

Online Reading Strategies Use in English as a Foreign Language in Biotechnical Engineering

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Abstract: *The paper examines the use of reading strategies by biotechnology engineering students when reading English texts online. The study involved twenty undergraduate students learning English as a foreign language at University of Kragujevac, Serbia. The instruments used in the study were the Background Information Questionnaire and Survey of Online Reading Strategies. The participants' overall use of online reading strategies is at the medium level. The obtained results also demonstrate that the most prominent online EFL reading strategies involve trying to maintain focus when losing concentration, reading slowly and carefully in order to understand the online text better, using reference materials for better understanding when reading online, and paying closer attention to what is read when reading difficult online texts. Significant gender differences are found with four online reading strategies: overviewing the online text to see what it is about, confirming the purpose of reading, guessing the content of the online text, and self-questioning about the online text.*

Keywords: *biotechnology engineering; English as a foreign language; online reading; reading strategies.*

1. INTRODUCTION

In the new knowledge economy reading has become highly important and remains the most effective human activity for transforming information into knowledge [1] no matter if it refers to reading on paper or reading online. Reading is considered a basic academic skill vital for the development of professional competences in various occupations [2]. Reading in a foreign language academic setting is significant in terms of students' expected involvement in later academic pursuits at academic level such as reading abstract materials, understanding the key ideas from the texts and lectures, reading scientific materials, writing summaries and critical essays. On the other hand, reading online has become common in our daily lives since the amount of reading material available online has been rapidly increased [3].

Since the beginning of the 21st century there has been an increased interest in reading research and how technology affects various aspects of reading all over the world. These issues become even more important in the context of professional development in engineering as a potent field of human activities. In the contemporary world of globally interconnected engineering activities, reading skills in English as a foreign language (EFL) have become vital for biotechnology engineers in performing their professional activities [4].

Perceptive foreign language learners are aware of and use appropriate reading strategies in learning a foreign language. The purpose of reading strategy use is to improve readers' performance in reading foreign language texts.

This study seeks to explore how biotechnology engineering students behave when they read English texts online by exploring the reading strategies they use. Also, it aims to find out potential gender differences in online reading strategy usage.

2. THEORETICAL BACKGROUND

The main issues of the research are focused on online language learning environment, reading and reading strategies in a foreign language, and the role of gender in a foreign language reading strategy use.

2.1. The importance of online language learning and reading in higher education

Since the beginning of the 21st century the digital technologies have been used in higher education to develop and distribute education. The use of information and communication technologies (ICTs), particularly the Internet, is highly important in language learners' exposure to authentic language on the topics they are learning about in foreign language classrooms.

Many forms of foreign language learning/teaching practices still have been carried out in a

school/classroom setting; however, in today's networked world driven by ICTs language learning environment can also be virtual which means that students and teachers do not have physically direct communication in the same classroom – they are far away in space and time. Nowadays distance education is most frequently realized through e-learning or online learning as interactive learning in which the learning content is available online providing automatic feedback to the students' learning activities [5].

ICTs have an important role in foreign language reading around the world. Online reading serves as a source of input for innumerable foreign language readers [6]. The texts EFL readers encounter online can be nonlinear texts, multiple-media texts, and interactive texts [7]. Such texts introduce new challenges for EFL readers. One of these challenges is undoubtedly the role of new literacies which include skills, strategies, and insights necessary to successfully exploit the rapidly changing ICTs that continuously emerge in our world [8]. New literacies, being deictic, multiple, multimodal, multifaceted, require not only critical literacies and new social practices but also various forms of strategic knowledge [9], including online reading strategies.

2.2. Reading and online reading strategy use in foreign language learning

Various definitions of reading come from the fields of mother tongue acquisition and foreign language learning. Reading may be defined as a psycholinguistic process as it uses language to get to the meaning [10], as extracting the information from the text [11], as decoding as the skill of transforming printed words into spoken words [12] or as the process of receiving and interpreting information in language form via the medium of print [13].

Since the mid-1970s, close attention has been given to the importance of language learning strategies [14, 15]. Language learning strategies are defined as specific actions, behaviors, steps, or techniques — such as seeking out conversation partners, or giving oneself encouragement to tackle a difficult language task — used by students to enhance their own learning [16]. Later, in the 1980s, various taxonomies of language learning strategies were proposed [17, 18], classified according to their psychological functions into memory, cognitive, compensation, metacognitive, affective and social strategies. They also can be classified according to skill area - reading, writing, listening, and speaking [19].

Foreign language reading strategies refer to those for building reading habits in a foreign language (e.g. making a real effort to find reading material that is at one's level or within the zone of proximal

development), for developing basic reading skills (e.g. planning how to read a text, monitoring to see how the reading is going, checking to see how much of it is understood, and making summaries in one's mind or in the margins of the text), and for determining what to do when encountering unknown words and structures (e.g. guessing the approximate meaning by using clues from the surrounding context, using a dictionary so as to get a detailed information of individual words meaning) [19].

Most foreign language reading empirical research is focused on the identification of metacognitive reading strategies of foreign language learners, the differences in using reading strategies between native and non-native English readers, gender differences in using reading strategies, relationship between reading strategy use and self-rated reading ability [20, 21]. Skilled readers are more able to reflect on and monitor their cognitive processes while reading, and tend to be better at regulating the use of these strategies while reading [20]. This research base on strategies is lacking in examining what foreign language learners do when they read online.

Relatively few studies discussed online reading strategies. When readers are engaged in online reading, they interpret the writer's viewpoints and integrate abundant materials by utilizing online reading strategies [22]. Readers also may transfer their print-based strategies to online reading but they will also need to use additional strategies in online reading [23].

The current study is a step in exploring what reading strategies EFL readers use while reading online.

2.3. The role of gender in foreign language reading

Several studies have been focused on the role of gender in foreign language reading [24-26]. It has been found that females show more positive attitude to reading while males report significantly more goal-oriented strategies with more memorizing, elaboration, and instrumental motivation [25]. Moreover, gender is an important factor in students' perceptions of the use of foreign language reading strategies in higher education: it has been revealed that male learners think about whether the content of the text fits their reading purpose more than female learners [27]. Nevertheless, there is a paucity of research dealing with the role of gender in online language reading practices [28].

3. RESEARCH QUESTIONS

This research was carried out to examine the undergraduate biotechnology engineering students' perceived use of online EFL reading

strategies. The following research questions are explored in the paper:

1. What foreign language online reading strategies are used by the participants?
2. How frequently these online reading strategies are used?
3. Are there any differences between females and males in their perceived use of online reading strategies in EFL?

4. METHODS

4.1. Participants

The participants in this study are 20 undergraduate students in the field of biotechnology engineering at the University of Kragujevac, Serbia. They are learners of English as a foreign language (EFL). Seventy percent of the participants are females and thirty percent are males. The learners ranged in EFL proficiency from high beginning to advanced.

4.2. Variables

The following variables are used in this study:

- 1) the perceived use of online EFL reading strategies; and
- 2) the participants' gender – 14 female and 6 male undergraduate biotechnology engineering students.

4.3. Instruments

Two instruments were used in the research: the Background Information Questionnaire (BIQ) and the Survey of Online Reading Strategies (SOORS).

The BIQ was used to gather information about the participants' demographic characteristics and experiences in learning EFL.

The SOORS was used to measure the perceived use of online reading strategies by non-native English readers. This self-report scale consists of 34 Likert-scale items with choices ranging from "never or almost never true of me" (1) to "always or almost always true of me" (5). The SOORS instrument [6], was adapted from the original Survey of Reading Strategy instrument (SORS) [21] so that each item was modified to include the word "online" each time a reading task was referred to. A pilot study was conducted among 20 undergraduate biotechnology engineering students.

4.4. Procedures and analyses

The research instruments were distributed to the participants by their EFL teacher during their regular EFL classes. The EFL classes were focused on developing students EFL reading skills both in online and face-to-face learning environments.

The measures of internal consistency, descriptive statistics, and analysis of variance (ANOVA) were analyzed by using SPSS 20.0 Package for

Windows. For the Likert-scale strategy-use items of the SOORS, the following key was used to help to interpret the means: mean values from 3.5 to 5.0 indicate high use, from 2.5 to 3.49 indicate medium use, and from 1.0 to 2.49 indicate low use [17].

5. RESULTS

The instrument overall internal consistency and reliability was established - Cronbach's alpha was $\alpha = 0.79$. This result shows that the SOORS instrument is internally consistent and reliable [29, 30]. It is not uncommon for contemporary researchers to characterize reliabilities in the 0.60s and 0.70s as good or adequate. This result is within the scope of the coefficient values found in the literature for the SORS, as the basis for SOORS, ranging from 0.74 to 0.93 [20, 31, 32]; however, it is lower than the result found for the referent instrument OSORS in [6], reporting Cronbach's alpha $\alpha = 0.92$.

5.1. The use of online EFL reading strategies in biotechnology engineering

Descriptive statistics, including a frequency analysis of overall reading strategy use, mean value, and standard deviation of the overall and each strategy use, were employed to describe the strategies the undergraduate biotechnology students use when they read English texts online. The means of self-reported scores for online reading strategy use are shown in Table 1 and Table 2.

The frequency analysis revealed that almost one third of the participants in the study (30%) reported that they used online reading strategies frequently; almost two thirds of the respondents (65%) showed medium use of online reading strategies, while only 1 student (5%) used online reading strategies rarely.

Table 1. Overall and top four online EFL reading strategies

Online EFL reading strategies	M (SD)
Trying to maintain focus when losing concentration	4.50 (0.69)
Reading slowly & carefully to understand online text better	4.20 (0.70)
Using reference material (online dictionary) for better understanding when reading online	4.15 (0.88)
Paying closer attention to what is read when reading difficult texts	4.05 (0.89)
Overall online EFL reading strategies	3.28 (0.36)
N=20	

The mean value of the overall perceived use of the online EFL reading strategies is $M = 3.28$ (Table 1), which indicates the students' moderate use of online reading strategies. The four most

frequently used online reading strategies are illustrated in Table 1 ($M > 4.00$).

The other online reading strategies at the high level of usage involve re-reading online for better understanding ("When online text becomes difficult, I re-read it to increase my understanding") ($M = 3.95$), checking understanding when coming across new information ("I check my understanding when I come across new information") ($M = 3.90$), guessing the content of the online text ("I try to guess what the content of the online text is about when I read") ($M = 3.90$), using background knowledge for better understanding when reading online ("I think about what I know to help me understand what I read online") ($M = 3.85$), visualizing information when reading online ("I try to picture or visualize information to help remember what I read online") ($M = 3.85$), reviewing the text characteristics ("I review the online text first by noting its characteristics like length and organization") ($M = 3.75$), setting purpose for reading online ("I have a purpose in mind when I read online") ($M=3.60$), confirming the purpose of reading ("I think about whether the content of the online text fits my reading purpose") ($M = 3.60$), and adjusting reading speed ("I adjust my reading speed according to what I am reading online") ($M = 3.55$).

The three least frequently used online reading strategies are taking part in live chat with other learners of English and with native speakers of English, and underline/circle information in the printed online text for better understanding; the mean values were $M = 1.65$, $M = 1.25$, and $M = 2.25$, respectively, all mean values being $M < 2.50$ indicating low strategy use.

The rest of online reading strategies were reported as medium usage strategies ($2.49 < M < 3.49$), as shown in Table 2.

Table 2. Online EFL reading strategies used at the medium level

Online EFL reading strategies	M (SD)
Taking notes while reading the text online	2.85 (1.04)
Taking overview of the online text for the content	3.35 (1.18)
Reading online text aloud for better understanding	2.65 (0.93)
Selecting what to read & what to ignore	3.30 (0.92)
Reading online for academic purpose	3.20 (1.32)
Using text features (tables, graphs, pictures)	2.55 (1.15)
Contemplating the online text read	3.30 (0.80)
Using context clues	3.30 (1.08)
Paraphrasing when reading online	3.25 (0.97)
Using typographical features for key information	2.85 (1.31)

Analyzing & evaluating information in the online text	2.95 (1.19)
Finding relationships among the ideas in the online text	3.35 (1.14)
Self-questioning about the online text	2.90 (1.25)
Confirming predictions	3.45 (0.99)
Guessing the meaning of the unknown online words/phrases	3.40 (1.05)
Scanning the online text for the purpose of reading	3.15 (1.18)
Reading online texts for fun	3.00 (1.26)
Evaluating the online text before using the text information	2.75 (1.07)
N=20	

5.2. Gender differences in online EFL reading strategy use

As previously mentioned 14 female and 6 male participated in the research. According to ANOVA, the female and male students generally use overall online EFL reading strategies at the similar levels of frequency since the significant differences were not recorded ($p > 0.05$). The only significant gender differences were found with the students' perceived use of four individual online EFL reading strategies (Table 3).

Table 3. Gender differences in online EFL reading strategy use

Online reading strategies	Females/Males (M)	p
Overviewing the online text for the content	3.00 / 4.17	0.039*
Confirming the purpose of reading	3.20 / 4.50	0.041*
Guessing the content of the online text	3.64 / 4.50	0.01*
Self-questioning about the online text	3.29 / 2.00	0.031*
N=20 * $p < 0.05$		

The male students take an overall view of the online text to see what it is about before reading significantly more frequently ($M = 4.17$, indicating high strategy use) than their female colleagues ($M = 3.00$, indicating medium strategy use); the mean difference is significant at the 0.05 level ($F = 4.939$, $p = 0.039$, $p < 0.05$). Also, the male participants think whether the online text content fits their reading purpose and guess the online text content significantly more frequently ($M = 4.50$ for both strategies, indicating highly frequent strategy use) than the female students ($M = 3.20$ and $M = 3.64$, respectively). On the other hand, the female students ask themselves questions about the online texts significantly more frequently ($M = 3.29$, indicating medium strategy use) than their male colleagues ($M = 2.00$, indicating low strategy use). All these results are presented in Table 3.

6. DISCUSSION

The results of this study continue to add to our understanding how strategies are used by EFL readers, particularly within the context of reading online.

The obtained results revealed that biotechnology engineering students reported to use online EFL reading strategies at the medium level, which is consistent with the findings obtained in the literature [33-35].

The findings from the SOORS also reveal that the most prominent online EFL reading strategies used in biotechnology engineering involve efforts to maintain the focus when losing concentration while reading online, reading slowly and carefully to understand online text better, and paying closer attention to what is read when the online text becomes difficult. It was not surprising that EFL readers most frequently look up an online dictionary when they read online reading material as vocabulary is perceived to be highly difficult task among EFL learners [34]. The least frequently used online reading strategies besides highlighting information in the printed version of an online text in order to understand the text better are participating in live chat with other learners of English and with native English speakers. The reason why learners seldom live chatted with other learners may be because they tended to focus on the understanding of the online English materials instead of social interaction with other readers [34] or because of the students' limited opportunities to interact with native speakers of English [33].

There is no significant difference between female and male students with regard to the overall online EFL reading strategy use. These findings are in line with the findings reported in [20, 35]. It is possible that with foreign language reading strategy use, gender differences are more related to task demands than biology. However, the participants differed significantly on four individual online EFL reading strategies. The results found in this study in the context of online reading are relatively consistent with [20], which indicates that male and female college ESL students only differed in one individual strategy. Several research findings have shown significant variations in terms of the frequency and adaptability of reading strategies between the genders [26, 36].

7. CONCLUSION

The study reported in this article is one step toward better understanding of the use of online EFL reading strategies in engineering domain. It reveals that biotechnology engineering students use online reading strategies moderately. There were no statistically significant differences in

overall online strategy use between female and male students. However, there were significant differences between females and males with regard to the use of certain individual online reading strategies.

These results have important pedagogical implications. Online reading is a new form of representation which requires high levels of multi-modal competence [37]. Readers should understand the complex ways these modes operate as well as their limitations and potentials [38]. They also need to understand how links function – where a particular link will take them and what to do when they get there [39]. EFL teachers need to be aware that success in online reading depends on being highly strategic [40], which requires explicit regular instruction. EFL learners tend to use a fixed set of reading strategies that they have long been accustomed to regardless of the text type; they should also be aware of different types of online reading strategies; and more importantly they should be aware of online reading strategies characteristic of skilled readers.

This study has several limitations that could be addressed in further research. The results of this study were based on the limited number of students; this, they cannot be generalized to the whole student population in biotechnology engineering and particularly not to engineering profession in general. Moreover, the SOORS instrument is a self-reporting tool - it means that the participants' responses depend on their sincerity and willingness to cooperate in the research as well as on their awareness of the online reading strategies they use. The present study is a pilot study and hence an initial step in validating the usage of characteristic online EFL reading strategies in biotechnology engineering by the students.

Further studies could investigate how the examined strategies correlate with the students' levels of EFL proficiency or the level of reading comprehension particularly when reading a printed text and when reading online. Future studies could also examine gender variations in using online reading strategies across populations and disciplines. This last issue is important because the gender differences are found, they may lead EFL teachers and researchers to look for ways to minimize them and afford both genders maximum opportunities to achieve high levels of online EFL reading strategies.

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