



ORIGINAL RESEARCH PAPER

Physiology

THE DIGITAL AGE BRAIN – THE IMPACT OF READING ON SCREEN ON LEARNING

KEY WORDS: Electronic screens, paper, reading.

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ABSTRACT

Background: Electronic screens such as laptops and computers are increasingly used by students of all ages. This study is undertaken to assess the impact reading on screen has on learning.

Aim and objectives: To assess and compare the performance of the screen and paper reading groups in pressured and free reading conditions.

Methods: 200 college students were divided into two groups of 100 each -the screen and the paper reading groups. They were given a text material of 3000 words- as PDF or as printed material. 50 participants in the screen and the paper group were given 10 minutes (pressured) and others were given their own time(free)to study . At the end, they were asked to predict their performance and take a test.

Result: Participants who read on paper showed better performance compared to the participants who read on screen in the free reading condition. In the pressured condition, there is no significant difference in performance.

INTRODUCTION

New inventions do make our lives easier in many ways, but they can also cause worries and troubles – both actual and imaginary. Reading on screens is becoming more prevalent both in and out of classroom settings. Electronic screens such as those found in computers, laptops, tablet computers, and e-readers are increasingly used to read text, being adopted by students of all ages^[1]. Reading is a cognitive activity. It is understandable that reading digital text will have cognitive and neurological implications on readers. Evidence from laboratory experiments, polls and consumer reports indicates that modern screens and e-readers fail to adequately recreate certain tactile experiences of reading on paper that many people miss and, more importantly, prevent people from navigating long texts in an intuitive and satisfying way^[2]. Like other cultural tools that have had cognitive impacts, screens may similarly be changing the way people read, and thus it is important to examine whether they impact the efficiency and effectiveness of reading and processing text. Although earlier research comparing reading on screens and paper has shown no consistent advantage for either medium, nonetheless given the widespread adoption of e-books and tablet computers by schools^[3], this study is taken up to revisit this question.

AIM

1. To assess and compare the learning ability in the free screen and paper reading groups.
2. To assess the compare the learning ability in the pressured screen and paper reading groups.
3. To compare the prediction of performance of all groups.

METHODS AND MATERIALS

Participants : 200 medical students belonging to the age group of 17 to25 years were included in the study after getting written consent. . The study objective and design were explained to them. The study was conducted over a period of four days.

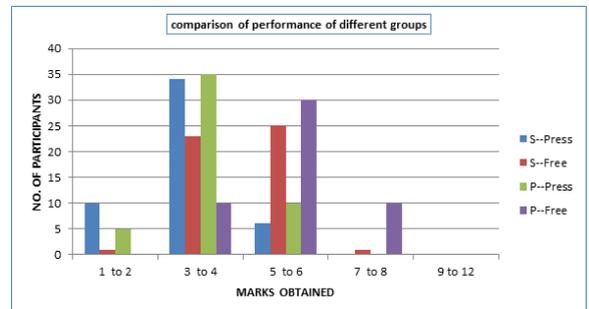
Material: Expository type of text material with 3000 words were given to the participants. They were divided into two equal groups of 100 each— the screen reading and the paper reading groups. To the screen reading group, the material was given in pdf format on standard computer screens. Lighting, inclination and text size were set at standard levels. Fifty Participants were asked to read and understand the text material given to them in 10 minutes (pressured reading group) and the other fifty participants were asked to take their own time for the same(free reading group).To the paper reading group, the text was given as printed material. 50 participants each were allotted to the pressured and free reading groups similar to the screen group.. After 10 minutes(pressured group)or at the end(free group), they were given a test to assess their learning ability after predicting how well they would perform in the test.

RESULTS:

Table 1 Mean test scores of the screen and paper reading groups.

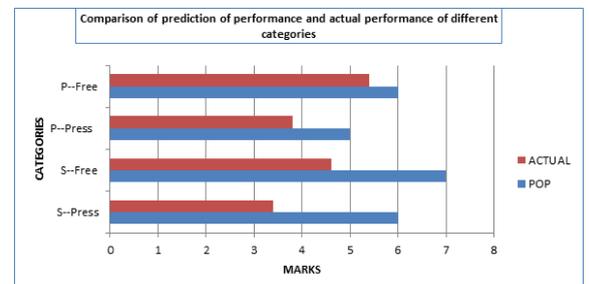
CATEGORY	NUMBER	MEAN (OUT OF 12)	SD
PAPER-- PRESSURE	50	3.8	1.087
SCREEN --PRESSURE	50	3.4	1.212
PAPER-- FREE	50	5.4	1.309
SCREEN-- FREE	50	4.6	1.085

Fig 1 comparison of performance of different groups



There is significantly better performance in paper pressured group compared to the screen pressured group. There is highly significant better performance in paper free group in comparison with the screen free group.

Fig 2 Comparison of prediction of performance of different groups



As shown in Fig 2, paper readers generally make a better calibration than the screen readers who tend to be overconfident.

DISCUSSION

Research has shown that different media forms do indeed help to foster and develop different cognitive skills^[4]. Also research suggests that the medium may influence how the information

presented is processed. There is an ongoing transition of reading from print to screen and the book is challenged by an increasing number of digital reading devices (computers and laptops, e-books, tablet devices, smart phones)^[5].

The paradigm of reading, in particular for young people, is increasingly screen-based rather than paperbound. The theoretical and pedagogical implications of the ongoing digitization for reading and reading comprehension are complex and multifaceted, and a number of fundamental research questions remain at best partially addressed^[6]. "Magazines are now useless and impossible to understand, for digital natives"—that is, for people who have been interacting with digital technologies from a very early age. Today's so-called digital natives still interact with a mix of paper magazines and books, as well as tablets, smartphones and e-readers; using one kind of technology does not preclude them from understanding another. Compared with paper, screens may also drain more of our mental resources while we are reading and make it a little harder to remember what we read when we are done^[7]. An open paperback presents a reader with two clearly defined domains—the left and right pages—and a total of eight corners with which to orient oneself^[8]. In contrast, most screens, e-readers, smartphones and tablets interfere with intuitive navigation of a text and inhibit people from mapping the journey in their minds. Students who read the texts on computers performed a little worse than students who read on paper^[9]. Based on observations during a study, Mangen thinks that students reading pdf files had a more difficult time finding particular information when referencing the texts^[10].

Depending on the model of the device, glare, pixilation and flickers can also tire the eyes. LCDs are certainly gentler on eyes than their predecessor, cathode-ray tubes (CRT)^[11], but prolonged reading on glossy self-illuminated screens can cause eyestrain, headaches and blurred vision. Such symptoms are so common among people who read on screens—affecting around 70 percent of people who work long hours in front of computers—that the American Optometric Association officially recognizes computer vision syndrome^[12]. People reading on screens take a lot of shortcuts—they spend more time browsing, scanning and hunting for keywords compared with people reading on paper, and are more likely to read a document once, and only once. When reading on screens, people seem less inclined to engage in what psychologists call meta cognitive learning regulation^[13] — strategies such as setting specific goals, rereading difficult sections and checking how much one has understood along the way.

When under pressure to read quickly, students using computers and paper performed equally well. When managing their own study time, however, volunteers using paper scored about 10 percentage points higher. When reading long, linear, continuous texts over multiple pages that require a certain amount of concentration, referred to as "Deep Reading," the reader often experiences better concentration and a greater overview when reading from a printed medium compared to a screen^[10]. Research has shown that individuals read differently from computer screens than from print materials, in part due to image quality, display size, and angle of the screen. Reading from the screen is slower than reading from paper. Readers perceive the text on-screen less accurately than paper. Readers report higher fatigue^[14] when reading from a screen than from paper.

CONCLUSION

Technology is playing a central role in young people's literacy development and reading choice. The wider reading opportunities is the positive impact it has but it's crucial that reading in print is not cast aside.

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