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Factors Influencing Digital Reading Behaviour of Students: A Study in Universities in Kerala

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ABSTRACT

The main aim of the study was to explore the factors influencing digital reading behavior of students. A survey with stratified random sample of 588 postgraduate students from the teaching departments of the universities in Kerala was used to conduct the study. The analysis revealed that majority of the students opined that with the availability of laptop, mobile phone and the Internet, their digital reading increases. There exists significant gender difference in the opinion of the students about the features like save, download, search, find and bookmark that helped them to read digitally. About half of the students mentioned that the factors like font size, text layout, type face and background colour are highly influencing while reading digitally. The students also responded that digital reading increases their selective reading, superficial reading, interactive reading, and decreases their in-depth reading, concentrated reading and sustained attention. Male students have significantly higher influence of e-resources on their reading practices than those of female students. This study is useful for professionals who are developing e-contents, e-resources and different types of e-learning interfaces.

Keywords: Digital reading; Online reading; Reading habit; Reading behaviour; E-resources; E-reading; E-learning; Students.

1. INTRODUCTION

Reading is the procedure of using over 'eyes', our 'mind' to grasp or comprehend the literal as well the hidden meaning of what the writer was endeavouring to pass on. Appropriately reading gives both power and pleasure with understanding the material as a unified whole by which one can amplify the frontiers of knowledge and scholarship[1]. The widespread global use of the Internet and the use of alternative reading resources, notably with hypertexts and multimedia have made drastic changes in reading patterns[2]. The extend of reading resources has also changed drastically in the digital environment to include websites, e-books, e-journals, e-newspapers, discussion boards, chat rooms, instant messaging, blogs, wikis, and other multimedia documents.

Researchers observe that the explosive growth of e-contents together with the embedded nature of hypertext is decreasing sustained reading[3-5]. Digital reading provides numerous strategies for skimming, scanning, recognizing cognates, guessing, foreseeing, inferencing, and differentiating main ideas from supporting ideas. Digital reading requires certain abilities and guidance, which will be utilised to find, locate, access, and manipulate e-resources, and to interpret and evaluate the digital texts as well[6-7]. Researchers have argued that, although the young generation spends considerable time for reading e-resources, they tend to skim and browse for information on the Internet rather than read intensively[8]. There is a negative view that digital reading hampers people's deep reading and thinking and accordingly weakens their ability of understanding and memorizing the objects[9].

Digitally native students are using different types of e-resources and online interfaces for reading digitally. They are facing several challenges and benefits while reading digitally due to the fragmentary nature of the hyperlinks, typographical capabilities of digital texts, interactive features of online environments, etc. Multitasking is not a new issue in digital reading. While students are at their laptop or desktop, they will keep various browser windows open, blinking images on the web, scrolling and turning of pages, check their e-mail and might also be on their mobile phone checking their twitter feed, also listening to the radio or television as well[10]. This will lead to decrease in in-depth and concentrated reading. There is a growing need to understand the factors that facilitate and hinder digital reading and also the affect of e-resources on the digital reading behavior of students. This study intends to explore the factors that influence the digital reading behaviour of the students in the universities in Kerala.

2. LITERATURE REVIEW

There have been many studies on various aspects of reading behavior in the digital age. The digital environment

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has brought numerous facilities for reading including quick access to information with a variety of e-resources and online interfaces[11]. In a study, Pardede[12] indicated that the Indonesian university students have a positive perception of digital texts because they access digital texts with familiar online platforms. Abidin, Pour-Mohammadi and Jesmin[13] revealed that digital reading is an exceptionally strong strategy in enhancing reading habits among the students of Malaysian rural secondary schools. In another study, Tseng[14] found that the variables that influence the students hypertext reading was background colour of web pages and font size. The significant difficulties included eye fatigue, inability to take notes, and skipping lines when reading hypertext on computer screens. Kanniainen[15], *et al*., observe that struggling readers probably face difficulties online. Bernard[16] *et al*. demonstrates that 12-point dot-matrix Arial is prevalent, as far as the judgment of readability and preference and is prescribed for both dot-matrix and anti-aliased text.

The utilisation of various online interfaces and tools as reading devices has driven the academic institutions to move to paperless classrooms[17]. In a study, Grzeschik[18] *et al.* revealed that there is no change in the concentration and reading rates while reading digitally with digital reading gadgets. Soroya and Ameen[19] revealed that the young Pakistani students reading time have been increased due to the availability of different types of e-resources and digital devices. In another study, Saaid and Wahab[5] observed that the reading habits of a good number of the undergraduate students of UITM (Universiti Teknologi MARA) have changed and their enthusiasm for reading has increased, because of the development of e-resources. Ajayi, Shorunke and Aboyade[20] revealed that most of the students in Nigerian universities lack the ability or skill on the best way to utilise e-resources.

The reviews show that there is a change in the reading behaviour of students because of the affect of e-resources, various digital reading devices and interfaces, and typographical capabilities of digital texts. However, there are still gaps to explore the factors that influence the digital reading behaviour of students.

3. METHODOLOGY

The potential population of the study comprises of postgraduate students in the teaching departments of the universities in Kerala. There are 17 universities approved by the UGC in Kerala state. Out of these universities, four state universities namely Kannur University, University of Calicut, Mahatma Gandhi University, and University of Kerala were selected based on the similarity of the nature of courses, geographical location, and year of establishment. There were 4507 postgraduate students in the teaching departments of these universities. A stratified random sample of 700 students was selected for the study. A survey with fully structured questionnaire was used as the tool for data collection. 700 questionnaires were distributed to the students of Kannur University (188), University of Calicut (183), Mahatma Gandhi University (115), and University of Kerala (214). Out of the 634 questionnaires returned, properly filled 588 questionnaires were taken for analysis with a response rate of 84 percent.

Table 1. Facilities making change in digital reading

Facilities	Responses (n=588)		
	Increases (%)	Decreases (%)	No change (%)
Availability of Laptop and Mobile Phone	401 (68.2)	123 (20.9)	64 (10.9)
Availability of Open Access Resources	237 (40.3)	124 (21.1)	227 (38.6)
Availability of the Internet	362 (61.6)	151 (25.7)	75 (12.8)
Availability of Computer networks (LAN, WiFi)	287 (48.8)	112 (19)	189 (32.1)
Availability of E- reader	292 (49.7)	61 (10.4)	235 (40)

The responses were segregated, coded and consolidated with microsoft excel and subjected to various statistical tests such as simple percentage analysis, mean, standard deviation, ANOVA and Z-test with SPSS.

4. RESULTS AND DISCUSSIONS

4.1 Facilities Making Change in Digital Reading

E-resources are becoming extremely popular among users and encouraged a shift from intensive reading to extensive reading[21]. According to Hillesund[22], digital reading is influenced by the design of handheld devices and personal computers in light of the fact that new designs present better approach for using hands and fingers. Here an attempt has been made to understand the influence of different facilities in making change in the digital reading of the students.

As per the detailed results depicted in Table 1, majority of the students opined that with the availability of laptop, mobile phone and the Internet, their digital reading increases. In a study, Herath[23] stated that the Internet or computer based activities make reading more enjoyable. Such activities likewise motivate students' to become active participants, encourage them to utilise critical reading skills, and enhance students reading fluency and understanding of content.

4.2 Distraction while Digital Reading

In the digital environment, readers need to adapt to an enormous measure of content and read selectively. In addition

Table 2. Distraction while digital reading

Responses	Male (%)	Female (%)	Total (%)
Yes	115 (43.9)	150 (46)	265 (45.1)
No	25 (9.5)	30 (9.2)	55 (9.4)
Sometimes	122 (46.6)	146 (44.8)	268 (45.6)
Total	262 (100)	326 (100)	588 (100)

Chi-square = 0.264^{ns} ; p-value = 0.877
ns non-significant at 0.05 level

to adapting to potentially distracting colourful or blinking graphics, audio, and video, readers often become disoriented on the grounds that they need to make constant choices on which hyperlink to click or whether to scroll further down, instead of devoting full attention to reading[24]. The students were asked whether they get distracted while reading digitally. It can be seen from Table 2 that out of 588 students, a good number of the students reported that they get distracted by the links, colours and advertisements of the digital documents while reading. Supporting these findings, Herath[22] reported that the graphics, video, and other commercial content in the online resources cause higher distraction levels to the readers. In another study, Schmar-Dobler[25] observes that the Internet content has blinking graphics, vivid colour, and lots of eye-catching phrases that can distract from the reading.

Table 3. Helpful features of digital reading

Features	Male (n=262) (%)	Female (n=326) (%)	Z-value (%)	p-value (%)
Scroll bar	233 (88.9)	273 (83.7)	1.711^{ns}	0.087
Cursor	248 (94.7)	308 (94.5)	0.104^{ns}	0.917
Hyperlinks	191 (72.9)	226 (69.3)	0.810^{ns}	0.418
Tagging	67 (25.6)	40 (12.3)	1.787^{ns}	0.074
Bookmarking	140 (53.4)	108 (33.1)	3.281**	0.001
Save & Download	262 (100)	321 (95.5)	3.889**	0.000
Copy & Paste	196 (74.8)	247 (75.8)	0.242^{ns}	0.809
Highlighting	107 (40.8)	94 (28.8)	1.801^{ns}	0.072
Search, Find	205 (78.2)	206 (63.2)	3.388**	0.001

*ns non-significant at 0.05 level; ** Significant at 0.01 level*

Table 4. Influence of typographical factors while digital reading

Factors	Response (n=588)				
	Not at all Influential (%)	Slightly Influential (%)	Somewhat Influential (%)	Very Influential (%)	Extremely Influential (%)
Font colour	63 (10.7)	192 (32.7)	146 (24.8)	162 (27.6)	25 (4.3)
Font size	10 (1.7)	82 (13.9)	219 (37.2)	228 (38.8)	49 (8.3)
Typeface (Font type)	15 (2.6)	86 (14.6)	187 (31.8)	243 (41.3)	57 (9.7)
Text layout	13 (2.2)	79 (13.4)	206 (35)	245 (41.7)	45 (7.7)
Background colour	14 (2.4)	78 (13.3)	182 (31)	228 (38.8)	86 (14.6)

Chi-square test was performed to look for an association between gender and distraction by the links, advertisements and colours of digital documents while reading. Since the p-value is 0.877 which is greater than 0.05, it can be observed that there is no significant association between gender and distraction by the links, advertisements and colours of digital documents while reading. As proposed by Leu[26] et al. certain online reading strategies and skills are required by the people to achieve comparative levels of reading experience as on paper. Readers need to control the distractions while reading digitally and try to dedicate more effort to concentrate on the content.

4.3 Helpful Features of Digital Reading

For reading digital texts, readers cannot turn page by page as they do on a printed book. They need to figure out how to navigate and explore the digital text, and navigational skills transform readers into dynamic information explorers[13]. Table 3 details the results of Mann-Whitney U-test by comparing the gender-wise opinion of the students regarding the features that helped or not while reading digitally. As the p-value is greater than 0.05, Z-value is not significant, it is concluded that there is no significant gender difference in their opinion about the features like scroll bar, cursor, hyperlinks, tagging, copy, paste and highlighting that helped them for digital reading.

Barnett[27] *et al.* in their study revealed that compared to male students, more female students copy and paste materials from online resources. Similarly, Large[28] et al. found that boys click more hyperlinks per minute than girls, and boys tend to perform more page jumps per minute than girls.

Results of Mann-Whitney U-test also reveals that in the features like save and download, search, find and bookmarking, p-value is less than 0.01, Z-value is significant, it is concluded that there exists significant gender difference in their opinion about the features like save and download, search, find and bookmarking that helped them to read digitally.

4.4 Influence of Typographical Factors while Digital Reading

Readability is likewise identified with features and layout of text which influence the understanding of the meaning that the author expected to pass on[29]. There are many variables that can influence or enhance the readability of text on a computer screen, such as font colour, font size, type face, text layout, background colour, etc. Table 4 indicates the level of influence of different typographical factors on the digital reading of the students.

It is revealed that nearly fifty per cent of the students mentioned that the factors like font size and text layout is highly influencing while reading digitally. For computer based instructional design, selection of appropriate fonts has an impact on students. At the same time, more than fifty per cent of the students stated that type face and background colour are the most influential factors while digital reading. One of the seldom highlighted issues identified with text and font is readability, and the common influencing factors affecting the readability

Table 5. Changes in reading practices by digital reading

Changes on reading practices	Responses (n=588)				
	Strongly disagree (%)	Disagree (%)	Neither agree nor disagree (%)	Agree (%)	Strongly agree (%)
Increased interactive reading	9 (1.5)	67 (11.4)	147 (25)	238 (40.5)	127 (21.6)
Decreased browsing & scanning	170 (28.9)	336 (57.1)	69 (11.7)	13 (2.2)	--
Increased sequential reading	4 (0.7)	87 (14.8)	170 (28.9)	241 (41)	86 (14.6)
Decreased keyword spotting	185 (31.5)	305 (51.9)	72 (12.2)	23 (3.9)	3 (0.5)
Increased superficial (Quick) reading	2 (0.3)	4 (0.7)	26 (4.4)	264 (44.9)	292 (49.7)
Decreased one time reading	56 (9.5)	245 (41.7)	113 (19.2)	161 (27.4)	13 (2.2)
Increased concentrated reading	178 (30.3)	242 (41.2)	134 (22.8)	32 (5.4)	2 (0.3)
Increased extensive reading	13 (2.2)	117 (19.9)	139 (23.6)	189 (32.1)	130 (22.1)
Decreased sustained attention	13 (2.2)	90 (15.3)	151 (25.7)	198 (33.7)	135 (23)
Increased reading selectively	2 (0.3)	19 (3.2)	102 (17.3)	362 (61.6)	103 (17.5)
Increased in-depth reading	229 (38.9)	226 (38.4)	109 (18.5)	22 (3.7)	--

are spaces, font size and font type[30]. Evidence exhibits that colour improve learning and motivation. Hence, the best possible decision of background and foreground colours is important in assuring good legibility[31].

4.5 Changes in Reading Practices by Digital Reading

Studies related with e-resources and its impact on people's reading behaviour exhibit mixed conclusions. Some researchers have recognised the powerful advantages of digital media which are absent in printed materials, others have criticised the impact of the Internet on human cognition and reading capabilities[23]. The students were asked to respond about the changes in their reading practice by digital reading and the responses are depicted in Table 5. Of the respondents, a staggering 95 per cent of the students agreed that a superficial or quick reading behaviour is increased due to digital reading. Due to large amount of digital documents available on the Internet, the students tended to skim read and scanned most documents in order to get through it fast. As indicated in the table, a large majority of the students disagree with the statement that their browsing and scanning while digital reading decreases.

It is also observed that majority of the students favoured the statement that digital reading increases their selective reading practice. A trend also identified in a study that students read more selectively[2]. Majority of the students disagree that digital reading increases their in-depth reading and concentrated reading. It can also be noticed that a majority of the students mentioned decrease in sustained attention and increase in sequential reading. Hyper-reading may affect sustained attention and contributes to more fragmented reading, since each page has to compete with many other pages for user attention.

Table 6. Changes in reading practices by digital reading (gender-wise)

Gender	N	Mean	Std. deviation	z-value	p-value
Male	262	57.76	11.25	2.385*	0.017
Female	326	55.66	11.33		

** Significant at 0.05 level*

Mann-Whitney U-test was conducted for comparing the changes on reading practices by digital reading among male and female students. As per the test results given in Table 6, p-value is less than 0.05, Z-value is significant, hence conclude that there exists a significant gender difference in the changes on reading practices by digital reading. Mean score is higher for male students, which indicates that the changes on reading practices are greater for the male students than the female

Table 7. Changes in reading practices by digital reading (discipline-wise)

Discipline	N	Mean	Std. deviation	Chi-square value	p-value
Science	191	52.94[c]	11.45		
Humanities	191	56.50[b]	9.75	40.862**	< 0.001
Social Science	206	60.08[a]	11.55		

*** Significant at 0.01 level*

students. This is somewhat contradictory to the study reported by Shabani[32] *et al.*

For comparison between disciplines, Kruskal-Walli's ANOVA test was done and the results are displayed in Table 7. Chi-square value is found to be significant at 0.01 level. Hence, pair wise comparison of the different disciplines was done with Mann-Whitney U-test. Results show that there exists significant association between discipline and changes on reading practices by digital reading. Mean score is higher in the case of Social Science group and lower for that of Science group. This indicates that Social Science group feels significantly more change in their reading practices compared with other two groups and Science group shows low change compared with other two groups.

4.6 Influence of e-resources on reading

Several scholars in reading and literacy such as Landow[33] and Lanham[34] agree that the digital media has introduced a transformative shift in reading and writing which has drastically changed the reading behavior of youth. Table 8 indicates the students' perception about the influence of e-resources on the reading. The results indicated that a good number of the students agreed with the statement, that e-resources improve their reading habit. Nearly half of the students disagreed that e-resource reduces their reading interest. This finding seems to be in agreement with the literature reviewed[35].

Reading on computer screen is more a scanning type, and as mentioned earlier, in-depth and concentrated reading is decreasing. A good number of the students stated that e-resources badly affect their reading habit. Nearly half of the respondents agreed that reading e-resources is enjoyable, also helps to improve the independent and lifelong reading skills and it decreases their dependence on print resources.

A score for perception about influence of e-resources on reading is calculated by adding the scores of statements related to it. For each statement, a score of 0, 1, 2, 3, and 4 were given to the response strongly disagree, disagree, neither agree nor disagree, agree and strongly agree in the case of positive statement favouring the influence of digital resources on reading and reverse score were given in the case of negative statements. Then the total score is divided by the maximum expected score (number of statements x 4) and multiplied it by 100 to get the percentage score. Then these percentage score is classified into three equal classes. Low level with scores less than 33.3, average level in between 33.3 and 66.7 and high level with score greater than 66.7. The analysis revealed

Table 8. Influence of e- resources on reading

Influence of E-resources on Reading	Response (n=588)				
	Strongly Disagree (%)	Disagree (%)	Neither Agree nor Disagree (%)	Agree (%)	Strongly Agree (%)
It improves my reading	46 (7.8)	157 (26.7)	142 (24.1)	176 (29.9)	67 (11.4)
It reduces my reading interest	65 (11.1)	213 (36.2)	190 (32.3)	115 (19.6)	5 (0.9)
It has expanded my reading possibility	5 (0.9)	27 (4.6)	152 (25.9)	279 (47.4)	125 (21.3)
It decreases the time spend on reading	21 (3.6)	137 (23.3)	113 (19.2)	281 (47.8)	36 (6.1)
It makes reading more enjoyable	13 (2.2)	112 (19)	191 (32.5)	250 (42.5)	21 (3.6)
Reading digital resources is a waste of time	126 (21.4)	249 (42.3)	194 (33)	17 (2.9)	2 (0.3)
Digital resources badly affect my reading habit	67 (11.4)	117 (19.9)	168 (28.6)	222 (37.8)	14 (2.4)
It has improved my independent and life-long reading skills	5 (0.9)	88 (15)	219 (37.2)	196 (33.3)	80 (13.6)
It decreases my dependence on print resources	44 (7.5)	170 (28.9)	106 (18)	209 (35.5)	59 (10)
It increases my access to wide variety of information sources	1 (0.2)	15 (2.6)	105 (17.9)	272 (46.3)	195 (33.2)

that a vast majority (96 %) of the students have an average level of influence of e-resources. Only a very few number of the students stated a high level (3 %) and low level (1 %) of influence of e-resources on their reading.

Score for perception about changes on reading practices by e-resources were subjected to Kolmogrov-Smirnov test to analyse the normality of the variable. Test statistic Kolmogrov-Smirnov Z (1.836) is found to be significant, since the p-value is less than 0.01 level. Hence the index subjected to non parametric test for testing the significant difference among the sub samples based on gender and discipline. Mann-Whitney U-test conducted for comparing the perception about the influence of e-resources on reading among the male and female students and the results are given in Table 9.

Table 9. Influence of e-resources on reading (gender-wise)

Gender	N	Mean	Std. Deviation	z-value	p-value
Male	262	52.81	8.86	2.480*	0.013
Female	326	50.78	8.07		

**Significant at 0.05 level*

Table 10. Influence of e-resources on reading (discipline-wise)

Discipline	N	Mean	Std. Deviation	Chi-square value	p-value
Science	191	51.43	7.90		
Humanities	191	51.13	8.43	2.110[ns]	0.348
Social Science	206	52.44	9.03		

ns non-significant at 0.05 level

As the p-value is less than 0.05, Z-value is significant, hence concluded that there exists a significant gender-wise difference in their perception about the influence of e-resources on reading. Mean score is higher in the case of male students, which indicates that they have significantly higher influence of e-resources on their reading practices than those of female students.

For comparison between different disciplines, Kruskal-Walli's ANOVA test was done and the results are shown in Table 10.

Since the p-value is 0.348, it can be assessed that the association between perception about the influence of e-resources on reading and discipline is statistically non-significant at 0.05 level of significance. This makes it clear that there is no significant association between the variables.

5. CONCLUSIONS

A number of critical effects of the digital environment on students' reading behaviour were evident through the findings. It is revealed that with the availability of laptop, mobile phone and the Internet, students' digital reading increases. The features like save, download, copy, paste, search and find options help students to a great extend for their digital reading. The factors like font size and text layout are the highly influencing factors among students while reading digitally. One of the implications noted through the analysis was the importance of reading skills for students in the digital age. To achieve similar levels of reading experience as on paper, students require certain online reading strategies and essential skills. Through digital reading, students' superficial reading, interactive reading, sequential reading, one time reading and extensive reading are increased and screen-based reading behaviour like browsing, scanning and keyword spotting practice also increased. At the same time, students are facing decreasing in-depth reading, sustained attention and concentrated reading while reading digitally. These changes on reading practice were greater for male students than female students.

E-resources made an average level of influence on the reading behaviour of students. In modern times helping students to become effective readers is one of the goals of educators. If traditional literacy world has been replaced by the digital technology, it is important that educators, distributors, publishers, writers, and software engineers might collaborate with each other to make all the interesting and economic digital materials for students[36]. Students nowadays are fairly techno-savvy, educators should go beyond teaching technical skills to integrating information and communication technology in the classroom where students can truly explore and experience different types of e-resources and a variety of online interfaces.

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