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READING ON PAPER AND DIGITAL SCREENING IN STUDENTS OF JOURNALISM AND FOREIGN LANGUAGES OF UNIVERSITIES OF MANIZALES, COLOMBIA AND KHARKIV, UKRAINE

The main objective of the current research was to evaluate aspects of the process of reading of printed text and of computerized text by considering students of Communication and Journalism of the University of Manizales, Colombia and students of Foreign Languages Department of Skovoroda Kharkiv National Pedagogical University, Ukraine. Statistically significant differences were found in the number of weekly hours of computer use by students according to the participating universities (p = 0.00). The analysis also determined significant differences between the grades received by those who used paper (p = 0.000) and digital (p = 0.000), with the results being higher in both cases for the students of Foreign Languages Department of Skovoroda Kharkiv National Pedagogical University- NPUK (Statistician U of Mann- Whitney).

Key words: *reading on paper, digital reading, computer, universities.*

Рамірес Л.М., Константинова Л.В. Читання тексту, надрукованого на папері і в електронному вигляді на прикладі студентів факультету журналістики Університету міста Манісалес, Колумбія і студентів факультету іноземних мов ХНПУ імені Г.С. Сковороди, Харків, Україна. *Основною метою дослідження було вивчення і оцінка різних аспектів процесу читання тексту, надрукованого на папері і з використанням електронного пристрою на прикладі студентів двох університетів: університету міста Манісалес (Колумбія) і Харківського педагогічного університету (Україна). Були виявлені статистично значущі відмінності в кількості годин, проведених за комп'ютером упродовж тижня, у студентів вищеназваних університетів (p = 0, 00). Також були відзначені великі розбіжності в отриманих оцінках як у випадку читання тексту надрукованого на папері, (p = 0,000) так і за допомогою електронного носія (p = 0,000). Причому в обох випадках результати виявилися вищими у студентів факультету іноземних мов ХНПУ імені Г.С. Сковороди.*

Ключові слова: *читання текстів, надрукованих на папері, читання текстів за допомогою електронних носіїв, комп'ютер, університет.*

Рамирес Л.М., Константинова Л.В. Чтение текста, напечатанного на бумаге и в электронном виде на примере студентов факультета журналистики Университета города Манисалес, Колумбия и студентов факультета иностранных языков ХНПУ имени Г.С. Сковороды, Харьков, Украина. *Основной целью данного исследования было изучение и оценка различных аспектов процесса чтения текста, напечатанного на бумаге и с использованием электронного устройства на примере студентов двух университетов: университета города Манисалес (Колумбия) и Харьковского педагогического университета (Украина). Были обнаружены статистически значимые различия в количестве часов, проводимых за компьютером в неделю, у студентов вышеназванных университетов (p = 0, 00). Также были отмечены значительные расхождения в полученных оценках как в случае чтения текста напечатанного на бумаге (p = 0,000), так и с помощью электронного носителя (p = 0,000) . Причем в обоих случаях результаты оказались выше у студентов факультета иностранных языков ХНПУ имени Г.С. Сковороды.*

Ключевые слова: *чтение текстов, напечатанных на бумаге, чтение текстов с помощью электронных носителей, компьютер, университет.*

Problem Statement. The introduction of digital electronic devices or Data Display Screens (DDS), in all scenarios of consumer society in general and education

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in particular, has promoted their excessive and inappropriate use and stimulated dependence on them. The current research showed that those who use digital displays had manifested difficulties in cognitive, visual and physical fatigue, inadequate scanning speed; deficiency in precision, misunderstanding and distraction; as well as difficulties in the intuitive exploration of the text. All this prevent users from forming an adequate mental image of the text.

Analysis of research. Nowadays a lot of problems arise in reading process in the university, mainly during the first academic year, and as a consequence of it – in the learning. Poor preparation of reading skills (including reading comprehension), day-to-day distance from reading on paper and with printed texts, disproportionate predilection for the use of electronic devices, Data Display Screens (DDS), mobile phones, tablets, among many others, to read, study or consult, are inconvenient in the didactics and make it difficult for the students to assimilate content consciously [1].

With the advancement of digital technologies, new generations of young people, mainly students, become more familiar with them: computer screen, smartphone and whatsApp, whose instant messaging application makes it more attractive. Also the tablets size is very comfortable. The possession of these devices and their use are not enough for students to take advantage of their benefits or to constitute tools for the development or stimulation of language skills or reading comprehension.

As regards reading on digital screens, uncomfortable difficulties and effects are evident. As Ferris Jabr [2] points out in the readers: they prevent users from intuitively exploring the text and from a proper mental image forming of the text structure. They provoke cognitive and physical fatigue, they cause visual fatigue and headache by the projection of direct light from computers and tablets that requires greater and constant attention of the reader by the movement on the screen and produces distraction. These signs and symptoms, which alter the understanding and memory of reading, have stimulated researchers to recommend and propagate printed texts more than electronic ones [3]. Andrew Dillon [4] refers to a critical review of the empirical literature and examines the differences between the media by establishing a difference between the result and the process in the reading analysis, according to the research of Schumacher and Waller [5].

Visual fatigue is also part of the study. Time periods of greater than 50 minutes in the reading of the DDS, as shown by the works of Wilkinson and Robinshaw, can cause fatigue and low performance [6].

One of the most debated variables to study in this type of work is reading comprehension. In general, questionnaires with questions on the texts, after reading them, are the instruments most used in the evaluation (4). In her investigation on the relationship between the legibility of the text on paper and CRT-screen, Dr. Kak [7], using the Nelson-Denny [8] reading test, paper and DDS, evaluated the probands with questions of understanding without finding significant differences in the means of presentation used. In another research about digital reading, the authors asked respondents to answer 25 multiple-choice questions after twice 1-hour reading tests. The results showed no effect on comprehension by condition or set of

questions [9]. In Cushman's research: Reading Microfiche, VDT and Printed Page: Subjective Fatigue and Performance [10], the author found that slower readers better understood the text in VDT (Video Display Terminal-).

Another of the characteristics analyzed in the investigations of the readings in paper and in screen is the preference. Starr, in his work found out that preference depended on the quality of the paper document; Egan et al found that participants preferred the DDSs on paper and Muter and Mauretto (1991), in their comparative studies of paper reading and screens, found that 50% of those surveyed expressed their preference for the digital display.

The abnormal signs and symptoms that arise from inappropriate use of Data Display Screens (DDS)) have been investigated by many authors [1, 3]. Attention (distractibility, hypoprosexia or decreased capacity for active and passive attention and dispersion), memory, work and learning alterations, among many others. Gary Small (2009), professor of psychiatry at the University of California, and director of the Center for Memory and Aging has studied the neurological and psychological effects of digital media use and believes that they cause extensive brain damage [14].

Norwegian researcher Anne Mangen, et al. [15] from the University of Stavanger, studied reading comprehension in 72 high school students with the help of an expository and a narrative text; half read it on paper, the other on digital display. Reading comprehension was very poor for those who read in the digital medium. In another research with 82 volunteers, conducted by Wästlund, a psychologist at the Swedish University of Karlstad, reading comprehension was studied through a computer-based and paper-specific test.

Many probands expressed a lot of stress and weariness in relation to those who read on paper. In this study, attention and operational memory were evaluated, which were greatly diminished with fatigue.

Kerr and Symons (16) compared the effects of reading on printed and on-screen paper by measuring time, free recall and clues, and inferential comprehension. The students (children) in the research were 60 fifth grade and each read two expository texts: one in traditional print format and the other on a computer monitor, which employs a common scrolling text interface. After the reading, each participant was asked to remember everything he could about it and answer questions that measured time, memory (recall) and comprehension of text. The children took more time in reading and remembered more of the material of the text read than that of the computer screen. The results indicate that children can take more time to read text on the digital screen and are more efficient when reading text on paper.

Objective of research. To evaluate aspects in the process of reading in printed text and in screens of computers and tablets in students of Communication and Journalism of universities of Manizales, Colombia and of Foreign Languages of Kharkiv, Ukraine in the periods of 2014 to 2016.

Methodology and statistics. The present observational, prospective, transversal and analytical, relational-level research included 78 students (53.8% from Manizales, Colombia and 46.2% from Kharkiv, Ukraine). The data were analyzed by Chi-square, U-Mann-Whitney, and Wilcoxon test statisticians. The statistical software SPSS®, version 24-IBM was used.

Analysis of data. The analysis of the information included quantitative and qualitative variables that are summarized in table 1.

Numerical variables	Categorical variables
• Age • Number of hours of computer use per week • Reading paper support rating • Reading support digital rating (screen)	• Sex • Provenance • Socio-economic stratum • University • Faculty o Subject • Access to portable devices • Frequency of online activities • Preference for printed reading / electronic devices • Comfort level with computer use • Electronic Read / Paper Advantage • Perceived effects of reading on electronic devices

Table 1. Variables analyzed in the research.

The data were subjected to descriptive and relational statistical procedures for categorical and numerical variables. A p (α) value <0.05 was considered statistically significant. In the analytical study, we used: × 2 (Chi square) for categorical variables, Mann-Whitney U for ordinal variables and Wilcoxon test for numerical variables with non-normal distribution. Statistical Package for the Social Sciences (SPSS) of the company IMB, version 24 was used for the data analysis.

Results. 78 students were investigated; of them 53.8% corresponded to the University of Manizales (Colombia) and 46.2% to the National Pedagogical University of Kharkov (Ukraine). (Table 2).

Participating universities		
	Frequency	Percentage (%)
UM	42	53,8
NPUK	36	46,2
Total	78	100,0

Table 2. Participating universities. UM: University of Manizales, Colombia. NPUK: National Pedagogical University of Kharkiv, Ukraine.

The average age was 18.49 years and the female sex predominated over the male in a ratio of 4: 1 (64 -82.05% - women and 14 -17.95% - men). The descriptive statistics of the numerical variables are shown in Table 3.

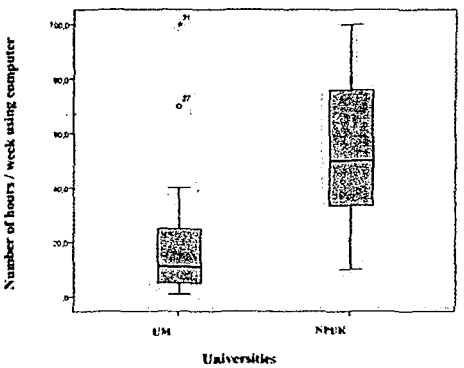
	Half	SEM	MD	F	SD	Min.	Max.	CI Half 95%
Age	18,49	0,22	18,0	17,0	1,97	16,0	25,0	18,04; 18,93
Number of hours / week using computer	34,59	3,47	28,0	35,0	30,68	1,0	100,0	27,67; 41,51
Reading note on paper support	2,74	0,13	3,00	3,7	1,13	0,3	4,66	2,48; 2,99
Reading note on display stand	2,54	0,13	2,33	2,0	1,18	0,66	4,66	2,28; 2,81

Table 3. Central tendency measures and confidence intervals for numerical variables for the whole group (n = 78). SEM: Standard Error of the Media. MD: Median. M: Fashion. SD: Standard deviation. CI: Confidence Interval.

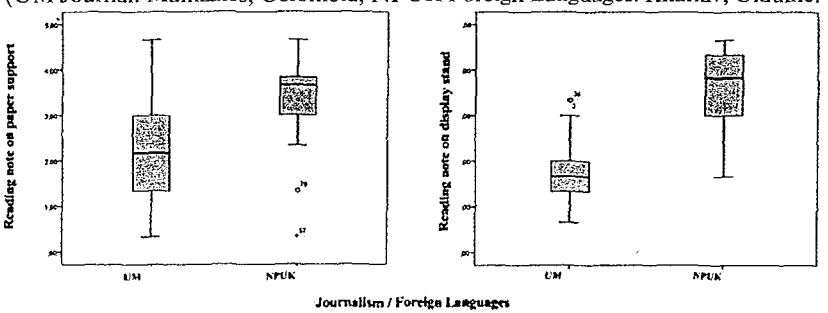
The average grade was higher for the University of Kharkiv-Ukraine; the notes of the questionnaires in paper support were of 3.36 and the ones of support of screen of 3.50. In relation to the University of Manizales-Colombia: 2.20 notes in paper support and 1.73 in screen support. For both texts (Table 4).

		Half	SD	SE	CI Half 95%		Min.	Max.
					LL	UL		
Age	UM	18,31	2,36	0,36	17,57	19,05	16,0	25,0
	NPUK	18,69	1,37	0,23	18,23	19,16	17,0	21,0
Number of hours / week using computer	UM	17,64	19,50	3,01	11,57	23,72	1,0	100,0
	NPUK	54,36	29,64	4,94	44,33	64,39	10,0	100,0
Reading note on paper support	UM	2,20	1,09	0,17	1,86	2,54	0,33	4,66
	NPUK	3,36	0,83	0,14	3,08	3,64	0,33	4,66
Reading note on display stand	UM	1,73	0,70	0,11	1,51	1,94	0,66	3,33
	NPUK	3,50	0,86	0,14	3,21	3,79	1,66	4,66

Table 4. Central tendency measures and confidence intervals for the numerical variables in consideration of the participating institution (UM-NPUK). DE: Standard deviation. SE: Standard Error. CI: Confidence Interval. LL: Lower Limit. UL: Upper Limit.



Graph 1. Comparative box-plot of the hours / week used in the computer by the students of the universities of the subjects and cities, participating countries (UM Journal: Manizales, Colombia; NPUK Foreign Languages: Kharkiv, Ukraine.



Graph 2. Box-plot comparisons of students' grades in paper and screen (digital) formats of subjects and cities, participating countries (UM Journal: Manizales, Colombia; NPUK Foreign Languages: Kharkiv, Ukraine).

Relational (bivariate) statistical analysis is presented in Tables 5 and 6.

CATEGORICAL VARIABLES		UM - n (%)	NPUK - n (%)	Value p
Sex	Man	11 (26,2)	3 (8,3)	0,04*
	Woman	31 (73,8)	33 (91,7)	
Origin	Rural	2 (4,8)	30 (83,3)	0,000*
	Urban	40 (95,2)	6 (16,7)	
Electronic reading - reason	Literature in general	7 (16,7)	22 (61,1)	0,000*
	Investigation	19 (45,2)	5 (13,9)	0,006*
Electronic Reading - Advantage	Easy to read	2 (4,8)	6 (16,7)	0,176
	Easy to use	7 (16,7)	19 (52,8)	0,002*
	Is updated	8 (19,0)	28 (77,8)	0,000*
Reading on paper - reason	For health, to protect the eyes	15 (35,7)	19 (52,8)	0,13*
	More realistic	4 (9,5)	6 (16,7)	0,548
	It is more pleasurable	15 (35,7)	16 (44,4)	0,432
	It is better to read with the book in the hands	14 (33,3)	25 (69,4)	0,003*
	Because it's easier to read	9 (21,4)	0 (0,0)	0,009*
	I get distracted by reading electronic texts	8 (19,0)	0 (0,0)	0,017*
Electronic reading - provokes	Distraction	14 (33,3)	4 (11,1)	0,04*
	Fatigue in the eyes	21 (50,0)	34 (94,4)	0,000*

Table 5. Comparison of categorical variables by participating university

CATEGORICAL VARIABLES		n women (%)	n men (%)	Value p
Sex	Rural origin	28 (43,8)	4 (28,6)	0,296
	From paper readings What do you consider to be the main advantage?			
	Read with the book in hands	33 (51,6)	6 (42,9)	0,555
	Reading on electronic devices causes			
	Physical tiredness	22 (34,4)	5 (35,7)	0,924
	Distraction	14 (21,9)	4 (28,6)	0,59
	Fatigue in the eyes	47 (73,4)	8 (57,1)	0,226
	Headache	17 (26,6)	4 (28,6)	0,878
	Difficulty understanding	9 (14,1)	4 (28,6)	0,187
	Dream	24 (37,5)	4 (28,6)	0,528
		n rural (%)	n urban (%)	Value p
Origin	Possess devices with internet access	31 (96,9)	45 (97,8)	0,794
	From electronic reading, what is the main reason?			
	Literature in general	20 (62,5)	9 (19,6)	0,000*
	From readings in electronic devices What do you consider to be the main advantage?			
	Easy to read	6 (18,2)	2 (4,3)	0,039*
	Easy to use	16 (50,0)	10 (21,7)	0,009*
	Is updated	23 (71,9)	13 (28,3)	0,000*
	From the readings in paper text What do you consider to be the main advantage?			
	More realistic	6 (18,8)	4 (8,7)	0,191
	It is better to read with the book in the hands	24 (75,0)	15 (32,6)	0,000*
	Because it's easier to read	0 (0,0)	9 (19,6)	0,021*
	I get distracted by reading electronic texts	0 (0,0)	8 (17,4)	0,035*
	Reading on electronic devices causes you to:			
	Physical tiredness	14 (43,8)	13 (28,3)	0,157
	Distraction	4 (12,5)	14 (30,4)	0,115
	Fatigue in the eyes	30 (93,8)	25 (54,3)	0,000*
	Headache	7 (21,9)	14 (30,4)	0,402
	Difficulty understanding	6 (18,8)	7 (15,2)	0,68

Table 6. Evaluation of the relationship between categorical variables in the general group. * Statistically significant ($p < 0.05$).

Compared with the findings related to numerical variables, a significant difference was found in the age of the participants in the subject (University) ($p = 0.038$; U statistic of Mann-Whitney), the median of the NPUK being higher (19 years).

It was evidenced statistically significant difference compared to the number of hours per week of computer use according to the participating university ($p = 0.00$). The NPUK presented an average number of hours / week of major computer use (54.36 hours vs 17.64).

The comparison between the notes that were obtained in the reading comprehension evaluation in paper support versus the digital support for the whole sample, did not show a statistically significant difference ($p = 0.124$; Wilcoxon sign statistician).

The analysis by the participating university determined significant differences between the notes in paper support ($p = 0.000$) and digital ($p = 0.000$), being greater for both tests, the obtained note in the NPUK (Statistician U of Mann-Whitney).

Discussion and conclusions. The main objective of the research was to evaluate aspects in the process of reading in printed text and in digital screens in students of Journalism of the University of Manizales, Colombia and of Foreign Languages of the National Pedagogical University of Kharkiv, Ukraine. There was no significant difference in the paper-based reading notes compared to the notes on screen support ($p = 0.124$); this implies a similar interpretation, not associated with the reading support used. Peronard's research [18] showed no statistically significant difference.

Other investigations showed that students who read paper-based texts scored significantly better on the reading comprehension test than students who read texts in digital format [9, 15, 17, 19, 20].

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