

CHAPTER IV

FINDINGS AND DISCUSSION

A. Findings

This study explored EFL students' experiences of using Mapify as an AI-based mind mapping tool for journal article summarizing. The findings were obtained from observations and semi-structured interviews involving six undergraduate EFL students in their eighth semester. The findings are presented based on the research questions of this study.

1. How EFL Students Use Mapify to Support Journal Article Summarizing

The findings revealed that EFL students used Mapify to support journal article summarizing through several interconnected activities. Based on the phenomenological analysis of observation notes and interview transcripts, six themes emerged: (1) reading and understanding the source text, (2) interpreting the AI-generated mind map, (3) identifying main ideas and important information, (4) eliminating unnecessary details, (5) paraphrasing and reorganizing ideas, and (6) writing the summary coherently.

a. Reading and Understanding the Source Text

Based on observation sessions conducted between June 7 and June 16, 2026, participants demonstrated activities related to reading and understanding the source text before and during the use of Mapify. These activities included reading the journal article before using Mapify,

understanding the general content of the article, and referring back to the original article while reviewing the generated mind map.

Table 4.1 Observation Results on Reading and Understanding the Source Text

Partici pant	Read the Journal Article Before Using Mapify	Demon strated Underst anding of the General Content	Referred Back to the Original Article While Reviewing the Mind Map	The Result
P1	✓	✓	✓	Read the article before using Mapify and referred back to the original article while reviewing the generated mind map.
P2	✓	✓	✓	Compared the generated mind map with the original article while reviewing the information.
P3	✓	✓	✓	Screened the article before using Mapify and checked the consistency between the generated mind map and the original article.
P4	✓	✓	✓	Referred back to the original article while reviewing the generated output.
P5	✓	✓	✓	Revisited the original article during the summarizing process.
P6	✓	✓	✓	Referred back to the original article while reviewing the generated mind map.

Table 4.1 shows that all six participants read the journal article before using Mapify and demonstrated an understanding of its general content before generating the mind map. During the summarizing process, all participants also referred back to the original article while reviewing the AI-generated mind map. These observations indicate that although Mapify provided an AI-generated summary, participants continued to use the original article as the primary reference for verifying and understanding the information.

Interview findings also supported these observations. During the interviews, several participants reported that reading the original article remained necessary to understand the topic and verify the information generated by Mapify. For example, P2 stated:

"I still needed to check the original article to make sure that no important information was missed."

Similarly, P3 explained:

"There were still some points that needed to be cross-checked between the original article and the results generated by Mapify."

Overall, the observation findings showed that all participants read the journal article before using Mapify, developed an understanding of its general content, and referred back to the original article while reviewing the generated mind map during the summarizing process.

b. Interpreting the AI-Generated Mind Map

Based on observation sessions conducted between June 7 and June 16, 2026, participants demonstrated activities related to interpreting AI-generated mind maps. These activities included reading and interpreting the generated mind map, navigating various features and functions provided by Mapify, and comparing the generated mind map with the original article.

Table 4.2 Observation Results on Interpreting the AI-Generated Mind Map

Participant	Read and Interpreted the Generated Mind Map	Navigated Mapify Features	Compared the Generated Mind Map with the Original Article	The Result
P1	✓	✓	✓	Read and interpreted the generated mind map, explored several Mapify features such as changing the map format and background, attempted to generate a more concise version, and compared the generated output with the original article.
P2	✓	✓	✓	Read and interpreted the generated mind map, requested a more concise version of the information, and compared the generated output with the original article.
P3	✓	✓	✓	Read and interpreted the generated mind map, attempted to change the

				map format and generate a more concise version, but some features could not be accessed due to premium account limitations. The generated output was also compared with the original article.
P4	✓	✓	✓	Read and interpreted the generated mind map, explored interactive features such as requesting additional explanations, asking questions about the article, modifying the map format, and comparing the generated output with the original article.
P5	✓	✗	✗	Read and interpreted the generated mind map but did not explore additional features or compare the generated output with the original article during the observation session.
P6	✓	✓	✓	Read and interpreted the generated mind map, requested a more concise version, changed the map format, and compared the generated output with the original article.

Table 4.2 shows that all participants were able to read and interpret the AI-generated mind maps produced by Mapify. Most participants also explored various Mapify features, including changing the map format, requesting more concise summaries, and using interactive functions to

obtain additional explanations. Furthermore, five out of six participants compared the generated mind map with the original journal article while reviewing the generated information. Only P5 did not explore additional features or compare the generated output with the original article during the observation session.

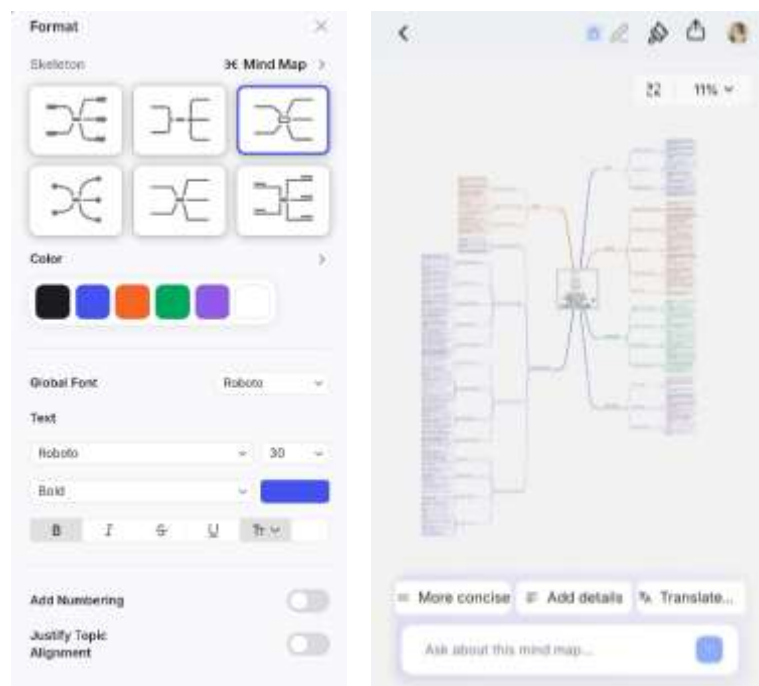


Figure 4.1 Mapify Features

The interview findings supported these observations. P4 stated:

"Since Mapify provides several options for the type of summary that users want, I think the summary can be adjusted based on each user's needs. Users can choose whether they want a longer or shorter version, which is very helpful."

Similarly, P6 stated:

"If the result feels too long or contains too much information, we can ask Mapify to summarize it again. That is one of the advantages of using Mapify because it allows us to get a more concise summary."

Overall, the findings showed that all participants interpreted the AI-generated mind maps, while most participants explored Mapify's features to adjust the presentation of information according to their needs. In addition, most participants compared the generated output with the original journal article while reviewing the generated information.

c. Identifying Main Ideas and Important Information

Based on observation sessions conducted between June 7 and June 16, 2026, participants demonstrated activities related to identifying main ideas and important information from the generated mind maps. These activities included identifying key ideas, distinguishing main ideas from supporting details, and selecting relevant information for summarizing.

Table 4.3 Observation Results on Identifying Main Ideas and Important Information

Participant	Identified Key Ideas from the Mind Map	Distinguished Main Ideas from Supporting Details	Selected Relevant Information for Summarizing	The Result
P1	✓	✓	✓	Identified the key ideas, distinguished the main ideas from supporting

				details, and selected relevant information from the generated mind map for summarizing.
P2	✓	✓	✓	Identified the main ideas and supporting details and selected relevant information for writing the summary.
P3	✓	✓	✓	Identified key ideas from the generated mind map, including several ideas that had not been noticed during the initial screening of the article, and selected relevant information for summarizing.
P4	✓	✓	✓	Identified the main ideas and supporting details but compared the generated information with the original article before selecting relevant information for the summary.
P5	✓	✓	✓	Identified important information, distinguished the main ideas from supporting details, and selected relevant information for summarizing.
P6	✓	✓	✓	Identified the main ideas, distinguished supporting information, and selected relevant points for the summarizing process.

Table 4.3 shows that all participants successfully identified the key ideas presented in the generated mind maps, distinguished the main ideas from the supporting details, and selected relevant information for summarizing. During the observation sessions, some participants also compared the generated information with the original journal article before deciding which information should be included in the summary.

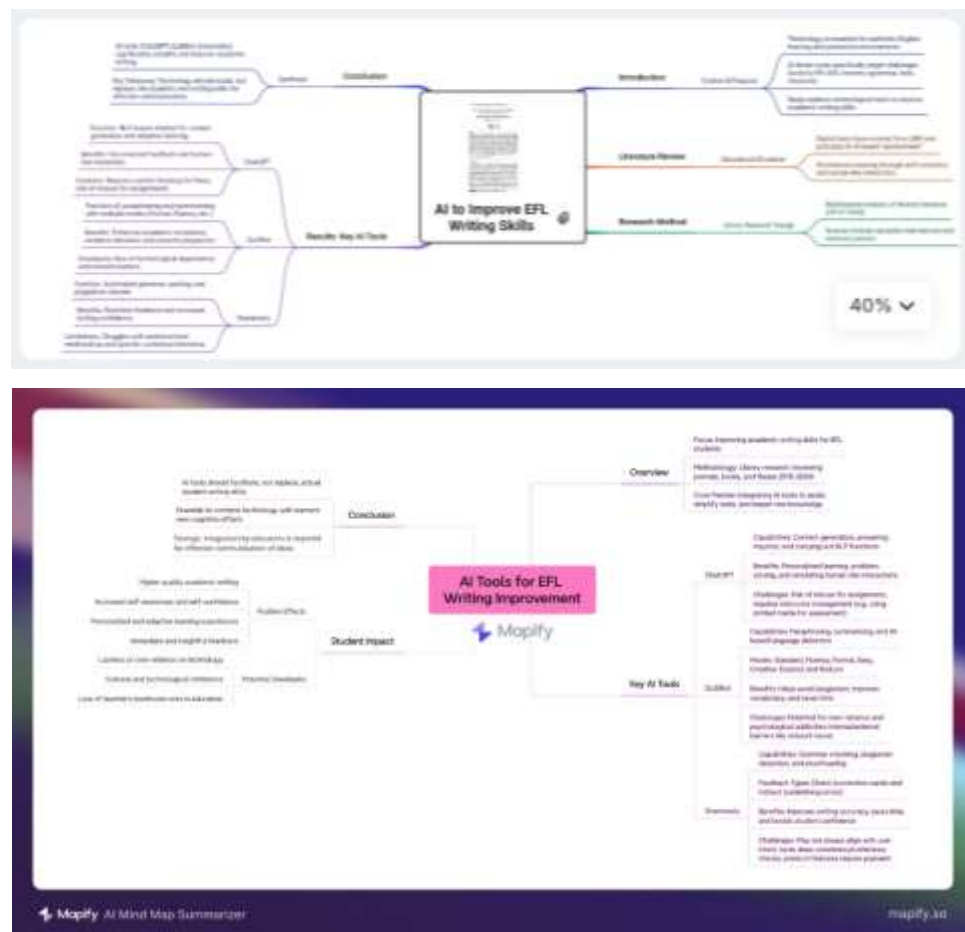


Figure 4.2 Mind Map Generated by Mapify (P2, P4, and P6)

Figure 4.2 illustrates examples of the AI-generated mind maps used by participants to identify the main ideas, supporting details, and relevant information before writing their summaries.

The interview findings also supported these observations. P1 stated:

"Mapify was quite helpful in identifying the main ideas and important details from a journal article. The mind map format made it easier for me to understand the content and see the important points from the article."

Similarly, P5 explained:

"After uploading the article, Mapify immediately provided different sections such as the strengths, weaknesses, and other important information. I could read the generated points and then summarize them again in my notes based on what I needed."

Likewise, P6 stated:

"Mapify really helped me identify the main ideas and supporting details. The information is directly presented with the main ideas and their supporting details, making it easier to summarize journal articles."

Overall, the findings showed that all participants successfully identified the main ideas, distinguished them from supporting details, and selected relevant information for summarizing by using the AI-generated mind maps provided by Mapify.

d. Eliminating Unnecessary Details

Based on observation sessions conducted between June 7 and June 16, 2026, participants demonstrated activities related to eliminating unnecessary details during the summarizing process. These activities included ignoring irrelevant or minor details and focusing on essential information presented in the journal article and the generated mind map.

Table 4.4 Observation Results on Eliminating Unnecessary Details

Participant	Ignored Irrelevant or Minor Details	Focused on Essential Information	The Result
P1	✓	✓	Ignored less relevant information and focused on the essential points from the generated mind map for summarizing.
P2	✓	✓	Focused on the key information generated by Mapify and excluded less important details during the summarizing process.
P3	✓	✓	Avoided unnecessary information from the generated mind map and selected only the most relevant information for the summary.
P4	✗	✓	Focused on essential information but retained some repetitive or seemingly unnecessary details because they were considered useful as supporting ideas.
P5	✓	✓	Selected only the relevant information and excluded less important details when preparing the summary.
P6	✓	✓	Ignored less relevant information and focused on the essential points from the generated mind map when writing the summary.

Table 4.4 shows that five participants (P1, P2, P3, P5, and P6) ignored irrelevant or minor details while focusing on the essential information needed for summarizing. In contrast, although P4 focused on the essential information, some repetitive or seemingly unnecessary details were retained because they were considered useful as supporting ideas during summary construction.

Interview data further supported these observations. P3 explained:

"Mapify helped make the summarizing process easier. However, one of the difficulties was that the generated mind map sometimes still contained too much unnecessary information. Therefore, I needed to remove some parts and reorganize the information based on the original article to make it more relevant and appropriate."

Similarly, P6 stated:

"Another difficulty was that the initial mind map was very detailed, including many supporting points, so sometimes there were too many branches and too much information."

These interview excerpts indicate that although Mapify facilitated the summarizing process, participants still needed to evaluate and reduce unnecessary information before incorporating it into their summaries. Overall, the observation findings indicated that most participants were able to eliminate unnecessary details and focus on the essential information during the summarizing process. However, some supporting information

was intentionally retained when participants considered it helpful for representing the overall meaning of the source text.

e. Paraphrasing and Reorganizing Ideas

Based on observation sessions conducted between June 7 and June 16, 2026, participants demonstrated activities related to paraphrasing and reorganizing ideas from the generated mind map. These activities included rewriting information using their own words, reorganizing information into a more suitable structure, and avoiding direct copying from the generated output.

Table 4.5 Observation Results on Paraphrasing and Reorganizing Ideas

Participant	Rewrote Ideas Using Own Words	Reorganized Information from the Mind Map	Did Not Copy Directly from the Mind Map	The Result
P1	✓	✓	✓	Rewrote the generated information using personal wording, reorganized it according to the summary structure, and did not copy directly from the generated mind map.
P2	✓	✗	✓	Rewrote the information using personal wording and avoided direct copying, but generally followed the structure already provided by Mapify without significant reorganization.
P3	✗	✓	✓	Reorganized the generated information to fit the

				summary requirements but did not substantially change the wording because it was already considered appropriate. Nevertheless, the information was reviewed rather than copied directly.
P4	✓	✓	✓	Rewrote and reorganized the generated information before writing the summary. The participant noted that the ideas were detailed but fragmented and needed to be connected into coherent paragraphs.
P5	✓	✓	✓	Paraphrased the generated information, reorganized it according to the needs of the summary, and avoided direct copying.
P6	✗	✗	✓	Did not substantially paraphrase or reorganize the generated information during the observation but reviewed it before using it and did not copy it directly.

Table 4.5 shows that most participants rewrote the generated information using their own words and reorganized it before writing their summaries. Four participants (P1, P4, P5, and partially P2) paraphrased the information, while four participants (P1, P3, P4, and P5) reorganized the generated ideas to better fit the structure of their summaries. Although differences were observed in the extent of paraphrasing and reorganization,

all participants reviewed the generated information and avoided copying it directly into their summaries.

Interview findings supported these observations. P4 explained:

"When creating a summary, I still experienced some difficulties, especially when transforming the mind map generated by Mapify into a complete paragraph. Outside of the supporting AI features provided by Mapify, I still needed to analyze the supporting information independently and decide which points were suitable to include in the summary."

Similarly, P3 stated:

"When writing a summary, it is necessary to have a basic understanding of the material that will be summarized first. Then, Mapify helps organize the information so that the article can be summarized based on the generated mind map. After understanding the content and the main ideas of the article, we need to select which information should be included in the summary and which information is not necessary. Therefore, critical thinking is still needed so that users do not simply copy and paste the information without evaluating it first."

Overall, the findings indicated that most participants paraphrased and reorganized the information generated by Mapify before writing their summaries. Although the degree of paraphrasing and reorganization varied among participants, all participants reviewed the generated information rather than copying it directly into their summaries.

f. Writing the Summary Coherently

Based on observation sessions conducted between June 7 and June 16, 2026, participants demonstrated activities related to writing summaries coherently using the generated mind maps. These activities included writing summaries based on selected ideas, organizing information logically, and using the generated mind map as a reference during the writing process.

Table 4.6 Observation Results on Writing the Summary Coherently

Participant	Wrote a Summary Based on Selected Ideas	Summary Shows Logical Organization and Coherence	Used the Mind Map as a Reference	The Result
P1	✓	✓	✓	Wrote a coherent summary in paragraph form using selected ideas from the generated mind map while continuously referring to the mind map during writing.
P2	✓	✓	✓	Produced a logically organized summary using the generated mind map as a reference, although the summary was presented in several main points rather than a paragraph.
P3	✓	✓	✓	Developed a detailed and coherent summary based on selected ideas from the generated mind map and used the mind map throughout the writing process.

P4	✓	✓	✓	Wrote a coherent paragraph based on selected information from the generated mind map, using it as a guide for organizing ideas.
P5	✓	✓	✓	Used the generated mind map as a reference to organize relevant information into a structured summary presented in several points.
P6	✓	✓	✓	Produced a coherent paragraph by selecting and organizing information from the generated mind map while referring to it throughout the writing process.

Table 4.6 shows that all participants wrote summaries based on selected ideas, organized their summaries logically, and consistently used the generated mind map as a reference during the writing process. Although the format of the summaries varied, with some participants writing in paragraph form and others using several main points, all participants demonstrated the ability to transform the information from the generated mind map into structured written summaries.

Interview data further supported these observations. P1 explained:

"The generated mind map was also clear enough, so it was easier to transform the information into written form or paragraphs."

Similarly, P5 stated:

"When writing a summary, I used Mapify as a reference to see the important points from the article."

P3 also emphasized that although Mapify provided organized information, users still needed to evaluate and select the content before writing the final summary:

"After understanding the content and the main ideas of the article, we need to select which information should be included in the summary and which information is not necessary. Therefore, critical thinking is still needed so that users do not simply copy and paste the information without evaluating it first."

Summary

The use of AI makes it easier for students to improve their writing skills and help students write faster and more accurately. However, this needs to be combined with students' writing skills so that ideas are conveyed well. The use of this AI is very helpful for students who have difficulty in choosing words, grammar, spelling, and other aspects of writing. The 3 most commonly used AIs are ChatGPT, QuillBot, and Grammarly.

AI for Enhancing EFL Students' Writing Skills

This study explores how AI-powered tools such as ChatGPT, QuillBot, and Grammarly can support English as a Foreign Language (EFL) students in improving their academic writing skills. The main issue is that many EFL learners struggle to generate ideas and express opinions effectively in academic writing. Integrating these AI tools offers a potential solution by improving writing accuracy, language quality, and efficiency.

Key AI Tools

- ChatGPT: Assists with text generation, answering questions, and providing personalized learning support. However, students should verify its accuracy and avoid overreliance.
- QuillBot: Helps paraphrase texts, enrich academic vocabulary, reduce plagiarism risks, and save time. Though dependence on technology can be a limitation.
- Grammarly: Provides instant feedback on grammar, spelling, and writing mechanics, but may not always fully understand the context of entire texts.

Educational Significance

Technology plays an important role in providing authentic learning materials and flexible learning environments. In modern education, AI systems are designed to support human intelligence rather than replace it. In language learning, digital media can enhance students' self-correction skills and extend communication abilities.

Main Findings

- AI tools should be used as supportive learning aids, not substitutes for students' writing skills.
- These tools help students identify mistakes and monitor their writing progress.
- Academic writing remains a key indicator of success for EFL learners, despite the challenges they face.

Research Method

The study uses a library research approach, analyzing books, journal articles, and reputable sources published between 2018-2024. The process includes topic selection, data collection, analysis, and drawing conclusions.

AI To Improve EFL Writing Skills

The article discusses how artificial intelligence (AI) tools can help EFL students improve their writing skills. Technology has become an important part of language learning because it provides a more productive and supportive learning environment. The study focuses on three AI tools: ChatGPT, QuillBot, and Grammarly. ChatGPT helps students generate ideas and receive personalized feedback, QuillBot assists with paraphrasing and improving vocabulary, while Grammarly helps check grammar, spelling, and plagiarism. The article is based on a review of various studies published between 2018 and 2024. The findings show that AI tools can make writing easier and more effective, but they should be used as learning aids rather than replacements for students' own writing abilities.

Figure 4.3 Examples of Participants' Summary Writing Outputs

Overall, the observation and interview findings indicated that all participants successfully used the generated mind map as a reference for writing coherent summaries. While the organization, format, and level of detail varied among participants, Mapify supported them in selecting relevant information, organizing ideas logically, and transforming the generated content into structured written summaries. At the same time, participants emphasized that writing an effective summary still required evaluating, selecting, and developing the generated information rather than relying solely on the AI-generated output.

2. The Weaknesses of Using Mapify for Journal Article Summarizing

The findings related to the weaknesses of using Mapify for journal article summarizing were obtained from interviews conducted between June 10 and June 17, 2026. Based on the interview data, several weaknesses were identified regarding the role of Mapify in supporting journal article summarizing. These weaknesses were categorized into six themes.

a. Weaknesses in Identifying Main Ideas and Supporting Details

Based on the interview data, participants shared their experiences regarding the use of Mapify in identifying main ideas and supporting details from journal articles.

P1 explained that the generated output was useful for understanding the article; however, the information still needed to be checked for accuracy.

P1 stated:

"However, since it is an AI tool, as users we still need to review and verify the results to make sure the information is accurate"

Similarly, P2 reported that the generated mind map helped identify important information, but additional checking was still necessary. P2 stated:

"I still needed to check the original article to make sure that no important information was missed"

Likewise, P3 explained that some generated information needed further comparison with the source text. P3 stated:

"There were still some points that needed to be cross-checked between the original article and the results generated by Mapify"

Observation data also supported these findings. During the observation sessions, participants frequently referred back to the original article while reviewing the generated mind map, indicating that the generated information was not used without verification.

These findings show that although Mapify assisted participants in identifying main ideas and supporting details, several participants still felt the need to verify the generated information by comparing it with the original journal article.

b. Weaknesses in Organizing Information and Understanding Relationships Between Ideas

Based on the interview data, participants shared their experiences regarding how Mapify organized information and presented relationships between ideas within journal articles.

P1 explained that the arrangement of information was sometimes confusing because certain sections appeared in unexpected positions. P1 stated:

"Usually, the conclusion is located at the end or at the bottom of the summary, but in this case, it was placed at the top"

Similarly, P2 reported that the generated mind map could become overly dense. P2 stated:

"Sometimes the generated mind map was quite dense, so I still needed to review it by comparing it with the original article"

Likewise, P3 explained that the generated information was sometimes too complex. P3 stated:

"Sometimes the information provided was still too complex, so I needed to reorganize it and select which information was more relevant and suitable"

In addition, P4 described the generated structure sometimes felt rigid because information was presented in separate branches rather than

connected explanations, making the relationships among ideas less clear.

P4 stated:

"Mapify breaks down the text directly into the main points, usually through arrows and short explanations. Personally, I was not really satisfied with that format because sometimes it felt too limited"

Observation data also supported these experiences. During the observation sessions, several participants explored Mapify features to simplify, reorganize, or modify the generated mind maps before using them for summarizing.

These findings indicate that although Mapify helped visualize and organize information, some participants still experienced difficulties understanding and managing the relationships among ideas due to dense, complex, or rigid mind map structures.

c. Weaknesses in Reducing Cognitive Load When Processing Complex Texts

Based on interview data, participants described their experiences regarding the use of Mapify when processing complex journal articles.

P1 explained that detailed mind maps were useful because they contained comprehensive information. However, excessive detail could make the mind map complex and difficult to navigate. At the same time, overly simplified summaries could omit important information. P1 stated:

"If it is too detailed, the mind map becomes too complex, but if it is too simplified, some important information may be missing"

Similarly, P2 reported that simplified outputs occasionally became unclear. P2 stated:

"Sometimes, after making it more summarized, the generated results became unclear or confusing"

In addition, P3 explained that the generated mind maps sometimes contained unnecessary information, which required further filtering. P3 stated:

"The generated mind map sometimes still contained too much unnecessary information"

Likewise, P6 described the generated mind maps as containing too many branches and supporting points, making the visual representation overwhelming. P6 stated:

"The initial mind map was very detailed, including many supporting points, so sometimes there were too many branches and too much information"



Figure 4.4 An Example of a Detailed and Complex Mind Map Generated by Mapify (P1, P3, and P5)

Figure 4.4 presents examples of detailed and complex mind maps generated by Mapify. The figure illustrates how the large number of branches and sub-branches sometimes resulted in information overload.

These findings indicate that although Mapify was designed to simplify complex information, the generated output did not always reduce cognitive load effectively because participants sometimes still needed to reduce, reorganize, simplify, or filter the information further.

d. Weaknesses in Enhancing Critical Thinking and Comprehension

Based on interview data, participants described their experiences regarding the influence of Mapify on critical thinking and comprehension during journal article summarizing.

P2 explained that receiving summarized information directly sometimes reduced deeper analyze the article in depth because the information was already available in a concise format. P2 stated:

“I tended to accept the generated results without analyzing the journal content deeply”

Similarly, P3 highlighted the importance of evaluating the relevance and accuracy of the generated output. P3 stated:

“Using Mapify could reduce critical thinking skills if users simply accept the results without reviewing or understanding them first”

Likewise, P4 reported that Mapify occasionally reduced the motivation to read the complete article because the generated mind map provided an immediate overview of the content. P4 stated:

“I sometimes felt less motivated to read the entire article because I assumed I already understood the overall content”

In addition, P5 similarly stated that users might become accustomed to relying on AI-generated summaries rather than independently identifying important information from the article. P5 stated:

“Sometimes I just feel like, ‘Oh, the information is already there, so I just need to write it down’”

These findings indicate that while Mapify supported comprehension by providing organized information, excessive reliance on AI-generated

outputs could potentially reduce critical reading, evaluation, and independent analysis of source texts.

e. Weaknesses in Increasing Motivation and Engagement

Based on interview data, participants described several experiences related to motivation and engagement while using Mapify.

P3 reported feeling confused when the generated information became too complex and difficult to process. P3 stated:

“Sometimes I also felt a little confused when the generated information was too complex”

Similarly, P4 explained that the offered provided by Mapify occasionally reduced the motivation and engagement to read the original article thoroughly because users might feel they already understood the content through the generated mind map. P4 stated:

“I sometimes felt less motivated to read the entire article because I assumed I already understood the overall content”

Likewise, P5 expressed concern that long-term use of Mapify could potentially create dependency on AI-generated summaries. P5 stated:

“If I had known about Mapify since my earlier college years, I think there was a possibility that I would become too dependent on it”

These findings suggest that although Mapify generally provided a positive learning experience, some participants reported reduced

engagement with the original reading materials because the generated summaries made the information easier to access.

f. Technical and Operational Limitations

Based on interview data, participants reported several technical and operational issues while using Mapify.

P3 identified the limited credits as one of the major weaknesses of the platform. P3 stated:

“The main weakness of Mapify is the limited credits for generating mind maps”

Similarly, P6 reported limitations related to continued access. P6 stated:

“Since Mapify has limited access in the free version, if we use it frequently, we may reach the limit and need to pay for more access”

Likewise, P5 explained:

“The free version can only be used several times, so users need to be careful when generating the mind map”

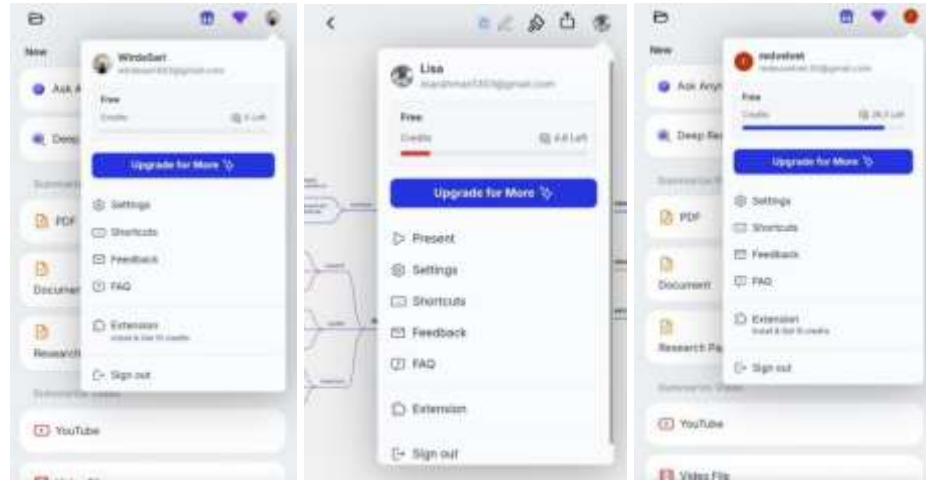


Figure 4.5 Examples of Mapify Credit Limitations Experienced by Participants

In addition, P4 reported difficulties related to saving and accessing outputs. P4 stated:

“When I refreshed the page, the conversation or previous process disappeared, so I had to repeat it again.”

P4 also experienced difficulties downloading the generated mind maps, she explained:

“When I clicked the download button, the file was not downloaded at all.”

Similarly, P5 reported problems with output quality. P5 stated:

“When the mind map contains a lot of information, the downloaded image can become unclear or blurry”

These findings indicate that limited credits, restricted free-version features, difficulties in saving generated outputs, and download-related

issues were the primary technical and operational weaknesses experienced by participants when using Mapify.

B. Discussion

1. How EFL Students' Use of Mapify to Support Journal Article Summarizing

The findings showed that EFL students used Mapify to support journal article summarizing through six interconnected activities: reading and understanding the source text, interpreting the AI-generated mind map, identifying main ideas and important information, eliminating unnecessary details, paraphrasing and reorganizing ideas, and writing the summary coherently. These activities indicate that students did not use Mapify merely as an automatic summarizing tool but as a cognitive and organizational support system throughout the summarizing process.

a. Reading and Understanding the Source Text

The findings revealed that all participants read the journal articles before using Mapify and frequently referred back to the original texts while interacting with the generated mind maps. Observation data showed that participants did not immediately rely on the AI-generated output. Instead, they first attempted to understand the content of the journal articles and later used the original texts to verify information presented in the mind maps. For example, P3 was observed screening the article before

generating the mind map and checking the correspondence between the generated output and the original article during the summarizing process.

This finding supports the theory proposed by Qin & Groombridge (2023), who argue that comprehension is the foundation of successful summary writing because learners need to understand the source text before reconstructing information into a concise written form. Similarly, Oshima & Hogue (2006) explain that reading and understanding the source text constitute the first stage of summary writing.

The findings further suggest that Mapify did not replace the reading process. Instead, it functioned as a supplementary tool that helped students gain an overview of journal articles and facilitated comprehension. This finding aligns with Luangkrajang (2022), who states that mind mapping serves as a cognitive tool that assists learners in organizing information and improving comprehension during language learning activities. Therefore, the findings indicate that although Mapify supported students in understanding academic texts, successful summarization still depended on learners' engagement with the original journal articles.

b. Interpreting the AI-Generated Mind Map

The findings showed that participants actively interpreted the generated mind maps and explored various features provided by Mapify. Observation data indicated that five participants (P1, P2, P3, P4, and P6) attempted to modify, simplify, or explore different mind map formats, while P5 primarily

focused on reading and utilizing the generated output without navigating additional features. Several participants also compared the generated mind maps with the original articles to ensure the information accurately reflected the source text.

These findings suggest that participants were not passive recipients of AI-generated information. Instead, they actively interacted with the visual representation produced by Mapify and evaluated its usefulness for summarizing purposes.

This finding supports Buzan (2024) theory that mind mapping reflects the brain's associative thinking process by enabling learners to process information through conceptual relationships and visual connections. Likewise, Fu et al. (2024) explain that mind mapping functions as a scaffolding tool that assists learners in organizing information and developing ideas.

The findings further indicate that Mapify's interactive features allowed learners to explore information flexibly and adjust the generated outputs according to their needs. Consequently, AI-based mind mapping can serve as an interactive learning environment that supports information processing during summary writing activities.

c. Identifying Main Ideas and Important Information

The findings demonstrated that all participants successfully identified key ideas, distinguished main ideas from supporting details, and selected

relevant information for summarizing. Observation data showed that participants used the generated mind maps to locate important information more efficiently. For example, P3 reported identifying ideas that were initially overlooked when screening the article, while P4 stated that the generated information still needed to be compared with the original article to determine which points should be included in the summary.

This finding supports Oshima & Hogue (2006) explanation that identifying central ideas and important information is an essential stage of summary writing. The findings are also consistent with Ahn (2022), who states that effective summarizing requires learners to distinguish between main ideas and supporting details. Furthermore, Tarin & Yawiloeng (2022) argue that mind mapping assists learners in identifying relationships between major and supporting information through visual organization.

The participants' ability to identify key information suggests that Mapify facilitated information selection by presenting concepts in organized branches and categories. As a result, learners could focus more easily on the essential content of journal articles. Therefore, the findings indicate that Mapify supported learners in identifying and selecting relevant information during the summarizing process.

d. Eliminating Unnecessary Details

The findings showed that most participants were able to eliminate irrelevant or unnecessary information and focus on essential ideas when

summarizing journal articles using Mapify. Observation data indicated that five participants (P1, P2, P3, P5, and P6) ignored minor or repetitive details and concentrated on the main information presented in the generated mind maps. P3 was specifically observed avoiding unnecessary information during the summarizing process. However, P4 demonstrated a slightly different approach by retaining some repetitive information because it was considered useful as supporting ideas for understanding the article.

These findings are consistent with Oshima & Hogue (2006), who explain that summary writing requires learners to omit examples, repetitions, and minor details while preserving the central meaning of the original text. Effective summarization involves reducing information without losing the core message of the source text.

The findings also support the concept of macroprocessing proposed by Dijk & Kintsch (1983), which emphasizes that learners simplify and reduce information by focusing on essential meanings and relationships among ideas. Through the visual organization provided by Mapify, participants were able to distinguish between important and less important information more easily.

Furthermore, the findings align with Fu et al. (2024), who explain that mind mapping functions as a scaffolding tool that helps learners manage large amounts of information by organizing content into more manageable structures. The generated mind maps appeared to assist participants in

identifying which information should be retained and which could be omitted during summary writing. Therefore, the findings indicate that Mapify supported participants in reducing unnecessary information and focusing on essential content, which is an important component of effective summary writing.

e. Paraphrasing and Reorganizing Ideas

The findings revealed that participants used different strategies when paraphrasing and reorganizing information from the generated mind maps. Observation data showed that P1, P2, P4, and P5 rewrote ideas using their own words, whereas P3 and P6 tended to retain the original wording provided by Mapify. P3 explained that the generated sentences already represented the article accurately and therefore did not require substantial modification. In terms of reorganization, P1, P3, P4, and P5 reorganized the information before writing, while P2 and P6 relied more heavily on the structure already provided by the generated mind map.

These findings support Altun & Çetinkaya (2023), who emphasize that paraphrasing and reorganizing information are essential strategies in summary writing because they demonstrate learners' understanding of the source text and prevent direct copying. The ability to restate information using one's own words reflects deeper comprehension and active engagement with the content.

The findings are also consistent with Oshima & Hogue (2006), who argue that summary writing requires learners to reconstruct information rather than simply reproduce sentences from the source text. Through paraphrasing and reorganizing information, learners transform selected ideas into a new and concise representation of the original text.

In addition, the findings support Wahid & Sudirman (2023), who found that mind mapping positively influences writing performance by helping learners organize ideas systematically before writing. The visual structure provided by Mapify appeared to facilitate the process of rearranging information and determining logical relationships among ideas.

However, the findings also indicate that not all participants fully engaged in paraphrasing and restructuring information. Some participants relied heavily on the wording and organization generated by Mapify. This suggests that while AI-based mind mapping tools can support idea organization, successful paraphrasing still depends on learners' language proficiency, comprehension, and writing abilities. Therefore, the findings indicate that Mapify facilitated the processes of paraphrasing and reorganizing information, although the extent to which learners modified the generated content varied among participants.

f. Writing the Summary Coherently

The findings demonstrated that all participants successfully used the generated mind maps as references when composing their summaries.

Observation data showed that all participants wrote summaries based on selected ideas from the mind maps, maintained logical organization, and referred to the generated maps throughout the writing process. In addition, P3 reported that using Mapify helped create a more focused summary because the important information had already been organized visually.

These findings support Oshima & Hogue (2006), who argue that effective summaries should maintain coherence, logical organization, and clarity while accurately representing the original text. The participants' summaries reflected these characteristics because they were developed from carefully selected information presented in the generated mind maps.

The findings are also consistent with Wahid & Sudirman (2023), who state that mind mapping assists learners in organizing ideas before writing and contributes positively to the coherence of written products. By presenting information in structured branches, Mapify appeared to help participants arrange ideas logically before transforming them into paragraphs.

Furthermore, the findings align with Luangkrajang (2022), who explains that mind mapping facilitates information organization and knowledge integration, ultimately supporting writing performance. The visual representation generated by Mapify provided participants with a clear framework that guided the writing process and reduced difficulties related to organizing ideas.

The findings also support Qin & Groombridge (2023), who emphasize that successful summary writing requires learners to integrate reading comprehension and writing abilities simultaneously. The participants demonstrated this process by selecting relevant information, referring to both the original article and the generated mind map, and constructing coherent summaries based on their understanding of the content. Therefore, the findings indicate that Mapify functioned not only as a summarizing tool but also as an organizational framework that guided participants throughout the writing process and supported the production of coherent summaries.

Overall, the findings demonstrate that EFL students used Mapify throughout almost every stage of summary writing, including reading and understanding the source text, interpreting the generated mind maps, identifying main ideas, eliminating unnecessary details, paraphrasing and reorganizing information, and writing coherent summaries. These findings support theories of summary writing and mind mapping that emphasize the importance of comprehension, information selection, organization, and reconstruction of ideas during summarization activities (Buzan, 2024; Oshima & Hogue, 2006; Qin & Groombridge, 2023). Moreover, the findings extend previous research by showing that AI-based mind mapping tools such as Mapify can integrate the cognitive and organizational benefits of traditional mind mapping with automated and interactive features that support learners in processing and summarizing complex academic texts.

2. The Weaknesses of Using Mapify for Journal Article Summarizing

The findings revealed several weaknesses experienced by EFL students when using Mapify for journal article summarizing. These weaknesses were identified from the interview data and were categorized into six themes based on the theoretical roles of mind mapping in summary writing: identifying main ideas and supporting details, organizing information and understanding relationships between ideas, reducing cognitive load, enhancing critical thinking and comprehension, increasing motivation and engagement, and technical and operational limitations. The discussion of each theme is presented below.

a. Weaknesses in Identifying Main Ideas and Supporting Details

The findings showed that several participants still needed to verify and compare the information generated by Mapify with the original journal article. Participants reported that although Mapify helped identify important information, the generated output could not always be accepted without further evaluation.

This finding partially supports the role of mind mapping proposed by Tarin & Yawiloeng (2022), who argue that mind mapping helps learners identify main ideas and supporting details by visually organizing information. In the present study, participants were generally able to identify important information through Mapify; however, they still felt the

need to cross-check the generated output with the original article to ensure accuracy and completeness.

This finding is also related to Qin & Groombridge (2023), who emphasize that successful summarizing depends on learners' comprehension of the source text. Since understanding the original article remains essential, AI-generated summaries cannot fully replace learners' engagement with the source material. Similar concerns have been reported in AI-assisted learning studies, where students often verify AI-generated information to avoid inaccuracies and omissions. Therefore, although Mapify facilitated the identification of important information, participants still relied on the original article to validate the accuracy, relevance, and completeness of the generated content.

b. Weaknesses in Organizing Information and Understanding Relationships Between Ideas

The findings revealed that some participants experienced difficulties when the generated mind maps became overly dense, complex, or rigid. Participants reported that certain information was difficult to follow because the relationships among ideas were not always presented clearly.

This finding partially contrasts with Wahid & Sudirman (2023), who found that mind mapping supports idea organization by helping learners structure information systematically before writing. Similarly, Buzan (2024) explains that mind maps facilitate understanding by visually

representing relationships among concepts. However, the present study indicates that AI-generated mind maps may not always achieve this purpose effectively when the structure becomes too detailed or visually crowded.

The findings also support Fu et al. (2024), who describe mind mapping as a scaffolding tool that assists learners in organizing information. Nevertheless, effective scaffolding should reduce complexity rather than introduce additional cognitive demands. In this study, several participants still needed to reorganize information and compare the generated map with the original article before using it. Therefore, while Mapify generally supported information organization, the complexity and rigidity of some generated mind maps occasionally limited its effectiveness in helping learners understand relationships among ideas.

c. Weaknesses in Reducing Cognitive Load When Processing Complex Texts

The findings showed that Mapify did not always reduce cognitive load effectively. Some participants reported that the generated mind maps contained excessive information, whereas others felt that overly simplified outputs omitted important details.

According to Fu et al. (2024), mind mapping functions as a scaffolding tool that reduces cognitive burden by transforming dense information into manageable visual representations. Likewise, Dijk & Kintsch (1983)

explain that summarization involves macroprocessing, in which learners reduce and reorganize information while maintaining essential meanings.

However, the present findings suggest that the balance between detail and simplification was not always achieved. When the generated maps contained too many branches and supporting points, participants experienced information overload. Conversely, when the information was excessively condensed, important details were sometimes lost.

As a result, participants still needed to simplify, reorganize, and filter the generated information independently. This suggests that AI-generated mind maps may reduce cognitive load only when the level of detail matches learners' needs and the complexity of the source text.

d. Weaknesses in Enhancing Critical Thinking and Comprehension

The findings revealed concerns regarding over-reliance on AI-generated information. Several participants reported that receiving ready-made summaries sometimes reduced their motivation to analyze the journal article deeply.

This finding differs from the argument proposed by Sari et al. (2021), who state that mind mapping promotes critical thinking because learners actively analyze, organize, and synthesize information. Similarly, Buzan (2024) emphasizes that mind mapping encourages active cognitive engagement through associative thinking processes.

In the present study, however, the automated nature of AI-generated mind maps occasionally reduced active engagement with the source text. Some participants admitted that they tended to accept the generated information without extensive evaluation because the information was already organized and summarized.

This finding suggests that the integration of artificial intelligence may alter the traditional benefits of mind mapping. While conventional mind mapping requires learners to construct relationships among ideas themselves, AI-generated mind maps may encourage more passive information consumption if learners do not critically evaluate the generated output. Therefore, the findings indicate that critical thinking and comprehension still depend largely on how learners use the tool rather than on the tool itself.

e. Weaknesses in Increasing Motivation and Engagement

The findings showed that although most participants reported positive experiences using Mapify, several participants also identified issues related to motivation and engagement. Some participants felt confused when the generated information became too complex, while others reported reduced motivation to read the original article because the generated mind map already provided a general overview.

This finding partially contrasts with Tarin & Yawiloeng (2022), who found that mind mapping increases learners' motivation and engagement

by making writing activities more interactive and manageable. In the present study, Mapify generally increased motivation by simplifying the summarization process; however, the convenience offered by AI-generated summaries occasionally reduced learners' engagement with the original source text.

The findings also suggest that excessive dependence on AI-assisted summarization may influence learners' willingness to engage in deeper reading activities. Similar concerns have been discussed in recent AI-assisted learning literature, which highlights the possibility that highly automated tools may reduce learners' effort and cognitive involvement when completing academic tasks. Therefore, while Mapify generally promoted positive learning experiences, its convenience may also reduce engagement with source materials if learners rely excessively on generated summaries.

f. Technical and Operational Limitations

The findings revealed several technical and operational limitations, including limited credits, restricted access in the free version, difficulties downloading files, disappearing conversations after refreshing pages, and issues with output quality.

Although the theoretical literature on mind mapping primarily focuses on cognitive and pedagogical benefits Buzan, (2024), Fu et al. (2024), Wahid & Sudirman (2023), the present findings demonstrate that

technological factors also influence the effectiveness of AI-based mind mapping tools.

These findings are consistent with broader discussions of educational technology adoption, which emphasize that accessibility, usability, and system functionality significantly affect learners' experiences. Even when a tool offers strong pedagogical benefits, technical barriers may reduce its practicality and limit its usefulness in authentic learning contexts. Therefore, the effectiveness of Mapify should be considered not only from a cognitive perspective but also from a technological perspective, as technical limitations may influence students' ability to fully utilize the platform during journal article summarizing activities.

Overall, the findings indicate that although Mapify provided meaningful support for journal article summarizing, participants also experienced several weaknesses throughout the summarization process. These weaknesses included difficulties in verifying the accuracy and completeness of AI-generated information, challenges in organizing and interpreting complex mind map structures, limitations in reducing cognitive load when the generated output was either overly detailed or overly simplified, the potential reduction of critical engagement with source texts due to over-reliance on AI-generated summaries, and several technical and operational limitations. These findings suggest that the weaknesses of using Mapify were not primarily related to the concept of mind mapping itself, but rather to the limitations of AI-generated outputs,

learners' dependence on automated information, and the technical constraints of the platform. Therefore, although Mapify can support learners in identifying, organizing, and summarizing information, its effective use still requires active learner involvement, critical evaluation, and continuous reference to the original source text. Consequently, Mapify should be viewed as a complementary learning tool rather than a replacement for reading, critical thinking, and independent summarizing skills.