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Students' perceptions of challenges in online reading and their affective responses: A focus group study

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Abstract

In the present-day digital landscape, the internet serves as an essential medium for learning and acquiring information. As reliance on internet-based reading increases, it is necessary to address and resolve the difficulties encountered by the readers in this medium. Keeping this objective in mind, this study investigates the challenges faced by students and the affective responses they evoke while reading on the websites for educational purposes. Three focus group discussions were conducted with six participants each to explore the students' perceptions and experiences while reading through websites. Four themes emerged related to the challenges of website reading such as: (i) distractions and interruptions, (ii) information overload, (iii) difficulty in using active reading strategies like highlighting and annotating, and (iv) difficulties while using hyperlinks. The results further show that these challenges evoked various unfavorable affective responses in the readers depending on the challenge they faced. The study concludes that these challenges and the ensuing emotional responses are likely to detract from the seamless reading experience and diminish the enjoyment derived from learning. Understanding such challenges faced by students while reading through websites is important for educators in making necessary interventions to enhance the effectiveness of online reading and learning.

Keywords: Online learning, Web-based reading, Qualitative research, Challenges, Affective responses

Introduction

In the contemporary digital epoch, the internet serves as a vast repository of information, providing access to knowledge on almost all the topics around the world. Reading through the internet has several benefits including easy accessibility to a large amount of information, cost-effectiveness, convenience, search features, customization tools, interactivity, and multimedia features (Dobler, 2015; Solak, 2014). Students, researchers,



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and academicians often make use of this rich source of information in educational settings to enhance their learning experiences (Hinson, 2011; Zlatkin-Troitschanskaia et al., 2021). However, reading for information through websites involves certain unique demands and challenges when compared to the conventional reading of printed materials (Brun-Mercer, 2019; Coiro, 2014). Due to these challenges, even digital natives who grew up in the era of digital technology find it difficult to engage effectively in the practice of online reading (Brun-Mercer, 2019). Therefore, it is important to understand the challenges of reading online in order to formulate necessary pedagogical interventions to enhance the online reading skills of students. However, in-depth qualitative research on the challenges of online reading and its affective dimensions, particularly from a non-Western student perspective, is limited in previous literature. Hence, this study aimed to collect nuanced qualitative data regarding the various challenges of online reading and its affective responses from the perspective of Indian students. Understanding such hurdles of web-based reading and the emotional impact it has on readers is essential as it enables educators and web designers to create effective interventions to enhance students' online reading skills and their overall reading experience.

Literature review

Challenges of online reading

Readers encounter several challenges while using the internet for reading. One major challenge is that there exists a lot of false, biased, and misleading information (Brun-Mercer, 2019). Readers must navigate and read multiple online texts causing challenges related to searching, evaluating the credibility and integrating information across different texts (Bråten et al., 2020; Wineburg & McGrew, 2019). Studies show that students were often deceived easily by professional-looking websites (Wineburg & McGrew, 2019), and struggle to evaluate online resources effectively, highlighting the need for educational interventions to build online reasoning skills in the digital age (Breakstone et al., 2021; McGrew et al., 2018).

Online reading is also hindered by a range of distractions such as advertisements, notifications, and emails (Brun-Mercer, 2019). Studies show that frequent multitasking in online medium also reduces attention to the text one is reading (Baron et al., 2017; Daniel & Woody, 2013). A survey found that 85% of US students multitask when reading digitally, and around 43% reported struggles with staying focused. Another study reported that e-reading takes longer time than reading printed texts due to distractions like instant messaging and using social media in between (Daniel & Woody, 2013).

Hyperlink navigation further challenges readers, leading to disorientation, fragmented reading, and increased cognitive load (Conklin, 1987; Cress & Knabel, 2003; Liu, 2005).

Research has also indicated that reading online leads to tiredness and fatigue due to physiological factors like eye strain and psychological factors like increased cognitive load (Solak, 2014; Wästlund et al., 2005). Solak (2014) in an experiment showed that 42% of participants reported eye irritation, while 23% found online reading tiring. Wästlund et al. (2005) linked screen reading to increased cognitive load and fatigue due to the need for simultaneously reading and handling computer operations.

With the transition to online reading, e-books and audiobooks have gained popularity. Studies on e-books report challenges like eye fatigue, unnecessary interactive features, distractions from reading devices and the lack of knowledge in using e-books (Dobler, 2015; Lim et al., 2021). Audiobooks present issues like passive engagement, difficulty in pausing or repeating content, difficulty in controlling the speed of reading and challenges in conveying visual content (Best, 2020; Rubery, 2016).

When analyzing these existing literature regarding the challenges of online reading, most of these studies have used either experimental or survey methods predominantly involving quantitative data analysis techniques (Baron et al., 2017; Breakstone et al., 2021; Cress & Knabel, 2003; Daniel & Woody, 2013; Lim et al., 2021; Liu, 2005; McGrew et al., 2018; Solak, 2014; Wästlund, 2007; Wineburg & McGrew, 2019). In such experimental and survey methods, the data collected is limited to predefined variables or questions determined by the researchers. Also, they only gather limited, basic quantifiable data needed for analysis. Hence it lacks in-depth, open-ended exploration of these challenges from the students' perspective, as in qualitative research. Existing studies mostly fall short of collecting elaborate details such as the underlying reasons, emotions, or experiences related to these challenges.

Further research in this area has concentrated on the detrimental effects of these challenges on one's cognitive functions. Studies show that digital distractions and multitasking impair one's attentional control (Firth et al., 2019; Liu, 2005). Consequently, researchers argue that distractions and information overload reduce our ability for sustained focus and deep reading, instead promoting more skimming and fragmented reading in the online environment (Carr, 2008; Liu, 2005; Sosnoski, 1999; Wolf, 2018). In terms of its effect on memory, distractions and information overload cause our working memory to function less optimally, thus disrupting the process of memory consolidation into long-term memory (Carr, 2010; Wolf, 2018).

Thus, existing literature has concentrated heavily on how various features and challenges of online reading affect our cognition, such as attention and memory. When a person faces a particular challenge, it can impact one's cognition as well as trigger certain affective responses in them. Affective responses are emotions like joy, excitement, frustration, and anxiety triggered by specific experiences (Frijda, 1993). Addressing these emotional

responses is essential as it can influence how effectively one comprehends and engages with the texts.

Affective factors in reading

Although past research has mostly concentrated on the relationship between cognitive factors and online reading, it is equally important to consider the affective states during the process of reading (Bohn-Gettler & Rapp, 2011). Despite the crucial importance of affective factors in reading, there is a gap in research examining the aspect of emotions with regard to one's reading process (Hamedi et al., 2020). The few existing research surrounding affective states have been in the context of printed texts, often neglecting the aspect of online reading. This gap may be due to the relatively recent surge in online reading when compared to our traditional practice of print reading.

There is a minimal body of research that links affective states with the reading of printed texts. These studies show that the mood and affective state of the reader play a significant role in the processing and comprehension of printed texts. Bohn-Gettler and Rapp (2011) showed that the mood of the reader – happy, sad or neutral – differently affected comprehension processes and post-reading memory. Participants in sad mood engaged in less text-based inferential processes than those in happier mood. In another experiment, Hamedi et al. (2020) demonstrated that positive emotions like enjoyment enhance the reader's engagement and reading comprehension, while negative emotions like anxiety and boredom had detrimental effects on these aspects. Another study by Zaccoletti et al. (2023) also showed that anxiety negatively impacts reading comprehension, and self-regulating emotions helps students perform better in stressful situations.

Moreover, research investigating the affective states in the context of online reading is scarce and is only an emerging field of study. A recent study by Su and Guo (2024) explored the emotions experienced while engaging in digital collaborative reading. Results show that students experienced a range of positive emotions, which came from interest in the topic and getting recognition from other groups and negative emotions like anxiety due to challenges in interacting with a group and time pressure. Novak et al. (2022) specifically explored frustration in e-textbook use, identifying reading from a screen, technical difficulties, and difficulty using active reading strategies as key sources of frustration.

Overall, there is a notable paucity of studies linking affective states to reading processes, particularly in the context of online reading. While there has been some exploration of frustration related to e-textbook usage (Novak et al., 2022), no studies have specifically examined the diverse emotional responses evoked while individuals read through websites. Hence, the affective states triggered by the challenges of reading through websites warrant further research.

Rationale for the current study

In recent times, reading for educational purposes has increasingly shifted to online platforms, and reading through websites has become a common practice among students. Students usually develop these online reading skills by themselves outside the formal classroom, whereas print reading is typically taught within a formal classroom setting. Despite being digital natives growing up in a world of information and technology, research indicates that students in the present generation struggle with effective online reading (Brun-Mercer, 2019; Singer & Alexander, 2016). This highlights the need for educators to incorporate pedagogical interventions to enhance students' online reading skills. Instructors must be aware of the distinct challenges students face during web-based reading, in order to formulate effective training strategies for them. This calls for an in-depth understanding of the challenges students face while reading online, as viewed from the student perspective.

Previous literature shows that there exist surveys and experimental studies that offer limited quantitative data on the challenges of online reading. However, there remains a gap in qualitative research that provides an in-depth, nuanced and open-ended exploration of the challenges from students' perspectives. Also, the affective responses evoked while reading online are largely unexplored in existing literature. Specifically, no previous study has examined the range of affective reactions triggered by the challenges of reading through websites. Thus, a gap in the literature demands more in-depth qualitative research into student perspectives of the various challenges and their affective responses evoked while reading through websites.

Further, much of the research done on online reading uses students from Western countries such as the UK or the US as a sample population (Breakstone et al., 2021; Daniel & Woody, 2013; Dobler, 2015; Liu, 2005; McGrew et al., 2018; Novak et al., 2022; Wineburg & McGrew, 2019; Zaccoletti et al., 2023). But previous studies like the one by Chen et al. (2023), have noted that students from Eastern and Western countries show different digital reading behavior. Hence, there is a need for further research exploring the online reading challenges from a non-Western perspective.

The current study addresses these gaps in previous literature by seeking in-depth insights from Indian students regarding the various challenges and the resulting affective responses they experience while reading through websites for educational purposes. Students generally use a wide range of website resources for educational purposes, such as for gaining knowledge, enhancing their understanding of concepts, learning a topic, preparing for projects and presentations, and for supporting their academic research. The study specifically focuses on the challenges experienced while navigating and reading through a wide range of websites for educational purposes, including educational websites, encyclopedic websites, blogs, institutional websites, news outlets, journal websites, and

other resourceful websites. To guide the investigation, the study is framed around the following research questions: What are the main challenges students encounter while reading websites for educational purposes, and what affective responses do these challenges evoke? How do these issues impact their overall reading and learning experience?

The objectives of this study are threefold. It aims to explore: (a) the main challenges encountered by students while reading through websites for educational purposes, (b) the affective responses of the readers to these challenges encountered during web-based reading for educational purposes, and (c) the impact these issues have on their overall reading and learning experience. These objectives were conceived to analyze the effectiveness of web-based reading and help educators implement necessary interventions to improve the reading experience of students.

Unlike existing studies that use quantitative methods, this study employs qualitative focus group approach which provides the richness of data, not achieved by quantitative methods. Qualitative focus group discussions do not limit the responses of students like quantitative methods do, instead they give the flexibility to ask for elaboration and allow further prompting to derive nuanced insights.

Methods

Participants

Eighteen Indian postgraduate students aged 20-23 ($M = 21.61$, $SD = 0.91$) were selected from the National Institute of Technology, Trichy as participants. These participants were chosen based on “purposive sampling”. Our rationale for the purposive sampling was to specifically gather perspectives from students who: (a) actively engaged in reading through websites as a part of their learning, (b) widely used web-based resources for research and (c) were motivated to participate in the research. The eighteen participants chosen were postgraduate students and their course curriculum required them to engage extensively in self-directed learning in addition to teacher-led instructions, encouraging them to explore and read widely using various resources available on the internet. Additionally, their course required them to submit a final-year dissertation during which they had to engage extensively with online resources for doing their research. Thus, these participants were selected because they had substantial experience with web-based reading and could provide meaningful insights related to the issues they face while reading online.

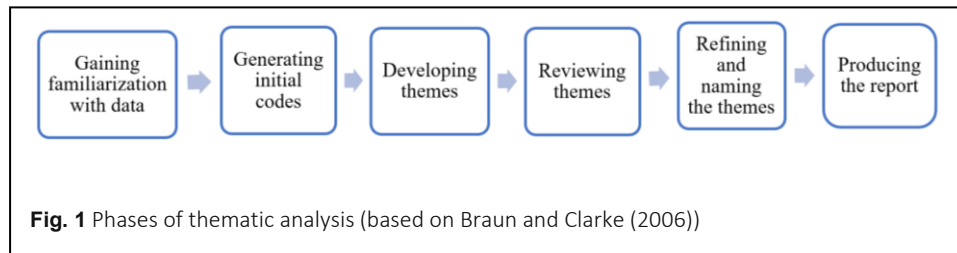
Design and procedure

A qualitative study method using focus group discussions was used to explore in an in-depth manner the students’ views about the issues of reading through websites. A total

of three focus groups were conducted with six participants each. We conducted the focus group discussion in a classroom at NIT, Trichy. Participants filled up forms giving consent to participate in the focus group discussion. The moderator of all the focus groups was one of the authors of this study. Participants were seated around a table along with the moderator. Before beginning the focus groups, the moderator reminded the participants about the ground rules to be followed throughout the discussion such as exchanging ideas politely and listening respectfully. The session started with an ice-breaker question to help the participants feel comfortable and to build rapport so that they freely express their opinions during the discussion. The moderator then guided the group through a series of questions and the participants discussed their insights on the same. The moderator facilitated a dynamic exchange of ideas by allowing participants to ask each other questions, clarify doubts and build on the contributions of others. Each focus group discussion lasted for approximately one hour.

Questions for the focus group discussion were formulated by gaining insights from the participants' peer groups and after consultation with experts in related fields such as digital reading, psychology and qualitative research. The authors engaged in a background discussion with the peer group of the participants by informally interacting with them about the common challenges they face while reading through websites, a few days before the actual focus group sessions. From this background discussion, the authors got insights into the challenges that students similar to the participants faced, which helped them develop the questions. Along with that, the authors sought the help of other experts in the pertinent field of study to formulate the questions for the focus group discussion. The questions and prompts used for the study are given in Appendix 1. Mostly, open-ended questions focusing on specific challenges were asked so that participants could give elaborate responses. Additionally, general questions were also included to uncover any other challenges that had not been considered by the authors in the specific questions asked. As the participants discussed these challenges, they were further probed to share specific details, personal experiences and affective responses evoked by those challenges.

The discussions of the participants in all the focus group sessions were audio-recorded. These recordings were later transcribed verbatim and the data from the transcripts were used for data analysis. We excluded comments related to the physical discomforts participants faced while reading on digital devices, as our research aimed to narrow its focus to challenges specifically arising from reading through websites on the internet, rather than broader issues such as eye strain, which is more commonly associated with digital devices in general. Certain points reported by only a small number of participants and occurring infrequently were also excluded from detailed analysis, as they were not considered representative of the broader participant experience. They were also not significant enough to be categorized as themes or subthemes in the study.



Data analysis

The data was analyzed through thematic analysis using MAXQDA software (VERBI Software, 2023). Thematic analysis included the following steps as mentioned by Braun and Clarke (2006): i) gaining familiarization with data by reading it several times, ii) generating initial codes via open coding, iii) developing themes by combining similar codes, iv) reviewing the identified themes, v) refining the specifics of the themes and choosing the appropriate name for each theme, and vi) producing the report of the conducted analysis. Both authors examined the transcripts and engaged in the coding process separately. Then the authors compared these codes together and discussed agreements and differences. The initial agreement between the coders was about 80%. The coders then jointly reviewed the data and the differences in opinions were resolved through discussions until a consensus was reached on the codes, which were then aggregated into subthemes and themes.

Results

The four main challenges related to web-based reading that emerged from the discussion were: (a) distractions and interruptions, (b) information overload, (c) difficulty in using active reading strategies like highlighting and annotating, and (d) difficulties while using hyperlinks. These difficulties evoke unfavorable affective responses like frustration, stress, fear, anxiety, guilt, powerlessness, confusion, demotivation, and procrastination in the readers depending on the specific challenge they face. Participants' quotes are presented to elaborate on each theme. The group is indicated by a G and the participant by a P next to each quote followed by the appropriate number (e.g., 'G1P1' means a quote from participant number one from the first focus group). A summary of the themes along with subthemes is given in Table 1. The summary of the affective responses evoked by these challenges is given in Table 2.

Table 1 Focus group themes and subthemes

Themes	Subthemes
Distractions and interruptions	<ol style="list-style-type: none"> 1. Advertisements 2. Pop-ups containing verification questions and consent prompts 3. Tendency to use social media and other apps 4. Paywall restrictions 5. Technical difficulties 6. Website designs
Information overload	<ol style="list-style-type: none"> 1. Choice overload and difficulty filtering information 2. Pseudo-information and authenticity 3. Digital hoarding and tab overload 4. Fear of missing out on relevant information 5. Overreliance on technology
Difficulty in using active reading strategies like highlighting and annotating	<ol style="list-style-type: none"> 1. Lack of immediacy and need for additional tools 2. Lack of tangible experience 3. Difficulty in annotating and highlighting while reading through hyperlinks 4. Lack of awareness about digital tools
Difficulties while using hyperlinks	<ol style="list-style-type: none"> 1. Non-linear structure and disorientation 2. Wrong or broken content 3. Distracting hyperlinks 4. Interesting hyperlinks deviating from the main topic

1. Distractions and interruptions

Participants mentioned that several instances of distractions and interruptions occur while reading for information on the websites. Six subthemes that emerged under this theme include:

a. Advertisements

Many participants mentioned advertisements as the major distractor while reading through websites.

G3P2: “In my opinion, advertisements are the biggest distractions while reading [...] There are even websites that only let you read an article after watching an ad.”

G3P5: “While reading sometimes, I find myself ending up in shopping sites or playing some games. After seeing ads, we go to those sites.”

Such distractions can also create emotions like guilt and stress in readers. A participant said: “Once we get diverted by ads, it will take a long time for us to come back again and then we will realize that we don’t have enough time to read a particular thing. That will create a sense of guilt conscience or fear or frustration (G2P3).”

b. Pop-ups containing verification questions and consent prompts

Participants expressed that they felt irritated with pop-ups like consent prompts, verification questions, or user-feedback questions while navigating through websites for reading.

G2P2: “At times it will ask ‘are you a robot?’ or ‘accept cookies first’. Even we get annoyed by the captcha challenges [...] They will make us frustrated if we are reading in a hurry.”

G1P6: “When ads pop up, we intend to close it. It further asks us questions like which option you choose for closing this ad, ‘Are you not interested?’, ‘Is this not relevant to you?’. It irritates and is so much of digression from reading.”

c. Tendency to use social media and other apps

Participants mentioned that they are prone to multitasking while reading online as they have easy access to social media and other apps. This makes it harder to sustain attention on the reading task.

G1P5: “I get very highly distracted. Even without knowing, without a voluntary action, I automatically open, say Spotify while I am reading something. And then I open my WhatsApp web and end up chatting in between reading.”

Frequently wasting time on apps like social media and procrastinating reading tasks leads to feelings of guilt, stress, and negative self-esteem in readers. A participant noted: “It has gone to the extent that I have a focus timer set for almost ten apps on my phone. After a point, I get tempted to delete the timer and use social media. So this increases my guilt and affects my self-esteem. I can’t rely on myself to stay concentrated while I am reading online (G1P5).”

d. Paywall restrictions

Participants expressed dissatisfaction with interruptions caused by paywall restrictions on several websites and the high subscription fees required to access those content.

G2P5: “We will be reading a website in a flow. But the website will only show half of the text and it will be asking us to avail premium to read full. We will feel frustrated at those times.”

G2P1: “The cost for subscribing to some websites usually comes in terms of foreign currency like dollars or euros. And, when we convert to Indian rupee, it is really high.”

e. Technical difficulties

Technical difficulties while navigating through websites also disrupt the flow of reading according to the participants.

G2P3: “In multiple situations, we have faced poor internet signal, so the page won’t load, the hyperlinks are not navigated.”

Participants said that these technical issues take away the pleasure of reading and leave them demotivated as suggested by the words, “I think it is not only frustrating, we feel this loss of interest in reading (G3P2).”

f. Website designs

According to the participants, another factor that could interrupt reading is the website design which is not well organized.

G2P1: “For certain websites, the layout will be cluttered so much, a cluttered menu bar, many advertisements, videos [...] It can create a sort of confusion and unpleasant reading experience.”

G2P3: “Too many pictures, videos, animations and all in a website can also be annoying.”

2. Information overload

Participants noted that information overload also poses challenges while reading through websites. The five sub-challenges of information overload include:

a. Choice overload and difficulty filtering information

Participants experienced indecisiveness and stress while filtering and choosing from the excess amount of choices in online medium:

G1P2: “As I read through digital medium, there is that stress of choosing the things that I actually want to read, choosing the things that are relevant to me. If I don’t choose that, later I will feel guilty.”

Choice overload also leads to demotivation and procrastination in some participants as suggested by the words of a participant, “[...] because there is a lot of information and that I am confused, I feel like let me do it later, that I can’t do it now (G2P2).”

b. Pseudo-information and authenticity

Participants expressed that another factor that concerns them is the widespread prevalence of pseudo information on online platforms.

G2P6: “We don’t know if information on internet is right or wrong. We can’t trust it completely.”

G1P1: “To know if the facts are real or not is very difficult. [...] we don’t know if a website is legit or not.”

c. Digital hoarding and tab overload

Several participants also acknowledged that they engage in the practice of digital hoarding, which is, excessively accumulating a lot of information mostly without reading it. One such consequence of it is tab overload.

G3P5: “Sometimes I just download a lot of materials and not read it. I have the feeling that it’s there, I can take a look at it anytime.”

G3P4: “When I start reading for an assignment, the usual practice for me is that, first I open the related websites and hyperlinks in multiple tabs [...] When I open a lot of tabs, my laptop gets hanged and I will end up getting angry.”

Participants said that digital hoarding causes negative affective responses in them like guilt and stress. A participant noted: “It induces a lot of stress, I know that. And it makes me scared that there is a lot to read (G3P4).”

d. Fear of missing out on relevant information

Another issue raised by the participants in web-based reading is the fear of missing out on relevant information. This induces stress and anxiety in several participants.

G2P3: “Because of lot of information, I don’t know where to stop. I always end up collecting a lot of information, but there is always a vast more. So I have this fear of missing out.”

G3P3: “There is always the anxiety of ‘is it enough?’, ‘is it enough?’.”

e. Overreliance on technology

Participants also agreed that overload of information makes them less patient and reluctant to engage in processes like memorization, contemplation, critical thinking, and creativity, thereby increasing their reliance on technology.

G1P5: “I feel it (overload of information) doesn’t really enable us to sit and analyze our own understanding of a concept. Just because there is too much information, I stop my thinking process, thinking that there is so much that I can easily get, instead of sitting and thinking for hours.”

G3P3: “It makes the information obsolete at a time, so you feel like there is already these information online. Why do I need to mug it up? I can just check it everytime I need. So studying itself becomes obsolete.”

3. Difficulty in using active reading strategies such as annotating and highlighting

Active reading is the practice of engaging with a text using strategies such as highlighting, annotating and other similar techniques (Inie et al., 2021). Participants in our study noted

difficulties in using such active reading strategies while reading through the web. The four themes that emerged under this topic include:

a. Lack of immediacy and need for additional tools

Participants opined that highlighting, annotating and underlining while reading through the internet requires additional tools or processes, and it lacks the immediacy and ease that physical copies offer them.

G1P1: “When reading a physical book, I have this freedom to interact with it best as I want. I can highlight, underline and write what I want to immediately. But it’s not the case while reading through websites. You have to do some setup and open some tools and all to do this. That kind of disrupts the flow, take the joy from reading.”

Participants also noted that using website annotation tools can lead to frustration as they are not always user-friendly as suggested by the words of a participant: “I don’t find tools for highlighting and annotating easy to use as doing it on a paper. Sometimes it makes the process complicated and I feel angry and stop doing it (G3P4).”

b. Lack of tangible experience

Many participants enjoy the tangible experience of holding a book and engaging with pen and paper while reading and taking notes. They find that reading on websites and typing doesn’t offer that kind of tactile experience.

G1P6: “I like the feel of having a paper and pen in my hand. [...] I generally like writing down things. Writing my own opinions against it. What I have written down stays in my mind for long. Typing does not bring out the same effect.”

G3P5: “I prefer the physical book. It just gives me the pleasure of reading, holding a book and just underlining or taking down things randomly. I don’t get that in online reading.”

c. Difficulty in annotating and highlighting while reading through hyperlinks

Participants expressed difficulty in highlighting and annotating while reading through hyperlinks.

G1P3: “While reading hypertexts, we navigate through several different links. So it’s practically difficult to annotate or underline.”

G2P4: “Physical copies are way easier to manage in terms of notetaking. Say I highlighted or annotated while I am reading through hyperlinks. It’s difficult when I come back to it later at the time of revision because notes are scattered across websites.”

d. Lack of awareness about digital tools

Many participants find it difficult to highlight and annotate due to their unfamiliarity with the digital tools that aid in it. They are more accustomed to the traditional pen-and-paper method of note-taking.

G1P2: “There are apps and tools that can support highlighting and annotating I guess, which I am not aware of.”

G2P5: “I can just underline or mark more easily while reading physical books. It’s not like I can’t highlight while using websites. But I am used to the system of dealing with physical copies from school and not sure about how to do it online.”

4. Difficulties while using hyperlinks

Participants noted that they experienced various kinds of challenges while navigating through hyperlinks. Four sub-themes emerged under this theme include:

a. Non-linear structure and disorientation

Due to the non-linear nature of hyperlinks, readers are prone to both conceptual and structural disorientation while using hyperlinks (Cress & Knabel, 2003). Participants reported experiencing conceptual disorientation, that is, difficulty in connecting ideas present in different links to get an overall understanding.

G3P6: “While reading from different links, there is no continuous flow of an idea, one after the other, as in a physical book. The flow often get disrupted [...] I feel it’s like reading from here and there. It can be vague sometimes.”

Some participants also admit that they get lost without a sense of location or direction in highly complex hypermedia environments. This is referred to as structural disorientation (Conklin, 1987) and it caused frustration according to the participants.

G1P2: “I get frustrated and lose patience at times. For example, if I want to find an information I previously read, I forget the keyword of the link and it becomes a struggle to find the link amidst many links. I get stuck in such situations.”

b. Distracting hyperlinks

Hyperlinks can also lead to distracting or irrelevant content, taking away the attention from our reading goal. Participants noted the following regarding the same:

G3P2: “Occasionally, hyperlinks found on websites leads to games, ads and sometimes to shopping sites.”

G1P5: “If it is not a well-reputed website, it might lead me to some other irrelevant or porn websites, which I feel is so absurd when I am sitting in front of an audience.”

c. Wrong or broken content

Participants noted that hyperlinks can sometimes direct one to wrong or broken content, thus breaking the flow of reading and leading to frustration.

G3P6: “Hyperlinks sometimes lead to broken links or deleted pages. I get annoyed if it is something that I wanted to read badly.”

G2P6: “It (hyperlinks) may mislead us. Sometimes it may give us the title as we want and then content something else.”

d. Interesting hyperlinks deviating from the main topic

Participants reported that while navigating through hyperlinks, interesting hyperlinks not related to their reading goal, divert them from their primary reading objective.

G1P4: “Hyperlinks can also deviate us. Initially we will be sticking to a topic. But some other hyperlinks may be interesting at that point and I click them. And after sometime we will be having this thing that I got distracted from the main aspect [...] and reading something which is not even connected with the topic I wanted.”

G2P4: “While I was preparing for my assignment on modernism, I was searching on cubism. I came across a link on cubism paintings, and then I looked through the link of a cubism artist. Then I clicked a link related to other paintings of the artist and went through many paintings which were not related to cubism. I went on and on and started looking some random paintings which had no relation to cubism or modernism. So ultimately I was like, ‘what did I start?, where did I reach?’. I was looking for cubism and I ended up somewhere else.”

Table 2 A list of the negative affective responses triggered by the various challenges of web-based reading

Negative affective response	Theme/challenge	Specific instances
Irritation and Frustration	1. Distractions and interruptions	<ul style="list-style-type: none"> a. Constant interruptions by ads b. Pop-ups like consent prompts and captcha challenges c. Paywall restrictions d. High subscription fee for accessing websites e. Technical issues f. Cluttered website
	2. Information overload	<ul style="list-style-type: none"> a. Issues related to tab overload
	3. Hyperlinks	<ul style="list-style-type: none"> a. Structural disorientation b. Wrong or broken links
	4. Active reading strategies	<ul style="list-style-type: none"> a. When annotation tools are not user-friendly or convenient to use
Stress and pressure	1. Distractions and interruptions	<ul style="list-style-type: none"> a. Only limited time to read, but constantly gets distracted by ads, pop-ups and notifications b. Only limited time to read, but vulnerable to multitasking using social media and other apps
	2. Information overload	<ul style="list-style-type: none"> a. Overwhelmed by excessive information and difficulty choosing from it b. Digital hoarding without reading them c. Feeling that one hasn't read enough d. Fear of missing out relevant information
Guilt	1. Distractions and interruptions	<ul style="list-style-type: none"> a. Constantly being distracted without performing the reading task b. Multitasking using social media instead of reading
	2. Information overload	<ul style="list-style-type: none"> a. When apt material is not chosen for reading and time is wasted b. Digital hoarding without reading it
Negative self-esteem (developing from guilt and powerlessness)	1. Distractions and interruptions	<ul style="list-style-type: none"> a. When a person is continuously distracted by other interesting things on the web and can't rely on oneself to remain concentrated on reading. For example, when readers can't control their impulse to look into their social media accounts while reading for educational purposes.
Loss of interest or demotivation	1. Distractions and interruptions	<ul style="list-style-type: none"> a. Constant distractions b. Technical issues c. Lack of immersive reading
	2. Information overload	<ul style="list-style-type: none"> a. Excess amount of information can lead to loss of interest and procrastination b. Confusion and difficulty filtering information
	3. Active reading strategies	<ul style="list-style-type: none"> a. Difficulties using active reading strategies on websites compared to physical copies b. Difficulty in using online annotation and highlighting tools

Discussion

This qualitative study supplements and elaborates on the difficulties of online reading discussed in previous studies (Bråten et al., 2020, Brun-Mercer, 2019; Dobler, 2015). While past research was predominantly quantitative studies, we incorporated a more nuanced and detailed perspective of each of the major issues of online reading using focus group interviews, which the quantitative nature of previous studies couldn't capture fully. The study also highlighted the emotional responses to these challenges, which to date, is an underexplored aspect of online reading in existing literature.

The first theme that emerged under the challenges of reading through websites is the problem of distractions and interruptions. Many participants reported that distractions like advertisements, notifications and social networking sites lure their attention away from the reading task. These findings have received prior empirical support with studies reporting that several distractions occur while reading online that draw focus away from the reading material (Brun-Mercer, 2019; Dobler, 2015). Participants admitted that constantly getting distracted and procrastinating their actual task, leads to affective responses like stress and pressure when reading in a limited time frame. It also leads to feelings of guilt and powerlessness, negatively affecting one's self-esteem.

While the aspect of distraction is consistent with earlier literature, our results further show the various other interruptions that occur while reading through websites such as cluttered websites, verification questions and consent prompts. Participants also noted that they were frequently interrupted halfway through reading due to the paywall restrictions of several websites. This is a problem faced especially by those living in developing countries, because the huge subscription rate of numerous websites is not feasible for them, restricting their access to the full content of these sites. Participants in our study acknowledged that such interruptions disrupt their reading flow and cause irritation and frustration. This is consistent with Novak et al. (2022) where participants reported that interruptions on the internet such as technical issues, difficulty navigating on-screen and difficulty using active reading strategies lead to frustration in readers.

The second theme that surfaced under the challenges of web-based reading is the problem of information overload. A major issue raised by the participants related to this was the presence of misleading and false information on the internet. They also reported that filtering from the vast amount of information available on the internet is confusing and overwhelming. They experienced the fear of missing out on relevant information while reading through the internet for academic purposes. Hence, our results show that the fear of missing out is not only experienced when engaging with social media as in pre-existing studies (Fioravanti et al., 2021). Readers also experience this fear because they don't feel completely satisfied or content about the extent to which they have read, as there is always a lot more information on the internet that they have not covered. This induces feelings of

fear and anxiety in the readers (G3P3: “There is always the anxiety of ‘is it enough?’, ‘is it enough?’”). As a result, participants admitted that they end up accumulating all the possible sources of information before reading, leading to problems like digital hoarding and tab overload. Digital hoarding is the practice of obsessively accumulating digital files, leading to heightened distress and disorganization (Van Bennekom et al., 2015). Our study shows that this can happen in the form of piling up information in multiple tabs causing tab overload. Tab overload leads to subsequent issues like losing track of the content in the tabs or the browser getting hanged, leading to the experience of frustration as reported by our participants.

The themes of distractions and information overload can be further explained in terms of concepts like novelty bias and instant gratification theory. Novelty bias is a characteristic of our brain’s prefrontal cortex by which our attention is easily captured by something new or unfamiliar. The brain’s novelty centers are rewarded for processing new stimuli and create an addiction loop, making humans susceptible to distractions and instant gratification rather than the reward from sustained focus and attention (Levitin, 2014). Instant gratification is the desire in human beings to get pleasure immediately and thus impulsively choose an immediate smaller reward over a more delayed, but larger reward (Lagorio & Madden, 2005; Mischel, 1974). Hence, as suggested by our participants, readers are lured into more novel and instant pleasure-giving distractions found online, rather than striving for the more fruitful intellectual reward they get when they complete the reading material.

Further, as the participants stated, the instant gratification of getting all the information immediately in the form of condensed summaries makes them over-reliant on the internet. This has made them less patient and reluctant to engage in more effortful processes like memorization, deep reading, contemplation, creativity, or critical thinking as shown in our results. According to Carr (2008) and Wolf (2018), this overreliance on technology for capsule content diminishes our intelligence and abilities for deep thinking. Previous research shows that this increased dependence on external sources for information reduces one’s ability to memorize information, hinders the formation of one’s internal knowledge base, and thus hampers their intellectual development (Sparrow et al., 2011; Wolf, 2018).

The third theme that emerged is regarding the challenges related to using active reading strategies like highlighting, underlining, and annotating while reading through websites. The findings related to this theme substantiate that readers employed these strategies more in the print reading than in on-screen reading as shown in previous studies (Foasberg, 2014; Liu, 2005). Participants in our study pointed out that they find it inconvenient to use these strategies in online reading due to the lack of immediacy, ease, and tangibility that they are accustomed to while using these strategies in the print medium. In addition, a major reason our participants mentioned for not using these strategies is because of their lack of

knowledge about digital tools that aid in it, which points out the importance of imparting essential digital literacy skills to students.

Challenges pertaining to navigation through hyperlinks emerged as the fourth theme under the difficulties of reading through websites. Our results indicate that while navigating the non-linear hyperlinks, some participants experienced instances of conceptual and structural disorientation as suggested by Cress and Knabel (2003). Previous researches suggest that it is learners with low prior knowledge of the domain who experience more disorientation in hypertext reading (Amadiou et al., 2009; McDonald & Stevenson, 1998). Our participants further noted that they get frustrated when they experience structural disorientation or when links lead to wrong, broken, or deleted pages. Distracting hyperlinks leading to ads, games, and other interesting topics also tend to deviate the learners from their primary reading goal. The problem of digressing from the task at hand while using hyperlinks has also received empirical support from prior literature (McDonald & Stevenson, 1998).

A major consequence of these four challenges that participants reported in our study is that they disturb the immersive experience and the natural flow of reading, thus hampering the amount of pleasure derived from learning through websites. This can be explained in terms of flow theory, where flow can be defined as a state of optimal experience where a person is completely immersed in a task and finds immense enjoyment in the task one is doing (Csikszentmihalyi, 1990). Learning from physical copies facilitates this state of flow as it allows an immersive and largely uninterrupted reading experience. On the other hand, reading online often disrupts the flow of reading and impedes complete engagement with the text due to the issues that participants noted such as constant distractions, information overload, difficulties in using active reading strategies, and other challenges like disorientation and fragmented reading, which occur due to reading through the hyperlinks. Moreover, as the results show, these challenges of web-based reading for educational purposes evoke many negative affective responses like frustration, fear, stress, pressure, anxiety, guilt, powerlessness, confusion, demotivation and procrastination in readers, depending on the challenge they face. Academic or educational web browsing is typically serious, goal-driven, time-bound, and centered on learning or research objectives. When users encounter challenges in this context, they are more likely to experience such strong negative emotions as reported by participants. In contrast, non-academic web browsing—such as scrolling through social media, reading blogs, watching videos, or shopping online—is generally more casual, leisure-oriented, and often undertaken to pass time, and therefore tends to evoke milder emotional responses and less intense negative feelings when faced with challenges. Any challenges faced during such activities are not taken much seriously, and the milder emotional responses evoked are dismissed without paying much attention to it. Hence, while reading particularly for educational purposes, the

challenges and the ensuing negative emotional responses are likely to diminish the seamless flow, immersive experience, and enjoyment derived from reading and learning in the online medium.

Implications and recommendations

Our findings may be used to inform web designers and educators about the challenges of web-based reading, thereby aiding them in designing necessary interventions to enhance the effectiveness of reading through websites. Web designers must aim to create reader-friendly websites and digital tools that support better reading experience online. For example, challenges like difficulty filtering relevant information due to information overload indicate a need for better search algorithms and filtering tools. Also, the difficulties in using active reading strategies can be decreased by incorporating more user-friendly annotation and highlighting tools into websites and digital platforms.

Traditionally, students acquire their online reading skills without formal training, outside the educational setting. However, given the critical importance of this skill in the contemporary era, educators must impart essential skills that enhance navigation and comprehension while reading on the internet. Some examples of such digital literacy skills include the ability to filter information effectively (i.e., information literacy; Eshet-Alkalai, 2004), the ability to skillfully access information in the non-linear medium (i.e., branching literacy; Eshet-Alkalai, 2004) and the ability to effectively engage in active reading strategies (Ślęzak-Świat, 2022). Several resources like Brun-Mercer (2019) and Eagleton and Dobler (2007) contain practical tools and various activities that can be used to teach effective online reading techniques in the classroom.

Students can also adopt certain strategies to effectively overcome the challenges present in reading through websites. The major problem that they faced related to distractions can be reduced by using browser extensions to block ads and pop-ups, turning off app notifications and enabling Do Not Disturb modes while reading. If websites are cluttered and distracting, one can switch to reader mode to simplify the layout and remove visual clutter. For managing the problem of information overload, students should narrow their search to trusted educational sources, skim content to save time and to find relevant materials, and avoid unreliable sources lacking proper authorship, date, or references. Verifying author credentials and cross-checking facts with credible sources and fact-checking tools is recommended. To tackle difficulties with highlighting and annotating, students can use web annotation tools like Hypothesis or copy important text into note-taking apps like Microsoft Word or Google Docs. Other strategies, like using a split-screen view with the website and a note-taking app, can also help maintain reading flow. To avoid confusion while navigating through hyperlinks, students should set clear reading goals, follow only essential links, and avoid distracting links to stay on the topic. Creating a

simple conceptual map showing how webpages (nodes) are connected through hyperlinks can also aid navigation and reduce confusion.

To deal with the negative emotions that arise from challenges while reading through websites — such as irritation, frustration, stress, guilt, low self-esteem, and demotivation — it is important to address the underlying challenges directly, as these emotions are often a result of them. The strategies mentioned earlier can help overcome the challenges of web-based reading and, in turn, reduce the emotional impact. When such emotions arise, instead of reacting impulsively, students should pause, reset, and patiently apply appropriate strategies to manage the situation. For instance, if a student feels stressed due to an overwhelming amount of information, prioritizing trusted or recommended sources can ease the pressure. If frustration occurs because of technical issues, staying calm and attempting basic troubleshooting can help manage the problem. Similarly, if one feels guilty for being distracted, it is helpful to accept that occasional distractions are normal and to use techniques to stay focused. Over time, maintaining a calm and resilient mindset can gradually help in dealing with the challenges and reading effectively despite the difficulties.

Limitations

Our sample included only 18 young adults (i.e., 20-23 years) who were students. Moreover, the sample was homogenous in terms of ethnic background as all of them were Indian students. While the small sample was suitable for this in-depth qualitative study, further research with larger and more diverse samples is needed to generalize these findings to populations. Further, this study is limited to reporting the challenges and affective responses of the students in an elaborate manner using focus group discussions, rather than providing an in-depth analysis or interpretation of these responses. Additionally, the focus group discussion had general questions that allowed students to openly share any challenges they faced while reading through websites. Although certain questions touched on specific aspects, the intention was to guide rather than limit responses, allowing participants to highlight a wide array of challenges. However, the specificity of these questions might have slightly directed the participants' attention toward particular issues, possibly influencing their responses and the themes that emerged from it. Also, the study is limited to exploring only negative emotions arising from the challenges of web-based reading, and this does not encompass the full spectrum of emotional responses that may occur.

Conclusion

To sum up, this study used focus group discussions to explore the challenges of reading through websites and the affective responses it evokes from the perspective of Indian students. Our finding suggests that there are several challenges faced by students when

reading through the websites including distractions and interruptions, information overload, difficulty in navigating through hyperlinks, and the difficulty of using active reading strategies like annotating and highlighting. These difficulties evoke unfavorable affective states like frustration, stress, fear, anxiety, guilt, powerlessness, confusion, demotivation, and procrastination in the readers depending on the specific challenge they face. These challenges and their emotional effects interrupt the immersive reading experience and diminish the complete pleasure derived from learning. Understanding such challenges of web-based reading and its emotional effect on students is vital for designing educational interventions that help students become proficient online readers.

This paper adds to the growing corpus on online reading and its affective response, offering in-depth perspectives from students' point of view. Future research should delve into how the challenges of web-based reading change in individuals according to factors such as age, gender, and educational qualification. Additionally, research should examine how the emotions evoked when encountering these challenges affect the readers' motivation to read and their reading comprehension. Based on the challenges and affective responses discussed in this study, the clear next step in the research is to design educational interventions that equip students overcome these obstacles and develop the skills needed to become proficient online readers.

Appendix 1: List of focus group discussion questions

The list of questions asked to the participants is as follows. The participants are instructed beforehand to give additional details about any affective responses evoked by specific challenges while mentioning those challenges in the discussion.

1. What are the obstacles you face while reading online through websites for educational purposes? What emotional responses do these obstacles evoke in you?
2. What difficulties do you face while reading through websites compared to printed materials?
3. The internet is a storehouse of a vast amount of information. Are there any challenges that you encounter while filtering and choosing from the large amount of information on the internet?
4. How does navigating through hyperlinks affect your online reading experience? What difficulties, if any, do you face while navigating through hyperlinks in search of information?
5. Do you have online multitasking tendencies that interfere with your reading experience while reading through websites? Could you elaborate on it?
6. Are there any difficulties you encounter when using active reading strategies like annotating and highlighting, while reading on the websites?

7. Does the website design, layout or features affect your reading experience in any way? Could you elaborate on it?
8. Other than the topics already discussed, what are the additional challenges you face and the affective responses they evoke while reading online?

Follow-up questions:

As the participants mentioned the challenges, they were further probed to talk about the affective responses evoked by those challenges. The sample questions used for this include:

1. What affective response did ... (specific challenge) evoke in you?
2. Could you explain your emotional reaction to ... (specific challenge)?

Additionally, follow-up questions were also asked to elicit nuanced details and personal experiences regarding the issues they encountered. The sample questions used for this include:

1. Could you explain with an example?
2. Are there any personal experiences related to ...?

Authors' contributions

Both authors contributed equally at every stage of the manuscript, including its conception, drafting, and revision.

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