Exploring Rumelhart's Model for Academic Reading Among Undergraduates

Nurul Bazilah binti Abd. Hamid[1*], Doreen Dillah[2], Sathiyaperba Subramaniam[3]

[1,2,3]*Centre of Foundation Studies, Universiti Teknologi MARA, Cawangan Selangor, Kampus Dengkil, 43800 Dengkil, Selangor, Malaysia*
corresponding author: [1]nbazilah@uitm.edu.my

ABSTRACT

Reading strategies are deemed important in academic reading among English as a second language (ESL) students because these strategies can help them to grasp a better understanding of academic texts. By incorporating the top-down and bottom-up strategies via Rumelhart's Interactive Theory, this study explored undergraduates' use of strategies for academic reading. For this purpose, 207 undergraduates were selected using purposive sampling method, while the quantitative research approach was utilised to gauge the necessary data. In specific, a 5-Likert scale questionnaire survey comprising 48 items distributed across 5 sections was administered among the participants. Results indicated that the top-down and bottom-up strategies are significantly correlated in the aspect of academic reading. Important findings from the study are crucial to guide instructors in creating language and classroom interventions with the focus on incorporating effective reading skills that are specifically tailored for better comprehension of academic texts among L2 learners.

1. INTRODUCTION

1.1 Background of Study

Reading materials in English is often considered a difficult task by many tertiary-level students in Malaysia, especially since English is the nation's second language. This underscores the importance of addressing difficulties in reading by imparting effective strategies among L2 undergraduates to increase their comprehension level in academic texts. Reading strategies refer to particular methods used to tackle a problem with strategically planned operation where information is managed in certain ways to achieve a desired outcome (Brown, 2007). In dealing with reading difficulties, Garner (1987) explained that effective readers utilise strategies deliberately and consciously to address cognitive failure. There are various useful strategies to help improve comprehension in academic reading. The current study was conducted to explore the top-down (global reading strategies), bottom-up (problem-solving strategies), and interactive reading strategies adopted by ESL tertiary-level students in comprehending texts of academic nature. In this paper, the terms top-down and global reading strategies as well as bottom-up and problem-solving strategies are used interchangeably.

Rumelhart (1977) proposes the interactive model which combines elements of the top-down and bottom-up models for reading because neither model individually explains the reading process in specific. The interactive model integrates the top-down and bottom-up processing, in which simultaneous processing of sensory and non-sensory data takes place. In the interactive model, readers undergo both the processes in interpreting information and comprehending a text.

As neither the model is solely accounted for in explaining the reading process, the interactive model is therefore deemed as the most thorough way to describe it. For example, active readers may start with the bottom-up strategy to understand a text, and switch to the top-down strategy upon stumbling difficult words to decode the meanings before resuming the task.

The importance of determining the most effective reading strategy and how they could be practised to improve readers' comprehension of an academic text has led to more research work in this area. Similarly, a considerable amount of studies need to be carried out to establish the correlation between top-down and bottom-up strategies that enable ESL undergraduates to read well and increase their understanding of academic texts.

1.2 Statement of Problem

Developing competency when reading academic texts is extremely crucial for tertiary-level ESL students. However, reading in the L2 can be a daunting task, especially for less proficient users of the language. Thus, it is imperative to adopt suitable and effective strategies for a better understanding of academic texts. According to Afflerbach and Cho (2009), readers must use the most strategies as mental tools for monitoring, repairing, or comprehending reading texts. These strategies, which include the top-down and bottom-up processes, or a blend of both (the interactive model), can be consciously and semi-consciously applied in achieving better comprehension.

Rumelhart (1989, as cited in Liu, 2010) explains that in the interactive model, the reader begins with accessing the "visual information store" in her mind where details of the words and their associated spelling and meaning are stored. Next, the reader identifies and extracts specific features of those words, as well as categorises them in the pattern synthesiser by making use of

his syntactic, semantic, orthographic, and lexical knowledge to finally understand their meanings. Meanwhile, Stanovich (1980) introduces the interactive-compensatory model, in which the bottom-up approach compensates for the top-down approach's weaknesses with its own strengths, and vice versa.

Relevant past research has focused on identifying the strengths and weaknesses of the top-down and bottom-up strategies as separate entities. However, studies that are specifically carried out to elaborate on the effectiveness of the combination of the two approaches when used in sync are still limited. Henceforth, the main purpose of this study is to establish the correlation between the top-down and bottom-up strategies when used by ESL undergraduates in their academic reading.

1.3 Research Objectives and Questions

This research was conducted to examine how L2 students perceive their use of reading strategies. In particular, the current work was done with the following questions:
1. How do students perceive their use of top-down strategies in academic reading?
2. How do students perceive their use of bottom-up reading strategies in academic reading?
3. How do students perceive their use of interactive reading strategies in academic reading?
4. Is there a relationship across all the reading strategies?

2. LITERATURE REVIEW

2.1 Rumelhart's Reading Strategies

Reading strategies have been the topics of interest among many scholars in academic reading research. Reading generally refers to decoding the underlying meaning of messages in written texts. Meanwhile, reading strategies are the approaches consciously chosen by readers in comprehending what they read. Rumelhart (1980), who used cognitive mechanisms in explaining comprehension, describes reading as an active and interactive cognitive processes that readers undergo when engaging with a text. These processes, categorised into top-down and bottom-up, are used either in isolation or simultaneously to attain comprehension. The bottom-up reading process starts with the basic step of word recognition leading up to the formation of comprehension, while in the top-down process, readers activate their schemata or background knowledge by drawing upon and relating it to their own experiences of the topic being read. In other words, readers' comprehension is developed by making meaningful association between what is being read and what they already know about it.

Opposing the notion that reading is a mere linear processing when explaining the top-down strategies, Rumelhart (1977, p. 573) stated that readers use knowledge of the language "syntactic, semantic, lexical, and orthographic information" to form "their perception of print" that renders them the ability to interpret written texts more effectively. To date, various research on reading strategies for academic materials has been based on Rumelhart's (1980) model of reading, showcasing the interaction and influence of the bottom-up and top-down processes in understanding a reading text. Thus, investigation into L2 readers' use of reading strategies in understanding academic materials is essential to guide them in using the right ones, particularly when their academic performance is largely determined by their ability to understand materials in English.

2.2 Past Studies on Academic Reading Strategies

There have several previous studies on academic reading strategies. The ability to read, particularly in the context of academic reading, is crucial for students pursuing their studies in institutions of higher learning. Yapp et al. (2021) conducted a study on the use of strategies by 801 L2 undergraduates at a vocational institution and highlighted two pertinent issues, namely (a) the increasing use of reading materials in English, and (b) less experience in L2 academic reading. Highlighting the direct association between the two issues and their effects on L2 readers' comprehension of academic texts, the researchers suggested an explicit instruction as an intervention to teach them effective academic reading strategies.

In a qualitative research involving two categories, namely SCT (strategies for comprehending reading texts) and SETC (strategies for enhancing textual comprehension), derived from a list of 39 reading strategies, Saengpakdeejit and Intaraprasert (2014) identified undergraduates' strategies in comprehending and coping with difficulties when dealing with academic materials. Although the undergraduates were reported to heavily depend on support strategies like referring to a dictionary for meaning, the findings revealed that they could monitor their use of reading strategies (e.g., contextual clues, background knowledge, etc., or their combination) according to the extent of their comprehension of the reading texts and the difficulty level. Research aiming to investigate the bottom-up and top-down models in academic texts was done by Suraprajit (2019) among 270 Thai undergraduates. The study showed that the undergraduates predominantly relied on the top-down strategies when reading academic and business texts, with the bottom-up strategies being least frequently used for both types. Therefore, it is clear that readers may use a combination of reading strategies, or interchangeably, or utilise them in isolation to understand reading texts.

Meanwhile, Oliver and Young conducted a study to determine how the top-down and bottom-up models affect tertiary students' reading fluency and comprehension. They found that bottom-up training negatively influenced fluency and comprehension, whereas the top-down training positively improved fluency but did not affect comprehension. Studies on the effects of top-down and bottom-up models have also been carried out to determine the association between reading comprehension and cognitive style. Fatemi et al. (2014) discovered that the more self-motivated field independent learners excelled in the bottom-up processes compared to field dependent learners. Conversely, a better performance was observed for field dependent learners in the top-down process reading compared to their counterparts. This finding highlights the importance of both the strategies in improving the reading abilities.

2.3 Conceptual Framework

The conceptual framework of this study is illustrated in Figure 1 below. Reading, especially in the academic context, is initially presumed by students as challenging based on the past difficulties (Rahmat et al., 2020) that they encountered in learning the English language. Unfortunately, these perceived difficulties might become a repetitive cycle for them as academic readers, which could subsequently lead to other issues in reading. The current study is based on the research work by Abeeleh and Al-Sobh (2021) on reading difficulties, as well as the investigation on the utilisation of reading strategies by Amer et al. (2010). In specific, Abeeleh and Al-Sobh (2021) highlighted some reading difficulties faced by students in terms of the content and the way it is written, words used in written texts, and the problems pertaining to their language. Meanwhile, Amer et al. (2021) reported that students relied on certain reading strategies, starting with the top-down process as portrayed by their use of the global reading strategies to extract a general idea of written text, followed by their use of the problem-solving

strategies (bottom-up process) to fully comprehend it. At times, students may go through sections in the text again to re-read, refer to a dictionary to search for meanings of certain words, while getting assistance from their peers for support.
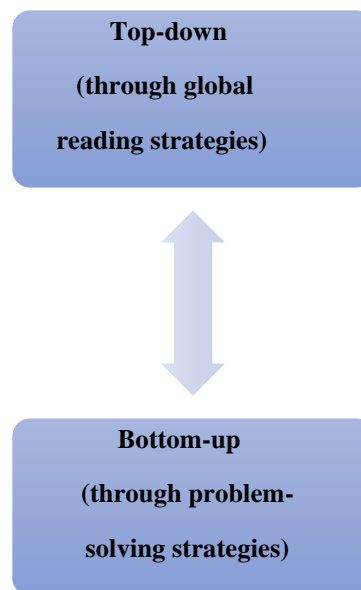

Figure 1: Conceptual Framework of the Study - Relationship between top-down (global strategies) and bottom-up (problem-solving strategies) processes in reading

3. METHODOLOGY

This quantitative study is conducted to investigate the perception of undergraduates on their use of various reading strategies; namely the top-down, bottom-up, or interactive models. A purposive sample of 207 respondents was involved in the survey. The instrument used is a 5 Likert-scale survey derived from Abeeleh and Al-Sobh (2021) on reading comprehension problems and also Amer, Al Barwani, and Ibrahim (2010) on the readers' perceived use of reading strategies to reveal the variables shown in Table 1 below. The survey consists of 4 sections. Section A has items on respondents' demographic profile, while Section B contains 14 items on reading difficulties. Section C has 17 items on the global strategies, and Section D has 8 items on problem-solving strategies.

Table 1: Distribution of Items in the Survey

Section	Strategy	
B	Global	17
C	Problem-Solving	8
D	Support	9
TOTAL		34

Table 2: Reliability of the Survey

Reliability Statistics

Cronbach's Alpha	N of Items
.892	25

Table 2 shows the reliability of the survey. The analysis yielded a Cronbach alpha of .892, thus, revealing a good reliability of the instrument chosen/used. Further analysis using SPSS was done to present findings to answer the research questions in this study.

4. DATA ANALYSIS AND RESULTS
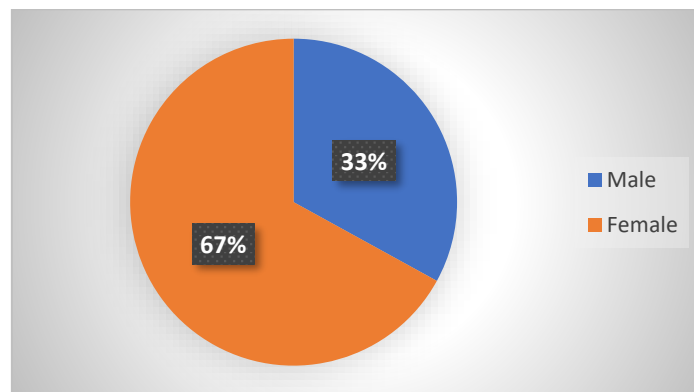
4.1 Findings for Demographic Profile

Figure 1: Percentage for Gender

Figure 1: shows that out of the total of 207 respondents, 33 percent are males, and 67 percent are females.
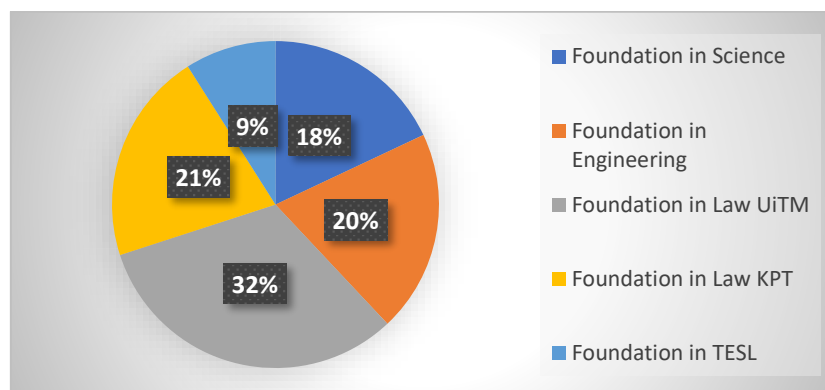

Figure 2: Percentage for Programme

Figure 2 shows the percentage of participants in the different programmes. The respondents were from the foundation-level courses in Law UiTM (32%), Law KPT (21%), Engineering (20%), Science (18%) and Teaching of English as a Second Language (9%).
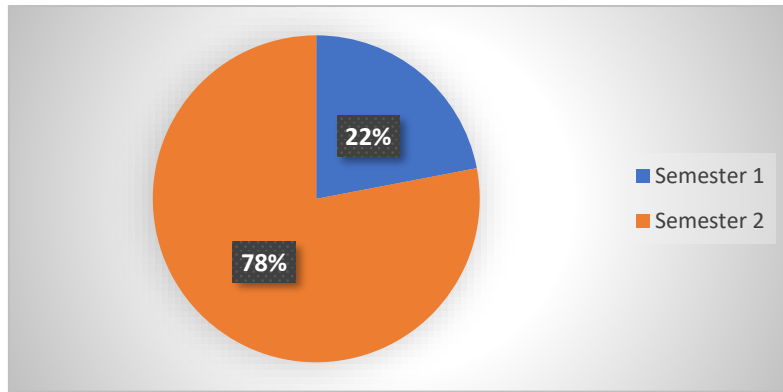
Figure 3: Percentage for Semester

Figure 3 displays the percentage of respondents based on their semester. Majority of the respondents were in their Semester 2 (78%), while others (22%) were in Semester 1 at the point of this study.
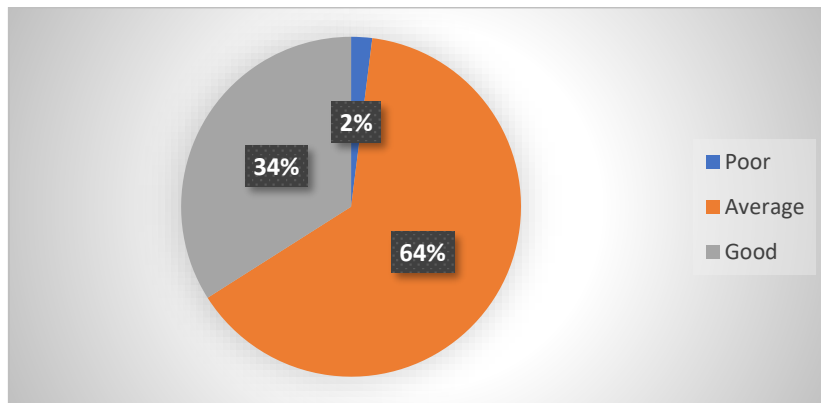

Figure 4 - Percentage for Self-Rating English proficiency

Figure 4 illustrates the percentage for self-rating English language proficiency. In specific, the majority of the respondents (64%) regarded themselves to possess an average level of the English language proficiency, followed by those who rated themselves as having a good level of proficiency (34%) and only 2 percent regarded themselves to have a poor level of proficiency.
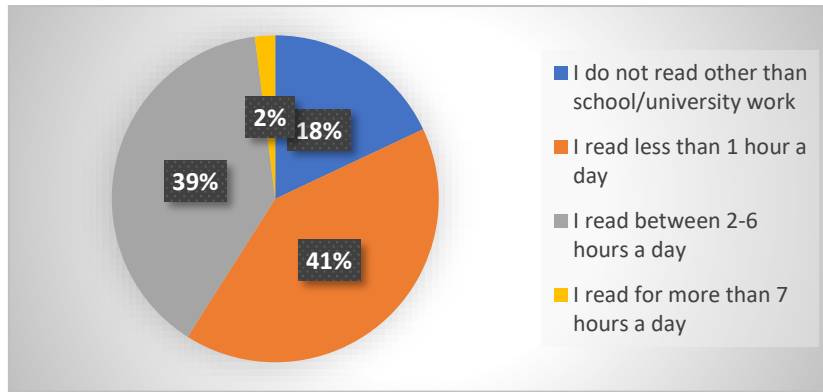
Figure 5 - Percentage for reading as a Free Time Activity

Figure 5 presents the percentage of reading as a free time activity among the respondents. Most of the respondents (41%) reported to read for less than 1 hour a day, followed by those who read between 2-6 hours (39%), and the respondents who do not read other than their school or university work (18%). Only 2 percent of them had reading as a free time activity.
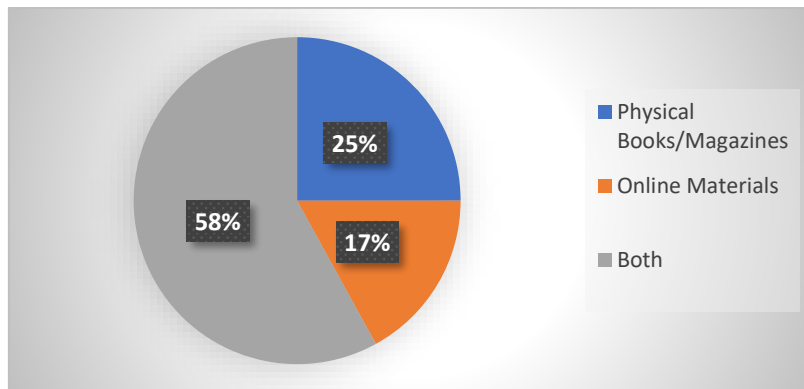

Figure 6 - Percentage for Reading Preference

Figure 6 illustrates the percentage for the respondents' reading preferences. As shown, 58 percent of the respondents claimed that they chose reading both physical books/magazine and online materials, while 25 percent particularly preferred reading printed copies in comparison to only 17 percent who made full use of online materials for reading.
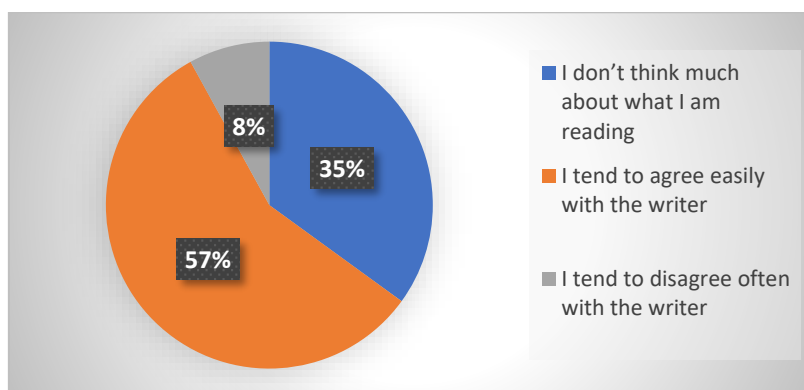

Figure 7 - Percentage for Reading Habit

Figure 7 depicts the percentage for the respondents' reading habit. The majority of respondents (57%) stated that they have the tendency to agree easily with the writer, followed by those who do not think much about what they read (35%), and only 8 percent of them tend to disagree often with the writer.

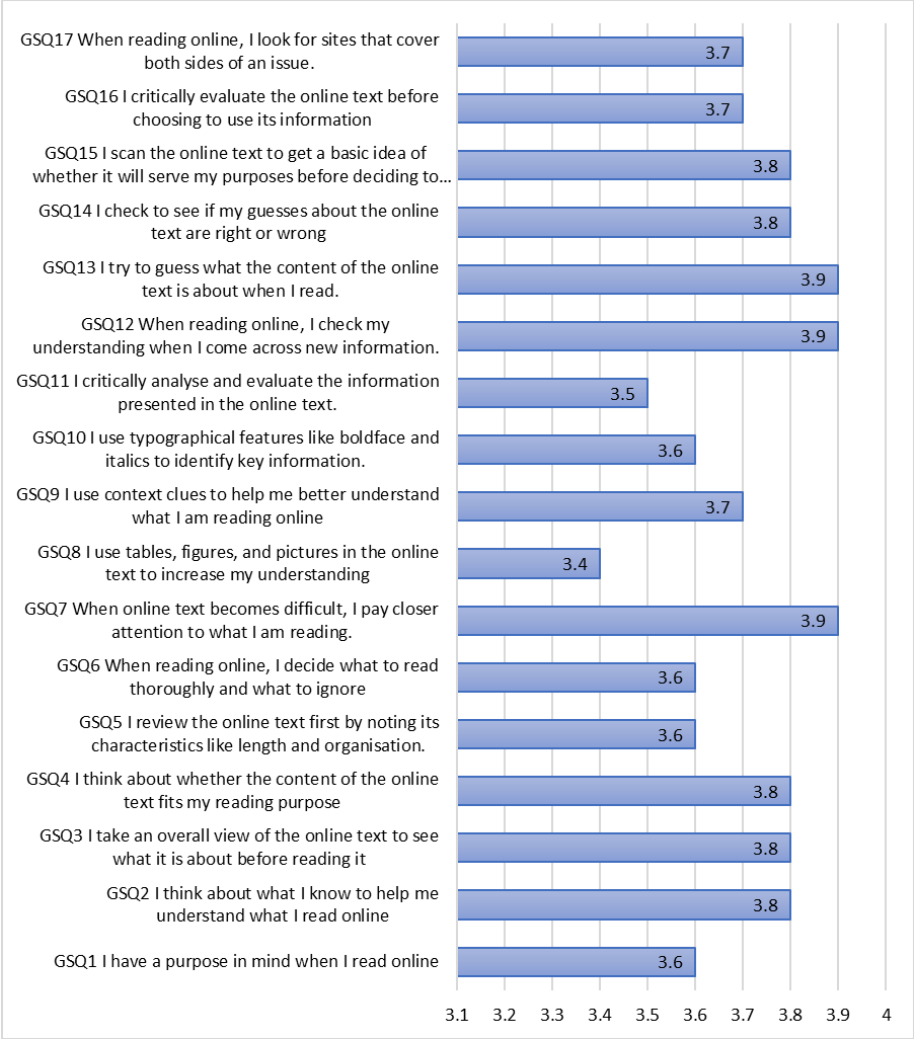## 4.2 Findings for Global Reading Strategies (Top-Down)

Figure 8: Mean for Global Strategies

Data required to answer research question 1, i.e. How do learners perceive the use of top-down reading strategies in reading? are presented in this section. In this study, the top-down strategies were determined based on the respondents' utilisation of the global reading strategies. Data on the means derived for the global reading strategies are shown in Figure 8 above. Interestingly, 3 items had the highest means of 3.9, namely "When reading online, I check my understanding when I come across new information", "I try to guess what the content of the online text is about when I read", and "When online text becomes difficult, I pay closer attention to what I am reading". The second highest mean score of 3.8 was indicated in 5 items, "I think about whether the content of the online text fits my reading purpose", "I scan the online text to get a basic idea of whether it will serve my purposes before deciding to read it", "I think about what I know

to help me understand what I read online", "I check to see if my guesses about the online text are right or wrong" and "I take an overall view of the online text to see what it is about before reading it". Meanwhile, 3 items had the mean score of 3.7, i.e. "I critically evaluate the online text before choosing to use its information", "When reading online, I look for sites that cover both sides of an issue" and "I use context clues to help me better understand what I am reading online".

4.3 Findings for Problem-Solving Reading Strategies (Bottom-down)
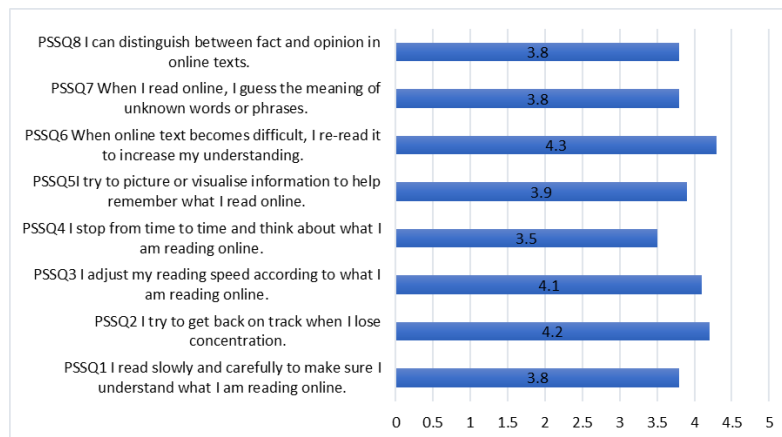

Figure 9: Mean for Problem-Solving Strategies

This section presents data to answer research question 2, i.e. How do learners perceive the use of bottom-up reading strategies in online reading? In the context of this study, bottom-down strategies are measured by the respondents' use of the problem-solving strategies. As illustrated in Figure 9, the highest mean at 4.3 is represented by ""When online text becomes difficult, I re-read it to increase my understanding". Furthermore, the second highest mean of 4.2 is denoted by "I try to get back on track when I lose concentration", while the third highest mean of 4.1 is signified by "I adjust my reading speed according to what I am reading online".

4.4 Findings for the relationships across all reading strategies.

This section presents data to answer research question 4, i.e. Is there a relationship across all online reading strategies? Therefore, to determine if there is a significant association in the mean scores between all reading strategies, data were analysed using SPSS for correlations. The correlation is shown in Table 3 below.

Table 3: Relationship between Top-Down and Bottom-Up Reading Strategies

Correlations

		TOPDOWN	BOTTOMUP
TOPDOWN	Pearson Correlation	1	.660**
	Sig. (2–tailed)		.000
	N	207	207
BOTTOMUP	Pearson Correlation	.660**	1
	Sig. (2–tailed)	.000	
	N	207	207

**. Correlation is significant at the 0.01 level (2–tailed).

Table 3 shows there is an association between the top-down and bottom-up reading strategies. The correlation analysis revealed a highly significant association between top-down and bottom-up ($r=.660^{**}$) and ($p=.000$). According to Jackson (2015), coefficient is significant at the .05 level and positive correlation is measured on a 0.1 to 1.0 scale. Meanwhile, a weak positive correlation would be in the range of 0.1 to 0.3, a moderate positive correlation from 0.3 to 0.5, and a strong positive correlation from 0.5 to 1.0. This means that there is also a strong and positive relationship between the top-down and bottom-up strategies.

5. DISCUSSION

Based on the research questions, the results can be summarised as follows:

How do students perceive their use of top-down strategies in academic reading?
Data indicates that the respondents apply the global-reading strategy mainly to check for understanding and that it is imperative for them to guess the meaning of difficult words that they come across while reading. This correlates with the study conducted by Nilforoushan, Rashtchi, and Abbasian (2023) where they discovered that the top-down reading strategy is utilised when they refer to academic texts.

How do students perceive their use of bottom-up reading strategies in academic reading?
In relation to the bottom-up reading strategy, the respondents claim to find it beneficial especially when they find certain words or contexts difficult to comprehend. As active readers, they would re-read a particular text over and over again to enhance their understanding, which indirectly shows that they are very much involved in what they are reading. This finding is in line with the study carried out by Kamarulzaman and Abdullah (2019) which indicates that problem-solving strategies are typically applied to check for understanding, adjust reading speed, and engage in metacognition to ensure text comprehension.

Is there a relationship across all the reading strategies?
From the findings obtained, it can be clearly seen that there exists a strong correlation between the top-down and bottom-up strategies which indicates the readers' ability to apply reading strategies at a higher level. This finding coincides with the explanation given by Carrell, Devine and Eskey (1998) in which they have stated that the good readers should be able to continually leap from one type of model to the other type according to what and how they read. Therefore, by integrating both the top-down and bottom-up strategies during reading, the respondents are able to recognise various words and simultaneously relate them with the prior knowledge to approve the assumption of meaning.

6. STUDY IMPLICATIONS

Based on the findings of this research, it is imperative that academicians take note of their students' ability to apply both the top-down and bottom-up strategies in academic reading. Having the awareness to combine both strategies is vital to improve their students' overall academic success. Educators can also utilise the findings of this study to design activities that will help their students identify, utilise and master appropriate reading strategies to be able to read well, improve comprehension, and attain academic success. Lastly and most importantly, pre-university ESL learners should apply a combination of reading strategies to prepare for more demanding academic requirements and tasks to be successful in their learning.

7. STUDY LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Several recommendations can be suggested for those interested in carrying out similar work in this area in the future. Firstly, a research that makes comparisons between respondents of different programmes at tertiary level would add more data into the existing literature. Since there were only 207 respondents, it is felt that this study would have conceded much more reliable results with a larger number of participants. Secondly, having respondents that come from different educational settings in Malaysia and beyond would also be beneficial in providing a better picture of the reading strategies of academic materials. Thirdly, an in-depth study should look at specific demographic and linguistic factors influencing L2 readers' use of reading strategies. Finally, more research should be done to include more variables to yield preference and use of reading strategies.

ACKNOWLEDGEMENT

AUTHORS' CONTRIBUTION

NBAH co-wrote the paper with all authors especially in the introduction as well as the discussion and implication sections. SS assisted with data analysis and results while DD helped construct the literature review and methodology sections. All authors came up with the original idea and concept of the study, provided valuable feedback, and helped shape the research and manuscript.

CONFLICT OF INTEREST

None declared.

8. REFERENCES

Afflerbach P., & Cho B. (2009). Identifying and describing constructively responsive comprehension strategies in new and traditional forms of reading. In Israel S.E., Duffy G.G. (Eds.). Handbook of research on reading comprehension. New York: Routledge.

Amer,A., AL Barwani,T., & Ibrahim, M. (2010) Student Teachers' Perceived Use of Online Reading Strategies. International Journal of Education and Development using Information and Communication Technology (IJEDICT), Vol 6(4), pp 102-113. Retrieved from httpe://ijedict.dec.uwi.edu.

Barrett, A. (2005). The information-seeking habits of graduate student researchers in the humanities. Journal of Academic Librarianship. 31(4), 324-331. https://doi.org/10.1016/j.acalib.2005.04.005.

Bilokcuoglu, H. (2012). Theories of reading and their implications to the teaching of reading in ESL/EFL classes and places of schemata theory on foreign language reading comprehension. *Developing Teachers*. https://www.developingteachers.com/articles_tchtraining/readingpf_hasan.htm

Brown, H.D. (2007b). *Teaching by Principles: An Interactive Approach for Language Pedagogy* (3rd Edition). New York: Pearson Education.

Carrell, P. L., Devine, J., & Eskey, D. E. (1998). Interactive Approaches to Second Language Reading. Cambridge: Cambridge University Press.

Fatemi, A. H., Vahedi, V. S., & Seyyedrezaie, Z. S. (2014). The Effects of Top-down/Bottom-up Processing and Field-dependent/Field-independent Cognitive Style on Iranian EFL Learners' Reading Comprehension. *Academy Publisher*, 4(4), 686-693. doi:10.4304/tpls.4.4.686-693.

Garner, R. (1987). *Metacognition and reading comprehension*. New Jersey: Albex

Holschuh, J.P. (2000). Do as I say, not as I do: high, average, and low-performing students' strategy use in biology , Journal of College Reading and Learning, 31(1), 94-108. https://doi.org/10.1080/10790195.2000.10850105.

Jackson, S.L. (2015). *Research methods and Statistics-A Critical Thinking Approach* (5^(tH) Edition) Boston, USA:: Cengage Learning.

Kamarulzaman, W. Y. W., & Abdullah, N. A. (2019). Analyzing the benefits of reading strategy instruction for reading comprehension in L2 English learners. International Journal of Instruction, 12(1), 1-16.

Liu, F. (2010). A Short Analysis of the Nature of Reading. *English Language Teaching, 3*(3).

Liu, F. (2010). Reading abilities and strategies: a short introduction. International Education Studies. Canadian Center of Science and Education, 3(3), 153-157. http://www.ccsenet.org/journal/index.php/es.

Lopatovska, I. & Sessions, D. (2016). Understanding academic reading in the context of information-seeking. Emerald Group Publishing Limited, 65(8/9), 502-518. DOI 10.1108/LR-03-2016-0026.

Nilforoushan, S., Rashtchi, M., & Abbasian, G.-R. (2023). Exploring the Perceived and Real Metacognitive Reading Strategies of Iranian EFL Learners: Different Text Types in Focus. SAGE Open, 13(1). https://doi.org/10.1177/21582440231164567

Oliver, R. & Young, S. (2016). Improving reading fluency and comprehension in adult ESL learners using bottom-up and top-down vocabulary training. Studies in Second Language Learning and Teaching,1(1), 111-133. Uniwersytet Adama Mickiewicza, Kalisz.

Rahmat, N. H., Arepin, M., & Sulaiman, S. (2020) The cycle of academic reading fear among undergraduates. Asian Journal of University Education, 16(3), 265-274. http://dx.doi.org/10.24191/ajue.v16i3.9730

Roberts, J.C. & Roberts, K.A. (2008). Deep reading, cost/benefit, and the construction of meaning: enhancing reading comprehension and deep learning in sociology courses. Teaching Sociology, 36(2), 125-140. https://doi.org/10.1177/0092055X0803600203.

Rumelhart, D. E. (1977). Toward an Interactive Model of Reading. In *Theoretical Models and Processes of Reading* (pp. 722-750). Newark, DE: International Reading Association. https://doi.org/10.1111/j.1540-4781.1989.tb05321.x

Rumelhart, D. E. (1980). Schemata: *The Building Blocks of Cognition*. Hillsdale: New Jersey.

Soomro, A.H., Khan, I., & Younus. M. (2019). Top down, bottom up and classroom reading anxiety and their effect on reading performance of undergraduate engineering students in Pakistan. Journal of Applied Research in Higher Education. ISSN: 2050-7003. DOI:10.1108/JARHE-07-2018-0138.

Stanovich, K. E. (1980). Toward an interactive compensatory model of individual differences in the development of reading fluency. Reading Research Quarterly, 16, 32-71.

Suraprajit, P. (2019). Bottom-up vs Top-down Model: The Perception of Reading Strategies among Thai University Students. Journal of Language Teaching and Research, 10(3), 454-460. ISSN: 2050-7003. DOI:10.1108/JARHE-07-2018-0138.

Yapp, D., de Graaff, R., & Van Den Bergh, H. (2021). Effects of reading strategy instruction in English as a second language on students' academic reading comprehension. *Language Teaching Research*. https: https://doi.org/10.1177/1362168820985236

AUTHORS' BIOGRAPHIES

Nurul Bazilah binti Abd. Hamid is an English lecturer at the Centre of Foundation Studies, UiTM Selangor (Dengkil campus) with approximately 11 years of teaching experience. She has been the Resource Person for the subject of *English for Foundation Studies I* - a course designed to prepare UiTM foundation students for MUET - for 5 years. Aside from teaching, she has also been appointed as a speaker, jury for innovation and language-related competitions, article proofreader as well as test examiner throughout her teaching career. Her research interests are in the fields of Phonetics and Phonology, Teaching and Learning Styles, as well as Curriculum and Instructions.

Sathiyaperba a/p Subramaniam is a senior lecturer of Academy of Language Studies at Centre of Foundation Studies, UiTM Selangor (Dengkil campus), with approximately 22 years of teaching experience. Her research interests include Linguistics, Critical Discourse Analysis and Genre Analysis. She has been teaching MUET related courses for the past 17 years. Her academic achievements include co-authoring MUET and other academic reference books.

Doreen Dillah is a senior lecturer at the Centre of Foundation Studies, Universiti Teknologi MARA (UiTM), with an over 20-year track record in tertiary language instruction for students with diverse linguistic backgrounds and capabilities. Her research interests include linguistics, second language acquisition, discourse analysis, and language pedagogy. She is currently involved in several academic tasks which include updating course syllabus and educational resources, publishing scholarly articles, and serving as a MUET instructor.