

CHAPTER I

INTRODUCTION

This chapter briefly explains the whole study, including the background, questions and purposes of the research, its significance, research scope, the research framework, and previous studies related to this research.

A. Research Background

The rapid development of digital technologies has transformed how students' access, consume, and interact with information. In Indonesia, the use of digital learning in the classroom is an emerging practice, particularly amid current education reforms that mandate technology-based learning (OECD, 2015). As a result, there is a growing use of English as a Foreign Language (EFL) students reading online via e-books, websites, online articles, and Learning Management Systems like Google Classroom. Although the process of digital reading is more accessible and flexible, new mental processes are also emerging, which can influence learners' processing and comprehension of English texts (Coiro, 2011).

Digital reading is quite different from traditional print reading. Hyperlinks, multimedia, and pop-up messages, along with navigation mechanisms such as scrolling, are common features of online texts. These factors can be distracting and strain learners' minds as they strive to understand the text (DeStefano & LeFevre, 2007). The Cognitive Load Theory (CLT) from Sweller states that working memory has a limited capacity and that, beyond this capacity, performance in the learning process declines (Sweller, 1988). Recent research indicates that digital space tends to increase extraneous cognitive strain, or unwarranted mental effort, due to poor design, redundant data, or complex interface configurations (Skulmowski and Xu, 2022). Extraneous load might also cause learners to lose concentration, assimilate information, and form a coherent meaning of the text.

In recent years, numerous studies have shown that online reading can impair comprehension. In an analysis of 40 articles, Li (2024) revealed that students tend to perform poorly on digital reading comprehension tasks compared to print reading because the former is more cognitively challenging. Equally, Vargas, Salmerón, and

Delgado (2024) indicated that adolescents who read regularly online are more likely to experience greater difficulties in determining central ideas, drawing inferences, and remembering information, particularly when the digital design includes distracting components. These results indicate that cognitive load (CL) is a key determinant of students' reading comprehension in the digital context.

Digital reading seems to be harder for Indonesian EFL learners due to an additional language barrier. Reading a foreign language means that learners should be able to decode words, identify grammar patterns, and construct meaning from the text simultaneously. This adds to the intrinsic CL, which is associated with the difficulty of the content in itself. If the extraneous load from the digital interface is introduced, students may experience cognitive overload, which, in turn, may complicate comprehension. A local Indonesian study by Herwiana et al. (2023) found that EFL learners often feel mentally exhausted and confused when reading digital English texts, which negatively affects their ability to extract information effectively.

In Indonesia, the use of digital reading materials in the classroom is increasingly adopted in many senior high schools where English teachers are beginning to incorporate them into their instruction. Although this method aligns with the development of educational technology, it is vital to note the impact of digital reading on learners' comprehension, particularly when mental effort becomes a crucial factor. The majority of studies, however, have focused on digital reading patterns, reading motivation, or comparisons of print and digital resources (Delgado et al., 2018). The connections between CL and reading comprehension difficulties in EFL learners of Indonesian senior high schools in digital environments have been limited.

This study seeks to address these gaps by examining how CL is related to reading comprehension difficulties among EFL students. This relationship is significant for understanding how to guide English teachers in creating effective digital reading exercises, minimizing unnecessary CL, and helping students read digital texts more effectively. Further, the study is important to the EFL field as it

provides empirical data on the effectiveness of cognitive factors on comprehension performance in digital formats.

B. Research Questions

Based on the background presented above, the research focuses on the following problems:

1. What is the level of CL experienced by EFL learners during English digital reading activities?
2. What is the level of reading comprehension difficulties experienced by EFL learners during English digital reading activities?
3. How significant is the relationship between CL and English reading comprehension difficulties among EFL learners?

C. Research Purposes

This research aims to:

1. Measure the level of CL experienced by EFL learners during English digital reading activities.
2. Measure the level of reading comprehension difficulties experienced by EFL learners during English digital reading activities.
3. Identify the relationship between CL and English reading comprehension difficulties among EFL learners.

D. Research Significances

As digital platforms become the primary medium for language learning, understanding the cognitive demands placed on students is essential for academic success. This study offers theoretical, practical, and pedagogical significance by providing insights into how cognitive load influences the ability of Indonesian EFL learners to navigate and comprehend digital texts.

1. Theoretical Significance

The results of this research are relevant to the creation of CLT in the EFL digital reading settings. Even though CLT has been extensively used in multimedia learning, there has been limited research to investigate its applicability in digital reading comprehension among EFL learners. This study also contributes to the level

of theoretical knowledge in the relationship between extraneous and intrinsic CL with reading comprehension performance in foreign language classrooms.

2. Practical Significance

For teachers, the research gives an insight into the impact of the CL on the understanding of digital reading texts by students. These findings are useful in allowing one to design digital learning materials to reduce distractions and unneeded cognitive effort on the part of the educator. Learners would be encouraged to develop skills in controlling their mental activity as they read online.

3. Pedagogical Significance

The study provides suggestions on how to enhance the teaching of digital reading in high schools. The findings can help curriculum designers to develop technology-enhanced learning tasks that will not overload the working memory of students. The study can also assist policymakers in designing policies that will be used to instruct digital literacy and reading comprehension.

E. Research Scope

This study is limited to the investigation of the connection between Cognitive Load (CL) and English reading comprehension challenges in digital reading among Indonesian EFL students. The scope is outlined so that it is clear, focused, and aligned with the conceptual framework and the research objectives. It will be possible to focus on the narrow scale of the scope, which will lead to the specific and manageable investigation of CL in reading digital English without extending the dimensions of the focus and variables beyond the target scope (Creswell and Creswell, 2009).

This study is restricted to online reading tasks with the help of textual material presented on the screen (e.g., PDF, online articles, learning platforms, etc.). Digital reading, in this case, involves reading without printed materials, audiobooks, and listening to multimedia resources. The need for such limitation lies in the fact that digital texts are often associated with navigation facilities, which include scrolling and hyperlinks that are proven to affect mental effort invested by learners in the process of reading (Skulmowski and Xu, 2022; Li, 2024).

Insofar as Variable X (Cognitive Load) is concerned, CL can be restricted to intrinsic and extrinsic CL as conceived in CLT. Intrinsic CL is mental effort concerning the linguistic challenge posed by the English readings, like vocabulary and sentence construction, whereas extraneous CL is supplementary mental effort occasioned by the feature of the digital user interface, like layout, navigation, and display of screens (Sweller, 1988; Sweller, van Merriënboer, and Paas, 2019). In this paper, other forms of CL, including germane CL, are not considered; the theoretical basis for this exclusion is elaborated in the discussion of Germane Cognitive Load in Chapter II.

Variable Y of this study will be the perceived reading comprehension difficulties experienced by students during English digital reading, as opposed to actual performance scores. These challenges are specifically restricted to vocabulary difficulties, literal comprehension, inferential comprehension, and digital navigation control. This focus is aligned with the Cognitive Theory of Multimedia Learning (Mayer, 2021), which suggests that comprehension difficulties arise when the cognitive demands of a digital task—such as navigating interfaces and decoding foreign language text—exceed the learner's limited mental capacity. From this perspective, reading challenges indicate a disruption in essential processing (represented here by vocabulary and literal meaning) and generative processing (represented by inferential comprehension), often caused by an overload of extraneous load from the digital environment. Consequently, standardized reading tests are excluded from this research scope to focus strictly on the learners' internal cognitive experiences.

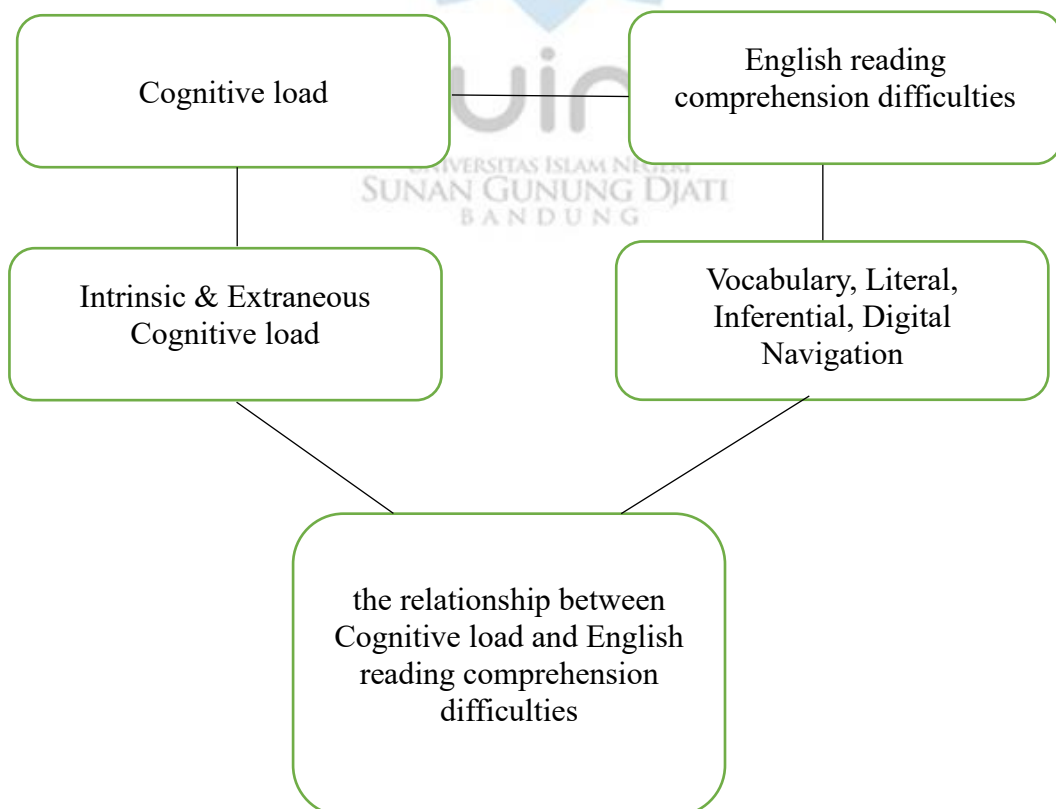
This study will be limited to the participants, in this case, eleventh-grade students, who are active digital English readers. This group has been chosen given that they have adequate exposure to English texts and knowledge of digital learning platforms that will provide more accurate reports of CL and reading challenges. These study findings are thus local and should not be generalized in the context of learners at other stages of learning or learning environments (Creswell and Creswell, 2009).

The methodological approach in this research study has a narrow scope, which is a limited quantitative correlational research design. The research is not focused on establishing the causality factor but seeks to establish the degree as well as the direction of the relationship between CL and English reading comprehension difficulties as it occurs naturally in the classroom setting. This is the right design since CL is a psychological construct that is not possible to ethically adjust in education (Bhandari, 2022; Sweller et al., 2019).

All in all, the purpose of the research scope is deliberately constructed in line with the conceptual framework that hypothesizes a positive link between intrinsic and extraneous CL, and the perceived English reading comprehension challenges in students regarding digital reading situations. The scope provides the study with theoretical consistency, methodological validity, and practicality of the data collection and analysis by ensuring the limits of the study are well defined.

F. Conceptual Framework

The conceptual framework of this research illustrates the relationship between CL and English reading comprehension difficulties. The results of these two



variables must be correlated in this research. The theoretical framework is described in the following scheme:

Figure 1. 1 Research Scheme

The framework explains the relationship between CL (X) and English Reading Comprehension Difficulties (Y) in digital reading, where learners were Indonesian EFL learners. It is formulated on the cognition and reading theories that, as a fundamental, describe the association linking mental work in the digital reading with learners' challenging comprehension issues. Since the research uses the correlational research design, the framework does not aim at establishing causality but determining the level of association between two variables.

The CLT is used as the theoretical backbone of this research study, and the framework starts with it. According to CLT, the human working memory is limited, and the level of learning declines when the demands on instructions surpass the working memory (Sweller, 1988). In this study, Dewi et al. (2025) stated that CL measured was limited to intrinsic and extraneous types. This is because the measurement and development of instruments to measure germane-type cognitive load is still controversial and theoretically still cannot be refined. In CLT, CL tends to be broken down into intrinsic CL, associated with the complexity of the learning content per se, and extrinsic CL, caused by the mode of delivery (Sweller, van Merriënboer, and Paas, 2019). Intrinsic CL comes about as a result of the linguistic factors in the context of English reading, i.e., complex sentence construction and unfamiliar vocabulary, whereas extraneous CL is a result of factors involved in the presentation.

The next step in the development of CLT is the consideration of CL functioning in digital reading conditions. As opposed to print texts, online texts require the students to deal with other features of the interface, like scroll bars, links, and multimedia. According to research on digital learning environments, they may boost extraneous CL and, therefore, exert more pressure on working memory (Skulmowski and Xu, 2022). Therefore, they have to split their focus between reading text and using digital interfaces, and it exacerbates CL overall when reading (Li, 2024).

The effects of CL can be observed on the processes of reading comprehension of the learners as the CL increases in digital reading situations. This correlation is demonstrated according to the Construction-Integration Model by Kintsch (1998) focus on mental model construction with Mayer's (2021) Cognitive Theory of Multimedia Learning, which accounts for how digital interfaces specifically disrupt these processes." Based on this model, reading comprehension is a process of creating meaning of the text and overall incorporating new information with previously known information. These activities demand sufficient mental resources. In scenarios where the working memory capacity is saturated with intrinsic and extraneous CL, fewer resources will be available to meaning construction and integration, thereby causing a problem in comprehension.

Additional effects of CL on reading comprehension also increase in EFL environments, where, in most cases, learners do not process a foreign language in an automatic way. The studies of EFL reading indicate that the learners often have a problem in their vocabulary processing, literal interpretation, and inferential processing of the information (Grabe and Stoller, 2019; Perfetti and Stafura, 2014). A combination of the language-related complications with the heightened CL requirements posed by the digital reading setting can lead to learners developing further comprehension complications, especially when using digital texts of the English language (Vargas, Salmeron, and Delgado, 2024).

Based on the CLT and reading comprehension theory, in this framework, an increase in CL levels correlates with increased reading comprehension problems in English digital situations. With the rise in CL, the resources of working memory are also limited, decreasing the performance of learners in the processing and formation of linguistic messages and meaning. Thus, it is anticipated that there would be a positive relationship between CL and problems with reading comprehension. The conceptual framework will offer a consistent theoretical realization of the study, whether differences in CL have a systematic relationship with the differences in English reading comprehension challenges among EFL learners in Indonesia, but not a cause-and-effect relationship.

G. Hypothesis

Based on the theoretical framework and the research questions previously formulated, the hypotheses for this study are defined as follows:

1. Null Hypothesis (*H₀*): There is no significant correlation between Cognitive Load (CL) and English Reading Comprehension Difficulties in digital contexts among EFL learners. This implies that variations in cognitive load do not statistically relate to the level of difficulty students face when reading digitally.
2. Alternative Hypothesis (*H_a*): There is a significant positive correlation between Cognitive Load (CL) and English Reading Comprehension Difficulties in digital contexts among Indonesian EFL learners. This suggests that as cognitive load (intrinsic or extraneous) increases, there is a corresponding shift in the difficulties experienced by students during digital reading tasks.

H. Previous Studies

A number of studies have focused on analyzing CL, digital reading, and English reading comprehension difficulties among EFL learners. The studies form significant theoretical and empirical backgrounds for the current study. Skulmowski and Xu (2022) examined the impact of digital learning environments on the CL. Their results indicate that the digital platforms tend to produce high extraneous CLs since students have to cope with scrolls, hypertexts, multimedia, and screen designs. These factors contribute to unneeded psychological work, as well as decrease the capacity of the working memory to comprehend the information. This research has relevance due to the fact that it demonstrates that digital reading inherently escalates CL, which might result in reduced comprehension.

A recent study by Dewi et al. (2025) also explored the cognitive load in the context of vocational schools in Indonesia, where the authors used EFL speaking competency. Their results showed that students had a different learning experience that was dominated by Intrinsic Cognitive Load ICL which evolves out of the complexities inherent in the language content, than Extraneous Cognitive Load ECL. This study identified that vocational students often encounter a high rate of ICL owing to the real-time processing requirements of productive work in grammar,

vocabulary, and pronunciation. Although Dewi was dealing with speaking, their conclusion that the balance between teaching material to prevent cognitive overload reminds the digital reading situation by stating that the high intrinsic demands of foreign language texts can contribute to the mental load of the digital interface is compatible with this idea.

The other meaningful study was that of Li (2024), who carried out a meta-analysis of digital reading comprehension and print reading comprehension across countries. It was found that reduced comprehension scores are likely to be attained using digital reading due to high mental effort during reading and distractions. The study substantiates the fact that cognitive overload is among the major reasons that cause the inability of students to comprehend digital texts. The findings of this discovery supported the general assumption of the present study, which rests on the association between the CL and the challenges in comprehension.

The contribution to the understanding of this problem is also made by Vargas, Salmeron, and Delgado (2024). Their study found that the online children's readers have issues in finding important concepts, making conclusions, and synthesizing information. These issues are especially apparent in the cases where the online contents is hypertexts, interactive, or has complex designs. The researchers assert that digital space engages more brainwork, and it is overwhelming to learners, particularly those with lesser reading skills or lesser digital literacy. These results can be connected to the hypothesis stating that digital reading creates a condition that makes the situation burdened with CL.

The same results can be found in the study conducted by Pardede (2019) when it comes to EFL reading. Pardede compared the performance of EFL students in both print and digital reading, where it was found that the digital reading was more challenging to understand among students. According to the students, screen reading required more concentration, mental effort, and they were normally puzzled due to screen organization. Although this study was carried out on the students of the university, this study can be applied since the students of Indonesia at any level experience similar problems in reading digital texts using the English language.

More recent research by Situmorang and Sulistyaningrum (2024) investigated the cognitive competencies of digital reading of English. In their systematic review, they have identified working memory, attention control, and CL as the key factors that have a significant influence on how students process digital reading material. They discovered that digital reading can essentially be successful based on the level of CL that the learner can cope with. The paper has asserted the idea that reading comprehension problems are influenced by one of the most important factors that comprise the CL.

Also, the relationship between CL, anxiety, and comprehension in EFL students in online reading conditions was studied by Alshehri (2025). The study noted that when the CL of the students is high, the state of anxiety is also high, leading to a further reduction in the level of comprehension. The importance of this research is that it shows that CL does not necessarily determine the level of comprehension, but may interact with the emotional factors. It extends the research theoretical background about CL in digital reading EFL.

This debate also applies to the Indonesian studies. A study conducted by Juhastris (2025) found that reading academic texts in English was a major issue of concern among students. The major problems were the vocabulary knowledge, the recognition of the main ideas, and the correspondence of thoughts in the text. Although the present paper entailed examination of reading academic journals, it demonstrates the commonly occurring reading issues of Indonesian EFL students, hence Variable Y in the present study.

In addition to this, the research undertaken by Arny Bana (2020) explored the views of the students on the application of the internet to build reading skills. Although the students appreciated the convenience of the online reading materials, the majority of them reported being distracted, overloaded with information, and unable to focus. These problems have direct relations with the CL, proving that the digital environments can negatively affect the reading performance. The work also adds to the further elaboration of the fact that digital reading does not allow for understanding students better.

Overall, the available literature suggests that online reading negatively affects CL and creates comprehension issues. However, as most of these studies were conducted in other countries or at the university level, there is a lack of empirical research focusing specifically on how cognitive load affects senior high school students within the current Indonesian educational reform context.

