional method (pencil and paper) only. Training was conducted through a reading comprehension program also based in progressive Cloze Technique, both in booklet format, for groups with traditional training, and in an electronic version for the others. Descriptive and statistical analyses of the data revealed that the performance of the subjects in the groups dealing with computerized texts was qualitatively superior to the traditional groups, although statistically significant differences were not found when comparison between groups was made. This is due to the fact that all groups showed significant progress after Programa de Leitura (*Reading Program*) independently of the type of resources used (booklets or computer).

Frequent use of computers for reading of news and trivia is a growing trend [16,20]. Despite this tendency and the modernity of this theme, scientific investigations about electronic text comprehension are still rare [21,22,23]. Within this perspective, the present study aims at investigating if there are differences in the reading comprehension performance for texts read electronically or in hard copy.

Method

Participants

80 freshman psychology students. 79% of them were female. 69,1% study at night. The age varied between 17 to 56 years (M=24,05, SD=7,13). 59,3% of the students were under 22 years of age and 30,9% were over 25.

Material

Reading comprehension test

Reading comprehension was evaluated through the use of a reading comprehension test in two versions. In the first version, a printed journalistic text was presented accompanied by three content interpretation questions, also in hard copy. In the second version, a journalistic text available from an Internet page was presented, which was also accompanied by three content interpretation questions, also printed. Both texts selected were informative, with six paragraphs, and an average of two sentences by paragraph. The direct language and vocabulary were appropriate for the educational level of the participants. The digital text was linear and contained some pictures (http://www.sblastro.org/noticia_extra.htm "*Sedna, o décimo planeta do sistema solar*?" Sedna the tenth planet of the solar system?). The printed article was taken from a newspaper called *O Estado de São Paulo* (15-03-2004) and the title was: "*Estudo derruba mito de que jovem é folgado*" (Studies defy the myth that youngsters are lazy). In both versions, the participants were asked to read the text and answer the questions. The objective of the first question was evaluating comprehension through identification of the logic sequence and essential elements of the text. In order to do that, seven sentences were presented, six of them summarized the content of each of the six paragraphs in the text, the other did not relate to any specific paragraph. The sentences were presented at random, that is, in a different order from that of the logical sequence of the text. The participant had to put the sentences in the correct order and number them, linking each sentence to the paragraph to which it referred and leaving the sentence that did not refer to any specific paragraph blank. A mark was attributed for each correct answer. The maximum score

for this question was five points.

The second question asked for a five-line summary of the main aspects of the text. The evaluation was based on content and form of the text produced. One point was awarded for each element of the journalistic text, which was present in the participant's summary. The maximum possible score for the digital text was seven and for the printed text nine points.One point was awarded for cohesion (production with logical articulation and sequencing) and one point for coherence (production with content which is compatible with the journalistic text that had been read) to texts compliant with the above-mentioned criteria. An extra point was awarded to the summary that was presented in text format and none for texts presented in topics. That way, the maximum score for this question was three points.

Question number three requested that a less relevant detail or aspect of the text be identified. The objective was to investigate whether the respondents were able to select elements of the text according to predefined criteria. This ability is also revealing of the level of comprehension proficiency. Maximum score for both types of text in this question was one point.The total performance of the participants was calculated by summing the points obtained for the three questions. The score for the printed text test was 15 points and 13 for the electronic text.

Procedure

The assessment was conducted collectively, by class and period. In the first evaluation, the participants read the printed text in the classroom. The electronic test was conducted in the computer lab of the university, one week after the first test. An instructor oversaw both evaluations in order to give orientation concerning the tests. The average duration was 30 minutes for each evaluation. The instructions and questions for both tests were printed and the answers were registered with pencil and paper.

Results and Discussion

The performance of the subjects in each question and the total score in the reading comprehension test both for the printed and digital texts are detailed in Table 1.

Table 1: Performance of the participants in the reading comprehension test

Points obtained questions	Minimum obtained	Maximum obtained	Maximum possible	Mean	SD
Q1 printed	0	4	5	2,86	1,270
Q1 computerized	0	5	5	2,65	1,351
Q2 printed	0	8	9	4,65	2,245
Q2 computerized	0	7	7	5,56	1,961
Q3 printed	0	1	1	0,09	0,284
Q3 computerized	0	1	1	0,11	0,318
Total printed	1	13	15	7,60	2,661
Total computerized	2	13	13	8,32	2,255

The results revealed that the students' performance in relation to printed text comprehension varied from 1 to 13 points (M = 7,60, SD=2,66) and of the digital text, from 2 to 13 points (M = 8,32, SD=2,25). In the digital reading comprehension test, some participants achieved the maximum expected score, both partial and total, whereas this did not occur for the printed text. Standard deviation from average scores obtained for the digital text was lower than for the printed text, which indicates a smaller variability in the performance standard of the participant's comprehension of the digital text.

It was also observed that participants exhibited, according to the classification proposed by Bormuth, a frustration level in relation to comprehension (score < 44% from the estimated total) for the printed text, which revealed little success in the task. [9]. The independence level of comprehension (score > 58% the estimated total) was observed in the digital text, which indicates autonomy of the readers in relation to this kind of text.

The test *t* of student was used to analyze the effect of gender (male x female) as well as age (age under 25 years x age equal or over 25) on the performance of the reading comprehension text, both for printed and digital texts. There were significant differences in the comprehension, both for printed and for digital texts, as a function of participants' gender (t=2,183; p=0,032; α=0,05) and age (t=1,972; p=0,053; α=0,05). Women exhibited a better performance than men in both text formats. It could also be observed that participants under 25 achieved better comprehension when reading the digital text. Similar results were also obtained in the studies of Hagood and Wayne [16,18].

The reading comprehension performance of the participants using digital texts did not confirm Wayne's investigation, even though the characteristics were very similar, but with a smaller number of subjects [18]. The results of Wayne's study reveled superior comprehension for the texts presented in printed format, whereas in the present study comprehension was superior for digital texts [18]. It is important to consider that the texts read in the present study exhibited an informative structure, simple vocabulary and dealt with modern themes. This, and the fact that young people have more often read news and trivia through digital medium than in printed format, may justify the results obtained [16,20].

The poor performance of freshmen in relation to reading printed texts is in accordance with other studies conducted with university students. As an example, Brazilian studies have shown great difficulty on the part of university students when evaluated in relation to reading printed texts [24,25,26,27]. Furthermore, we can observe that the independent level of reading comprehension of such students reading digital texts is a divergent result, which calls for further investigation in order to identify other variables that may influence performance.

It is worth emphasizing that, besides the fact that reading is essential for learning, higher education is an opportunity to transform the student in a competent reader, critic, avid and creative, who understands and uses the information obtained from the text adequately [28]. Thus, the need to investigate digital comprehension is clear, since this is the most frequent reading medium used by young people and one that can also implement specific metacognitive abilities for understanding information in different media. [21,22,23,29].

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