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The Use of Graphic Organizers to Facilitate Reading Comprehension of Biographical Narratives Among Computer Science Students

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Abstract- **This study investigates the effectiveness of graphic organizers in facilitating the reading comprehension of biographical narrative texts. Recognizing the persistent issue of low literacy and reading interest in Indonesia, especially among non-English majors. This research focuses on how visual learning strategies can aid in understanding complex English texts. A total of 65 early-semester Information Systems students from the Computer Science Faculty, Universitas Duta Bangsa Surakarta, participated in the study. Data were collected through pretests and posttests to measure students' reading comprehension, and through perception questionnaires to explore their attitudes toward the use of graphic organizers. The comprehension aspects measured included vocabulary, reference, main idea, inference, and factual information. They were provided with three biography texts on Bill Gates, Elon Musk, and Steve Jobs. The posttest results showed a clear improvement across all aspects. In the perception questionnaire, results showed a significant score. These scores indicate that graphic organizers are effective in helping students organize and internalize key content from reading materials. These findings suggest that graphic organizers are a powerful tool in enhancing comprehension by helping students visually structure and connect information. The implications of this research highlight the importance of integrating visual learning strategies into English instruction for non-language majors, as they not only enhance comprehension but also foster learner motivation and autonomy. Therefore, educators in higher education are encouraged to implement graphic organizers more widely as part of reading instruction practices.**

Keywords: **Graphic Organizer, Reading Comprehension, Narrative Biography, Computer Science Students**

I. INTRODUCTION

Low literacy remains a critical and persistent issue in Indonesia. Based on data from UNESCO, Indonesia ranks second to last in global literacy, with a reading interest rate of merely 0.001%. This indicates that only one in every 1,000 Indonesians engages in regular reading activities. This alarmingly low level of reading engagement has profound implications for the nation's educational outcomes, particularly in students' ability to comprehend texts written in English.

In higher education, reading comprehension is not only a fundamental component of language-related programs but is also essential across disciplines, including in non-language fields such as students in Information Systems in the Computer Science faculty. Students in these programs are often required to access and understand

English academic texts, technical documentation, and global research publications. Without sufficient reading skills, particularly in English, students may struggle to grasp key information, engage critically with course content, and meet the academic demands of their fields.

II. LITERATURE REVIEW

Narratives are the primary vehicle for the moral education of the young, and the primary way humans of any age develop and alter their moral sensibilities. Narratives capture the imagination and elicit the emotions that motivate action [1]. Biographical narrative texts are commonly used to enhance reading skills because they contain factual, historical, and motivational content relevant to students' academic and personal growth. However, many students struggle with these texts due to limited vocabulary, low comprehension, complex structures, and a lack of interest in narrative reading [2].

One such strategy to support students' reading comprehension is the implementation of a visual aid, like a graphic organizer [3]. As stated, graphic organizers help learners build their understanding, support recall of key information, and promote critical thinking towards the content of a text [4]. To address these issues, instructional strategies like graphic organizers can help students systematically organize and understand information. A Graphic Organizer is used to improve comprehension in reading, teaching, and learning methods used to organize knowledge and ideas in an easy-to-understand and internalize format [5]. Graphic organizers are defined as visual representations of information that highlight the key structural relationships between core concepts and help students create mental representations of knowledge [6]. The visual nature of graphic organizers helps students identify relationships between concepts more easily, leading to improved comprehension outcomes [7]. Additionally, they reduce reading anxiety and enhance motivation, especially for students unfamiliar with English academic texts [8].

Several studies have confirmed the effectiveness of graphic organizers in improving reading comprehension, particularly among non-language learners who face difficulties with English academic materials [9]. These tools not only enhance textual understanding but also promote learner autonomy and critical thinking. However, most existing research focuses on school-aged learners or language majors.

The significance of this research lies in its contribution to addressing Indonesia's persistent challenge of low literacy and limited reading engagement [10], particularly among non-English majors who are increasingly required to comprehend English academic and technical materials in their fields. Previous studies have shown that many students encounter difficulties in understanding biographical and narrative texts due to limited vocabulary, complex linguistic structures, and low motivation to read [11]. To address these challenges, visual-based instructional strategies such as graphic organizers have been recognized as effective tools to facilitate comprehension by enabling learners to organize and internalize textual information. As visual representations that clarify conceptual relationships, graphic organizers help learners recall information and build deeper understanding. By applying this approach to biographical narratives, the present study extends prior findings [12] into the context of higher education, specifically Computer Science programs, which have been largely overlooked in reading comprehension research. Theoretically, this research reinforces the growing body of evidence that visual learning tools enhance comprehension, critical thinking, and learner autonomy. Practically, it offers pedagogical implications for integrating graphic organizers into English for Specific Purposes (ESP) instruction to foster literacy, engagement, and academic achievement among non-language learners.

This study fills a gap by investigating the role of graphic organizers in improving reading comprehension among higher education Information Systems students in the Computer Science Faculty, who are often overlooked in this area of research. Since these students must engage with English academic texts, including biographical narratives that can serve as professional inspiration, the main purpose of this study is to demonstrate the effectiveness of the application of graphic organizers to improve reading comprehension in students of English as a second language [13]. The findings are expected to inform more effective reading instruction strategies for non-English majors in higher education.

III. METHOD

This study uses a quantitative approach with a one-group pretest-posttest design to determine the effectiveness of using graphic organizers in improving reading comprehension of biographical narrative text. The research was conducted in the early semester of Information Systems in the Computer Science Faculty who took the English course. The participants of this study were 65 early-semester undergraduate students aged 18–21 from the Information Systems program at the Computer Science Faculty, Universitas Duta Bangsa Surakarta. They were enrolled in an English for Specific Purposes (ESP) course during the 2024–2025 academic year. The participants were selected through purposive sampling based on their status as non-English majors who had completed at least one semester of English instruction and demonstrated beginner to intermediate English proficiency. This group was considered suitable for the study because Computer Science students often face challenges in understanding English academic and biographical texts, making them relevant for examining the effectiveness of graphic organizers in improving reading comprehension. The learning materials consisted of three biographical texts of technology world figures, namely Elon Musk, Bill Gates, and Steve Jobs, which were equipped with reading comprehension exercises and graphic organizer sheets in the form of mind maps, timelines, and diagrams to help students organize information from the text.

The steps of the study include giving a pretest to measure the initial ability to understand biography text. Next, a learning session was conducted where students read a biography text and filled in a graphic organizer based on the content of the text. This process aims to help them identify the main idea, important details, vocabulary, and sequence of events. After that, students worked on practice questions. After the intervention, students were given a posttest to measure the improvement of learning outcomes. Quantitative data from the pretest and posttest were analyzed using a paired-sample t-test within a descriptive–inferential framework to determine the significance of improvement after the use of graphic organizers. Descriptive statistics summarized students' performance across comprehension aspects, while inferential analysis tested the effectiveness of the intervention. The paired-sample t-test was chosen because it compares two related measures from the same participants, providing valid evidence of learning gains. Data from the perception questionnaire were analyzed descriptively through frequency and percentage distributions to examine students' attitudes toward the use of graphic organizers. The integration of test results and perception data offered a comprehensive understanding of the effectiveness and acceptance of the instructional strategy.

IV. RESULTS AND DISCUSSION

A. Students' Reading Comprehension before and after Using Graphic Organizers

The results showed that students demonstrated noticeable improvement in all five categories after using graphic organizers. The average scores indicated a positive trend, with reference and vocabulary receiving the highest average correct responses. This suggests that the use of visual tools helped students decode complex vocabulary and retain specific factual details about the figures discussed.

Table 1. Pretest and Posttest Reading Comprehension Score

No	Reading Comprehension Aspect	Pretest Average Score (%)	Posttest Average Score (%)	Description
1.	Vocabulary	65	73	Good understanding of key terms and technical words in the texts
2.	Reference	70	75	Good ability to identify referents (e.g., pronouns, connectors).
3.	Main idea	68	72	Adequate comprehension of the central message of each section.
4.	Inference	65	70	Moderate ability to draw conclusions and understand implicit meanings.
5.	Factual Information	65	72	Moderate accuracy in identifying specific facts from the texts.

The findings of this study indicate that the use of graphic organizers had a positive impact on the reading comprehension skills of Computer Science students, particularly when engaging with biographical texts such as those of Elon Musk, Bill Gates, and Steve Jobs. The average scores across vocabulary, reference, main idea, inference, and factual information demonstrated overall improvement, suggesting that graphic organizers were effective as a supportive learning tool, even for non-English majors.

The highest score was achieved in the reference aspect (75%), indicating that students became more proficient in identifying pronouns, connectors, and other referential devices. This supports previous studies that graphic organizers like flowcharts enhance learners' ability to recognize textual cohesion and anaphoric references in narrative texts [14]. In vocabulary acquisition, students scored 73%, suggesting that semantic mapping and word webs provided visual scaffolding to infer meanings and group related terms [15]. This finding emphasized that graphic organizers help EFL learners break down unfamiliar vocabulary through contextual visualization. The main ide**a** aspect yielded a 72% score, reflecting students' ability to identify central themes. This outcome is consistent that graphic organizers assist students in navigating narrative structures to extract core messages. Students scored 72% in factual information, indicating that organizers such as timelines and fact charts supported their retention of specific events, names, and chronological sequences. This is particularly relevant in biographical texts, where understanding the life trajectory of a figure is essential. Studies also confirm that graphic organizers enhance factual recall by allowing students to map sequences and details visually. The lowest, but still positive, result was in inference (70%). This suggests that while graphic organizers supported comprehension, drawing conclusions from implicit information remains a challenge. However, tools like cause-and-effect diagrams and character comparison charts did provide some assistance. It is noted that inference-making improves when learners are guided through visual relationships between ideas.[16].

These results collectively align with prior research indicating that graphic organizers are particularly effective for students with logical or visual learning styles [17] [18]. The use of computer-based graphic organizers in teaching narrative text reading increases students' reading enjoyment, creates feelings of comfort and pleasure, and also encourages a deeper motivation to learn English [19]. For Computer Science students, who are accustomed to processing information structurally, this strategy provides a familiar mode of accessing and organizing English textual content.

These findings confirm that graphic organizers serve as an accessible and structured tool that supports students in decoding unfamiliar vocabulary, organizing key ideas, and making sense of complex biographical texts. The lowest scoring category at 70% still showed improvement, demonstrating the organizers' potential in fostering higher-order thinking. It indicates that the use of a graphic organizer contributes to assisting students' comprehension of a passage. Meanwhile, the students gave a good response to the utilization of a graphic organizer in extensive reading learning [20]. These results align with previous research highlighting the positive impact of graphic organizers on reading comprehension, particularly among learners with non-language academic backgrounds. Furthermore, the use of biographies of globally recognized figures such as Elon Musk, Bill Gates, and Steve Jobs provided relevant and inspiring content for students in technology-related fields, which may have further contributed to their engagement and comprehension. This study also supports the notion that graphic organizers are especially effective for learners who are accustomed to structured, logical thinking, characteristics often found in Computer Science students.

B. Students' Responses toward the Use of Graphic Organizers

In addition to assessing effectiveness quantitatively through reading comprehension tests. This study explored students' perceptions of using graphic organizers in learning news item texts among 65 second-semester students from Universitas Duta Bangsa (UDB) Surakarta. Data were collected using 10 perception questionnaires. Each item was rated using a 5-point Likert scale (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree) [21]. The findings revealed a highly positive perception that students agreed with 7 of 10 statements.

To provide a detailed analysis, perception results for Universitas Duta Bangsa Surakarta (65 students) are presented in Table 2.

Table 2. Results of the Student Perception Questionnaire

No.	Statement	SA (Students)	A	N	D	SD
1.	The learning method using graphic organizers helps students understand the material	11	28	21	3	2
2.	The learning method with a graphic organizer helps students learning.	9	29	21	3	3
3.	The learning method using a graphic organizer helps students obtain information more easily.	10	29	22	1	3
4.	The learning method using a graphic organizer helps students to recognize important information.	11	30	21	1	2
5.	The learning method using a graphic organizer helps improve students' understanding of reading comprehension	12	22	28	1	2
6.	Learning methods using graphic organizers help improve students' long-term memory.	13	24	23	2	3
7.	The graphic organizer method makes students more active.	10	20	27	5	3
8.	The graphic organizer method makes learning more interesting.	11	26	22	4	2
9.	The graphic organizer method motivates me to participate in reading for a specific purpose (ESP) learning.	6	29	27	1	2
10.	The graphic organizer method should also be applied in other academic learning	7	23	28	5	2

V. CONCLUSION

In conclusion, graphic organizers not only enhanced reading comprehension outcomes but also served to reduce reading anxiety and support learner autonomy. Given their effectiveness, educators in higher education, particularly in non-language departments, are encouraged to adopt graphic organizers as part of their instructional strategies. Further research is recommended to explore long-term impacts and students' preferences regarding different types of graphic organizers across diverse academic disciplines.

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