YEDITEPE UNIVERSITY

GRADUATE SCHOOL OF EDUCATIONAL SCIENCES

THE EFFECT OF TEACHING MIND MAPPING STRATEGIES ON EFL STUDENTS' WRITING PERFORMANCE AND THEIR PERCEPTIONS TOWARDS MIND MAPPING TECHNIQUE IN PERSUASIVE AND DESCRIPTIVE ESSAYS

Zeynep Bakırezen

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Zeynep Bakırezen

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ABSTRACT

THE EFFECT OF TEACHING MIND MAPPING STRATEGIES ON EFL STUDENTS' WRITING PERFORMANCE AND THEIR PERCEPTIONS TOWARDS MIND MAPPING TECHNIQUE IN PERSUASIVE AND DESCRIPTIVE ESSAYS

This study aimed to investigate the effect of the mind-mapping strategy on intermediate-level English foreign language learners' writing performance in descriptive and persuasive essays and explore their perceptions towards the mind-mapping strategy. A quasi-experimental design with a mixed-method approach was employed, involving an experimental group and a comparison group with thirty-nine participants in total. The pre-test, the post-test, and the questionnaire were administered to both groups to collect quantitative data for the study. For qualitative data, semi-structured interviews and reflection papers were conducted for the participants in the experimental group. The quantitative data were analyzed through the Mann- Whitney U test, the Wilcoxon Signed-rank test, and the descriptive statistics, while the thematic analysis was used to obtain data for the qualitative analysis. The findings indicated a significant difference in writing performance between the experimental and comparison groups, demonstrating the positive impact of mind mapping on writing in both essay types. Regarding the comparison of descriptive and persuasive essay performances in experimental group, task response criteria revealed less improvement in presenting arguments in persuasive essay genres. The questionnaire analysis also revealed that participants mostly agreed on the benefits of cognitive and metacognitive aspects, but they showed less agreement on the impact of motivation. For the qualitative analysis, students' responses to the mind-mapping technique indicated a generally positive perception of cognitive and metacognitive aspects. However, less agreement was found regarding the effect of the mind-mapping strategy on vocabulary improvement and time management. These findings provide insights into the mind-mapping technique in writing instructions and its genre-specific effects and students' perceptions.

Keywords: Constructivist learning theory, Essay types, Mind-mapping, Writing-process, Writing strategies

ÖZET

ZİHİN HARİTALAMA STRATEJİLERİ ÖĞRETİMİNİN YABANCI DİL OLARAK İNGİLİZCE ÖĞRENEN ÖĞRENCİLERİN, İKNA EDİCİ VE BETİMLEYİCİ METİN TÜRLERİNDEKİ YAZMA PERFORMANSLARINA VE ZİHİN HARİTALAMA TEKNİĞİNE İLİŞKİN ALGILARINA OLAN ETKİSİ

Bu çalışmanın amacı, zihin haritalama stratejisinin orta düzey İngilizce öğrenen yabancı dil öğrencilerinin betimleyici ve ikna edici kompozisyon yazma performansları üzerindeki etkisini ve zihin haritalama stratejisine yönelik algılarını araştırmaktır. Bir deney grubu ve bir karşılaştırma grubu olmak üzere toplam otuz dokuz katılımcının yer aldığı karma yöntem yaklaşımlı yarı deneysel model kullanılmıştır. Çalışma için nicel veri toplamak amacıyla her iki gruba da ön test, son test ve anket uygulanmıştır. Nitel veriler olarak da deney grubundaki katılımcılar için yarı yapılandırılmış görüşmeler ve yansıtma kağıtları uygulanmıştır. Nicel veriler Mann- Whitney U testi, Wilcoxon Signed-rank testi ve betimsel istatistikler aracılığıyla analiz edilirken, nitel analiz için veri elde etmek amacıyla tematik analiz kullanılmıştır. Bulgular, deney ve karşılaştırma grupları arasında yazma performansında anlamlı bir fark olduğunu göstermiş ve zihin haritalamanın her iki kompozisyon türünde de yazma üzerindeki olumlu etkisini ortaya koymuştur. Deney grubundaki betimleyici ve ikna edici kompozisyon performanslarının karşılaştırılmasıyla ilgili olarak, görev yanıt kriterleri ikna edici kompozisyon türlerinde argüman sunmada daha az gelişme olduğunu ortaya koymuştur. Anket analizi ayrıca katılımcıların bilişsel ve üstbilişsel yönlerin faydaları konusunda çoğunlukla hemfikir olduklarını, ancak motivasyonun etkisi konusunda daha az hemfikir olduklarını ortaya koymuştur. Nitel analiz için, öğrencilerin zihin haritalama tekniğine verdikleri yanıtlar, bilişsel ve üstbilişsel yönlere ilişkin genel olarak olumlu bir algıya işaret etmiştir. Ancak, zihin haritalama stratejisinin kelime dağarcığını geliştirme ve zaman yönetimi üzerindeki etkisine ilişkin daha az mutabakat bulunmuştur. Bu bulgular, zihin haritalama tekniğinin yazma öğretiminde, tür bazında etkilerinde ve öğrencilerin algıları hakkındaki içgörüleri sunmaktadır.

Anahtar Kelimeler: Deneme türleri, Süreç odaklı yazma, Yapılandırmacı öğrenme kuramı, Yazma stratejileri, Zihin Haritalama

DEDICATION

To my dear mother…

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1. INTRODUCTION

1.1. Background of the Study

Enhancing the ability to use productive skills effectively plays an essential role in mastering English as a Foreign Language (EFL) context, particularly within academic and professional fields. Writing, as one of the productive skills, stands as a significant means to achieve the purpose of communication, which is a requirement for success in educational and professional disciplines. However, developing writing skills can be challenging for English foreign language learners since it requires cognitive and linguistic ability to convey their knowledge to the readers. Beyond the grammatical and rhetorical devices, one also needs to master conceptual and judgemental elements in order to achieve proficiency in writing skills (Heaton, 1988, p. 135). Additionally, Harmer (2004) pointed out that even a simple written task involves its writing approach, “that is, the stages a writer goes through in order to produce something in its written form" (p. 4). This process may be affected by the content, the type, and the medium" however, in all of these cases, it is suggested that the process has four main elements, namely planning, drafting, editing, and the final version". (Harmer, 2004, p. 4). Besides these stages of the writing process, learners are supposed to consider the purpose and audiences of the text when composing their written texts. The communicative aspects of writing are also significant, especially in academic fields, where writing practices are generally genre-specific, namely “elemental genres” (Hyland, 2019, p. 2361). Descriptive and persuasive essays are two elemental genres, requiring involvement in their own conventions and purpose in the writing process. While the persuasive essay genre relies on the writers’ capability of convincing the readers and fulfilling the purpose of writing (Stab & Gurevych, 2014), the descriptive genre mainly focuses on the writers’ depiction of a subject often related to an experience, an object, or a person (Basri & Syamsia, 2020). However, due to its nature of complexity, writing an essay within a different genre is considered a highly demanding process, especially in the context of English as a Foreign language where the learners struggle with the lack of linguistic and cognitive competency in the writing process. (Chen, 2022; Raimes, 1983).

In that respect, Schmitt and Rodgers (2002) suggest that understanding the strategies is essential, especially for teachers, in order to instruct the process of writing beyond "teaching about writing" (p. 281). Within an agreement with emphasis on the process, Grabe and Kaplan (2014) also emphasize this process, stating that "writing is a technology, a set of skills which must be practiced and learned through experience" (p. 6). Writing improvement, therefore, necessitates practice with the involvement of effort and training.

To promote this development, educators implement various strategies to help learners express or reflect their thoughts and ideas comprehensively and fluently. Writing strategies, particularly those including cognitive and metacognitive within the involvement of background knowledge, can effectively contribute to learners' writing development (Cer, 2019; Graham, McKeown, Kiuhara, & Harris, 2012). Therefore, teachers allocate time to guide their learners through assisting different methods and techniques, aiming to provide an awareness of the concepts for their writing enhancement.

Regarding the writing strategies implemented in the context where English is learned as a foreign language, the mind-mapping technique is one of the valuable methods for supporting learners in improving their writing abilities. Tony Buzan (1995), who popularized this technique, defined mind mapping as "a powerful graphic technique which provides a universal key to unlocking the potential of the brain" (p. 59). Mind mapping is a visual organizer that begins with a central theme surrounded by related branches, themes, and images representing the group of ideas. The application of the mind-mapping technique presents benefits not only for writing enhancement but also for other areas related to education and professional development.

The writing strategies related to the mind-mapping technique also align with the view of constructivist learning theory. From a constructivist perspective, using mind-mapping technique reflects the principles of cognitive constructivism proposed by Piaget (1977) as it promotes knowledge construction through the experiencing the process of two main concepts of namely "assimilation and accommodation" (p. 7). With respect to the constructivist educational context, mind mapping serves as a useful tool for facilitating various aspects related to the writing process, namely cognitive, metacognitive, creative, and motivational aspects. The implementation of mind mapping promotes cognitive functions, enabling learners to organize their essay writing in a logical flow (Davies, 2011; Dhindsa & Anderson, 2011; Melrose, 2019). Metacognitive aspects of the mind-mapping technique involve self-regulatory skills that encourage students to critically evaluate their writing processes (Bukhari, 2016; Graham, Harris, & Mason, 2005; Zhang, 2018). Furthermore, mind mapping fosters creativity by encouraging learners to discover new ideas, generations, and associations (Al Kamli, 2019; Zubaıdah, Fuad, Mahanal & Suarsını, 2017). In addition to these benefits, the mind-mapping strategy enhances motivation for the learners by making writing practices enjoyable (Chalarut & DeBacker, 2004; Jones, Ruff, Snyder, Petrich & Koonce, 2012; Naibaho, 2022).

The current study employed the mind-mapping technique to evaluate the EFL learners' writing performance and their perceptions of the mind-mapping technique. Regarding writing practices, descriptive and persuasive essay genres are commonly used in the preparatory writing curriculum at the university where the intervention was conducted for this study. Therefore, descriptive and persuasive essay genres were chosen due to their common use in academic writing context (Jayanti, 2019; Lim & Tam, 2022; Musaed Alkthery & Abdullah Al-Qiawi, 2020; Osman & Januin, 2021; Suriyanti & Yaacob, 2016; Uccelli, Dobbs & Scott, 2013). Moreover, the descriptive and persuasive essay types require different cognitive demands, including detailed description and presenting arguments critically. By exploring the effect of mind mapping on these essay types. this study aimed to provide a deeper understanding how this writing instruction influences the participants' writing performances and their attitudes related to the implementation of mind-mapping technique.

1.2. Statement of the Problem

Considering the importance of productivity in the period of learning a foreign language process, the ability to write can be regarded as one of the most challenging skills for learners to master. Accordingly, majority of teachers tend to employ various strategies and techniques, aiming to enhance the students' writing abilities. However, the students, particularly in the English as a Foreign Language context, find the writing to be a demanding and complex task. This is mainly because productive skills require them to activate their background knowledge and use their cognitive abilities to demonstrate their writing abilities. Also, due to the time constraints, high number of classes, and requirements of the exams, teachers generally tend to focus on more the product-based writing approach. This approach involves preparing more model texts for the students to improve their writing skills, emphasizing only on the final outcomes of their writings rather than the writing process. Therefore, the essential of the pre-writing stage, where learners use their cognitive and metacognitive skills to transcribe, plan, or express their knowledge, and "*the necessity of integrating writing strategy training in instruction to promote learners' development of writing abilities are often neglected by teachers*" (Zhang, 2018, p. 93). Additionally, the student's learning styles and attitudes are not sufficiently taken into account in the product-based approach. Regarding self-regulation, Zubaidah et al., (2017) stated that students need opportunities to get the awareness of the learning and consequently to take action based on this awareness when writing an essay. This focus on the pre-writing stage, where the application of mind mapping promotes learners' cognitive and metacognitive skill ability, represents a contribution to EFL writing instruction.

Moreover, there is a significant gap found in the literature regarding the analysis of comparing the two essay types- descriptive and persuasive genres- through the implementation of mind-mapping techniques within the same classroom context. Lastly, while a number of studies were conducted through the mind-mapping technique on descriptive essay type, the studies explicitly investigating the mind mapping effect on persuasive essays remain limited. Therefore, this study intends to investigate the impact of mind-mapping strategies on students' writing performances and processes in descriptive and persuasive essays, examining their attitudes in-depth throughout the writing process.

1.3. Significance of the Study

Numerous studies have been conducted to explore a range of writing instructions to develop the students' writing abilities in the EFL context, and the applications of mind-mapping strategies can be regarded as one of the techniques that capture teachers' and researchers' interests in the educational field. However, there is a significant gap in research in terms of exploring the application and effectiveness of mind-mapping techniques specifically for persuasive essay writing among EFL learners. While some studies have investigated argumentative writing or employed related graphic organizers like concept maps, research directly examining the influence of mind mapping on persuasive writing skills remains limited.

Furthermore, there appears to be no study to explore the potential relationships between descriptive and persuasive essays in terms of analyzing their relationships with the mind-mapping technique in the literature.

Finally, while extensive research has been conducted investigating the outcomes of mind-mapping strategies on reading and vocabulary using in-depth analysis, limited research has been found in the literature regarding the writing aspects of mind mapping employing comprehensive analysis, particularly for descriptive and persuasive essay genres in terms of data triangulation.

Based on the statements above, this research aims to carry out a mixed-method design to develop a deeper insight into the learners, examine their progress as they interact with different data collection instruments over a longer period, and assess the impact of applying the mind-mapping technique on students' writing performance in two different essay genres.

1.4. The Purpose of the Study and Research Questions

The present study investigates the effects of the mind-mapping strategy on the English as a Foreign Language learners’ writing performance development, particularly, in persuasive and descriptive essays. The study aims to examine how this strategy influenced participants’ writing skills by analyzing students’ perceptions of the technique. Additionally, the study seeks to analyze whether a statistically significant difference exists between the scores on persuasive and descriptive essays related to the mind-mapping technique.

To address these aims, the research questions are presented below.

1. Is there any effect of using a mind-mapping strategy on EFL students’ writing performance in a descriptive and persuasive essay? If so, to what extent?

2. Is there any significant difference in cohesion/coherence and task response scores between descriptive and persuasive essays performed based on the mind-mapping technique?

3. Do EFL students find mind mapping for improving their writing skills in essay writing effective? If so, how?

1.5. Organization of Thesis

This study comprises five chapters: Introduction, Literature Review, Method, Results, and Discussion. As a first chapter, Introduction section serves to provide general information about the study namely, the background of the study, statement of the problem, significance of the study and purpose of the study which provides an overview about the main study. This current study presents the main subjects and their contribution to the significance of the study, including the min-mapping technique, the importance of writing, and essay genres through the lens of constructivist learning theory.

The second chapter, the Literature Review, informs readers about the theoretical framework and previous research conducted in the educational field to provide an understanding of the study's philosophy. Considering this current study, the literature review consists of three main sections: constructivist learning theory as a theoretical framework, the nature of writing, and the mind-mapping technique, concluding with some related research.

Following the Literature Review section, the Method part gives detailed information about the research questions, the context, participants, research design, data collection instruments, the procedure of the study, and data analysis. This section informs the reader about the path the researcher followed. With respect to this research, method sections present the rationale for the experimental group, who took the treatment, and the comparison group, who received the conventional treatment. This chapter also introduces the quasi-experimental design for the data gathering and summarizes the procedures related to mind mapping.

The next chapter, Results, presents the findings collected through the qualitative and quantitative data analysis, addressing the research question of the study. In terms of the current study, the procedures and findings obtained from both quantitative and qualitative analysis are presented to promote a statistical understanding of mind mapping and to analyze the students' perceptions.

The discussion part, interprets all the data analysis, considering the findings of previous studies. This part also includes implications, limitations, and suggestions for further research.

2. LITERATURE REVIEW

2.1. Theoretical Framework

2.1.1. Theoretical Basis: Constructivist Learning Theory

Constructivist Learning Theory (CLT) is one of the essential paradigms of educational philosophy underlying the construction of learners' own knowledge based on their existing information in a recursive way. Constructivism is an "epistemology, learning or meaning-making theory of knowledge" that posits ways of connecting an individual's past and present experiences, resulting in a modification to create new knowledge (T. M Al-Jarrah, Mansor, Talafhah and Al-Jarrah, (2019). In that regard, the acquisition of new knowledge and the development of understanding in individuals happens through the construction of mental frameworks based on their existing knowledge through active involvement.

Constructivist Learning Theory (CLT) has been shaped by different interpretations of constructivism proposed by fundamental scholars. Within the constructivist framework in the field of education, two prominent perspectives are cognitive constructivism, which is mainly derived from Jean Piaget's cognitive development studies and highlights individual cognitive restructuring through assimilation and accommodation for the construction of meaning (Piaget, 1977), and sociocultural constructivism, which Lev Vygotsky puts forth and gives importance to the significance of social interactions, cultural influences, and the zone of proximal development (ZPD) in supporting collaborative learning experiences (Vygotsky & Cole, 1978).

Another well-known philosopher and pedagogic who contributed to constructivist learning theory, John Dewey, pointed out the value of "continuity of experience", "reflective thinking", and the role of educators in constructivist pedagogy. Dewey (1938) emphasized the "experience, " an inclusive term encompassing components in the environment, interior ideas, and interaction with others. By addressing the "continuity of experience", he proposed the idea that each experience is supposed to help a learner develop more profound and broadened experiences in the future, which he states is "the very meaning of growth, continuity, and reconstruction of experience" (Dewey, 1938, p. 47). Dewey's other idea, which can be related to constructivist learning theory, is “reflective thinking”. Dewey emphasized the idea that “thinking is the method of an educative experience” (p. 176) and it is significant to find a connection between experiences and their consequences in a reflective way during the learning process (Dewey, 1916).

Furthermore, influential figures, including Lev Vygotsky (1978,1986), Ernst Von Glasersfeld (2001), Gerard P. Schank (2015), and Seymour Papert (1991-1993), have also made substantial contributions to constructivist learning theory. Their collective perspectives and research have established the groundwork for comprehending how learners actively generate knowledge within the paradigm of constructivism, which impacts educational practices and pedagogical approaches.

The multifaceted nature of the theoretical framework has introduced other types of constructivism, such as radical constructivism and contextual constructivism, in addition to cognitive processes and social interactions. Radical constructivism, influenced by the works of Ernst von Glasersfeld, holds the view that knowledge is individually produced and subjective, emphasizing the ways of mind construction of the external world concerning personal experiences, opposing the idea of “certain knowledge of nature” (Taber, 2019, p. 16). Considering its pedagogical stance, the radical constructivist idea suggests that learners are supposed to improve their notions depending on their thoughts, cognitive processes, and reflections (Glasersfeld, 2001). In addition to Glasersfeld’s radical constructivism, Papert (1993) also contributed to the constructivism emphasizing both individual construction and the importance of contextualism in education to acquire knowledge in pedagogical settings.

While different concepts are emphasized in each constructivist aspect of learning, these theories share a common background, considering active engagement, knowledge construction, the importance of learners’ experience, and the “social nature of learning” (Phillips, 1995, p. 11). These perspectives offer unique insights into how students actively engage and construct and develop knowledge in the context of education.

2.1.1.1. Principles of Constructivist Learning Theory: Cognitive and Social Aspects

Considering constructivist learning theory, the cognitive aspects and the mental processes highly involved in acquiring knowledge, influence how learners’ perceptions and comprehension contribute to gaining new knowledge. Contrary to other learning theories, CLT asserts that individuals do not retain and store the information as stable or formalized knowledge through transmission, but rather, they develop and interpret the information through a continuous process of knowledge construction by adapting to different situations or contexts (Ertmer et al., 2013). In that respect, the cognitive process within a constructivist learning theory highlights the knowledge construction, active participation of learners, reflections, and social interaction as key concepts.

As one of the fundamental paradigms of theories regarding learning and instruction, constructivism relies on the belief that "all the knowledge is built upon learners' prior knowledge and their existing experiences, and learners should be able to identify their current knowledge and their needs for further learning” (Zhang, 2018, p. 94). Learners gain understanding by building upon their prior knowledge and by integrating new information into their existing schemata. Therefore, unlike rote memorization, knowledge construction is not regarded as the passive acquisition of information. Instead of linear progression, learning mainly involves a dynamic and recursive process of development gained through individuals’ experiences and reflections within their social community (Fosnot & Perry, 1996).

At the center of constructivist learning theory, active engagement has the primary role in the process of learning. The learner constructs his own designs, finds his own solutions to problems, and behaves autonomously and independently (Krahenbuhl, 2016). According to constructivists, learning is a result of individual meta-construction (Ültanır, 2012, p. 205). Constructing knowledge is also viewed as an active process in which learners associate their past experiences with their own ways of thinking. Additionally, since learners are placed in the center position as “active creators,” they need to get involved in all stages of their learning process in terms of gathering, evaluating, and processing the information (Suhendi, 2018; Kingir et al., 2013). In other words, learners need to reflect and form their own knowledge and ideas by means of building the information in a period of dynamic learning process. Jean Piaget, one of the most influential contributors to the theory of constructivist learning, introduced the concepts related to the way of active knowledge construction, namely “assimilation and accommodation” (Piaget, 1977). To acquire and comprehend new knowledge, learners engage with these cognitive processes by involving actively. According to Piaget (1977), learning takes place in a dynamic setting where the students get interaction between these two mental activities for the development of meaning-making in an active way. In that respect, "assimilation" refers to the incorporation or understanding of new experiences by learners using their existing knowledge without making any substantial changes to their mental structures. On the other hand, "accommodation", which follows the cognitive process, involves adapting and reassessing new information that does not align with the existing framework (Piaget, 1977). In constructive learning theory, assimilation and accommodation are fundamental for the dynamic process of learning within cognitive development since they enable learners to be active during the knowledge development rather than being passive learners (Amineh & Asl, 2015; Bada, 2015).

Knowledge construction is not merely an individual process but also occurs as a social process in which learners engage in collaborative activities or discussions with their peers and teachers (R. Johnson & D. Johnson, 2008). Thus, social interaction can be considered one of the essential tenets of constructivist learning theory. Cognitive processes do not occur only in individual engagement but are also provided by different perceptions and experiences in a wider context (Kingir et al., 2013; Suhendi, 2018). In that aspect, interaction through the environment promotes knowledge acquisition in a collaborative sense. Accordingly, this interaction fosters a capability to develop meaning-making and perspective, facilitating the internalization of new knowledge through integration (Ahmad et al., 2020; Chuang, 2021). The learner benefits from interacting with his or her environment and in doing so, understands his/her characteristics and perspectives. According to constructivist view, knowledge is not a thing that individuals find by discovering but they can dynamically generate through the engagement of social interactions (Amineh & Asl, 2015). In other words, even though individual experiences and self-direction can be considered central to the constructivist view of learning, social negotiations or interactions shape meaning making and enhance understanding.

2.1.1.2. Constructivist Learning Context

In a constructivist learning environment, teachers play a crucial role by providing assistance in constructivist learning activities. The educational environment is also characterized by a learner-centered approach, reflective practices, and a focus on the learning process.

Teachers' Role

Within the constructivist approach to learning, teachers have distinct roles, as opposed to those in the traditional learning environment. The primary role of educators in the constructivist setting is being a facilitator rather than a lecturer. Teaching aims to facilitate student learning by equipping them with the skills to independently initiate and engage in their own learning experiences. Contrary to the traditional approach, students are the ones situated in the center of learning in the class while instructors take on the role of a "mentor" empowering them to foster self-directed attitudes during knowledge acquisition (Chuang, 2021; Ultanir, 2012). As Al-Jarrah et al. (2019) asserted, constructivism provides a learning atmosphere in which learners can access new knowledge with the guidance of the teachers who act as facilitators.

The term "generative learning," which is the process of creating information actively by a learner rather than through passive transmission or memorization, can be expressed as one of the key features related to teacher guidance in constructivism (Applefield & Huber, 2000). To promote generative learning as a strategy, teachers need to provide engaging activities such as synthesizing or analyzing based on students' discovery of their learning.

In constructivist-based instruction, teachers prepare the lessons by focusing on key principles that promote learning in an educational setting. Activating the student's engagement in the classroom can be regarded as one of the fundamental approaches since the learning arises through an "internal cognitive process" where the learners dynamically construct knowledge in accordance with their experiences by developing a meaningful connection between their prior knowledge with the current one (Devi, 2019 & Bada, 2015; Krahenbuhl, 2016; Tam, 2000; Tuma, 2021). Learning depends on the way of students' explorations, questioning, and participation to reach a meaningful understanding in the learning process. Contributing to developing students' self-awareness is also an important factor considering the teachers' attitudes in the classroom. Activities are supposed to be planned for learners to reflect them by filtering, analyzing, and modifying the information to comprehend the content of the knowledge.

Regarding teacher practices, the knowledge creation is perceived as continuous reflective learning in which the students gain insight into their process of learning information (Al-Jarrah, 2019; Bada, 2015; Devi, 2019). Another approach adopted by instructors in constructivist settings is "scaffolding", a term coined by Lev Vygotsky. The main tenet of scaffolding is to provide support given by the instructors or peers in order to help learners build an understanding of the information or task throughout the skill development. According to the idea presented by Vygotsky is that there is an area between an individual's progress independently and the level of development obtained under the guidance or support of skilled peers or instructors, which is called a Zone of Proximal Development (ZPD). Vygotsky (1978) defined the Zone of Proximal Development as "it is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers" (p. 86), highlighting the importance of mediated learning in educational settings.

Based on the constructivist learning context, scaffolding can be considered one of the essential approaches for helping students improve the cognitive skills they achieve through their peers and instructor engagement. Therefore, teachers need to prepare tasks that enable students to expand the learners' cognitive schema through mediated learning. By incorporating new concepts or skills with adequate support, these instructional strategies can provide an understanding to identify and construct complex topics, resulting in students' own interpretation within the social negotiation (Devi, 2019; Ertmer, 2013; Orak, 2021).

Learner-Centered Approach

In constructivist teaching and learning practices, student autonomy can be seen as one of the significant tenets underlying individual freedom. According to Bukhari (2016), individuals are distinct in terms of making connections between existing and current knowledge, and learners understand the concept by constructing information which is based on their own "unique backgrounds" (p. 62). Fox (2001) also highlights the essence of "this subjectivity of individual learners' experience" addressing that since students have their own distinct values and interpretations, educators need to notice these different perspectives within the "shared construction of knowledge" (p. 29). Therefore, individual freedom needs to be emphasized in that learners have their own “unique” thinking process of learning and accordingly, a learner-centered atmosphere is crucial to help learners integrate new information with their existing knowledge to build better understanding (Null, 2004; Qui, 2019). Without regard to the individual’s current schema, every student’s existing knowledge has a unique effect on determining and establishing a task during the learning process (Applefield & Huber, 2000; Tam, 2000). Since learner-centered approaches in constructive learning theory focus on the idea of learners’ independent attitude during knowledge construction, reflective thinking has gained an important role in promoting the individuals’ self-awareness, adaptability, and flexibility for continuous self-development.

Creating an appropriate environment where students are allowed to use their reflective ability enhances cognitive involvement and learner autonomy throughout the learner process (R. Bell & H. Bell, 2020; Orakçı, 2021; Salvador, Paetz & Tippetts, 2020; Tam, 2000). The knowledge that people acquire is based on what experiences they have encountered and how they shape and incorporate these experiences into their mental structure through the act of interpretation (Seyihoğlu & Kartal, 2010). Considering the constructivist learning theory, the applications of authentic tasks relevant to real-world contexts are central to gaining knowledge and promoting critical thinking (R. Bell & H. Bell, 2020; Chuang, 2021). Within the engagements of such tasks, learners construct the information based on their experiences to reach understanding of new input and subsequently tend to evaluate their actions by analyzing, synthesizing, and accommodating thereby enhancing their reflective manner and critical thinking skills as well. Therefore, a learner-centered atmosphere, which emphasizes dynamic participation and construction of knowledge, can be regarded as a necessity for developing understanding as opposed to “rote memorization”.

2.1.1.3. Constructivist Learning Models

In constructivist educational settings, the primary focus is on active learning, which requires the instructors to prepare tasks to engage the students in learning effectively. Since a constructivist learning environment aims to promote students’ ability to “explore, discuss, and make meaningful relationships within context”, the activities that enhance critical thinking, problem-solving skills, and experiential learning with the involvement of authentic tasks are seen as prominent in student-centered learning within the constructivist approach

(Holmes, 2019, p. 10). In instructional settings, certain models such as inquiry-based learning, problem-based learning, and experiential learning have come to the forefront regarding constructivism.

Inquiry-based learning is a method that enables learners to build knowledge by seeking information in a critical sense. This approach prioritizes the students' role in the learning process by preparing them to explore, question, and share the information with the guidance of the instructor rather than merely depending on the teachers' authority, either individually or collaboratively (Kayi & Akpomi, 2022). Problem-based learning is another constructive approach encouraging students to reach knowledge by working on complex questions or problems. Students gain insight into the new information in a process where they try to find answers, evaluate the information, and apply it to their cognitive framework in a real-world situation (Darma, Karma, & Santina, 2019). Experiential learning, another constructive learning method proposed by Kolb (2014), highlights the way of constructing the information based on the learners' own experiences and reflections to gain an understanding of the task (R. Bell & H. Bell, 2020). As Dewey (1938) emphasized the importance of individual experiences and reflections, learning occurred in a way of the meaningful connection between one's past and present experiences in a reflective manner. Therefore, experiential learning can also be considered an effective learning approach to acquiring new information.

While these learning models have some distinctions in terms of their applications, they are grounded in the commonalities addressing learner-centered approach, knowledge construction, collaboration, reflective thinking, higher-order thinking skills, and authentic material.

2.1.1.4. Mind-Mapping Strategy: Cognitive Constructivist Relevance

The mind-mapping technique is closely aligned with the key principles of cognitive constructivism, which is one of the key aspects of constructivist learning theory (Ausubel, 1968; Wette, 2017).

Schema Development

It centers on how individuals construct mental structures through their own experiences and organize their knowledge based on their cognitive processes. Mind maps provide representations of the information which are the combinations of new ideas individuals develop with their prior knowledge and experiences. Implementing the mind-mapping strategies enables learners assimilate new expressions into the prior schema and promote understanding how these new associations align with their existing structures within the process of accommodation. In that respect, learners are able to reach meaningful learning since developing mind maps help them use their existing knowledge to come up with new ideas in the process of writing (El-Muslimah et al., 2021; Jun & Jamaludin, 2023). Moreover, by integrating experiences into the new information, mind mapping enables learners to observe their interpretations visually, resulting in the improvement of schema and critical thinking skills (Bukhari, 2016; Polat & Aydın, 2020).

Active Learning

Active participation is the other key factors representing the constructivism in learning setting. Unlike the traditional methods, which focus on "knowledge transmission" from instructor to students, the mind mapping technique highlights student-centered learning and promotes students' active involvement through the process of learning (Bud, 2004; Dhindsa & Anderson, 2011; Seyihoğlu & Kartal, 2010). According to Sabarun et al. (2021), mind-mapping technique stimulates different functions of the brain making the writing more practical (p. 147). Based on the idea that learning occurs within the active engagement of knowledge construction, mind mapping assists learners in visually illustrating and organizing the concepts they have learned. From this perspective, students generate multiple ideas and dynamically structure them with the aid of their experiences during the learning process.

Personalized Learning

Apart from the principles of knowledge construction and active engagement, mind mapping can be closely linked to constructive-based learning, which highlights personalized learning. In this approach, learners develop knowledge through their unique experiences or opinions, become self-directed, and reshape their mental models by creating their own mind maps. (Bukhari, 2016, p. 62; Chuang, 2021, p. 12). Personalized learning can also promote creativity by allowing students to explore their interests and learn independently. Furthermore, the providing the use of words, pictures or colors facilitates more options for individuals to organize their ideas or sentences before and during the writing process (Davies, 2010; Erdem, 2017; Yunus et al., 2016).

Cognitive & Metacognitive Skills

Regarding constructivism, learners' prior and existing knowledge have an interaction with each other which directs learners to associate their ideas in during the learning process. In that respect, mind-mapping strategies enhance learners' ability to identify, interpret and organize their expressions by in an explicit way (Fahaady, 2019; Zhang, 2018). The use of mind mapping in a constructive-based approach also contributes to learners' improvements regarding their critical thinking, idea generation, and reflective thinking and reasoning skills (Mohammed & Kinyo, 2020). Mind maps provide the use of ability to improve their metacognitive skills by evaluating, revising, restructuring, or developing their argument, leading to a deeper understanding of the concepts. By this way, leaners gain awareness of monitoring and reflecting on their mind maps and written texts critically (Wette, 2017).

Integration of Mind Mapping with Constructivist Models

Of all the constructivist techniques, the mind mapping tool can also be related to certain constructivist learning models, promoting learners to combine their existing experiences with new information in the duration of the learning process. The mind mapping technique is also used as a tool in many constructivists learning models, including inquiry-based learning, experimental learning, problem-based learning, or discovery learning. These are some of the efficient and common models that can be incorporated with mind-mapping tools by actively participating and constructing knowledge reflectively in order to reach a meaningful understanding. Implementing mind mapping tools within these constructive learning approaches basically promotes learners' enhancement in a way of classifying information, making meaningful connections between their prior and new knowledge reflectively throughout the learning process (Sari et al., 2021; Ula, Supardi, & Sulhadi, 2018).

All in all, the mind-mapping technique is consistent with the common principles of constructive learning theory within the cognitive constructivist aspects by promoting active participation, learner-centered attitude, reflective thinking, and knowledge construction to reach a meaningful understanding. Regarding the cognitive constructivism, mind-mapping technique is one of the effective tools that helps students construct and connect their ideas and thoughts explicitly, which means that learners can find associations with the ideas by using their schemata.

2.2. Multifaced Nature of Writing

Writing is considered one of the effective skills for English Foreign language learners to become proficient throughout their educational life, contributing to their academic success and learning experiences. EFL students are required to develop proficient writing skills since writing is essential in various professions and academic fields (Bhowmik, 2021; Bukhari, 2016; Chen, 2022; Sun, Wang, Lambert & Liu 2021). A number of prominent scholars have attempted to define writing from diverse perspectives, highlighting its importance and developmental process. According to Schmitt and Rodgers (2002), writing is not merely a "representation of speech" but also a reflection of writers' language, views, or communicative purposes involving four aspects of writing, namely, "relational aspect (elements of writing), strategic aspect (for developing and communicating ideas), and textual aspect (discursive repertoire)" (pp. 279-280). To Grabe and Kaplan (2014), "writing is a technology, a set of skills which must be practiced and learned through experience." (p. 6). In that respect, writing is considered a productive skill that necessitates the use of communicative language within linguistic knowledge, unlike simply putting the words and arranging them together (Schmitt and Rodgers, 2002).

Writing skill encompasses some key concepts that characterize the nature of writing in educational and professional contexts. Writing skills that serve as a communicative tool require higher-level cognitive and metacognitive processes emphasizing idea generation and organization in a written form to develop cohesive and coherent products (Kazemian, Irawan & Haerazi, 2021; Yunus & Chien, 2016). Therefore, in the process of writing, micro-skills such as organizing, analyzing, paraphrasing, revising, and editing enhance learners to mastery in developing texts. In addition to cognitive and metacognitive aspects of writing, reflectivity can be also viewed as an important factor for effective writing practices related to metacognitive skills.

Reflection involves the process of writing starting from decisions about form and the content, “transforming into legible text” within a correct structure to the evaluation in terms of using our self-monitoring and self-regulation skills in a critical sense (Graham, Harris & Beard, 2019). In addition to the need for cognitive aspects, socio-cognitive factors also play an important role in gaining writing proficiency in terms of social interaction and learning between peers and instructors in educational settings (Hyland, 2003).

Based on the concepts related to acquiring writing skills, achieving proficiency in writing represents a fundamental indicator of one’s level of language competency in terms of his/her ability to express ideas and present them systematically and reflectively within a logical framework. Therefore, as Grabe & Kaplan (1996) emphasized, writing is a skill that “must be practiced and learned through experience” (p. 6); learners need to be active in practicing regularly to develop their writing skills.

2.2.1. Importance of Writing Skills

As the writing skill itself is highly effective in a range of occupational and academic areas, students need to be equipped with the knowledge and competence of “language devices and techniques within the permanent and regular practice” (Bukhari, 2016, p. 58). Beyond being a tool for communication, writing contributes to personal and professional development through the way we use our cognitive and metacognitive skills in the educational field. Moreover, being proficient in writing also contributes to learners’ social development in the sense that they have an understanding of readers’ intentions and the target content of the writing (Moses & Muhammad, 2019). Concerning foreign language instruction in writing skills, learners can gain insight and advance their information processing, critical thinking, and mechanics skills, which provide facilities in academic and professional contexts. These benefits necessitate underlining the significance of writing with two educational approaches: "write to learn” and “learn to write”

2.2.2. Write-to-learn and Learn-to-write Models

The concepts namely, "learning to write" and "writing to learn" skills are closely linked to each other in terms of their effects on individuals' educational and professional experiences. Write-to-learn is a model in which learners use writing for learning and mastering topics about different content and promotes learning with the alignment of developments in writing skills. In their review of the writing to learn study, Klein and Boscolo (2016) emphasized how writing activities within their different purposes have effective roles in learning resulting in various outcomes in terms of the enhancement of learning in cognitive, metacognitive, and sociocultural aspects (p. 335). Additionally, Nückles, Roelle, Glogger-Frey, Waldeyer, and Renkl (2020) highlighted that writing serves as a scaffolding tool for learners to manage their process of learning reducing the cognitive load in the writing process (p. 1112). In that respect, write-to-learn activities aim to foster "exploratory, retrospective, and reflective learning environments" in which learners evaluate their performances while assimilating gained information and building competencies in related fields of study (Chmarkh, 2021;Lew & Schmidt, 2011). With the support of this model, individuals expand their ability to internalize and retain field-specific concepts.

In the learn-to-write approach, improving writing skills is essential, such as learning a range of structures or techniques. Learn-to-write activities, which are also highly related to cognitive and metacognitive or linguistic aspects of learning, promote the enhancement of learners' ability in writing practices, including "text features, composing processes and contexts of writing" (Chmarkh, 2021, p. 86). Considering the writing enhancement, "text-oriented," "writer-oriented," and "reader-oriented" approaches developed by Hyland (2015) are fundamental for writers to gain an understanding of the concept of learning to write. Hyland (2015) pointed out that the text-oriented approach highlights the importance of the surface meaning of the text itself, focusing on linguistics and style. The other approach centers only on the writer's own perceptions related to writing, emphasizing individuals' voice, creativity, "immediate context" and translingual repertoire" (p. 12). Reader-oriented is the last approach Hyland (2015) mentioned, which addresses audiences' perspectives of writing within a social context. This approach emphasizes that the text can be shaped by the readers' needs and expectations to provide "social interaction, construction, and power and ideology (Hyland, 2015, p. 25). Regarding the three interpretations of writing, learning to write can be considered not as a singular thing but as a combination of these key aspects: mastering structural components, expressing the writer's voice, and understanding the social context.

Based on these concepts, especially the former one, it can be understood that acquiring writing skills contributes to the development of proficiency in the language learning context and the areas related to the various fields.

2.2.3. The Challenges in Writing Skills in EFL Context

EFL learners encounter a variety of challenges in the process of writing practices resulting from cognitive, linguistic, or motivational factors. Writing is recognized as a complex and challenging process, as it requires active engagement in both understanding and production stages (Chen, 2022; Kellogg, 2008; Raimes, 1983). Composing a text in different languages is a highly demanding task for learners because the writing process requires the application of higher-order thinking abilities (MacArthur & Graham, 2016; Yunus & Chien, 2016). Since the process of developing a text involves the ability to use cognitive and metacognitive skills, including creating, organizing, revising, or editing, students face obstacles resulting in a lack of success and motivation. Moreover, as Flower and Hayes (1981) emphasized, the main distinction between novice and expert writers in the writing process is the planning stage. Learners who have not reached sufficient EFL proficiency encounter problems such as evaluating, organizing, or interpreting ideas, unlike expert writers who have knowledge of the importance of the prewriting stage (Al Asmari, 2013). In addition to cognitive factors, learners have difficulty in writing due to a lack of language usage in terms of grammar, vocabulary choice, and syntax (Chen, 2022; Yunus & Chien, 2016), as well as their educational background.

The problems in the process of writing a text are related to pedagogical factors. The inappropriate teaching instruction leads to a lack of motivation and failure throughout the composing stages of writing. Additionally, teachers need to acquire appropriate pedagogical knowledge and approaches, including "providing prompts and effective feedback to students" (p. 83) to raise their motivation and proficiency in writing skills (Fareed, Asraf & Bilal, 2016; Zhang, 2018). Based on the above, instructions are required to search and identify the most relevant and appropriate writing strategies to contribute to students' development of writing skills.

2.2.4. The Importance of Writing Instruction in EFL Context

During the practice of writing, students' cognitive processes are at the center of learning concerning the learning-to-write concept (Chmarkh, 2021). Besides cognitive skills, having good metacognitive skills and motivation also promotes improvement in writing such as "social and physical environment, working memory, long-term and so on" (Sun et al., 2021). In that regard, the focus is supposed to be on the mental processes and learning environment in accordance with the strategies to develop the action of writing (Chen, 2022).

Learning how to write is one of the necessities that learners are expected to develop their understanding of writing to gain success in every discipline of their academic and professional domains in the EFL context. However, writing has a range of challenges and complexities (Fareed et al., 2016; Moses et al.,2019). During the process of learning, they encounter difficulties to deal with, including idea generation, paraphrasing, summarization followed by vocabulary choice, and the usage of language within the writing process (Fareed et al., 2016; Srour, Aqel & Shawish, 2021). Regarding writing development, many EFL learners struggle to find the appropriate way when it is time to start their writing and face challenges in expressing their ideas in written form. Despite attempts to enhance their skills, students' writing performance is considered insufficient in composing good writing in the EFL context (Chen, 2022).

Given the complexity and challenges involved in developing efficient writing, instructional approaches applied in learning EFL settings have become one of the fundamental factors in mastering writing skills (Bhowmik, 2021). Teachers also play a crucial role in preparing appropriate instructional plans to assist learners in developing their writing abilities, and they can extensively facilitate learners in a way of presenting guidance, support, and feedback utilizing effective strategies. To address the students' needs for writing development, a variety of techniques and strategies representing different educational approaches for learning or teaching have been researched and proposed in the academic field.

2.2.5. Approaches in Relation to Writing Development

Based on EFL writing instructions, multiple approaches have emerged aiming to address their needs to increase their competencies in written texts. The term “approach” refers to philosophies, principles, or values implemented in learning environments in instructional settings (Cheung, 2016) in which specific techniques or strategies are employed according to them for learning objectives. Although there have been many various approaches emerged in an educational context for years, ranging mainly from “controlled composition” (Cheung, 2016) to “process-genre-based (Selveraj &Aziz, 2019), the most essential ones commonly applied in various classroom environments are product-based, process-based and genre-based approach.

As an initial approach, ‘controlled composition’ was intended to develop learners’ ability to correctly form sentence structures. As Cheung (2016) explains, after experiencing and observing the limitations of learners’ writing performance, controlled composition, which was highly about “repetition and imitation” (p. 2) focusing merely on sentence-level structures, the attention shifted from the “sentence-level accuracy” to “discourse level” (p. 2) in writing practices.

2.2.5.1. Product-oriented Approach

The product-oriented approach can also be regarded as a traditional method that emphasizes the product itself regardless of communicative dimensions of writing, such as audience/readers or context in a teacher-centered environment, mainly focused on “the grammatical and lexical knowledge” (Hyland, 2019, p. 3). According to the principles of the product-based approach, the presentation of writing rules, the use of a model text, and correcting the text at the final are given prominence (Selvaraj & Aziz, 2019). Modeling, which is used as a way to present the structural and organizational rules of a text, plays a prominent role in composing the written product (Badger & White, 2000). Considering the product-based approach, Pincas(1982) introduced three stages: “familiarization, control/guided exercises, and free writing" (p. 14), which represent the product-based approach. Given the limitations of the product-based approach, such as imitation of a model text and a lack of student engagement and motivation, an alternative approach emerged, namely the process-based approach, emphasizing the writing process and cognitive skills rather than product and accuracy.

2.2.5.2. Process-oriented Approach

As the shift from a behaviorist perspective to cognitivism gained attention, the focus on writing proficiency moved to the importance of the "process" of writing within the student-centered learning environment. The process-based writing, which is mainly associated with the model advanced by Flower and Hayes (1981), highlights that writing practice comprises three elements, namely "task environment, long-term memory, and the writing process" addressing text itself or readers, storing and activating storing knowledge and stages of writing respectively (p. 369). According to Flower and Hayes (1981), the "writing process" involves three stages called "planning, translating and reviewing" (p.369). In that regard, "planning" stands for the pre-writing stage, "translating" is related to expressing one's ideas on a paper in an organized way, and "reviewing" refers to revising the written form reflectively. Besides this initial model, Hayes (2012) revised and developed a new model called "Hayes' Model" which consists of three factors, namely "the control level" and "the resource level, which are related to affective factors and planning/shaping the task, cognitive and metacognitive aspects of writing and effective requirements in the writing process correspondingly (p. 371).

2.2.5.3. Genre-based Approach

The genre-based approach is considered a newer model for writing than the product approach, and the process approach mainly emphasizes the genre of the text itself in connection to the social context (Hasan & Akhand, 2010). As opposed to the process approach which highlights the importance of processes in writing, the focus is on the reader and society by addressing the specific genre forms. Swales (1990) stated three key concepts that form the genre-based approach, including "discourse community", "genre" and "language-learning task" (p. 1), emphasizing the importance of social context, the communicative purpose of the text, and diverse activities based on the "cognitive and communicative procedure" (p. 76).

According to this genre approach, the purpose is to gain awareness of the genres used across social contexts, thereby providing effective communication with a targeted audience for a particular purpose. In the genre approach, writing generally involves three stages: "modeling the related genre", "construction of a text" where teachers provide support in writing a text, and "independent construction" of a text addressing the analysis of the specific genre, rebuilding the text and finalizing the product individually (Eliwarti & Maarof, 2014).

While the genre approach has some potential benefits in teaching concepts in terms of its emphasis on social and communicative learning aspects (Zhang, 2018), it has also several drawbacks aligned with the procedures of developing writing texts, including the passive role of the students, focusing only the product rather than a process, limited creativity, and content (Eliwarti & Maarof, 2014; Hasan & Akhand, 2010).

2.2.5.4. Process-Genre-based Approach

Considering the limitation of the genre approach, the process-genre approach was proposed to change the focus from solely emphasizing the genre itself to the significance of the process students go through during the writing process. Badger and White, (2000) are two prominent figures in developing process-genre-based approach combining product, process, and genre approaches within the involvement of "language", "context", "purpose," and "skills in using language" (pp. 157-158). According to their model (Badger & White, 2000), the process genre approach typically comprises five stages: construction of situation, modeling a text, "collective construction developing a text through processes of writing and accomplishing final draft built on the functions of genre and process and product approaches" (p. 159). In the process-genre approach, the essential changes compared to the principles in the genre approach are student-centered learning and the enhancement of metacognitive skills aiming to boost the learners' development in terms of motivation and improve their writing performance.

2.2.6. Processes of Writing

Concerning the principles of writing approaches, the effective role of the processes that students engage in promotes learning across traditional or modern teaching approaches. As mentioned in the approaches section, both the cognitive writing model developed by Flower and Hayes (1981) and the latest current model Hayes' model proposed by Hayes (2012) and highlight the stages of the writing process aiming to explain how to prepare and produce written texts. Despite the diversity in terminology named by various scholars, the conceptual definitions of these stages are highly recognized as consistent with each other (Gezmiş, 2020). Accordingly, one of the well-known models commonly referenced in the literature is Hyland's (2003) model of writing instruction.

The stages of process writing have several principles which can be commonly attributed to each stage. The first significant principle is that all the stages in the writing process are recursive, enabling students to revisit the earlier stages while developing their writing tasks. The other principle emphasizes that learners are at the center of learning throughout the writing phases, and teachers act as facilitators, providing support in terms of giving feedback or guiding them as needed. Besides these principles, stages of process writing provide an understanding related to acquiring or enhancing writing strategies, including metacognitive, cognitive, or social strategies (Chen, 2022; Javadi-Safa, 2018).

2.2.6.1. Stages of Processes

Planning

As suggested by its name, planning, which is also used as pre-writing in some articles, is the initial stage of the writing process, serving to prepare students for the act of writing. This section encompasses the thinking process whereby students try to generate and organize ideas based on their mental frameworks (Gezmiş, 2020; Hasan & Akhand, 2010). There are techniques that serve as an assistance for students to provide support in this stage, including brainstorming, listing, and outlining (R. Johnson & D. Johnson, 2008).

Drafting

Drafting is the stage where students start expressing their ideas about the task based on their planning, which is identified as “translating” and “transcription” in Flower and Hayes’s model (1981) and Hayes’ model (2012), respectively. In the drafting stage, students translate their ideas from the prewriting section into a coherent sentence without paying attention to accuracy and mechanics.

Revising

In the revising stage, students carefully review and modify their paragraphs or sentences regarding the content, organization, and ideas mentioned in the drafting section. They also modify their texts to develop well-organized text for its clarity and coherence if needed (Gezmiş, 2020).

Editing

The editing phase involves reviewing and checking the “content and organization of the writing” again, mainly focusing on sentence structure, lexical items, punctuation, or spelling (Gezmiş, 2020; Masrur, Irawati & Sulistyo, 2020). This stage can be considered a narrow scope of evaluating process since it is the last step before publishing their written product. Moreover, students are able to add new main or supporting ideas and foster to their writing if required (R. Johnson & D. Johnson, 2008).

Final Draft

Students are asked to finalize their written text during the final draft phase. That means their draft is considered as ready to publish (Masrur et al., 2020). Publishing is the act of students sharing their products in the educational setting via presenting in class or online platforms individually or collaboratively.

2.2.7. Definition of Essay Writing

Essays are one of the common writing forms utilized to enhance students' writing skills in the EFL context, addressing different purposes and approaches. In the EFL setting, writing instruction related to essays is widely used to promote students' writing skills in academic writing, allowing them to convey their ideas, claims, or arguments reflectively within a particular rhetorical and organizational structure.

Essays are widely recognized as genres, a category of texts showing how writers employ language to respond to situations in different contexts within the social and cognitive aspects (Hyland, 2004). Genres are specifically characterized as essays when the focus is on text structure and the use of language, including grammatical or communicative aspects of the written text (Hyland, 2004). In other words, while writing essays, students determine how to organize their drafts using structural patterns aligned with the purpose of the related genre.

2.2.7.1. Essay Types

Considering essay types, learners are encouraged to master various genres of writing, each addressing the different communicative purposes in the EFL context. There are numerous essay types aligning with the particular purpose of the genres and styles, such as descriptive, persuasive, narrative, expository, compare & contrast, or problem-solving essays (Osman & Januin, 2021; Uccelli, Dobbs & Scott, 2013). Descriptive and persuasive essays, which have different writing purposes within the rhetorical composition, can be regarded as two of the well-known genres of writing commonly taught in literacy education.

Descriptive essay

A descriptive essay is a kind of writing that mainly involves writers' depictions of a subject -such as an experience, an object, a person, or a place- aiming to convey sensory information during the writing process. The primary focus of the descriptive genre is to capture the readers' feelings and engage them in the writers' thoughts as reflected in the essay (Jayanti, 2019). Another important aspect of a descriptive essay is a detailed description of an experience in a way that deeply relates to the five senses, allowing the readers to vividly relive the writers (Basri & Syamsia, 2020).

Descriptive essays are categorized into two kinds namely objective and subjective description. While an objective description refers to the describing a subject with the isolation of expressing feelings or thoughts about it, a subjective description involves the way of portraying a person, a place, or an object based on the writer’s own perception (Basri & Syamsia,2020; Pratama, 2019). In other words, in objective description, visualization and giving factual details about a subject are the main focus; on the other hand, subjective description prioritizes the writer’s reflections and impressions in a detailed way, with both requiring attention to consistency and clarity in the text. Beside the principles of content, writing in the descriptive genre necessitates the appropriate language usage in terms of sentence structure, adverbs, adjectives as well as figurative language to create vivid impressions on the reader (Basri & Syamsia, 2020; Hambali, 2021; Jayanti, 2019).

Based on the statement above, providing sensory details through subjective or objective manners and evoking readers’ emotions by vivid and detailed depiction of a subject using carefully chosen vocabulary are highly recognized as the fundamental aspects of writing a descriptive essay.

Persuasive essay

A persuasive essay is a kind of writing in which the writer aims to convince the reader of a particular viewpoint based on the arguments proposed on a given idea of the topic. The persuasive genre can be considered one of the most commonly used essay types in educational settings since it requires the expression and construction of strong arguments for or against the central idea within the ability to utilize effective communicative skills (Latifi & Noroozi, 2021). Compared to the narrative or descriptive essay types, learners have some difficulties in establishing well-prepared organization or language due to the challenges of expressing their arguments and using cognitive skills (Alkthery & Al-Qiawi, 2020; Crowhurst, 1990). A persuasive essay is a type of text in which the writer supports their own arguments and tends to disprove the opposing attitudes on the subject, focusing on making decisions and evaluating different viewpoints (Alotaibi, 2020; Stab & Gurevych, 2014).

Having argumentation skills is highly considered beneficial in meeting the standards of persuasive writing, as it promotes the use of higher-order thinking skills, engages students' active participation in writing, and convinces the readers to adopt a certain position on the essay subject within a rhetorical perspective. As Jonassen and Kim (2010) mentioned, "rhetorical arguments conceived as a dialogue between an arguer and an audience are the most common form of argumentation" (p. 443), which aims to convince readers about the idea the writer defends. Given that argument structure, Toulmin (1958) developed a model that includes essential components, namely a claim (argument), data (evidence), a warrant (logical connection), along with backing (support for the warrant), a qualifier (certainty level), and rebuttal (counterarguments) which contribute to achieving higher standards of persuasive writing (Jonassen & Kim, 2010).

In that respect, writers need to express the main idea by providing evidence and supporting sentences, including illustrations, while emphasizing the importance of opposing arguments to persuade readers.

2.2.7.2. Components of Essay

Given the writing components, an essay comprises three main parts: the introduction, body, and conclusion.

The introduction, comprising general and thesis statements (Turmudi, 2017) addresses the information about the writing topic and its background in general. In essence, while general statements are developed to take the readers' attention within the overview of the subject, the thesis statement, which reflects the writer's attitude, serves as the plan of the body paragraphs (Oktavianti, Gusmuliana & Apriani, 2021). Therefore, writers need to consider what they are going to mention in the introduction deeply so as not to include irrelevant issues in the body paragraphs.

As a central part of the essay, the body paragraph(s) consists of the ideas highlighted in the thesis statement (Turmudi, 2017). It is important to note that each body paragraph is supposed to have a topic sentence that outlines the essential point and provides a meaningful connection with the entire paragraph (Medvid & Podolkova, 2019). Additionally, in each body paragraph, supporting details and examples are given to develop the main idea established in the topic sentence. The paragraph ends with a concluding sentence that summarizes the discussion and fosters the main point of the body paragraph.

The conclusion part of the essay involves the summary of the main ideas presented in the body paragraphs and final messages that offer final insight, leaving an effective impression on the reader. Besides that, the writer finishes the concluding paragraph with suggestions to reinforce the topic's central (Medvid & Podolkova, 2019). Additionally, suggestions can be also included to strength the main idea of the topic to provide reflections.

2.2.8. Assessment Criteria for Writing

Regarding the evaluation of learners' foreign or second language level, tests or assessments have a crucial role in an educational context. Weigle (2002) asserted that the fundamental objective of "a language test is to make inferences about the language ability of a learner" (p. 41). Language testing is also considered to diagnose learners' abilities and provide guidance in determining the appropriate methods or materials for instruction (Galti et al., 2018, p. 4). Among the various methods for language testing, Bachman's (1990) test of communicative language ability model integrates organizational and pragmatic knowledge in the academic field and different contexts (Farhady, 2018). Based on the principles of assessing communicative competence, performance tasks are one of the primary assessment models for identifying learners' language levels (Weigle, 2002). For performance-based assessments, essays are common as they allow teachers to evaluate factors related to language competencies in writing (Perlman, 2003). In order to analyze performance assessments, rubrics are generally used since they indicate the quality of written texts, support teachers in making judgments, and contribute to the students' writing development (Becker, 2011; Jonsson & Svingby, 2007; Li, 2022).

Rubrics consist of criteria, providing a systematic approach to determine the level of the effectiveness of written texts. Adopting or developing rubrics and their criteria are emphasized to be essential due to the validity aspects of scoring (Weigle, 2002). While determining these criteria can depend on the institution, the subjects, or the instructors, some "core criteria" are generally used for the scoring process, including language use, structuring, developing an argument or organization (Elander et al., 2004, p. 202).

IELTS (International English Language Testing System) writing tests have developed specific criteria to assess the examinees' writing performance. The scoring rubric comprises four subscales: Task Response, Coherence and Cohesion, Lexical Resource, and Grammatical Range and Accuracy (IELTS, 2023).

Task response mainly addresses the completion of the writing task by giving the main and supporting ideas related to the topic with an introduction, body, and conclusion paragraph. Furthermore, these ideas should be elaborated with examples in order to illustrate key elements. In task response, candidates are also expected to reflect on their opinions that are relevant to the topic, and their responses must align with the type of writing task.

Regarding the coherence and cohesion criteria, the focus mainly centers on the organization and development of the ideas mentioned in both the overall essay and each paragraph within the involvement of cohesive devices in a logical order (IELTS, 2023). Furthermore, "the natural use of cohesion without repetition, the managing of paragraphs, presenting a central theme within a unity of relevant paragraphs and the use of references are also critical factors in meeting the standards of these criteria" (Yadi, 2020, p. 797).

For the lexical resource, grammatical range, and accuracy criteria, the accurate use of vocabulary and the structures are considered fundamental in these categories, respectively. As Chong and Ye (2020) stated, candidates are expected to show their abilities to use the lexical items effectively and accurately, focusing on "the collocation, word formation, and spelling, and to demonstrate a range of simple and complex sentences" (p. 7). The criteria developed for the IELTS writing task present a comprehensive framework for measuring the examinees' language ability in writing performance and contribute to understanding their overall language competence in writing.

2.3. Mind mapping: Definition and Implementation Process

Learning to use four skills effectively- listening, speaking, reading, and writing- in the EFL context requires understanding various influencing factors. As a productive skill, writing, like speaking, is widely recognized as one of the critical skills that involve fundamental aspects for acquiring proficiency in educational environments, including "text features, composing process and context of writing" (Chmarkh, 2021, p. 86). However, students, especially in EFL settings, face several challenges since writing ability entails cognitive and social factors essential for mastering composing well-developed texts. In this regard, strategies learners need to adopt have a crucial role in supporting these aspects and enhancing writing skills. Based on the instructional necessities, teachers can employ multiple strategies or techniques within their own different frameworks, processes, or adjustments (Bukhari, 2016) in order for students to advance their performance while practicing writing.

Mind mapping stands out as one of the most effective techniques for learning instructions. Mind mapping is a learning and teaching tool used as a graphic organizer comprising a core center with its branches aiming to present collections of thoughts, ideas, or information within a visually organized non-linear format (Astriani, Susilo, Suwono, Lukiati & Purnomo, 2020; Dhindsa, 2011; Sebit & Yıldız, 2020). The core center of a mind map represents the central topic from which the main categories are branched off with their subcategories, creating a diagram that involves key ideas, groups of sentences and words, or visual figures. These primary and minor ideas, along with their supporting ideas, create a flowing diagram that can be seen as a reflection of one's thinking process.

Buzan (2018, p. 4), who popularized the mind mapping tool, which has three characteristics, namely "central image, thick branches radiating out, single key image or word”, presented the implementing procedures within the seven steps:

1. Write or draw the main subject horizontally in the center of the paper, aiming to activate it and generate ideas.

2. Draw a thick branch spreading from the central core to create an engaging mind map and promote memorization through the illustrations.

3. Write only one word or draw a figure to label this branch to represent the main ideas related to the central theme.

4. Draw the subordinate branches writing supporting details in the form of a figure or single word in order to support the main theme.

5. Use a different color to draw the second branch, which signifies the second main idea related to the topic.

6. After completion of drawing the main branches, repeat the same procedures performed in the first branch by adding sub-branches to provide more information on the major themes.

7. To strengthen the associations between the major and subbranches, draw additional arrows or lines that link them to the supporting ideas.

Based on the statements above, applying mind maps is appropriate enough to be instructed in the learning environment as it does not necessarily require extra resources beyond basic classroom materials to perform this process.

2.3.1. Benefits of Mind Mapping in Relevance to Learning Aspects

The application of mind mapping offers numerous advantages that promote gaining proficiency pertaining to the learning process in educational and professional settings. Mind mapping can commonly serve as an opportunity for developing skills across academic fields such as science, business, and art, but it is mainly prevalent in language learning, which facilitates various facets of language learning.

Firstly, the mind mapping technique enhances the ability to generate and organize ideas coherently in various disciplines. Mind maps as a visual tool allow learners to express their ideas independently and associate them in a meaningful way, thereby assisting the generation and organization of concepts or thoughts in different areas of learning, such as noticing, gaining understanding about complicated subjects, or enhancing communicative skills (Al Kamli, 2019; Dhindsa, 2011; Feng, Alsager, Azizi & Sarabani, 2023). Teachers also can benefit from mind mapping by organizing their lesson plans or presentations and evaluating their students' performances during the learning process (Feng et al., 2023; Wang, 2019). Furthermore, by synthesizing, organizing, and regulating the learning process, which leads to knowledge activation, mind mapping helps learners improve both their cognitive and metacognitive skills (Astriani et al., 2020; Budd, 2004; Yunus & Chien, 2016). Another advantage of using mind-mapping tools in language learning is enhanced memory retention.

The application of mind mapping facilitates recalling and storing information in long-term memory, which is particularly helpful for mastering vocabulary, developing reading skills, or comprehending the usage of language (Al Kamli, 2019; Bukhari, 2016; Farrand, Hussain & Hennessy, 2002; Zubaidah, Fuad, Mahanal & Suarsini, 2017). Enhancing creativity can also be considered an advantage of mind mapping in learning, leading to increased motivation. When using the mind mapping tool for generating, planning, or organizing ideas, students are able to gain insight in terms of associating their ideas or exploring new information, thereby improving to think creatively (Bukhari, 2016; Feng et al., 2023; O. Gafour & W. Gafour, 2020; Zubaidah et al., 2017). Additionally, expressing ideas through drawing images or freely using color can also improve students' enthusiasm in the learning process.

Considering educational disciplines, mind mapping is a supportive tool that assists in developing diverse aspects of the learning process.

2.3.2. Mind Mapping Strategies for Writing Development

The mind mapping tool, which aids in representing ideas and thoughts in a structured and organized way, is a highly appreciated strategy for writing development. As opposed to traditional instructions, implementing mind mapping facilitates mastering writing skills through various methods, including brainstorming ideas, analyzing, categorizing, and recalling the information systematically (Pribadi & Susilana, 2021; Sari et al., 2021). The mind mapping technique also enhances learners' divergent thinking by exploring and expressing their ideas on a graphical organizer (Zheng, 2018). While the significance of mind mapping on effective brainstorming is well-known due to its practicality, its utility in writing practice extends beyond the pre-writing stage by addressing cognitive and affective factors essential for writing development.

2.3.2.1. Cognitive Dimension

Cognition is commonly defined as the mental processes involved in activities - thinking, finding solutions, remembering, learning subjects, or using a language to accomplish various tasks in daily or academic life (Luangkrajang, 2022). In addition to its general definition, the implementation of cognitive strategy facilitates learning, allowing people to enable the connection between new concepts and existing knowledge by analyzing and rebuilding it logically (Astriani et al., 2020; Luangkrajang, 2022).

The cognitive dimension is highly regarded as an essential factor in writing skills in terms of planning, organizing, and synthesizing the generated ideas logically since composing a well-written text is aligned with the working principles of the mental process. Implementing cognitive writing skills facilitates the organization of the writing process in which writers analyze and synthesize the primary and supportive ideas related to their planning during writing (Al Naqbi, 2011; Wischgoll, 2016). Therefore, using mind mapping as a strategy plays a crucial role as it mirrors learners' cognitive process in building an understanding of the associations and interconnections between the main ideas and concepts, resulting in meaningful learning (Feng et al., 2023; Sabarun et al., 2021; Zheng, 2018). Furthermore, employing a mind map contributes to the idea expressions in a well-structured and coherent manner rather than simply transferring thoughts on a paper in a non-hierarchical way, thanks to the aid of visualization (Astriani et al., 2020; Zubaidah et al., 2017).

Considering the EFL context, learners are not able to start writing immediately due to challenges that hinder them from starting to compose a text, such as a lack of ideas. One of the reasons why they struggle to begin writing is a cognitive load, which refers to the quantity of information stored in a limited capacity of working memory. In a writing task, if learners lack cognitive skills, the information load in their working memory goes beyond its limits, leading to a failure in writing ability (Li, Hwang, Chen & Lin, 2021). Mind mapping can effectively reduce learners' cognitive load since they have a coherent outline of their draft by reflecting their ideas on the map before starting the writing process (Zhang, 2018).

All in all, utilizing the mind mapping tool as a cognitive strategy promotes learners' writing skills efficiently by facilitating idea generation, synthesis, and planning of the writing process, avoiding writer's block.

2.3.2.2. Metacognitive Dimension

Mind mapping can be regarded as an effective tool in enhancing the metacognitive strategies that are necessary for learners to develop a well-written composition. Flavell (1979) defined metacognition as learners' consciousness and control of their own thinking processes (Teng & Yue, 2023; Teng, Wang & Zhang, 2022). In other words, applying metacognitive skills effectively leads to a deeper understanding related to the principles of cognitive development. While writing, writers go through the stages of writing, mainly “planning, translating and reviewing” (Hayes & Flower, 1981; Hayes, 2012) in a recursive manner based on their experiences and the purpose of the text. Throughout these stages, utilizing metacognitive skills is fundamental for learners to develop well-organized and coherent writing texts.

Self-Regulated Learning with the Realm of Mind Mapping

Metacognition is identified as a core element of self-regulated learning, which centers on actively managing the learning process (Zimmerman, 2002). Self-regulated learners are aware of the appropriate strategies needed to reach their goals by controlling, analyzing their ideas, and reflecting on them throughout the writing process (Bai, 2018; Robillos & Thongpai, 2022). Research reveals that while proficient writers tend to use metacognitive skills, including planning, revising, or editing more, less proficient ones compose a text without considering the metacognitive aspects of writing and critical thinking (Teng & Yue, 2023). Learners who gain an understanding of metacognitive awareness are likely to use critical thinking skills, which will result in greater success in their writing. Given the cognitive complexity of academic writing, developing practical writing skills necessitates using self-regulatory skills and adopting metacognitive strategies that enhance critical thinking.

Considering the EFL context, instructions that support self-regulation strategies can be acknowledged as essential for learners to improve their writing proficiency, aiming to compose a well-written text. Mind mapping is one of the learning tools that contribute to enhancing the metacognitive strategies in writing practices (Yunus & Chien, 2016; Zhang, 2018). As integrated into all stages of the writing process, from pre-writing to post-writing stages, mind mapping enables learners to enhance critical skills by making connections between different ideas or concepts or adding and revising the information on their mind maps flexibly (Ngo & Tran, 2021). Mind mapping also helps learners monitor and evaluate their performance, which leads to managing their own writing learning process. Since mind mapping contributes to learning autonomy within learners' engagement in every stage of the writing process (Wahid & Sudirman, 2023; Zubaidah et al., 2017), it cultivates learners' capacity for thinking reflectively, allowing them to evaluate their actions during the writing process critically.

A mind map can be considered one of the highly effective tools for developing learners' writing performances in the EFL context. It facilitates the active involvement of learners and provides opportunities to enhance self-regulatory skills through planning, monitoring, or assessing.

2.3.2.3. Creativity

Mind mapping is widely described as one of the most effective tools for enhancing creativity in the learning process. Within the writing process, the planning stage, where the learners brainstorm and organize their opinions or ideas, is essential for enhancing learners' creativity. This pre-writing stage particularly encourages divergent thinking- the ability to generate ideas- which becomes significant for developing a creative manner in idea generation (Leeds, 2018; Wahid & Sudirman, 2023; Wang, 2019).

Treffinger, Young, Selby, and Shepardson, C. (2002) stated five key dimensions related to creative writing, namely “fluency” (generating ideas fluidly), “flexibility” (adaptive thinking), “originality” (unique perspective), “elaboration” (adding details, and “metaphorical thinking” (making analogies for new connection) (pp. 12-14). Based on these factors of creative writing, mind-mapping tools provide an appropriate platform for learners to enhance their creativity in the writing process. Mind mapping contributes to fluency, as the visual representations of the ideas support the creation of new idea connections, unlike traditional learning instructions. Moreover, expressing and reflecting the ideas or opinions within a non-linear map form can reduce the cognitive load. Furthermore, mind mapping's non-linear structure allows for flexible branching from any point, allowing learners to connect ideas in a way that reflects their unique thought process (Bukhari, 2016; Zubaidah et al., 2017).

Mind mapping additionally promotes originality by encouraging students to express their ideas visually and engagingly, supporting learner autonomy and creativity (Dhindsa, 2011). Elaboration, the next dimension affecting creativity, aligns with the principles of mind mapping regarding the variety of main and supporting details about the themes (Abd Karim, Abu & Khaja, 2016). Writing down numerous ideas or concepts with colorful branches stemming from the topic enables learners to make connections between the concepts, thus leading to elaboration (Pribadi & Susilana, 2021). Despite having no direct connection, mind mapping provides a space for learners to explore or generate ideas in a novel way through original visualization.

2.3.2.4. Motivation

Motivation has a significant role in various disciplines of the educational field. In language learning, gaining motivation is also essential for learners as well as instructors. Considering the cognitive and social aspects, language learning can involve complexities that cause the loss of motivation among learners and accordingly affect their learning process in a negative sense. Learners, particularly in educational settings, can get overwhelmed by the challenges faced during the writing process. They can doubt their ability to produce a text, which is a demanding process for especially EFL learners (Zhang, 2018), resulting in a lack of motivation and reluctance to write.

Motivation is defined by Dörnyei and Ushioda (2021) as a "direction," which means a goal that is encouraged to reach, and "magnitude" which refers to the amount of effort a person possesses to push toward the objectives (p. 4). Dörnyei and Ushioda (2021) mention two aspects of motivation which are widely recognized in the studies of learning; intrinsic and extrinsic (p. 23-24). Regarding the writing process, intrinsic motivation is related to learners' own motive to start producing a text in terms of their own interest in writing or idea explorations. On the other hand, extrinsic motivation addresses learners' desire to write because of external factors such as exam grades, deadlines, or rewards. Learners' writing motivation is affected by a range of factors, including attitudes, beliefs, and desires (Sabarun et al., 2021).

Given the instinct and extrinsic motivation, as a visual graphic organizer, the mind mapping tool acts as a supporting tool, increasing students' motivation in writing and writing proficiency. (Abd Karim, Abu & Khaja, 2016; Alqasham, Al-Ahdal, 2022; Jones, Ruff, Snyder, Petrich & Koonce, 2012; Rafii, 2017). Mind mapping, which supports a learner-centered approach, offers distinct ways of expressing and generating learners' ideas (Bukhari, 2016), such as using lines, pictures, drawings, or symbols. These multiple ways of idea expression through mind mapping can make the writing process more enjoyable and engaging than traditional instruction. Furthermore, mind mapping improves cognitive skills by enabling learners to connect with various ideas stemming from a single concept (Arulselvi, 2017). This process of associations helps writers generate new concepts or ideas, further promoting both their writing ability and motivational level. Regarding extrinsic motivation, mind mapping can be used as a strategy to provide convenience for assessments, essays, or topic familiarization. By visually organizing and categorizing subjects or concepts (Arulselvi, 2017), mind mapping can reduce the possibility of cognitive load and minimize writer's block.

Mind mapping effectively contributes to constructing new knowledge built on the experience by actively engaging learners in cognitive processes (Dhindsa & Anderson, 2021; Sari et al., 2021; Wette, 2017). This active involvement, resulting in increased motivation, allows learners to create their personalized maps using different techniques.

2.4. Related Studies

This section examines several studies highlighting how the application of the mind-mapping strategies improves EFL learners' writing performances and their perceptions towards the mind-mapping technique. Firstly, studies investigating the role of mind-mapping technique on learners' writing performance within the realm of constructivist learning theory will be explained focusing on the cognitive aspect. Subsequently, this section will analyze studies, particularly exploring the effects of mind-mapping strategy on students' writing development across descriptive and persuasive essay genres, reflecting the principles of cognitive constructivism.

Regarding EFL and ESL contexts, several studies conducted within a range of research designs have explored the impact of mind-mapping techniques on students' writing performances and their perceptions of writing skills across various aspects. El-Muslimah et al. (2011), for example, conducted pre-test-post-test quasi-experimental research in order to investigate how mind-mapping strategy benefits EFL students' writing skills. The researcher collected data through pre-test and post-test as an instrument. The treatment of this study lasted for whole term, and the implementation of mind-mapping aimed to enhance the participants' writing performance in terms of sentence structure and organization, linguistic component and punctuations assigning expository writing topics. The findings revealed that the learners were able to generate and organize their ideas more easily by activating their prior experiences leading to idea generation.

Bukhari (2016) also studied the effects of mind-mapping techniques on writing development for 40 EFL learners within two phases: an initial analysis of methods and problems the instructors had when teaching writing and the intervention of mind-mapping application, which lasted for seven to eight weeks. Regarding the data examination, Bukhari (2016) employed the quantitative research design using pre-tests and post-tests to compare experimental and control groups' writing performances. The results of the study showed that the mind-mapping technique in the pre-writing stage promoted the students' writing skills, specifically in content, cohesion, and coherence. The mind-mapping strategy improved the organization of the main and supporting ideas relevant to the writing topics, unlike the traditional methods the teachers used before the intervention. Bukhari (2016) highlights the uniqueness of individuals in terms of their experiences and the way they express through mind-mapping referring to the cognitive constructivist view.

Yunus and Chien (2016) sought to find out 25 ESL learners' perceptions of the mind-mapping strategy and its impact on their writing. The questionnaire was the data collection tool consisting of a seven-item Likert scale and two open-ended questions. While the close-ended item was developed to investigate the students' overall perceptions of the mind-mapping technique, open-ended items explored their opinions about the benefits of this technique. Yunus and Chien (2016) found that ESL learners held positive attitudes toward mind-mapping strategy, particularly in planning, organizing their writing, and presenting their ideas effectively which mentioned as the development of cognitive construction. However, a minority of the participants found the technique time-consuming and ineffective, in contrast to the positive effects of this strategy.

Sabarun et al. (2021) carried out quasi-experimental research focusing on the effects of mind-mapping techniques on learners' writing skill development and motivation. Adapting the quasi-experimental research design, the researchers used the pre-test and post-test as an instrument for experimental (N = 19) and control groups (N = 18) and the intervention lasted for 15 weeks. The data gathered from the pre-tests and post-test scores were analyzed regarding the accuracy of writing and motivation level through one way ANOVA. The statistical results of the study revealed that the participants in the experimental group overperformed the control group, showing that the mind-mapping is an effective tool for developing writing skills. Moreover, the students in experimental group indicated more motivation due to the active engagement and personalized learning.

Naibaho (2022) conducted a quantitative study to investigate the role of mind-mapping strategy on students' writing performance. Participants with 44 students in experimental and control group were selected with purposive sampling. Regarding the instruments of this study, pre-test and post-test, were used for quantitative data analysis, adapting descriptive interpretation. For the treatment six sessions were arranged to give instruction related to the mind-mapping strategies. The researcher carried out the based on the principles of constructivism, such as active involvement and the importance of experiences in learning. The findings indicated that, there was a difference between the mean score of experimental (M = 63) and control group (M = 52), indicating that the mind-mapping strategy positively influenced students' writing performances. Regarding the experimental group, the analysis of the pre-test and post-test data also showed that participants demonstrated improved writing performance in content and language criteria in their essay writing.

As for the descriptive essay genre related to mind mapping, a number of studies have investigated the connection between mind mapping and descriptive essay writing in an EFL setting. However, most of them employed a single approach addressing research design or insufficient reporting on some aspects, including methodology or presentation of results.

The study investigated by Wangmo & Chalermnirundorn (2018) adopted experimental research with one group pretest-posttest design to examine effectiveness of the mind-mapping strategy in improving the participants' writing skills. For instruments, pre-test and post-test were administered to analyze the quantitative data through descriptive statistics. For qualitative data, observation and focus group discussion were the instruments interpreted through content analysis. In terms of treatment, mind-mapping strategies were instructed for eight lessons with fourth-grade 18 students. Regarding the quantitative findings, the post-test scores of the students were found higher than their pre-test scores, indicating the positive effect of mind-mapping technique on writing development. Qualitative results also revealed that the use of mind-mapping strategies had positive impacts on participants' perceptions in terms of gaining confidence, idea organization, higher order thinking skills and motivation in writing. The study referenced constructivist learning theory highlighting, active involvement and construction of knowledge based on experiences for the accomplishment of writing in this study.

The quantitative study conducted by Basri and Syamsia (2020) investigated the effect of a mind-mapping strategy on writing descriptive texts. The study's research design was a correlation that examines the relationship between the mind-mapping technique and the student's writing skills. As an instrument, a pre-test and post-test were assigned to fifteen participants chosen by quota sampling technique to analyze the findings. The implementation of the treatment included three meetings where the participants were instructed about the use of mind-mapping strategy in descriptive writing practices. The research findings indicated that the mind-mapping strategy improved the participants' writing performance in descriptive texts.

Al Kamli (2019) is another study that examined the effects of using the mind-mapping technique as a pre-writing strategy on EFL learners' idea organization, linguistic knowledge, and perceptions of writing skills. This mixed-method research involved 128 participants assigned to experimental and comparison groups. For the quantitative data, the pre-test and post-test instruments were used to obtain statistical data analysis. Additionally, at the initial and final stages of the study, the questionnaire was administered to measure changes in the EFL learners' perceptions related to their writing skills. The qualitative data gathered through the interviews provided a deeper understanding of the students' attitudes towards their writing abilities. Following the eight-week treatment, the quantitative findings revealed a significant difference between both groups, suggesting that the mind-mapping technique enhanced the students' descriptive writing performances in terms of organization skills and learner autonomy. According to the qualitative findings, the students showed positive reactions regarding the motivation and usefulness or convenience of the mind-mapping strategy, regarding the use of visual elements during the writing process.

Another study administered by Dianto and Basuni (2015) aimed to find a solution for the students' writing difficulties by integrating mind mapping into the treatment. A pre-experimental study was employed for the research model due to the lack of randomization. Also, one intact group of 428 students gathered from the seventh, eighth, and ninth classes. The treatment lasted for a month within the implementation of pre and post-tests. Findings show a significant difference between the two tests, which emphasizes the success of mind mapping in improving students' writing skills.

Rafii (2017) also explored the effects of the mind-mapping strategies on student motivation and writing performance in descriptive texts. The study involved 35 participants in their fourth semester and employed classroom action research within two cycles. Pre-test and post-tests were used to measure the mind-mapping tool's impact on participants' descriptive writing skills. Regarding the scoring process, the researcher used an analytic rubric comprising the content, organization, grammar, and mechanic components. The findings suggest that the mind-mapping technique enhanced the students' descriptive writing performance regarding idea association and organization. In contrast, fewer improvements were observed in grammar, vocabulary, and mechanics. Additionally, the classroom observation revealed that applying the mind-mapping technique allowed the students to be more active during the writing process, leading to increased motivation.

Hambali (2021) carried out a study aiming to examine the effect of mind-mapping strategy on the learners' writing skills in descriptive texts. The study involved 44 participants divided into experimental and control groups. The data collection instruments were determined as writing tests and the questionnaire. Due to the intact group design, the Mann-Whitney U test was used to analyze pre-test and post-test scores. The writing rubric comprises four components: organization, grammar, vocabulary, and mechanics. Based on the descriptive and statistical findings, participants' writing performances in experimental groups were found to be significantly better than the control groups, particularly in idea development. Furthermore, questionnaire analysis showed that participants in the experimental group responded positively to implementing the mind-mapping technique, reporting increased motivation and active participation.

Nurialla (2013) conducted a mixed-method study to investigate the impact of the mind-mapping technique on the student's writing ability in descriptive essays. The study employed a one-group pre-test-post-test pre-experimental research design with 36 junior high school students in an intact group. Besides administering pre-test and post-test, the questionnaire and the interview were carried out to collect and examine the data during the study. A writing rubric measuring genre, register, discourse, grammar, and graphic features was used for the scoring process. The findings of the study suggest that the mind-mapping strategy developed students' writing performances, particularly in idea organization, sentence arrangement, creativity, and vocabulary. However, the findings gathered from questionnaires and interviews revealed that students had challenges managing their time while creating mind maps. Some participants stated they focused on drawing a better mind map rather than writing descriptive texts.

While a number of existing studies have examined the persuasive or argumentative essay types in a broader sense, the research addressing the relationships between the application of the mind-mapping technique and persuasive essay remains very limited.

For instance, Ningrum, Latief, and Sulistyo (2016) studied how mind-mapping strategy affects idea generation during the pre-writing stage in the argumentative essay genre. The study adopted a post-test-only experimental design with 82 seventh-year EFL students registered in TOEFL classes at a state college in Iran. Participants were allocated to the experimental and control groups to carry out the study. Before the treatment, all students received TOEFL writing tests to examine the students' initial English level, and a writing test was assigned to them to evaluate the impact of the mind-mapping strategy in argumentative writing following the intervention. The results were analyzed based on gender differences, learning styles, and idea generation in argumentative essay writing through ANCOVA. Contrary to expectations, the mind-mapping strategy was not found statistically effective in idea development related to argumentative writing. Additionally, no significant change was seen in gender differences and learning styles.

The study by Zhang (2018) aimed to explore the relationship between the administration of a mind-mapping strategy and the student's writing performances in argumentative essays. Thirty-nine first-year EFL students randomly placed in experimental and control groups participated in this study. Regarding the quantitative data, the pre-test and post-test were examined using an independent sample T-test focusing on the content, organization, and language aspects of writing. Qualitative data were gathered through interviews with five participants from the experimental group following the seven-week intervention. According to the quantitative results, the experimental groups performed better than the comparison group in terms of content and organization (p = .040 < .05). Furthermore, qualitative data revealed that students perceived the mind-mapping tool as beneficial for idea generation, identification of concepts and increased writing confidence.

Al-Majali (2022) applied quantitative research aiming to find out the effects of mind-mapping techniques on students' use of conjunctions in persuasive writing development. The study employed a quasi-experimental design with 27 tenth-grade male participants who were randomly selected for experimental and control groups. For the quantitative data analysis, the pre-test and post-test were administered as an instrument of the study. The rubric, which includes the organization, goal, reason, attention to audience, word choice, and the use of conjunctions aspects, was chosen in order to score the participants' essay writing. Regarding the statistical interpretation, one-way MANCOVA and ANCOVA were used to evaluate the findings. The findings revealed a significant difference between experimental and control groups regarding conjunction use and writing improvement in persuasive essays.

Based on the statements above, there appears to be a significant gap in research in terms of exploring the application and effectiveness of mind-mapping techniques specifically for persuasive essay writing among EFL learners. While some studies have investigated argumentative writing in general or employed related graphic organizers like concept maps, research directly examining the influence of mind mapping on persuasive writing skills remains limited. Moreover, in the literature, no study has explored the potential relationships between descriptive and persuasive essays in terms of evaluating students’ writing abilities with the use of mind mapping. Therefore, to fill the gap in the literature, the current study will investigate the effect of mind-mapping strategies on students' writing performance, focusing on the relationships between these two essay types.

3. METHODOLOGY

This chapter mainly introduces the methodology used in the current study, including the context and the participants, research design, data collection instruments, procedures, and data analysis.

The objective of the study was to investigate the effect of mind-mapping strategies on the students' writing performance in descriptive and persuasive essays and their perceptions regarding the use of mind-mapping techniques. Concerning this issue, this study focuses on the research questions listed below.

1. Is there any effect of using a mind-mapping strategy on EFL students’ writing performance in a descriptive and persuasive essay? If so, to what extent?

2. Is there any significant difference in cohesion/coherence and task response scores between descriptive and persuasive essays performed based on the mind-mapping technique?

3. Do EFL students find mind mapping for improving their writing skills in essay writing effective? If so, how?

3.1. Setting and Participants

The study was conducted in one of the private universities providing education in associate degree, bachelor's degree, and master's degree programs in Türkiye. In terms of the setting, the research was carried out in a preparatory school targeting students who were admitted to study at the Civil Aviation Programs of Vocational College. Attending the English preparatory school is a prerequisite for learning in their specialized field programs. Regarding the curriculum covered in these aviation departments, English instruction is also compulsory, with a minimum requirement of 30% for those who completed preparatory school successfully. The objectives of the preparatory programs are to provide students with the competencies in primary language skills and utilize them in their departments and professionals effectively.

Throughout the period of preparatory school, the students are supposed to take English courses that last one academic year, including the fall and spring terms. In their weekly schedule, they have the main course and skills classes (R&W and L&S), comprising 10 hours and 10 hours a week, respectively. The English levels in the prep school are aligned with the Common European Framework of Reference for Languages (CFRR)" namely A1/A2 in the Fall Term – and B1 in the Spring Term. Before beginning their education, students are given a placement test to evaluate language skills and language usage. The placement test contains two sections: the Oxford Online Placement Test (OOPT) and the in-house speaking/writing test. In the first stage, the students are required to take OOPT, which has listening, structure, and vocabulary parts. On the condition that the students get results ranging from 41 to 60, corresponding to the B1 level in CFRR, they have the right to take the second stage of the placement test, including speaking and writing sections. The requirement for students to pass the program is to obtain an Intermediate B1 level at the end of the Spring term.

Regarding the participants, 39 EFL students of the Intermediate level ranging in age from 18 to 19 participated in the current study. The participants of this study took the Preparatory Program in the Spring Term of 2022/2023, having two intact classes, namely experimental and control groups. In the experiment group, the number of students participated in the study was 19, comprising three females and 16 males. In the comparison group, the number of participants observed in the study is 20, consisting of five female and 15 male students. Also, the native language of all participants is Turkish. The sampling process in this study did not consider participant selection factors because the students' L2 level was already determined based on their results in the Fall term final and Oxford Online Placement Test. According to their performance on these tests, their proficiency level was assessed, and they were placed in the groups to be instructed in the second term of the Preparatory Program at Intermediate level (B1).

All participants in both groups were informed about the treatment and asked to complete the consent form, ensuring they would be kept confidential and anonymous before the study. Throughout the term, besides their main courses, the participants in two groups took writing classes for four hours, during which the treatment related to the current study was given. Since both groups are majoring in Aviation programs, including Civil Aviation Transportation Management, Flight Operation Management, and Aircraft Technology, after finishing the Preparatory Program, they are supposed to improve their speaking and writing ability regarding the importance of communication and reporting process based on their occupational field.

The instructor/researcher has about fourteen years of teaching experience. She was responsible for giving instructions and analyzing the data for these two groups to avoid any drawbacks of different instruction.

3.2. Research Design

The present study aimed to determine the effects of the mind-mapping technique on the student's writing performance and to identify the students' perceptions of this technique. Therefore, a quasi-experimental method was used to meet the objectives of this study. The study proceeded in two phases: instrument development and its outcome. The first phase was concerned with the development of a questionnaire. The second phase employed a pre- and post-test design to see if the mind-mapping technique had a significant impact on language learning. Finally, participant perceptions were collected in the last stage, and the interview and questionnaire data were qualitatively and quantitatively analyzed. The method was aligned with quantitative and qualitative approaches designed as quasi-experimental research. The integration of these approaches allowed the researcher to diagnose the issue from a different angle, integrating the quantitative data with the qualitative ones, with the aim of answering the research questions. The purpose of implementing this design was to get a deeper understanding of two different methodological approaches.

3.3. Data Collection Instruments

For the current study, two types of data collection tools were used: the quantitative and the qualitative. These instruments facilitated the triangulation of the information, promoting a comprehensive understanding of the findings with increased validity. First, quantitative data are presented to describe the development process of the instruments and the administration procedures, including the questionnaire, pre-test, and post-test, along with the application of statistical tests to analyze the findings. Regarding the qualitative data, the development process of the interview and the reflection paper is presented within the thematic analysis to examine the results by interpreting the participants’ experiences or perceptions through the mind-mapping technique in depth.

3.3.1. Quantitative Data

In this section, the development process of quantitative research instruments is explained, focusing on the item generation, piloting process for questionnaire and, pre-tests and post-tests within the scoring procedure.

3.3.1.1. Questionnaire

Questionnaires are one of the primary methods of collecting data for the assessment and evaluation of inputs such as knowledge, attitudes, opinions, or behaviors in applied research (Singh, 2017). Therefore, for the current study, one of the quantitative data collection tools was determined as the questionnaire formed on a 4-point Likert scale, which helps evaluate the implications of participants' perceptions toward the treatment, Mind Mapping technique. The scale contains options for *strongly agree, agree, disagree*, and *strongly disagree*.

In this study, instead of adapting and revising a used questionnaire, the researcher decided on a new questionnaire to develop with related procedures to increase validity and reliability, including statistical techniques piloting. The questionnaire was given so as to analyze the participants' attitudes toward the mind-mapping technique. The inventory consisted of 24 items, which were categorized into four groups: *cognitive skills* (items 1-9), *metacognitive* (10-15), *creativity* (16-19), and *motivation* (20-24) to gain insight into the participants' perceptions through the treatment to gain insight of the participants' perceptions throughout the intervention process (Appendix A).

The questionnaire for this study was thoroughly created using a systematic procedure involving methodical steps to ensure its validity and reliability.

3.3.1.2. Item Generation

The first step that the researcher followed during the construction of the questionnaire was item generation. In light of the objectives and research questions, the statements for the scale started to be created following the theoretical framework to align with the constructs of the current study. With the help of an adviser, the initial draft with plenty of newly created items was formed. The target respondents and the intended construct were taken into consideration during the beginning of the process.

The second step involved obtaining comments from an adviser and three colleagues to revise and arrange the items. Firstly, three colleagues reviewed the questionnaire items before the piloting process for their readability, clarity, relevancy, and bias. After getting feedback from the colleagues, the adviser also reviewed the items to ensure the content and construct validity of the questionnaire. Following experts' feedback from the experts, the researcher made modifications to some of the items by incorporating additional content, rewording, rephrasing, and reordering them.

3.3.1.3. Piloting

As part of the piloting process, the questionnaire was administered twice, each time to a distinct focus group, to ensure comprehensive feedback and validation of the instrument. This process was conducted to provide feedback and to improve the reliability and the validity of the instrument. During the initial piloting stage, the focus group, who were chosen from the other preparatory classes, consisted of 25 participants. Prior to administering the questionnaire, the participants were informed about the objectives of the piloting process, including the purposes, procedures, and expected outcomes. Their voluntary participation was mandatory in adherence to ethical guidelines. They were assured that their participation was not obligatory, and they could finish filling the questionnaire at any stage. Following administration, the results of the questionnaire were analyzed to check the reliability and validity of the items, addressing the consistency of students’ responses and measurement of the intended factors in the questionnaire. This piloting stage also provided feedback from the participants in order to improve the clarity of the items in the questionnaire.

The following table shows Cronbach's alpha values of the questionnaire used for the first piloting and the Rotated Component Matrix, which are the outputs of the factor analysis.

Table 1

Reliability statistics of the first piloting process

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.670	.624	20

Table 2

Reliability statistics: rotated component matrix [a] of the first piloting process

	Components					
	1	2	3	4	5	6
Item 1	.692				-561	
Item 2				.832		
Item 3			.910			
Item 4			.903			
Item 5				.768		
Item 6				.908		
Item 7			.656		.542	
Item 8	.866					
Item 9						.439
Item 10						
Item 11		.915				
Item 12	.841					
Item 13	.571			.441		-.437
Item 14	.647	.815	.505			
Item 15		.937				
Item 16		.725				
Item 17						
Item 18			.449		.337	
Item 19						
Item 20		.324	.321			

According to the results of the pilot study, the reliability value of the questionnaire was found to be 0.67, which means that internal consistency is not high enough for actual administration. Besides the reliability results, the rotated component matrix was generated to illustrate the correlation between the variables and the factor, as well as the way the variables are weighted for each factor to check the validity of the instrument. Based on the rotated component matrix results, while some items loading is closer to 1, the other items loading is much closer to 0. This finding indicates that items close to 0 needed to be modified in order to contribute more strongly to the factors. Also, when the researcher categorized the factors, it was found that some variables were unrelated to the underlying factors, which are the main components of the questionnaire. Considering the results of the first piloting, the researcher modified items 1,13, 18, and 20 to be more precise in terms of the structure of the sentences and added three more items to balance variables and factor(component) relations. Moreover, according to the Rotated Component Matrix table, it could be interpreted that components 5 and 6 needed to be suppressed due to the fact that none of the variables are related to these underlying concepts.

The second piloting process comprised the modification of the items and components and the administration of the scale. Based on the statistical analysis of the first piloting, the researcher first revised the components of the questionnaire. Before the piloting, the components of the instrument related to the mind mapping technique were "Cognitive skills" "Metacognitive Strategy", "Memory Strategy", "Creativity", "Motivation", and "Self-Regulated Learning". Since the two components did not meet the criteria of the statements in the first administration, "Self-Regulated Learning" and "Memory Strategy" were extracted from the scale. Besides, items 1,13, 18, and 20 were rephrased and four new items were added with regard to the main components. Following the improvements to the questionnaire, the modified scale was run with the 37 participants whose consent was obtained through verbal agreement. The tables below indicate the Cronbach's alpha values obtained from the second piloting process, as well as the Rotated Component Matrix, which displays the correlation of loading between the item and components.

Table 3

Reliability statistics: rotated component matrix [a] of the second piloting process

	Components			
	Creativity	*Cognitive Skills*	*Metacognitive Skills*	*Motivation*
Item 1		.727		
Item 3		.589		
Item 4		.878		
Item 5		.723		
Item 6		.568		
Item 7		.691		
Item 8		.698	.632	
Item 9			.664	
Item 10			.743	
Item 11			.567	
Item 12			.756	
Item 13			.51	
Item 14			.535	
Item 15	.619			
Item 16	.542			
Item 17	.546			
Item 18	.696			
Item 19	.565			.546
Item 20				.815
Item 21				.585
Item 22				.546
Item 23				.622
Item 24				.585

Table 4

Reliability statistics of the second piloting process

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.929	.930	24

As presented in the tables above, values derived from the Rotated Component Matrix and Cronbach's alpha analysis, the internal consistency of the scale is .929, which means that the reliability index is strong enough to conduct the questionnaire for the recent study and the components developed to gain an insight for the participants' attitude toward the Mind Mapping technique could be interpreted as appropriate for the administration.

3.3.1.4. Pre-Test and Post-Test

For quantitative data collection, apart from the questionnaire, the participants were assigned writing tasks as a pre-test and post-test before and after the intervention to evaluate their writing performances based on implementing mind-mapping strategies. Both comparison and experimental groups were given the same tasks for assessment so as to be analyzed to get a picture of statistical data related to their writing performance.

The pre-tests and post-tests consisted of descriptive and persuasive writing topics, which were formulated based on writing materials provided by the Preparatory Unit and the contents from the course books with the collaboration of input from the testing department.

The researcher developed the pre-test assessment the students underwent. Before conducting the pre-test, the researcher gave the writing tests to the students attending different courses to identify any possible issues related to the difficulty level, transparency of instructions, and timing mentioned in the pre-test. Additionally, three experts working in the testing department were asked to make sure the items in the writing tasks measured the expected constructs.

Considering the post-test instruments, the writing topics and prompts were prepared to align with the final exams that the testing office prepared, and items used for the post-tests were developed according to the same level the participants had. To avoid negative washback, the topics were prepared and aligned with the curriculum of that course as implemented in the pre-test development process (Appendix B-C).

3.3.1.5. Assessment

The selection of the scoring rubric is one of the essential parts of the evaluation in order to provide consensus between scores and raters and to raise the validity and reliability (Shabani et al., 2020). Regarding the validity of the measurement, the IELTS rubric was determined to be utilized since the scoring criteria prepared by the institution are not appropriate enough to address the writing components in detail. While the writing scale used in the institution barely guides the raters during the scoring process, the IELTS rubric provides a more extended description of the different performance levels, which promotes more in assessing students' language proficiency. Correspondingly, the IELTS rubric would also be better for understanding the difference between participants' initial and final writing as well as objectivity and consistency in terms of standardized and analytical aspects. Moreover, since the scope of this current study primarily focuses on examining the participants' ability how to generate and organize their ideas by supporting them, the IELTS writing rubric scale with its sub-scales was found adequate and relevant for the researcher to score and analyze the results of the pre and post-tests writing assessment.

In this study, pre-tests and post-test assessments were evaluated through the IELTS writing Band Descriptors of Task 2 comprising four main criteria, namely “task response” “coherence and cohesion”, “lexical resource” and “grammatical range and accuracy” (Appendix D). In Task 2 of the writing tests, writing prompts are designed in a question or a statement format that could be answered with the support of applicants' own ideas or experiences (IELTS, 2023). As a sub-scale, although the student competency in vocabulary and accuracy was essential to evaluate the students' writing performance, the main concern was on “task response” and “coherence and cohesion” criteria to deeply observe and analyze the outcomes resulting from the writing tasks regarding the extent of this study.

While the “task response” component of the scoring rubric measures how an individual approaches the task extensively, develops his/her ideas with relevance to the topic, and formulates the introduction, body, and conclusion part clearly, “coherence and cohesion” is also another effective scale which revolves around the “overall organization” and “logical development” of the task addressing how the topic is logically organized, ordered logically with the use of linking words, “discourse markers” and “substitutions” comprehensive use of topic organ (IELTS, 2023, p. 3).

Regarding summative scores, the rating scales range between 0 and 9, which addresses the proficiency level in writing tasks. A participant who obtains a score of 9 in the IELTS Band Score is considered an "Expert," whereas participants who score one on IELTS writing tasks are considered as a "Non-user" (Appendix D).

Interrater reliability: Scoring Procedure

In terms of scoring the pre-test and post-test assessments, two instructors, apart from the researcher of this study, working in the Preparatory Unit of the same institution, voluntarily accepted to score pre- and post-writing tests. The objective of this procedure is to ensure consistency among the three raters (one was a researcher) regarding the agreement between the raters' scoring results.

Before the scoring process, the scoring procedures, including components of the rubric, the writing prompts of the writing tests, timing, and the level of the students, were discussed in three separate sessions. Two of these meetings were held through teams, while the third was conducted face-to-face. The first session was mainly about the extent of the study, including information related to the mind mapping technique, the participants' competency in L2, procedures, and the IELTS rubric. The second sessions were primarily carried out to inform the subscales of the IELTS rubric and scoring process. Accordingly, the instructors were informed that the fundamental purpose of assessments was to focus on task accomplishment, coherence and cohesion, and the writing content in the scoring process. Similarly, the final discussion centered on covering the administration date of the pre and post-tests, timing consideration, and any further questions from the raters.

During the scoring phase, the papers were anonymized to minimize bias and subjectivity in the scoring outcomes, even though the instructors had no previous knowledge of the students' writing performances.

After scoring two pre-tests and post-tests (descriptive and persuasive essay), inter-reliability analysis was computed through the Intraclass Correlation Coefficient to ensure whether the agreement level among the three raters was high. Tables 5 and 6 present the results of the intraclass correlation coefficient analysis calculated using SPSS.

Table 5

Intraclass correlation coefficient - pre-test descriptive essay scores of comparison and experimental groups

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Pre-test Descriptive Essay (comparison group)	,883[c]	,748	,95	9,803	19	38	0
Pre-test Descriptive Essay (experimental group)	,893[c]	,737	,958	12,284	18	36	0

Table 6

Intraclass correlation coefficient -pre-test persuasive essay scores of comparison and experimental groups

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Pre-test Persuasive Essay (comparison group)	,880[c]	,745	,949	7,97	19	38	0
Pre-test Persuasive Essay (experimental group)	,862[c]	,706	,943	7,154	18	36	0

Regarding the interpretation of the data, average measures were taken into account. Intraclass correlation of Pre-tests related to descriptive and persuasive essay scores are indicated as .883 and .093, which means that the writing scores of the three raters correlate with one another. Additionally, correlation coefficients for % a 95-confidence interval at the Lower and Upper bound values show that the correlation between the three raters' scorings is high enough since the numbers are more significant than 0.7.

Besides the pre-test scoring consistency, both groups' post-test descriptive and persuasive essay scorings were also analyzed using the Intraclass Correlation Coefficient measure. Tables 7 and 8 illustrate the value of correlation among three raters scoring the descriptive and persuasive essays as post-tests. Accordingly, the intraclass correlation was calculated as .932 and .916, highlighting the high consistency level among the scoring outcomes. Moreover, the Lover Bound and Upper Bound of Confidence Interval values are found to be .853 and .821 for descriptive essay scoring and .827 and .77 for persuasive essay scoring. These data also present that there is no irrelevant scoring process considering the three instructors.

Table 7

Intraclass correlation coefficient -post-test descriptive essay scores of comparison and experimental groups

	Intraclass	95% Confidence Interval		F Test with True Value 0			
	Correlation[b]	Lower Bound	Upper Bound	Value	df1	df2	Sig
Post-test Descriptive Essay (comparison group)	,932[c]	,853	,971	16,684	19	38	0
Post-test Descriptive Essay (experimental group)	,916[c]	,821	,965	11,883	18	36	0

Table 8

Intraclass correlation coefficient-post-test persuasive essay scores of comparison and experimental group

	Intraclass	95% Confidence Interval		F Test with True Value 0			
	Correlation[b]	Lower Bound	Upper Bound	Value	df1	df2	Sig
Pre-test Persuasive Essay (comparison group)	,919[c]	,827	,966	13,238	18	36	0
Pre-test Persuasive Essay (experimental group)	,902[c]	,77	,961	12,872	18	36	0

Based on the findings in the tables, no discrepancy was found regarding the raters' scoring procedures, results, and interpretation of the rubric content.

3.3.2. Qualitative Data

3.3.2.1. Interview

One of the qualitative data collection instruments in the current study was the interview, which would help the researcher/teacher to interact in depth with the participants. In terms of the format, a semi-structured interview was chosen since it is primarily common for their flexibility in group or individual settings (DiCicco-Bloom & Crabtree, 2006). The items in the interview were structured according to the constructs developed during the questionnaire preparation process with the aim of providing the researcher with a deeper understanding of participants' attitudes and perceptions towards the techniques used in treatment. In this regard, "expert assessment", which involves guidance for developing the items, was considered beneficial in assessing the appropriateness and comprehensiveness of the interview in relation to the aims and the subjects of the study (Kallio, Pietilä, Johnson & Kangasniemi, 2016, Pilot Testing of the Interview Guide section, para. 3). Furthermore, since semi-structured interview was created for the study, the new questions were asked depending on the flow of conversation throughout the course of interview (Appendix E).

In this study, five participants were selected to be interviewed about the application of the mind-mapping technique during the in-class treatment. As a first step, the researcher asked the whole class whether they voluntarily agreed to participate in the interview. Subsequently, out of seven participants, five students were invited for semi-structured interviews in accordance with the variances in their writing abilities and active participation in the class.

Before the interview session, interviewees were asked for their consent again and informed that the interview was recorded and transcribed to be analyzed for the current study later. Each interview session lasted for approximately 20 minutes and was conducted face to face in order to get a better understanding in terms of body language, gestures, and good rapport between a participant and the researcher. The questions in their native language (Turkish) were posed, and some follow-up questions that were not written in the interview form were also asked based on the students' replies in the course of the interview process.

3.3.2.2. Reflection Paper

The reflection paper was the other qualitative data the researcher used to obtain information on participants' perceptions throughout the intervention. After submitting each week's tasks related to drawing mind maps and writing essay procedures, students were asked to write reflection papers to articulate their feelings or thoughts pertaining to the mind mapping technique. After the instructions and the questions were prepared by the researcher, the questions were asked to two colleagues so as to check and revise the instructions if required. Reflection paper tasks were given to the experimental group every other week via the Google Classroom platform with guidelines for their answers to align with the purpose of the study for six weeks. Also, the students were free to use their native language when they wrote their reflections about mind mapping and treatment to express their opinions transparently (Appendix F).

3.4. Procedures

Considering the treatment plan process, two intact groups, including experimental and comparison groups, were involved in the study. The duration of the study lasted 14 weeks to obtain the qualitative and the quantitative data simultaneously. The researcher asked permission from the head of the department to take on the role of the teacher for both experimental and comparison groups in order to prevent any bias and misunderstanding related to the instructions and to observe students' writing performances in both groups.

In this study, the treatment, including the mind-mapping technique for the pre-writing stage, was applied to the experimental group to see any significant differences between the two groups. During the processes of while-writing and post-writing, the students were directed to use their mind maps in order to evaluate, edit their drafts, and finalize their essays more effectively before submitting them to the teacher for feedback. While both groups were given the same writing topics and basic writing instructions during the term, the comparison group was not instructed about the mind-mapping technique in the pre-writing stage. Instead, students in this group were exposed to the conventional phases of writing pertaining to discussing writing topics questions (pre-writing stage), while-writing, and post-writing. The student's performance during the pre-writing stage was not monitored and assessed. Unlike the comparison group, the pre-writing stage was highly observed and analyzed during the treatment in the experimental group, as well as the while-writing and post-writing stages (Appendix G). The allocated time for creating mind maps was 25 minutes in the first 11 weeks and 10 to 15 minutes in the other weeks. Additionally, throughout the instruction, the designated time for writing an essay was 35 minutes for while-writing and 10 minutes for post-writing stages, with a minimum 150-word limit in both groups.

3.4.1. Weekly Treatment Schedule for Experimental Group

Before starting the treatment, the instructor informed the students about the intervention process due to ethical reasons. The students were asked to complete the written consent form to participate in the in the observation and interview process. Following the mutual commitment, during the first week, the instructor elaborated on the detailed instructions on transitioning from paragraph writing into essays. This included explanations on topic sentences, thesis statements, and parts of the essay writing. Given their knowledge of how to develop a structured paragraph, they were introduced to the parts of the essay writing, including the introduction, body, and conclusion paragraphs. In the third and fourth hours, the students were asked to write descriptive and persuasive essays based on their proficiency level to gain information about their initial writing performance.

In the second week, the researcher continued informing her students about the processes of developing essays and introduced the mind-mapping technique, elaborating on samples and videos for students to gain insight into the method. Informing the students about the technique, the researcher wrote a writing topic (*one of the country's customs*) on board, and the teacher implemented a think-aloud protocol technique. The students verbalized their opinions about the given topic regarding deciding the country and examples of customs. Accordingly, the teacher instructed them to create their mind maps in pairs, followed by a collaborative session to promote their familiarization with the technique.

In the third and fourth weeks, the students were instructed about the processes of descriptive and persuasive essays with the valuable expressions given to develop their writing skills. During the pre-writing stage, they were asked to create their mind maps independently and share the crafts with their partners under the teacher's guidance. During the while-writing stage, the students started to write their essays as drafts using their mind maps. Through the sessions, the teacher tried to supervise them regarding using ideas reflected on their maps. The allocated time for writing their drafts was 35 minutes. Once finished with their writing, the students were tasked to revise their papers and rewrite them before submitting them to the teacher with the addition of mind maps for post-writing activity. The objective of submitting the paper was for the researcher to give additional feedback and observe their performances, considering how they created their mind maps and whether any ideas were relevant or not in their essays.

From the 5th to the 13th week, the treatment procedures were the same as performed in the third and the fourth weeks; the students were trained to plan their mind mapping design based on the topics the teacher assigned to write an essay for the related theme. In the while-writing stage, the participants were expected to create their drafts, focusing on their mind maps. After allocating time for the revising and editing process, they were asked to finalize their writing tasks with the assistance of their mind maps. In this way, mind maps allowed the participants to visualize the generation and organization of their ideas, facilitating them to recheck and refine their writing tasks during the post-writing stage. Unlike previous weeks, in the 12th and 13th weeks, the students were supposed to draw a mind map for 10-15 minutes promptly in the pre-writing stage rather than more extended time. After developing their mind maps, the students were expected to write their drafts, finalize their papers, and submit them to the teacher for feedback, as in the previous weeks.

In the final week, students in the experimental group were asked to write two types of essays -descriptive and persuasive- to examine their final writing performances regarding the treatment with mind-mapping strategies. The purpose of this assessment process was to analyze how the mind-mapping technique affected their writing ability in order to develop well-structured essays in both descriptive and persuasive genres. Moreover, the questionnaire and the interview were implemented to analyze their perceptions of the mind-mapping technique. While the questionnaire provided an understanding of the general attitudes with the mind-mapping technique, the interview aimed to gain insights related to the effect of mind mapping on students' writing performances.

3.4.2. Weekly Schedule for Comparison Group

Students in the comparison group received conventional training regarding the writing instructions to develop their essay writing throughout the term. The teacher introduced the basic rules for the transitions from paragraphs to essay writing in the first week. Like the experimental group, the students in the comparison group also had knowledge of paragraph development, so the teacher focused on information about the introduction, body, and conclusion paragraphs to compose their essay. Moreover, in the third and fourth hours, the students were asked to write descriptive and persuasive essays based on the writing prompts in order to evaluate their initial writing performances. In the second week, the teacher asked the students to write an essay on one of the given topics to practice applying essay parts. During the third and the fourth sessions, the overall information about the writing process was explained, and the students practiced one of the writing topics (*one of the country's customs*). While the experimental group was introduced to applying the mind-mapping technique during the pre-writing stage, the comparison group received non-specific instructions on pre-writing stage techniques. The students were allocated time to make preparations for their essays by themselves without explicit strategies. The teacher tended to focus merely on the essay prompts, questions, and unstructured instructions, such as a list format without visual aids. During the while-writing stage, the students composed their writing without guidance or feedback. They were not allowed to use additional techniques, including mind maps or visual tools. For the post-writing process, the teacher instructed the comparison group to revise and edit their essay based on the general writing principles, including checking for grammar, mechanics, and content. After submitting their essays, feedback was provided to the comparison group about their finalized papers.

In the third and fourth weeks, the two essay types -descriptive and persuasive- were presented to the students along with relevant instructions, respectively, similar to the experimental group. For these two weeks, since the objective was rather to focus on the familiarizing students with the essay types and the conventional procedures of writing process, the post-writing process was assigned as homework for students, allowing them additional time to analyze and revise their essays. From the fifth and thirteenth week, students were given five descriptive and five persuasive essay topics to practice and develop their writing skills within the same format of processes, facilitating the improvement of their writing skills in these two essay genres. During these weeks, feedback was given to the students, addressing their final products. In the last week, the teacher assigned descriptive and persuasive writing topics which were identical to those in the experimental group, to evaluate their performances at the end of the term.

3.5. Data Analysis

In order to find an answer for the research questions, the quasi-experimental research design was selected to gain an understanding of the relationships between mind-mapping strategies and the students' writing performances in an educational environment. Regarding the analysis of the findings, both quantitative and qualitative data were examined to present detailed interpretation of the mind-mapping effect on students writing performances and their perceptions.

For the quantitative findings, two instruments were used to address the research questions of the study, namely the questionnaire, the pre-tests, and the post-test results of the participants. As the first instrument, the researcher developed the Likert-scale questionnaire, with twenty-four items, to determine the participants' attitudes and perceptions, addressing the question, "*Do EFL students find mind mapping for improving their writing skills in essay writing effective? If so, how?"* The findings were interpreted based on the four categories of the questionnaire: cognition, metacognition, creativity and motivation. The results were obtained to compute the descriptive data through SPSS, analyzing the frequency distribution. Frequency distribution provided an understanding of how frequently the participants' responses distributed across the categories, emphasizing common or different responses in the data set.

The other quantitative instruments used to gain insight into the students' writing performance are pre-tests and post-tests to answer the research questions, "*Is there any effect of using a mind-mapping strategy on EFL students' writing performance in a descriptive and persuasive essay? If so, to what extent?",* and *"Is there any significant difference in cohesion/coherence and task response scores between descriptive and persuasive essays performed based on the mind-mapping technique?".* In order to determine any significant difference between comparison and experimental groups, in terms of descriptive and persuasive essays, a non-parametric test called the Mann-Whitney U test was used. The choice of the Mann-Whitney U test was due to the limited sample size, and lack of randomization in terms of the participant distribution which did not meet the standards required for parametric tests (McKnight & Najab, 2010). Moreover, Wilcoxon signed rank test, non-parametric test, was used to examine any significant difference between these two types of essays regarding the cohesion/coherence and task response criteria. The reason of choosing the non-parametric test for this analysis was the absence of normal distribution and the small sample size of the two groups. Since Wilcoxon signed rank test is employed to analyze the paired data within a single group (Woolson, 2005), the researcher used this non-parametric test to evaluate any changes before and after the treatment within the experimental group.

Based on the analysis of qualitative data, semi-structured interviews and reflection papers were administered to find an answer to the research question, *"Do EFL students find mind mapping for improving their writing skills in essay writing effective? If so, how?"*. In order to analyze and interpret the data systematically, thematic analysis was used to categorize and organize the responses provided from the semi-interview questionnaire and reflection papers into themes. The reason for determining this data analysis was that the thematic analysis can be defined by its flexibility, not just conceptually but also regarding the research topic, sample size and composition, data collection strategy, and approaches to meaning development (Clark et al., 2017). Furthermore, thematic analysis can be applied to evaluate larger and smaller datasets, including homogeneous and heterogeneous samples, case studies with 1-2 participants, and extensive interview studies with 60 or more people (Clark et al., 2017). The interview duration for each participant was between 15 and 20 minutes, providing insights for the participants' attitudes or experiences with the mind-mapping technique. Regarding the thematic analysis, the transcription and the developing code processes were developed manually by the researcher. As in the development of the questionnaire, the researcher consulted one of the instructors in order to check whether the coding process was valid and consistent with the themes, thereby promoting the credibility of the findings.

3.6. Summary

This chapter sheds light on information about the settings and participants, data collection instruments, implementation of the procedures, and the data analysis of this study. As a research design, the quasi-experimental method was chosen as the research method to investigate the effect of mind-mapping techniques on EFL students' writing performance and their perceptions of the mind-mapping technique based on their writing improvements in descriptive and persuasive essays. The instruments conducted to gather the quantitative and the qualitative data, were determined to align with the objectives of the research questions of the study. The summary of the process with respect to the methodology section is given in Table 9.

Table 9

The overview of the data collection process

No	*Research question*	*Source data*	*Participants*	*Instruments*	*Analysis*
1	Is there any effect of using a mind-mapping strategy on EFL students' writing performance in a descriptive and persuasive essay? If so, to what extent?	Essays	39(comparison and experimental)	Pre-test & Post-test	Mann-Whitney U Test
2	Is there any significant difference in cohesion/coherence and task response scores between descriptive and persuasive essays performed based on the mind-mapping technique?	Essays	19(experimental group)	Pre-test & Post-test	Wilcoxon Signed-rank Test
3	Do EFL students find mind mapping for improving their writing skills in essay writing effective? If so, how?	The information obtained from participants	19(experimental group)	Semi-structured Interview Reflection Paper & Questionnaire	Thematic analysis & Descriptive Statistics

4. RESULTS

This chapter comprises the results of the study obtained through the quantitative and qualitative analysis aiming to answer the four research questions.

In this section, the study presents its findings using two main methods: quantitative and qualitative research. The first section presents the results from the quantitative analysis addressing the three research questions:

1. Is there any effect of using a mind-mapping strategy on EFL students' writing performance in a descriptive and persuasive essay? If so, to what extent?

2. Is there any significant difference in cohesion/coherence and task response scores between descriptive and persuasive essays performed based on the mind-mapping technique?

3. Do EFL students find mind mapping for improving their writing skills in essay writing effective? If so, how?

4.1. Quantitative Research Findings

Considering the quantitative aspects of this study, findings were systematically collected from the administration of pre-test and post-test for both the comparison and experimental groups, and a questionnaire was administered to the experimental group only after the treatment. The following sections will detail the findings from the quantitative analysis.

4.1.1. The Effect of Using the Mind-Mapping Strategy on EFL Students' Writing Performance in a Persuasive and Descriptive Essay

Regarding the first research question, "*Is there any effect of using a mind-mapping strategy on EFL students' writing performance in a descriptive and persuasive essay? If so, to what extent?*" aimed to provide an understanding of whether there was a statistically significant difference between the experimental and comparison groups' writing scores in their descriptive and persuasive essay at the beginning of the treatment.

4.1.1.1. Pre-test Results of Comparison and Experimental Groups

In that respect, the pretest scores of both groups were analyzed to ensure the initial equivalence of their writing scores of both groups.

Since the data were non-normally distributed, the nonparametric Mann-Whitney U test was used to analyze pre-test scores. Tables 10 and 11 illustrate pre-test scores for comparison and experimental groups related to initial descriptive and persuasive essay performances.

Table 10

Mann-whitney u test for pretest scores in persuasive essay

	Persuasive Essay Pre-test Score
Mann-Whitney U	155
Wilcoxon W	365
Z	-0,996
Asymp. Sig. (2-tailed)	.319

Table 11

Mann-whitney u test for pretest scores in descriptive essay

	Descriptive Essay Pre-test Score
Mann-Whitney U	146,5
Wilcoxon W	356,5
Z	-1,259
Asymp. Sig. (2-tailed)	.208

As shown in Tables 11 and 12, the pre-tests between comparison and experimental groups were found to be not significant, with p = .319 for a persuasive essay and p = .208 for a descriptive essay (p < 0.05). These findings indicate that there is no significant difference between the two groups in accordance with writing performances and the two groups had similar scores at the beginning of the treatment.

4.1.1.2. Post-test Results of Comparison and Experimental Groups: The Effect of Using a Mind-Mapping Strategy on EFL Students' Writing Performance in a Persuasive and Descriptive Essay

The second step was to analyze post-test scores to explore whether the treatment influenced the students' writing performance in the experimental group. Tables 12 and 13 show the descriptive statistics for the two groups' descriptive and persuasive essay scores, including the mean, standard deviation, and minimum and maximum scores, to provide a comprehensive summary of the data before presenting the results statistically.

Table 12

Descriptive statistics: persuasive essay post-tests for two groups

Persuasive Essay Post-test	N	Minimum	Maximum	Mean	Std. Deviation
Comparison Group	20	3,00	7,50	5,8	,94
Experimental Group	19	4,50	8,00	6,7	,78

Table 13

Descriptive statistics: descriptive essay post-tests for two groups

Descriptive Essay Post-test	N	Minimum	Maximum	Mean	Std Deviation
Comparison Group	20	3,00	7,00	5,6	,93
Experimental Group	19	5,50	8,00	6,65	,76

According to Tables 12 and 13, the mean scores for the experimental and comparison groups on the post-tests for persuasive essay and descriptive essay are 6.7 and 5.8, and 6.65 and 5.6, respectively, which means that the experimental group outperformed the comparison group in both essay types. This improvement in the experimental groups' performance suggests that the treatment which involved the mind-mapping strategy positively impacted the students' writing skills. In addition to the descriptive analysis, Mann-Whitney U test was used to see whether there was a statistically significant difference between the two groups related to their post-scores for persuasive and descriptive essays. The results of the tests for both comparison and experimental groups are presented in Tables 14 and 15, indicating the students' writing performances in post-tests.

Table 14

Mann-whitney u test for post-test scores in persuasive essay

	Persuasive Essay Post-test Scores
Mann-Whitney U	64,5
Wilcoxon W	274,5
Z	-3,572
Asymp. Sig. (2-tailed)	.000

Table 15

Mann-whitney u test for post-test scores in descriptive essay

	Descriptive Essay Post-test Scores
Mann-Whitney U	78
Wilcoxon W	288
Z	-3,209
Asymp. Sig. (2-tailed)	.001

As illustrated in Tables 14 and 15, post-test scores between comparison and experimental groups were found to be significant, p = .000 and .001 ($p < 0.05$) for persuasive and descriptive essays, respectively. These results indicate a significant difference between the two groups, as the p-value is less than the conventional significance level of 0.05. This finding presents that the implementation of intervention had a positive effect on students' writing performances in the experimental group in terms of persuasive and descriptive essay types.

4.1.1.3. Pre-Tests / Post-test Analysis of Comparison Group: The Effect of Using a Mind-Mapping Strategy on EFL Students' Writing Performance in Descriptive and Persuasive Essays

This section analyzes the pre-test and post-test scores of the comparison group that did not have any mind-mapping instructions during the term. This examination investigated whether significant differences occurred in the students' writing performances in descriptive and persuasive essays. In order to compare two pre-tests and post-tests results of participants related to one single group, the Wilcoxon Signed-Rank test was used to evaluate the findings. The following tables illustrate the comparison group's writing scores regarding inferential and descriptive analysis.

Table 16

Wilcoxon signed ranks tests for pre-test and post-test scores in descriptive essay.

	Descriptive Essay
Z	-2,622[b]
Asymp. Sig. (2-tailed)	0,009

Table 17

Descriptive statistics: pre-test and post-test for comparison group in descriptive essay

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-test scores	20	3,5	6	4,82	0,69
Post-test scores	20	3	7	5,65	0,93
Valid N	20				

As shown in Table 16, the results demonstrated a significant change between pre-test and post-test scores for comparison group, with p = .009 ($p < 0.05$). The findings suggest that students in the comparison group developed their writing performances although the comparison group did not receive any treatment with regard to mind-mapping instructions during the study. In terms of the descriptive findings, the mean post-test score (*M* = 5.65) for the comparison group was found to be higher than the pre-test scores (*M* = 4.82). This increase, presented in Table 17, indicates that the comparison group improved their writing scores compared to the initial performances.

The same process was conducted in order to assess the pre-test and post-test scores for the persuasive essay type. This process was carried out to determine whether there was a significant difference in their writing performances for persuasive essays between pre-test and post-test scores. The results are detailed in Tables 18 and 19 below, presenting the data for both tests.

Table 18

Wilcoxon signed ranks tests for pre-test and post-test scores in persuasive essay

	Persuasive Test
Z	-3,451[b]
Asymp. Sig. (2-tailed)	0,001

Table 19

Descriptive statistics: pre-test and post-test for comparison group in persuasive essay

	N	Minimum	Maximum	Mean	Std. Deviation
Persuasive Test Pre-test scores	20	3,5	6	4,76	0,78
Persuasive Test Post-test scores	20	3	7,5	5,76	0,94
Valid N (listwise)	20				

According to the pre-test and post-test results related to persuasive essays, there was a significant difference between the two tests, $p = .001$ ($p < 0.05$) given in Table 18. The findings indicate the observed improvements in participants' writing performances. Additionally, table 19 reveals progress in the mean scores from the pre-test (M = 4.76) and post-test (M = 5.76), aligning with the findings shown in Table 18.

4.1.1.4. Pre-Tests / Post-test Analysis of Experimental Group: The Effect of Using a Mind-Mapping Strategy on EFL Students' Writing Performance in Descriptive and Persuasive Essays

This section examines the findings obtained from the pre-test and post-test scores of experimental group in both descriptive and persuasive essays, aiming to investigate whether there were any significant differences between the initial and final writing performances of the same group of students. Since the data belonged to the same group of participants, the Wilcoxon Signed Ranks test was employed to interpret the results based on the students' writing performances. Tables 20 and 21 present the findings related to the inferential and descriptive statistics, using the Wilcoxon Signed Rank test given below.

Table 20

Wilcoxon signed ranks tests for pre-test and post-test scores in descriptive essay

	Descriptive essay Post-test scores Descriptive essay Pre-test scores
Z	-3,764[b]
Asymp. Sig. (2-tailed)	.000

Table 21

Descriptive statistics: pre-test and post-test for experimental group in descriptive essay

	N	Minimum	Maximum	Mean	Std. Deviation
Descriptive essay Pre-test scores	19	3	6	5,05	0,66

Descriptive essay Post-test scores	19	5,5	8	6,65	0,76
Valid N (listwise)	19				

As demonstrated in Tables 20 and 21, comparison between the pre-test and post-test scores for descriptive essays were found to be significant with $p = .000$ ($p < 0.05$), which is less than 0.05. Considering the descriptive statistics, the mean score for the post-test ($M = 6.65$) was found to be higher than the mean score for pre-test ($M = 5.05$) in a descriptive essay. These findings in the mean scores suggest that the mind-mapping treatment instructed to the experimental group had a positive impact on the students' writing performances.

Given the comparison of pre-test and post-test scores in a persuasive essay, the same procedures were carried out to evaluate the effect of the mind-mapping technique on this essay genre. The analysis aimed to determine whether there was a positive effect of the mind-mapping technique on students' writing performances in the experimental group. The following tables indicate the findings based on the inferential and descriptive statistics below.

Table 22

Wilcoxon signed ranks tests for pre-test and post-test scores in persuasive essay

	Persuasive essay Post-test scores Persuasive essay Pre-test scores
Z	$-3,836^{b}$
Asymp. Sig. (2-tailed)	0

Table 23

Descriptive statistics: pre-test and post-test for experimental group in persuasive essay

	N	Minimum	Maximum	Mean	Std. Deviation
Persuasive essay Pre-test scores	19	3,0	6,00	5,00	0,91
Persuasive essay Post-test scores	19	4,5	8,00	6,78	0,78
Valid N (listwise)	19				

The analysis of the findings reveals that the p-value was found to be .000, which is less than .005 ($p < 0.05$), highlighting the statistically significant difference between pre-test and post-test scores of persuasive essays. This result is supported by the mean scores presented in Table 23. The descriptive statistics show that the mean score of post-tests (M = 6.7) is higher than the pre-test scores for the pre-test (M = 5.0). This increase in mean scores points out that the implementation of mind mapping had a beneficial impact on the students' performances in terms of persuasive essays, focusing on the application of the mind-mapping strategy during the treatment.

4.1.2. Significant Difference in Cohesion/Coherence and Task Response Scores Between Descriptive and Persuasive Essays Performed Based on The Mind Mapping Technique

Regarding the second question, "*Is there any significant difference in cohesion/coherence and task response scores between descriptive and persuasive essays performed based on the mind-mapping technique?*" the study intended to investigate any significant difference between these two essay types and to explore whether the mind-mapping technique promoted their writing performance within similar levels of improvement. To address the research question, the overall analysis was conducted first based on their post-test scores across both essay types. Since the related samples in only a single group were compared, the Wilcoxon Signed Rank test was used to interpret the results. The following table illustrates the post-test results of descriptive and persuasive essays belonging to the experimental group.

Table 24

Wilcoxon signed ranks tests for post-tests scores in persuasive and descriptive essays

	Persuasive essay posttest score - Descriptive essay Posttest score
Z	-,554[b]
Asymp. Sig. (2-tailed)	0,580

The test results, presented in Table 24, show that there is no significant difference between the two post-test scores (p = 0.580). Since the p-value is higher than the common significance level of 0.05, the difference between the scores of post-tests is not significantly different. In other words, the data suggest that the student's writing performance in both tests was similar, and the mind-mapping treatment did not result in any difference between these two essay types. Additionally, to emphasize the data within the descriptive statistics, the following table summarizes the results of post-test scores involving the minimum and maximum scores, mean, and standard deviations. These descriptive statistics provide an understanding of the distribution or variability of the post-test scores.

Table 25

Descriptive statistics: post-tests scores for experimental group

	N	Minimum	Maximum	Mean	Std. Deviation
Scores for overall scoring (descriptive essay)	19	4,50	8,00	6,7	,78

Scores for overall scoring (persuasive essay)	19	5,50	8,00	6,6	,76

As detailed in Table 25, the mean scores for both descriptive essay (*M* = 6.7) and persuasive essay (*M* = 6.6) are nearly identical, indicating that the treatment's effect was not different regarding their writing performances in the two essay types. This close alignment in mean scores shows that the mind-mapping treatment had impact on students' writing skills for both descriptive and persuasive essay.

In order to gain a deeper insight into how the mind mapping technique affected the participants' writing performance on two scoring criteria: "task response" and "coherence and cohesion". These criteria are considered as two key aspects of writing an essay performance that are expected to be developed by the mind mapping technique. In order to examine whether this strategy had a significant effect on these criteria, Wilcoxon Signed Test was conducted for inferential statistics analysis.

Tables 26 and 27 present a detailed summary of the two post-test results focusing on the scoring criteria of "task response" and "coherence and cohesion" from the descriptive and inferential statistical analysis aspects.

Table 26

Wilcoxon signed ranks tests for post-tests scores on coherence and cohesion criteria

	Coherence and Cohesion
Z	$-1{,}690^{b}$
Asymp. Sig. (2-tailed)	,091

Table 27

Descriptive statistics: post-tests scores on coherence and cohesion criteria

	N	Minimum	Maximum	Mean	Std. Deviation

Scores for coherence (descriptive essay)	19	4.50	8.00	6.9	.87
Scores for coherence (persuasive essay)	19	5.00	8.00	6.5	.82

Regarding these two statistical analyses, there was no significant difference between the descriptive and persuasive essays in terms of their coherence and cohesion as the p = 0.91, which is higher than p = 0.05 (p < 0.05). Also, post-test results indicated similar writing performances in terms of two essay types. The mean for the descriptive essay was 6.9 (*SD* = .87) and 6.5 (*SD* = .82) for the persuasive essay, with minimal variance across the two different essay types. The second important aspect of scoring criteria is task response. The task response was analyzed to check for a significant difference between the two post-test results. The following table presents the findings.

Table 28

Wilcoxon signed ranks tests for post-tests scores on task response criteria

	Task Response Criteria
Z	-2.098[b]
Asymp. Sig. (2-tailed)	.036

Table 29

Descriptive statistics: post-tests scores on task response criteria

	N	Minimum	Maximum	Mean	Std. Deviation
Scores for task response (descriptive essay)	19	4,00	8,00	7,1	,99
Scores for task response (persuasive essay)	19	5,00	8,00	6,5	,77

In contrast to the “coherence and cohesion” scoring criteria, the “task response” analysis presented in Tables 28 and 29 demonstrates that there was a significant difference between descriptive and persuasive essay types as $p = .036$ ($p < 0.05$). Moreover, the mean score of descriptive essays ($M = 7.1$) is higher than the persuasive essay ($M = 6.5$) which shows that the students may have found it easier to write descriptive writing in terms of achieving “task response”. However, the spread of descriptive essays ($SD = .99$) is slightly higher than that of persuasive essays ($SD = .77$), indicating more variability in descriptive essay scores and more consistent performance in persuasive essay types. In other words, while students, on average, outperformed in a descriptive essay in terms of fulfilling the “task response” variance in their performance suggests a range of ability or fulfillment in this scoring criteria.

4.1.3. Questionnaire Analysis Findings

Aiming to address the third question, “*Do EFL students find mind mapping for improving their writing skills in essay writing effective? If so, how*?”, the four-point Likert-type questionnaire was conducted after the treatment in the experimental group. The questionnaire comprises 24 items divided into four subscales: metacognitive, cognitive, creativity, and motivation. This section details the descriptive analysis of the data gathered through the questionnaire under these four sub-categories using the SPPS 20 Statistics Package program, providing an understanding of how the students’ opinions were shaped based on the mind-mapping technique. Cognitive aspects consist of nine items, metacognitive aspects of six items, creativity of four items, and motivation of five items in the questionnaire given at the end of the treatment.

4.1.3.1. Cognitive Aspects

For most of the nine items related to cognitive abilities, students tended to choose the “agree” option, such as items 1, 3, 4, 5, 6, and 7. For instance, considering item three stated as “Mind mapping helps me to distinguish between more and less important information about the topics.”, 14 (73,5%) students indicated their agreement with the ability to categorize the ideas about the writing topics with the involvement of two participants selected “strongly agree” option. Additionally, in response to item 1, worded as “Mind mapping helps me to organize my ideas.*"* 11 (57,9 %) students agreed, and four students (21.1 %) strongly agreed that the mind mapping technique contributed to organizing their opinions before the writing process. In contrast to positive responses, students generally tended to disagree with items eight and nine, which related to the connection of supporting ideas and the use of linking words. To illustrate:

In response to item eight, which stated "Mind mapping helps me to make connections between supporting ideas.", seven students (36,8 %) disagreed with the statement, and the other seven students (36,8 %) also choose the "strongly disagree" option in the cognitive skills section.

Regarding item nine, which had the most negative perceptions of the cognitive skills aspects, particularly 13 students, representing 64,8 % of the participants, tended to select the "disagree" response on the scale and two students, representing the 10,5 % of the participants, expressed a negative attitude by selecting "strongly disagree" responses for the questionnaire.

These findings highlight that the students generally had a positive outcome about implementing the mind-mapping technique based on cognitive skills, such as organization, idea association or expressing main or supporting ideas; however, they also expressed negative perceptions towards the mind-mapping technique, considering the use of linking words effectively and the connection of supporting ideas.

Table 30 highlights a comprehensive overview of the students' perceptions of the cognitive aspects of mind mapping, presenting the frequencies of the students' responses to the questionnaire which administered after the intervention.

Table 30

Overview of student responses: cognitive skills

Cognitive Dimension	Strongly agree	Agree	Disagree	Strongly Disagree

Item No.	N	Mean	Std. Deviation	f	(%)	f	(%)	f	(%)	f	(%)
1	19	2	0.66	4	21,1	11	57.9	4	21,1	-	-
2	19	1,84	0,83	8	42,1	6	31,6	5	26,3	-	-
3	19	2,10	0,65	2	10,5	14	73,5	-	-	1	5,3
4	19	2,42	0.83	2	10,5	9	47,4	6	31,6	2	10,5
5	19	2,15	0,68	3	15,8	10	52,6	6	31,6	-	-
6	19	2,21	0,78	3	15,8	10	52,6	5	26,3	1	5,3
7	19	2,30	0,74	2	10,5	10	52,6	6	31,6	1	5,3
8	19	2,15	0,76	4	21,1	8	42,7	7	36,8	7	36,8
9	19	2,78	0,87	2	10,5	2	10,50	13	64,8	2	10,5

4.1.3.2. Metacognitive Skills

Items related to the metacognitive aspects of the mind mapping technique consist of six questions ranging from item 10 to item 15. The analysis of this second dimension, which focused on metacognitive skills, brought slightly contradictory findings. While the majority of the students had positive opinions related to the mind mapping technique, some of the students' responses revealed uncertainty or a negative tendency towards item 10 and item 14, which are examined below in detail.

In response to item 10, written as "Mind mapping helps me to analyze how different ideas fit together to write about a topic.", eight students (42,1 %) and one student (5,3 %) tended to agree and strongly agree with the statement, nine students (42,4 %) and one student (5,3 %) expressed their opinions as "disagree" and "strongly disagree" for the item. The finding suggests that half of the students might have problems differentiating opposite ideas within a single concept.

Regarding item 14, "Mind mapping helps me manage my time well during the writing process." seven students agreed, and seven students (36,8 %) disagreed with the statements related to time management. Additionally, five students (26,3 %) tended to select the "strongly disagree" response, indicating that more than half of the students did not find mind mapping helpful for managing time.

Despite the negative perceptions regarding timing and differentiation of ideas, students reflected their positive perceptions on the mind mapping technique related to other statements mentioned in the questionnaire, particularly for items 11, 12, and 15. For instance, in item 15, 11 students (57,9 %) agreed, and two students (10,5 %) strongly agreed with the statement, “Mind mapping helps me to categorize the ideas I find.” Similarly, for item 12, stated as “Mind mapping helps me to remove or revise what is not necessary for the topics.” 11 students (57,9 %) tended to agree, and four students (21 %) tended to strongly agree with the statement. Moreover, item 11, which is about the effect of mind mapping on planning ideas, revealed that ten students (52,6 %) agreed, and three students (15,8%) strongly disagreed with the benefits of mind mapping in metacognitive aspects. Table 31 below presents the overview of students’ responses based on the dimension of metacognitive skills.

Table 31

Overview of student responses: metacognitive skills

Metacognitive Dimension				Strongly agree		Agree		Disagree		Srongly Disagree	
Item No.	N	Mean	Std. Deviation	f	(%)	f	(%)	f	(%)	f	(%)
10	19	2,5	0,69	1	5,3	8	42,1	9	42,4	1	5,3
11	19	2,15	0,68	3	15,8	10	52,6	6	31,6	-	-
12	19	2,05	0,77	4	21	11	57,9	3	15,8	1	5,3
13	19	2,42	0,5	-	-	11	57,9	8	42,1	-	-
14	19	2,9	0,8	-	-	7	36,8	7	36,8	5	26,3
15	19	2,21	0,63	2	10,5	11	57,9	6	31,6	-	-

4.1.3.3. Creativity Aspects

The questionnaire regarding the creativity dimension comprises four items focusing on exploring new and different ideas and emphasizing role visualization. Based on the findings, most of the students in the experimental group expressed their positive views regarding the effect of creativity on mind-mapping techniques. To illustrate, for item 16, nine students (36,8 %) agreed, and seven students (36,8 %) strongly agreed with the statement, “Mind mapping helps me to diversify new, more central ideas.” Moreover, Item 17, which stated that “Mind mapping helps me to diversify new more supporting ideas.” received 13 agreements (68,4 %) and three strong agreements (15,8 %) related to the creativity dimension. Also, for item 19, 11 students (57,9 %) tended to agree that “Mind mapping allows me to be more creative when writing an essay.”

In contrast, students expressed their disagreement and strong disagreement with item 18, which focused on “using different colors or drawing pictures to present the ideas.” Nine students (47,4 %) disagreed, and four students (21,1 %) strongly disagreed with the idea of using colors during the mind mapping. Table 32 below presents an overview of the students' responses related to creativity dimension items.

Table 32

Overview of student responses: creativity aspects

Creativity Dimension				Strongly agree		Agree		Disagree		Strongly Disagree	
Item No.	N	Mean	Std. Deviation	f	(%)	f	(%)	f	(%)	f	(%)
16	19	1,80	0,71	7	36,8	9	47,4	3	15,8	-	-
17	19	2,00	0,57	3	15,8	13	68,4	3	15,8	-	-
18	19	2,80	0,83	1	5,3	5	26,3	9	47,4	4	21,1
19	19	2,52	0,69	-	-	11	57,9	6	31,6	2	10,5

4.1.3.4. Motivation Aspects

The questionnaire assesses motivation using five items, specifically items 20 to 25, which pertain to the fourth dimension. Analysis of the questionnaire data indicated that the students mainly had negative perceptions of mind mapping in terms of “motivation,” considering items 21, 22, and 23.

Firstly, for item 21, while only three students (15,8 %) expressed their agreement, 14 students (73,7 %) disagreed that mind mapping motivated them to participate in writing activities, including three students (10,5 %) who strongly disagreed. Similarly, regarding item 22, which stated, "Mind mapping makes writing activities more enjoyable.", only four students (21,1 %) tended to agree; on the other hand, eleven students disagreed (57,9 %), and four students strongly disagreed (21,1%) with the statements related to the motivation. Moreover, for item 23, while one student (5,3 %) strongly agreed, and five students (26,3 %) agreed with the statement related to "using lines, colors or pictures when creating a mind map makes the writing more interesting.", seven students (36,8 %) and six students (31,6 %) chose "strongly disagree" option.

These findings point out that while the students acknowledge the benefits of mind mapping on their writing performances, they could find the implementation of mind mapping less motivating. The following table provides a summary of student's responses related to the dimension of "motivation" in the questionnaire.

Table 33

Overview of student responses: motivational aspect

Motivation Dimension				**Strongly agree**		**Agree**		**Disagree**		**Strongly Disagree**	
Item No.	N	Mean	Std. Deviation	f	(%)	f	(%)	f	(%)	f	(%)
20	19	2,63	0,76	-	-	10	52,6	6	31,6	3	15,3
21	19	2,94	0,52	-	-	3	15,8	14	73,7	2	10,5
22	19	3,00	0,66	-	-	4	21,1	11	57,9	4	21,1
23	19	2,94	0,91	1	5,3	5	26,3	7	36,8	6	31,6
24	19	2,47	0,96	3	15,8	7	36,8	6	31,6	3	15,8

4.2. Qualitative Research Findings

To analyze the third question, "*Do EFL students find mind mapping for improving their writing skills in essay writing effective? If so, how?",* the qualitative analysis was also implemented through the interviews and student reflection papers given during the treatment. The interview questions consist of two main parts: "the students" thoughts and experiences regarding their own writing skills” and “students' attitudes on the mind-mapping technique applied in the class.” Besides semi-structured interviews, reflection papers related to students’ opinions about mind mapping, guided by two main prompts, were collected: "Describe the experience” and “Benefits and drawbacks.” To gain deeper insight into the attitudes and perceptions towards the mind mapping technique, the thematic analysis (TA), focusing on the identification of patterns of meaning (Clarke & Braun, 2017), was employed based on the semi-structured interview and reflection papers. Given the thematic analysis, the inductive approach was adopted, addressing the bottom-up process in which the themes are developed through the identifications of codes. Duration of inductive coding process, *descriptive and values coding methods* were conducted to uncover both apparent and underlying meaning within the codes. Creating the patterns from the participants’ interview transcripts and reflections, involved several stages, namely the initial coding, coding line by line, and finalizing labelling, followed by identifications of main themes and sub-themes. Considering the qualitative analysis, the findings are presented with each theme and its sub-themes explored in the sections to address the third research question of the study.

The following table shows the overview of the themes, sub-themes and related codes obtained from the categorization of data extracts, indicating the process of categorization resulted in the development of codes, sub-themes and themes.

Table 34

Overview of the thematic analysis on participants' perceptions of mind mapping technique

THEMES	SUB-THEMES	DESCRIPTIVE CODES	VALUE-BASED CODES
Educational Setting	English Language Background	Intensive Grammar Limited skill-based Instruction Classroom Context General English Curriculum Structured Class time	Emphasis on Accuracy Gap in Formal education Self-critical Self-directed
	Prior Writing Experiences	Lack of Writing instructions Limited Writing Practice Difficulty in Coherence Difficulty in Idea Expressions Confidence in Idea Generation	Fear of Making mistakes Feeling of inadequacy
Conceptualization	Definition and Purpose	Organizing tool Easy to remember Note taking and Summary Free Flowing ideas	Retention & Recall Practicality in every Field
	First Impression and Its Challenge	Need for Organization Initial Reluctancy Ease of Use Visual Adaptation	Desire for Clarity & Structure Fixed Mindset
Benefits of Mind Mapping	Writing Confidence	Self-discovery Confidence	Self-efficacy Affective Factors
	Cognitive Skills	Brainstorming Identifying examples Idea Generation Connection of Main & Supporting ideas	Cognitive Load
	Metacognitive Skills	Visualizing Gap Assessment Tool	Higher-order Thinking skills Self-reflection
Weaknesses of Mind Mapping	Time Consuming	Application in the Exam Lack of Space Limited Time	Practicality Individual Differences
	Limited Vocabulary	Basic Vocabulary Attention to Key Words Emphasis on connecting	Idea Fluency over Key words

4.2.1. Theme: Educational Setting

This section involves the themes collected from the first part of the questionnaire, reflecting "students' previous experiences with writing skills" and "weaknesses and strengths in writing". Therefore, the theme, *educational setting*, was divided into two sub-themes, focusing on participants' English language instruction background and prior writing experience. Both descriptive and values coding were used to analyze the sub-themes explicitly and implicitly.

Considering the first sub-theme worded as “English Language Background”, the codes identified as descriptive were “intensive grammar instruction”, “limited skill-based instruction” and “classroom context” and *“*general English curriculum” based on the questions worded as “Were you exposed to intensive language training before starting your university studies?” and “Did you receive training in writing in English during tour secondary and high school years?” The codes developed as values-based codes were “emphasis on accuracy”, “gap in formal education”, “self-critical”, and “self-directed”.

Given the second sub-theme emerged as “prior writing experience”, the codes presented as descriptive were “lack of writing instruction and practice”, “difficulty with coherence and cohesion”, “difficulty with idea-expression” and “confidence in idea generation and vocabulary”. On the other hand, values-based coding involves “traditional writing instruction”, “feeling of inadequacy”, “fear of making mistakes.”

4.2.1.1. Sub-theme: English Language Background

“English Language Background” under the theme of *Educational Setting* was developed to inform about the participants’ language learning experience prior to studying in preparation class. The descriptive codes, namely “intensive grammar” and “limited skill-based instruction” stated that participants were exposed to the traditional way of teaching process where productive skills were neglected. From the value-based codes perspective, this lack of practical instructions can result in participants' emphasis on accuracy rather than communicative effectiveness. The following quotation can be stated as a reflection of a “gap in formal education”, which was mentioned as a value code:

“I don't think it helped me because we kept learning the same basic grammar every year, and I couldn't make real progress in English." or “*Before, my English education consisted of worksheets and grammar, and I had no other experience with the language. It was only in the preparatory class that I gained real experience with English.”*

The other descriptive codes identified from the participants’ extracts were “classroom context”, “general English curriculum”, and “structured class time” which refer to the participants’ opinions about the intensity of English language learning in their pre-university education. During the interview, all the participants reported that the hours of English classes and the course contents were insufficient to improve their foreign language. Some responses given as evidence for this sub-theme and codes are as follows.

"It wasn't intense. It was just like how we learned English in middle school and high school. I wouldn't say they really focused on it much."

"If I remember correctly, we had only about two hours of English class a week, which is what the school offered."

"I don't think it helped me at all because I was going home every year to study the same subjects and unfortunately, I couldn't advance further than grammar."

"At those times, I remembered that we started to learn four hours a week or 6. In high school, the numbers of hours decreased to the two hours."

"I tried to learn English by myself, I watched videos to improve myself in English."

These quotes imply that the participants' experiences in English learning education were unsatisfying. When analyzing these extracts in a deep sense, it could be said that they had desires to learn English, which can be interpreted as their "self-critical" and "self-directed" learning tendencies.

4.2.1.2. Sub-theme: Participants' Prior Writing Experiences

As a sub-theme of *the Educational Setting*, "prior writing experiences" were developed based on the participants' comments on their attitudes toward their writing skills. The codes were gathered based on the questions, "What are your weaknesses and strengths in writing?" From the analysis of the interview transcript related to, five descriptive codes were developed, namely, "lack of writing instructions, "limited writing practice", "difficulty in coherence and cohesion", "difficulty in idea expressions," and "confidence in idea generation," were collected through the interview transcription. While two participants mentioned their strengths in writing skills, including vocabulary use and idea generation, the other three participants pointed out their weaknesses in writing. The quotes given below reflect their self-identified strengths and weaknesses.

"I really liked using the words I learnt in my compositions which makes me feels as if I can write well."

"Since I really liked reading Turkish, I don't find writing hard. I can find many ideas to write easily."

"I actually have a weakness in finding and connecting the ideas and topics. The sentence I wrote in the first paragraph looks very similar to the sentences in the second paragraph. Because of this, I cannot achieve continuity and more than one paragraph."

"I really want to express my ideas I have in my mind, but it is too hard for me to start writing at the beginning."

Regarding value coding conducted to gain a deeper understanding of the participants' attitudes towards the mind-mapping technique, namely "fear of making mistakes", "feeling of inadequacy", and "self-doubt" were developed based on the participants' thoughts about writing practice as well as self-motivation in writing. Participants' self-expressions about their writing process revealed that they highly tend to achieve in composing written texts but also have an awareness of inadequacies. In addition to these code groups, "lack of writing instruction" and "limited writing practice" were developed along with the value codes of "negative aspects of traditional writing instructions" based on the participant's sentences given below:

"At school, we only wrote in some days and exams, but I wrote something by myself... In the classroom, only one or two topics were given. Apart from that, no other activity or method was done to improve our writing skills."

"Sometimes, we did activities about free writing, and sometimes we translated some reading texts into Turkish."

The codes and the themes stated that none of the participants experienced a writing-oriented class where all instructions or activities related to writing development before the preparation class. However, only two participants mentioned their strengths in addressing writing practices, which can be considered as the importance of self-improvement in the language learning process.

4.2.2. Theme: Conceptualization of Mind Mapping

Conceptualization of mind mapping was the second theme developed to explore one of the aspects related to mind mapping, examining what the technique means for the participants and their first experiences in using this tool to support writing. Two sub-themes were categorized under the theme of "conceptualization of mind mapping," including "definition and purpose" and "the first impression and its challenges." Exploring these sub-themes informed about how the participants conceptualize the mind mapping strategies, particularly within the concepts of purpose and their initial experiences.

4.2.2.1. Sub-theme: Definition and Purpose

The responses related to the interview question, "*How would you describe the Mind mapping technique you performed in the class during the term*?" were analyzed and coded using descriptive and values approaches. As a descriptive code, "organizing tool", "easy to remember", "note taking and summary", and "free-flowing ideas" represent the definition of mind mapping based on participants' perspectives. Their descriptions of the mind mapping technique reveal that they view mind mapping not only as a tool for organization but also as a method for summarization or note-taking. The following are extracts obtained from the interview:

"We have a complicated ideas in our mind, they are always changing, and this technique means to organize these ideas, and make them permeant."

"Mind mapping is like a note. You can write something as a note. Actually, mind maps need to remind you something"

"In fact, mind maps are valid for everything that you write or speak, not only for writing."

"If you get ready for a job interview or speech, you can also use it."

"I can say that mind mapping is about to express everything in your mind, it doesn't matter what the writing is."

In the process of analyzing these extracts, value-based codes also emerged to emphasize the implicit ideas held by the participants, namely “retention & recall”, and “practicality in every field”. These values-based codes emphasize the multifaceted nature of mind mapping that promotes usefulness in the prewriting stage of writing and contributes to recall and retention. Besides, mind mapping provides practicality in various educational and professional areas. Moreover, the diverse responses of the students related to the mind-mapping technique point out how applying this technique provides insight for them to think in a reflective manner.

4.2.2.2. Sub-theme: First Impression and Challenges

“First impressions and challenges” is the second sub-theme drawn from the interview and reflection papers data. Regarding the interview, the codes were improved to answer the question, “Could you tell us about your first experience with the mind-mapping technique?” In addition to the interview process, the students in the class were asked an open-ended quote, “Write about your first impression of drawing a map,” as guidance for reflection papers two weeks after the treatment.

In the descriptive coding process, “need for the organization”, “unfamiliarity,” “initial reluctancy”, “ease of use”, and “visual adaptation” were the codes developed from interview transcriptions and reflection papers explicitly. The descriptive codes unveiled that a number of students found the first implementation of mind mapping highly challenging to comprehend. On the other hand, only a few of them stated relatively positive things related to their first experience with mind maps. To illustrate these codes, a range of sentences taken from interviews and reflections are given below respectively:

“Of course, it was very difficult at first. I could not put the words in order.”

“My teacher showed us a video about mind map. Arrows and pictures seemed complicated for me.”

“Because I am not used to making mind maps or putting the complexity on the paper, I had difficulty in the first lesson.”

“This was the first time I had ever done an interactive writing exercise.”

“Drawing mind maps were difficult for me at the beginning. I hadn’t experienced it before.

“Actually, I can say I was lazy to draw something instead of writing. I found a bit difficult.

“If you start writing a mind map, I think you will get bored. Maybe you won’t like it. However, when you practice with mind mapping, you will see the improvement.

“At first, I felt like I was in elementary school. Colorful pencils helped me understand the connections easily. The mind map looked beautiful.

“Teacher gave us a lot of colorful pencils. I enjoyed a lot and learned how to do it.”

The analysis of the underlying meaning within these quotes uncovered value-based codes, namely “desire for clarity and structure”, “lack of diverse writing activities”, and “fixed mindset”. “The desire for clarity and structure” demonstrated that students experienced complexity in expressing their ideas on given writing topics, leading to a desire to overcome this problem. Additionally, exposure to traditional teaching methods in elementary and high school could cause initial reluctance or unfamiliarity with the mind mapping technique for their first attempts, thereby causing a lack of motivation to draw their mind maps before writing. Furthermore, participants who experienced limited writing instructions in their previous educational setting denied leaving their *comfort zone*, potentially affecting their anxiety levels. Accordingly, this lack of experience in writing instructions likely promoted resistance to performing distinct learning approaches.

4.2.3. Theme: Benefits of Mind Mapping

The third main theme was revealed through the interview questions worded as “Do you find mind mapping useful? What aspects of mind mapping do you find useful for?” and reflection papers. As a main code, “benefits of mind mapping” comprise three sub-themes, including “writing confidence”, “metacognitive ability”, and “cognitive ability”. The data extracts were categorized based on the participants’ responses from the interview and reflection papers, addressing writing processes guided by mind mapping.

4.2.3.1. Sub-theme: Writing Confidence

Regarding writing confidence, “self-discovery” and “confidence” were the descriptive codes that emerged from the data. Improving the ability to start writing a paragraph quickly was one of the common expressions when asked, “Did the mind-mapping technique make you more confident in writing?” Participants stated that mind mapping is a handy tool that encourages them to write more. Moreover, based on the interview and reflection paper data, this technique provided insight into the self-awareness of participants’ writing strengths. To highlight this argument as evidence, several quotes are shown below.

“I thought I was not good at finding examples for general topics. I had to search similar essays on the internet. But when I started using mind mapping, I realized that I knew how to do it.”

“When everybody starts writing topics, they think “What am I going to write?”, and they don’t want to write. When I see my ideas on mind map, I think I can write a lot of things”

“When I study with colorful pens, I concentrate on my writing more and I become more successful.”

“I gained confidence in organizing my thoughts about the subjects”

“Writing activity improved me a lot. I didn't know many words at first, now I write long paragraphs.”

“Write what I have on my mind before I write it down.   they good force me to think and i like it “

Considering the value-based codes, “self-efficacy” and “affective factors” can be stated as important components developed from the students’ attitude toward mind mapping. When the participants gain self-awareness of their performance in planning, idea generation, or capability to start writing, they become more confident in their writing and willing to compose written texts with the help of the mind mapping technique.

4.2.3.2. Sub-theme: Cognitive Skills

Participants' responses revealed that implementation of the mind mapping technique contributes to learners' use of cognitive skills, enhancing a more effective writing process. To further investigate how practical the mind-mapping techniques were during the treatment, the participants were asked questions such as "Is mind mapping useful for finding main and supporting ideas?" "Were you able to come up with new ideas?" or "Did the mind-mapping method help you put the ideas or examples in a logical order?". These interview questions mainly addressed the essential factors related to structuring main and sub-ideas, organization, and thinking process of writing. In addition to the interview, the students' reflection papers also provided evidence to point out the "cognitive skills" as benefits of mind mapping.

The main descriptive codes explored were "brainstorming," "idea elaboration", "identifying examples", "idea generation", and "connection of main and supporting ideas". With respect to these codes, most of the students stated that mind mapping techniques deeply improved their mental processing in planning, promoting more coherent and organized writing. Also, the mind mapping technique enabled them to enhance their capability of associating the main or supporting ideas with relevant examples. The following data extracts are shown below.

"We saw how the main ideas and dividing them into other sub-ideas were really helpful for our writings."

"When you combine and blend these sentences, it results in more useful, readable and visually good writing."

"Generally, it is very difficult for me to come up with many ideas on any subjects. I don't know I maybe overthink, but mind mapping helped me with this issue."

"When I started to draw mind maps, thinking process becomes faster, because a draft formed in my mind instead of abstract ideas."

"I can write the details or examples by using mind mapping technique."

"I made a mind map about money and I think , mind mapping is very helpful for me because it makes it easier for me to think."

4.2.3.3. Sub-theme: Metacognitive Skills

Metacognitive skills are one of the key factors helping learners succeed in the process of writing, and mind mapping techniques provide support to improve these metacognitive skills, such as planning, observing, evaluating, and reflection. Resulting in the analysis of students' sentences related to the interview questions and reflection papers, "visualizing the gap in writing" and "assessment tool" were the descriptive codes found in the data by asking, "Do you think this technique contributed to you in planning?", "Did the mind-mapping help you identify your strengths and weaknesses during the writing process?" and "Was the mind mapping helpful strategy to evaluate the paragraphs you wrote?". The following quotes are shown to gain insight into the participants' attitudes toward writing.

"Mind mapping helps us to measure our knowledge. We can see our missing ideas or examples."

"We actually see what comes to mind, and in this way, I think we can see our shortcomings". These two examples showed the self-evaluation aspect of metacognitive skills. Mind mapping developed an understanding of their limitations or strengths. Therefore, learners tend to use mind map as a self-assessment tool as well.

"On the mind map, all the ideas I expressed are written there. So, I can choose the better ideas from the map to use in the paragraph.

"After I wrote about the tiny house, technique, I checked my mind map again to match the ideas with my essay." As it can be understood from both quotes, students utilized their mind maps to reevaluate their writing performances reflectively. Considering the values coding process, "higher-order thinking skills" and "self-reflection" were developed as value-based codes that aimed to get a deeper insight into the participants' attitudes or beliefs.

4.2.4. Theme: Weakness of Mind Mapping

Besides “the strengths of mind mapping”, the coding process also revealed the negative aspects of the mind mapping technique the participants expressed through the interview questions and reflection papers such as “Do you think there are negative sides of the mind mapping technique?” and “Did you have any difficulties during the application of mind-mapping technique?”. From the descriptive and value-based coding, the main theme, “weakness of mind mapping”, emerged, highlighting the sub-themes of “time management” and limited vocabulary development”. These sub-themes, along with their codes, were developed based on the interview questions and reflection paper related to this technique.

4.2.4.1. Sub-theme: Time In-efficiency

A sub-theme, “time inefficiency” was created based on the codes, namely “application in the exam,” “lack of space”, and “limited time”. With regard to the further exploration of the negative aspects of the mind-mapping technique, the question “What are your opinions about timing during the implementation process of mind mapping?” was also directed to the participants due to some responses related to timing that emerged during the interview. Additionally, concerns about management were expressed in a few responses from the reflection papers. One reason why students reflected on the timing was the application of this technique during the exams. According to them, it would be highly difficult to arrange their time to draw the map for the exam. Additionally, a space is required for them to carry out mind-mapping techniques.

“During the exam, actually everyone struggles to create a mind map.”

“Making a mind map definitely takes time and writing in the exam will take longer.”

“For example, I spend 15 minutes out of 30 minutes on drawing a map and thinking about ideas. If don’t use mind mapping, I can write my essay in 25 minutes. Because thinking only five minutes is enough for me.”

Considering “time-consuming” and “limited time”, the two students stated that mind mapping could be time-consuming when they already have enough knowledge of a writing topic, as they believe that they can easily compose on a familiar subject without mind mapping.

“If I know a topic very well, I don’t need a mind mapping.”

“Because I have information about the writing topic in my mind, I create the outline in my mind unconsciously.”

Given the participants’ idea of mind mapping, “practicality” and “individual differences” can be suggested as value-based codes. By their nature, it is likely that not all learners or individuals have the same cognitive processing style, which may emphasize the significance of self-reliance.

4.2.4.2. Limited Vocabulary

“Limited vocabulary” is another sub-theme that emerged from the codes, which were “basic”, “attention to keywords” and “emphasis on connecting.” Mostly, every student who participated in the interview pointed out the lack of vocabulary improvement in the process of mind mapping technique. The essential reason was that they generally tended to focus on organization, planning, and idea connections while performing mind-mapping techniques.

“… because mind mapping technique is about drafting, it needs to be general. So there is no development in vocabulary.”

“… since we create a mind map which suits my own mind, I use very simple phrases, so I don’t learn new words.”

“When I draw mind maps, I actually pay attention to the only important word or subjects. I never think different and extra words for the writing topics. I don’t think I learnt new words.”

During the mind mapping process, participants prioritized the generation of ideas and organization instead of exploring new words to structure their draft. Therefore, “idea fluency over word choice” could be highlighted as a value-based code to present the underlying pattern of participants' attitudes toward the mind-mapping technique.

5. DISCUSSION

Numerous studies in literature have highlighted that writing is widely recognized as an essential but also challenging skill that requires a range of cognitive procedures in terms of the teaching and learning process (Kellogg, 2008; MacArthur & Graham, 2016; Olive, 2008; Raimes, 1983; Schmitt & Rodgers, 2002). Accordingly, this emphasis on the development of writing skills underlines the necessity of instructional strategies. Therefore, the current study investigated the effectiveness of mind mapping on writing skills within a multifaceted analysis approach.

5.1. The Quantitative Analysis

As an initial phase of analysis, the quantitative analysis was conducted to compare the pre-test and post-test scores of the experimental and comparison groups to reveal any significant differences between these two groups in terms of their writing performance on descriptive and persuasive essays. In order to see whether the treatment promoted the students' writing practices, the statistical data was interpreted based on the inferential and descriptive examination. The findings of the study revealed a significant difference between the comparison and experimental groups. Data obtained from the Man Whitney U test indicated that the experimental group received higher descriptive (p =.001) and persuasive essay scores (p = .000), demonstrating the mind-mapping technique's positive impact on writing practices. This finding is consistent with previous studies supporting the positive effects of mind mapping on improving writing skills (Al Naqbi, 2011; Bukhari, 2016; Naibaho, 2022; Rafii, 2017).

The findings could be attributed to treatment, in which the students created their mind maps before starting to compose their writings. This process assisted them in generating ideas and gaining an understanding of organizing them systematically. As Zhang (2018) stated, creating mind maps reflects the learners' thinking process and provides clear guidance for them to start writing effectively. This explanation is further supported by the significant development analyzed in the experimental group's writing scores. The students received higher scores in the descriptive essays (M = 6,7) and persuasive essays (M = 6,6) compared to comparison groups in descriptive (descriptive essay: *M* = 5,6; persuasive essay: *M* = 5,8). This finding can also be interpreted through the framework of constructivist learning theory, which is a widely recognized educational approach with prominent contributors, namely Piaget (1971), Vygotsky (1978), Dewey (1959), and Schank (1970). This theory highly emphasizes the active construction of learning by connecting new information to existing knowledge within a contextual learning environment. The implementation of mind mapping directly supports this learning process by providing students with an environment to generate, organize, and elaborate on their ideas about the writing topics their ideas based on their prior experiences (Ertmer, 2013; Krahenbuhl, 2016). Regarding the constructivist approach, creating their mind maps promotes learner-centered learning, where the participants actively use their cognitive skills to gain a deeper understanding of the topics and improve their writing performance (El-Muslimah et al., 2011; Sabarun et al., 2021; Wangmo & Chalermnirundorn, 2018).

After having investigated any difference between the comparison and experimental groups in terms of their writing performance on descriptive and persuasive essay scoring, the second research question aimed to examine whether mind-mapping affected the participants' writing performances across these different essay genres in terms of "coherence and cohesion," and "task response" component. This objective of the study was followed because while a number of studies have examined the persuasive essay (Alotaibi, 2020; Al-Majali, 2022; Ferretti & Lewis, 2019; Latifi & Noroozi, 2021; Ningrum, Latief and Sulistyo, 2016) and descriptive essay (Basri & Syamsia, 2020; Bukhari,2016; Hambali, 2021; Nurlaila, 2013) separately, there is limited research which directly compares the effects of mind-mapping strategy on both essay types, particularly in terms of task response. Therefore, the current study also aimed to address this gap by exploring if the mind mapping technique creates any difference between descriptive and persuasive essay types.

Regarding the finding of the study, there was no overall significant difference in students' writing performances between descriptive and persuasive essays; however, in terms of scoring components for writing, significant change was found in "task response". The overall data were analyzed with the Wilcoxon signed rank test, revealing no statistical difference between the two essay types, $p = .009$ ($p < 0.05$).

The results suggest that the treatment the participants received had similar effects on both essay genres (*M* = 6.7 for the descriptive essay, *M* = 6,6 for the persuasive essay), indicating the mind-mapping techniques' similar contributions to the writing performance in both genres. In addition to the overall analysis of the results, this study investigated two components of the writing rubric - "cohesion and coherence, "task response" -in order to further explore the second research question. According to the data analysis, the Wilcoxon signed rank test revealed no significant difference between the post-test scores of descriptive and persuasive essays related to the "cohesion and coherence" component (p =.91, $p > 0.05$). On the other hand, the analysis of "task response" revealed that a significant difference between descriptive and persuasive essays was found (p = .36, $p < 0.05$), showing that the participants in the experimental group experienced difficulty in fulfilling the requirements of the "task response" components. Furthermore, the mean score of descriptive essays (*M* = 7.1) compared to persuasive essays (*M* = 6.5) points out that the participants were more likely to perform the "task response" better when composing the descriptive essay. While the comparison between these two essay types is directly limited in the literature, regarding this finding, a number of research address the importance and the main structure of persuasive essays. Crowhurst (1991) mentioned that students had difficulties in writing persuasive essays resulting from the lack of content, supporting ideas, and elaboration during the composing process. Stab and Gurevych (2014) explained in their study that the persuasive essay requires a structure of argument consisting of the "major claim that is supported or attached by at least one premise" (p. 1504).

Based on the prior studies, the results of this current study could be interpreted that the necessity of presenting a well-organized argument structure in the persuasive essay may lead to lower scores in persuasive essays than in descriptive essays. The other attribution to the results of this research question could be the cognitive demand. Due to the necessity of presenting the argument within the counterarguments, students experienced more cognitive load compared to descriptive writing. Moreover, composing a persuasive essay involves reflecting on critical thinking skills rather than describing or giving information about the topic. Therefore, participants may be exposed to further scaffolding within the construction of the ideas more strategically. This interpretation could be aligned with the study of Osman and Januin (2021), which highlights the importance of defending and critiquing ideas related to higher-order skills in persuasive essay writing.

Regarding utilizing quantitative approaches in this study, following the treatment of the mind mapping tool, all the participants (*N* = 19) in the experimental group were administered a questionnaire for the quantitative face of the process. The questionnaire, designed to explore students' attitudes toward mind-mapping strategies, focused on the four dimensions assessed using a separate scale in the inventory: *cognitive skills, metacognitive skills, creativity* and *motivation.* Given the importance of this quantitative analysis within the investigation of students' perceptions towards the technique, data obtained from the questionnaire aimed to uncover insights about the students' opinions beyond the numbers. The quantitative and qualitative data analysis revealed significant findings regarding the students' opinions and experiences about the mind-mapping technique carried out in the experimental group.

Considering the questionnaire analysis, which was the first stage of analyzing the third research question, students' opinions about the mind mapping technique were divided into four dimensions. For the first dimension, cognitive skills, most participants who selected "strongly agree" and "agree" responses for most items stated that mind mapping is beneficial for organizing ideas, distinguishing more and less important information, or establishing logical relationships between the ideas. The finding of the study aligned with the research of Astriani et al. (2020), Feng et al. (2023), and Zheng (2018), which suggests that mind-mapping technique promotes the idea association between the ideas and organizations before the initial writing. These findings highlighted that those participants in the experimental group agreed with the supportive aspects of mind mapping in their writing processes.

The next dimension, metacognition, aimed to investigate how mind-mapping techniques contribute to the students' self-awareness and regulation in their writing practices. Most participants agreed that mind mapping helped them to revise, plan their writing by categorizing the major and main ideas, and reflect on their essays by noticing the areas for their writing development. Findings are also in line with the studies of Bai (2018), Yunus, and Chien (2016), indicating that the mind-mapping technique positively affects the students' self-regulated learning skills in terms of monitoring or evaluating their writing performances. While most participants acknowledged the benefits of mind mapping, some participants (26,3 %) disagreed with one item related to timing. In the study of Al Kamli (2019), participants also had some problems with time spent on the mind-mapping technique, which can be viewed as consistent with this current study.

Following the analysis of cognitive and metacognitive dimensions, students' perceptions of mind mapping regarding creativity and motivation were also explored. Findings revealed that most students tend to have a favorable view about the creative aspects of mind mapping, including generating different and various ideas in creative ways in the pre-writing stage, discovering creative connections between the ideas, and dealing with writer's block with the help of visualization. However, some students in the group mentioned their disagreement about using colors or drawings. Despite the general agreement related to items in creativity sections, nine students (47,4 %) disagreed, and four students (21,1 %) strongly disagreed about the ideas in the mind mapping process. While this result contrasts with the findings of most previous studies, which present using colors or pictures as one of the benefits of the mind-mapping technique, Yunus and Chien (2016) found similar findings aligned with this study, suggesting that visual factors related to the mind mapping could not be considered as common and, factors including the learning styles, the difference in age or experiences with visual instructions may affect the result of this study.

Given the questionnaire's motivational aspects, the findings can be considered highly different from the prior research. Most of the students preferred to disagree with the items reflecting the motivational dimension of the questionnaire. For instance, item 21 (73,7 %) and item 22 (57,9 %) had a significant rate of disagreement response, exploring the increase in motivation and finding the process of drawing a map more enjoyable before writing. These findings revealed that although the participants have positive perceptions of mind mapping in terms of cognitive and metacognitive aspects of writing, the motivational aspect of mind mapping was found to be less impactful for the students. While existing studies on mind mapping predominantly present an increase in motivation, the current study identified negative aspects of mind mapping related to the motivational factor. Based on the evidence, the proficiency level could be attributed to the students' lack of motivation related to the mind-mapping technique. Since the participants demonstrated language proficiency level beyond the beginner level, they might have tended to start writing an essay directly. This tendency could be consistent with the finding of Al Kamli (2019), which stated the higher-level participants found the mind-mapping detailed, so they needed to consider the mind-mapping conductive more to their writing compared to the low-level students. Additionally, existing research highlighted that collaborative learning promotes student motivation (Zheng, 2020). Therefore, this finding may point to the possibility that the individual mind-mapping could have limited the possibility for peer negotiation and scaffolding, leading to decreased motivation.

5.2. Qualitative Data Analysis

After evaluating the effect of mind mapping on students' writing performance and the questionnaire, this section explores the participants' perceptions towards the mind mapping technique itself in a qualitative way, adressing the third question. Accordingly, in order to gain a deeper understanding of the students' attitudes to the mind technique strategy, the combination of qualitative and quantitative analysis was conducted through the interviews and the questionnaire. While the examination of quantitative data used for this research question presents valuable insight into the participants' view on the use of the mind-mapping technique, the qualitative analysis also provides more subjective and meaningful awareness of participants' experiences, which led to more explanatory findings related to the implementation of the mind-mapping technique in writing. Alongside the quantitative aspects of data investigation, qualitative analysis also has an influential role in examining the data analytically. As Clarke and Braun (2013) stated, the qualitative analysis "is rich, exciting, and challenging in lots of ways; it captures the complexity, mess, and contradiction that characterizes the real world, yet allows us to make sense of patterns of meaning." (Why We Love Qualitative Research, parag. 1). Therefore, the current study put emphasis also the qualitative angle of the analysis in addition to the quantitative method. For the qualitative analysis, five participants from the experimental group were selected for individual semi-structured interviews to analyze and investigate their perceptions of the mind-mapping strategy for writing through the qualitative aspects. Moreover, the reflection papers asked all students to write bi-weekly six times as the other qualitative instrument to gain a deeper understanding of the students' perceptions of mind mapping. Employing thematic analysis, which “provides accessible and systematic procedures for generating codes and themes from qualitative data” (Clarke & Braun, 2017, p. 1), the themes were developed by categorizing the codes to address the aim of the research question.

Regarding the qualitative part of this study, thematic analysis was conducted to further investigate the students’ perceptions related to the mind-mapping technique. The thematic approach enables an understanding of participants’ experiences with implementing mind mapping, presenting four important main themes: *educational setting*, *conceptualization*, the *benefits of mind mapping*, and the *weaknesses of the mind-mapping* strate*gy.*

The first main theme developed from the semi-structured interview data was aimed at addressing the participants’ prior learning experiences of writing. The finding revealed that students needed more training related to the integrated skill courses, including reading, writing, listening, and speaking, thereby limiting formal training in their writing skills. All the participants in the interview reported that their prior learning environments comprised grammar-based courses where the instruction in writing processes was largely neglected. This experience was reflected in one of the participant’s statements: “Before, my English education consisted of worksheets and grammar, and I had no other experience with the language”. Numerous studies (Eryılmaz &Yeşilyurt, 2020; Lee, 2005; Toba, 2019) highlighted that the educational setting with a grammar-oriented background or limited writing instruction could lead to difficulty or writer’s block in writing practices. This kind of difficulty results from the fact that being proficient in writing requires both linguistic elements and cognitive and analytical abilities (Sun et al., 2021, p. 2). Based on the findings, it could be expected that students confronting the application of mind-mapping strategies related to cognitive and critical thinking skills, could experience some limitations because of their grammar-oriented background.

The second theme that emerged from the interview is “the conceptualization of the mind-mapping technique”, which explores the participant’s definition and purposes of the technique as well as their expressions in their first experiences. In terms of “the definition and purpose”, participants mainly defined the mind-mapping technique as a notetaking or summarizing activity, an organizational tool, and a memory aid. This finding suggests that participants understood the multifaced nature of mind-mapping, seeing its usefulness in the pre-writing stage, related to brainstorming, organizing the information, and improving retention and recall. This perception aligns with those of Farrand et al. (2002), and Feng et al. (2023), who highlighted that the implementation of the mind-mapping technique had benefits on the function of recalling the words, retention, and improvement in memory for written texts. Additionally, Davies (2011) and Hasan and Akhand (2010) pointed out that the mind-mapping technique effectively improved brainstorming and organizing the ideas during the pre-writing stage.

In addition to the definition of the mind-mapping technique, participants shared their initial experiences with it, revealing both the challenges and positive aspects. Students mentioned that they experienced difficulties such as the unfamiliarity with the method, creating mind maps, and structuring their ideas, aligning with Buzan's (1976, p. 93) statement, "Although this first attempt at mapping may have been a little difficult, you will probably have noticed that the experience is quite different from that of the first exercise". Buzan (1976) also added in his book that logical sequence, organization, order, and emphasis of the ideas can be problematic for the writers who use this technique for the first experience. These challenges may result from the student's lack of writing instruction or exposure to different learning techniques and traditional instructions. On the other hand, students also stated their positive expressions related to the mind-mapping technique, addressing the visual appeal of the mind-mapping tool and its potential for their self-improvement in their writing performances.

The third main theme developed based on the student's responses in the interview and the reflection papers centers on the "benefits of mind-mapping", including three key sub-themes: "writing confidence", "cognitive skills" and "metacognitive skills". Regarding "writing confidence", students broadly expressed how they gained self-awareness related to their writing strengths, revealing that engaging in mind mapping enables students to discover their ability to write an essay. For instance, one participant, who relied heavily on external sources while writing, previously understood that he could compose an essay with greater confidence through a mind-mapping strategy. Based on this evidence, the application of the mind-mapping technique promotes students' affective experiences positively related to belief in their writing skills. This finding aligns with the research by Abd Karim et al. (2016), Rafii (2017) and Wangmo & Chalermnirundorn (2018), highlighting that mind mapping facilitates students' writing enhancement, thereby increasing their self-confidence.

Within a sub-theme called "cognitive skills", students expressed that implementation of mind mapping promoted the participants' writing processing by enhancing idea structuring, idea generation, and the ability to associate between the main ideas and supporting examples. Moreover, some participants reported that this technique helped them to manage numerous ideas stemmed from overthinking, suggesting that the technique may reduce the cognitive load on working memory, allowing students to use higher-order thinking skills. Concerning the interview and reflection papers, "metacognitive skills" emerged as the last sub-theme. Students frequently mentioned that the mind-mapping technique enhanced their capacity for self-reflection, self-evaluation, and self-assessment, stating that the visual representation of their mind maps enabled them to identify their weaknesses and strengths by easily observing and evaluating their thinking in pre-writing and the writing process. These findings are highly consistent with the research on mind mapping's cognitive and metacognitive aspects. Studies explored that mind mapping activates students' prior knowledge, thereby enhancing planning, organization, and idea generation (Luangkrajang, 2022; Ngo & Tran, 2021).

Moreover, the studies emphasize the effectiveness of mind mapping in improving the idea association between concepts (Yunus & Chien, 2016; Polat & Aydın, 2020) and supporting self-regulation skills through monitoring and evaluating students' performance in writing (Astriani, 2020; Zhang, 2018; Zubaidah et al., 2017). These studies and the findings related to the present study foster the multiple functions of mind-mapping techniques for essay writing, involving both cognitive and metacognitive strategies. Additionally, reduced cognitive load suggests that mind mapping promotes self-regulated learning skills while composing a written text.

The last main theme, developed from the participants' expressions on the treatment, is "the weakness of mind-mapping" divided into two sub-headings: "time inefficiency" and "limited vocabulary". Regarding time inefficiency, several participants had difficulties estimating the time required for their mind maps, while others mentioned their concerns about the allocated time as a "waste". Moreover, most students also expressed that for the exam, they would struggle to finish their writing. This finding, in which the participants struggled with managing time while drawing their maps, contrasts with the previous studies. Zhang (2018), for example, stated that mind mapping improved students' time management skills before starting to write.

Additionally, Budd (2004) asserted that only initial mind-mapping attempts were time-consuming. However, other research pointed out variables that may affect the time efficiency of mind mapping. For instance, Abd Karim et al. (2016) explored paper-based mind maps, which were likely to be more time-consuming than software-based mind maps, suggesting how mind mapping can influence the outcome. Moreover, Al-Kamli (2019) revealed that some students preferred to organize their ideas mentally instead of creating a mind map, highlighting individual differences and preferences in pre-writing strategies. On the other hand, Al-Naqbi (2011) stated that timing is considered a drawback of mind mapping, primarily under exam conditions. While Yunus and Chien (2016) and Ngo and Tran (2021) suggested that few participants reported the drawbacks of mind mapping as time-consuming, more students tended to share the same view within a specific context in the current study. Based on the findings, the timing problem could be attributed to individual differences in their prior learning experience, proficiency level, or preferred study strategies. In addition to the "time inefficacy", "limited vocabulary" is the other sub-theme developed based on the participants' responses, revealing that most participants expressed that they were not able to develop their vocabulary knowledge. They suggested that they generally paid attention to the organizational or planning aspects of mind mapping before writing an essay. These findings suggest that mind mapping aids in developing cognitive or metacognitive aspects rather than vocabulary enhancement in writing. While a number of studies (Farrand et al., 2002; Ngo & Tran, 2021; Shi & Tsai, 2022) highlight the positive effect of the mind-mapping technique on vocabulary development, including recalling of new words, retention or learning different words, no studies explicitly examine relationships between the vocabulary and writing connections within a mind mapping instruction during the pre-writing stage.

5.3. Limitations

While the current study presents valuable results to the educational field regarding mind mapping as a strategy for writing skills development, several limitations need to be considered. Firstly, the small sample size, which has thirty-nine participants for both groups, limits the generalizability of the findings. Moreover, administering the piloting with a limited number of participants may affect reliability aspects of the questionnaire during the questionnaire development process.

Another limitation is that this study did not carry out the sampling procedures since both classes were distributed before the implementation of the study, thereby conducting a study with two intact groups. The third limitation is that the follow-up post-test was not administered to the experimental group, which avoids the long-term effect analysis of the mind-mapping technique on writing skills.

The final limitation could be the need for an observational checklist. Even though multiple data sources, including interviews, questionnaires, reflection papers, and pre-test and post-tests, were used to conduct the study to triangulate the findings, using a direct classroom observation list during the treatment could be integrated into the analysis, providing a deeper understanding of the findings.

5.4. Implications

Regarding the application of mind mapping as a strategy for writing improvement, the current study provides a number of implications for learning, teaching, and curriculum development for the EFL educational context.

The mind-mapping strategy can be integrated into writing instruction for EFL learners, particularly as a pre-writing stage. Accordingly, curriculum planning may allocate appropriate time for EFL learners to participate in mind-mapping activities actively, recognizing its effects and practicality in the process of writing. Moreover, since both the process and product have a significant role in composing writing, mind maps can be integrated into the evaluation process, allowing students to reflect on their idea generation, association, and organization skills alongside their final written texts. Finally, in order to improve their communicative proficiency in writing, learners may receive writing instruction and practice in genre-based writing.

For instructors in EFL context, teaching aspects may be equipped with knowledge and procedures to administer mind-mapping techniques in built-in professional development units effectively. This training may extend from the writing instruction to the implementation of other skills, namely reading, speaking, listening, and vocabulary development.

Considering curriculum preparation, the mind mapping technique may also assist instructors with lesson plans. With the help of mind maps, they can gain more awareness of how lesson plans are prepared to interconnect with different lesson objectives. In other words, by visualizing the connections between diverse language skills, educators may create an integrated and effective learning environment for students, contrary to traditional learning methods.

5.5. Suggestions for Further Research

Regarding this study's findings, future research is recommended to explore the implications of the mind-mapping technique in EFL educational settings. Firstly, given the limited emphasis on group work in this current study, further research could explore the collaborative aspects of the mind-mapping technique and its effects on in-writing skills development.

Secondly, due to the varied motivation results in this study, it is highly recommended that the correlation between motivation, mind mapping, and writing practices be examined. Analyzing how the implementation of the mind-mapping technique influences motivation and its effects on writing can contribute to the literature.

Moreover, a longitudinal study that focuses on productive skills, especially writing, is highly recommended to examine the long-term effect of mind mapping on writing. Observing learners for an extended period might provide a deeper understanding of the technique's effects on writing enhancement.

Additionally, due to the need for more research on specific writing genres, more studies should examine the effects of mind mapping on persuasive writing, especially in the Turkish EFL settings. Exploring how mind mapping promotes developing arguments, supporting ideas, and creating persuasive language could be more beneficial.

Finally, more future research could be recommended to investigate teachers' perceptions and experiences of mind-mapping techniques in classrooms. Gaining insight into teachers' perspectives on mind-mapping practices can contribute to the pedagogical aspects of teaching and learning.

6. CONCLUSION

The present study aimed to explore the implementation of the mind mapping strategies on students' writing skills in the context of descriptive and persuasive essay genres, analyzing both the impact of writing quality and participants' perceptions towards the mind mapping technique. Regarding these objectives, this study tended to analyze three main research questions. The first question sought to determine any significant effect of using mind-mapping strategies on students' writing performances in descriptive and persuasive essay genres. In order to examine results, the non-parametric The Mann-Whitney U test was employed since there was no normal distribution of samples. The findings suggest that the application of mind-mapping technique had a positive impact on students writing performances.

The second questions addressed to find out any significant differences between the descriptive and persuasive essay scores concerning the task response and, cohesion and coherence criteria of the scoring rubrics. The data were analyzed using Wilcoxon signed-rank test in order to obtain the statistical findings. Based on the results, while there was no overall difference between two essay types, significant difference was found considering the task response, highlighting that the students had lack of presenting arguments in persuasive essay compared to descriptive essay.

Finally, the study investigated the participants' attitudes towards the mind-mapping technique by administering the questionnaire, semi-structured interview and reflection papers. In terms of the questionnaire administration, the frequency distribution was computed through SPSS to examine the students' responses. The findings showed that mind-mapping technique enhanced the students' cognitive, metacognitive and creativity aspects, including organization, categorization, self-evaluation and reflection. However, the majority of the students expressed that mind-mapping has no effect on their motivation level. These results aligned with the findings from the interview and reflection paper analyses, which also highlighted that mind maps improved their writing performance. Despite the positive attitudes, some students also found the implementation of mind mapping time-consuming and ineffective for time management.

To sum up, this study provides deeper insights into the effectiveness of the mind-mapping strategy in writing, triangulating measures of writing scores and further analyzing participants' viewpoints on this technique through both quantitative and qualitative evaluation.

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APPENDICES

APPENDIX A: ANKET: ZİHİN HARİTALAMA STRATEJİSİ

Bu anket; ***zihin haritalama*** stratejisi ile ilgili öğrencilerin görüşlerini analiz etmek amacıyla hazırlanmıştır. Ölçekte yer alan sorular kesinlikle not vermek ya da sizi eleştirmek amacıyla kullanılmayacaktır. Yaptığınız değerlendirmelerin araştırmaya önemli bir katsısı olacaktır. Lütfen aşağıda belirtilen ifadeleri size uygun olarak işaretleyiniz. Katılımınız için teşekkür ederiz.

	Sorular	Kesinlikle Katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle Katılmıyorum
	Bilişsel Beceriler				
1.	Zihin haritalama, fikirlerimi düzenlememe yardımcı olur.				
2.	Zihin haritalama, çeşitli fikirleri bulma konusunda daha akıcı olmama yardımcı olur.				
3.	Zihin haritalama, konu başlıklarıyla ilgili önemli bilgileri ayırt etmeme yardımcı olur.				
4.	Zihin haritalama, fikirlerimi mantıklı bir sıraya koymama yardımcı olur.				
5.	Zihin haritalama, daha fazla ana fikir bulmama yardımcı olur.				
6.	Zihin haritalama, daha fazla ayrıntı ve örnek bulmama yardımcı olur.				
7.	Zihin haritalama ana fikirlerim arasında mantıklı ilişkiler bulmamayardımcı olur.				
8.	Zihin haritalama, destekleyici fikirler arasında bağlantı kurmama yardımcı olur.				
9.	Zihin haritalama, bağlayıcı kelimeleri etkili bir şekilde kullanmama yardımcı olur.				
	Metabilişsel Beceriler				
10.	Zihin haritalama, bir konu hakkında yazmak için farklı fikirlerin uygunluğunu ölçmeme yardımcı oluyor.				

11.	Zihin haritalama, ana ve destekleyici fikirleri planlamama yardımcı olur.				
12.	Zihin haritalama, çalışmamı değerlendirmeme ve konular hakkındaki uygun olmayan fikirleri çıkarmama veya değiştirmeme yardımcı olur.				
13.	Zihin haritalama, bilgileri kategoriler halinde sınıflandırmama yardımcı olur.				
14.	Zihin haritalama yazma sürecinde zamanı iyi yönetmeme yardımcı olur.				
15.	Zihin haritalama yazma süreci hakkında farkındalık kazanmama yardımcı olur.				
	Yaratıcılık				
16.	Zihin haritalama, daha fazla ana fikri çeşitlendirmeme yardımcı olur.				
17.	Zihin haritalama, daha fazla yeni destekleyici fikri çeşitlendirmeme yardımcı olur.				
18.	Zihin haritalama, fikirleri sunmanın farklı yollarını seçmeme yardımcı olur. ör; renkleri, görselleri kullanarak.				
19.	Zihin haritalama, daha fazla ayrıntı ve örnek bulmama yardımcı olur.				
	Motivasyon				
20.	Zihin haritalama, yeni fikirleri sunarken kendime daha çok güvenmeme yardımcı olur.				
21.	Zihin haritalama yazma etkinliklerine katılmam için beni motive eder.				
22.	Zihin haritalama yazma etkinliklerini daha keyifli hale getirir.				
23.	Zihin haritalama, çizgiler, renkler veya resimler kullanarak, yazma sürecini daha ilginç hale getirir.				
24.	Zihin haritalama, kompozisyon veya paragraf yazma ile ilgili sınavlara, hazırlanmama yardımcı olur.				

APPENDIX A: QUESTIONNAIRE: MIND-MAPPING STRATEGY (ENGLISH VERSION)

This survey is designed to analyze student opinions about the *mind-mapping* strategy. The questions are not intended for grading or evaluation. Your honest feedback will be valuable to the research. Please mark the statements below according to your level of agreement. Thank you for your participation.

	Items	Stronly Agree	Agree	Disagree	Strongly Disagree
	Cognitive Skills				
1	Mind mapping helps me to organize my ideas.				
2	Mind mapping helps me to be more fluent in finding different ideas.				
3	Mind mapping helps me to distinguish between more and less important information about the topic.				
4	Mind mapping helps me to put the ideas in a logical order.				
5	Mind mapping helps me to find more main ideas.				
6	Mind mapping helps me to fin more details about the main ideas.				
7	Mind mapping helps me to make connections between the main ideas.				
8	Mind mapping helps me to make connections between the supporting ideas.				
9	Mind mapping helps me to use linking words effectively.				
	Metacognitive Skills				
10.	Mind mapping helps me to analyse how different ideas fit together to write about a topic.				
11.	Mind mapping helps me to plan main and supporting ideas.				
12.	Mind mapping helps me to remove or revise the ideas for the topics.				

13.	Mind mapping helps me to categories the ideas.				
14.	Mind mapping helps me to manage my time well during the writing process.				
15.	Mind mapping helps me to gain awareness about my writing development.				
	Creativity				
16.	Mind mapping helps me to diversify new more main ideas.				
17.	Mind mapping helps me to diversify new more supporting ideas.				
18.	Mind mapping helps me to choose different ways of presenting ideas, for example, using different colors, or drawing pictures.				
19.	Mind mapping helps me to be more creative when writing an essay.				
	Motivation				
20.	Mind mapping helps me to feel more confident when presenting new ideas.				
21.	Mind mapping motivates me to participate in writing activities.				
22.	Mind mapping makes writing activities more enjoyable.				
23.	Using lines, colors or pictures makes the writing more interesting.				
24.	Mind mapping helps me prepare myself for exams on essay or paragraph writing.				

APPENDIX B: PRE-TEST (DESCRIPTIVE ESSAY)

Name / Surname:

Student No:

Describe one of the topics below and write an essay (minimum 150 words)

** Fictional Person from a film or a book*

** A real Person you know well in your life*

Your essay should include an introduction

a body paragraph (at least 3 different reasons)

a conclusion

APPENDIX B: PRE-TEST (PERSUASIVE ESSAY)

Name / Surname:

Student No:

Write an essay about one of the topics below (minimum 150 words)

-University student should live with a family"

-Country life is better than city life. Do you agree or disagree?

Your essay should include an introduction

a body paragraph (at least 3 different reasons)

a conclusion

APPENDIX C: POST-TEST (DESCRIPTIVE ESSAY)

Name / Surname:

Student No:

Write an essay about one of the topics below (min. 150 words).

- Describe *a memorable experience from your childhood that had a significant impact on you.* Focus on recreating the setting, the people involved, and the emotions you felt.

-Describe *an object that holds special meaning for you, such as a family heirloom, a gift, or a personal possession*. Focus on a description of object, explain its significance.

APPENDIX C: POST-TEST (PERSUASIVE ESSAY)

Name / Surname:

Student No:

Choose one of the topics below and write an essay including introduction, body, and conclusion paragraph. (Min. 150 words)

1. Social media is becoming increasingly popular amongst all age groups. However, sharing personal information on social media websites has some risks. Do you think the advantages of social media websites outweigh the advantages? Use specific reasons and examples to support your opinion.

2. Some people would like to spend their money as soon as they earn it, while others think it is better to save their money for specific future purposes. Which option would you prefer to choose? Why? Use specific reasons and examples to support your opinion.

APPENDIX D: IELTS WRITING RUBRIC

IELTS™

WRITING TASK 2: Band Descriptors (public version)

Band	Task response	Coherence and cohesion	Lexical resource	Grammatical range and accuracy
9	• fully addresses all parts of the task • presents a fully developed position in answer to the question with relevant, fully extended and well supported ideas	• uses cohesion in such a way that it attracts no attention • skilfully manages paragraphing	• uses a wide range of vocabulary with very natural and sophisticated control of lexical features; rare minor errors occur only as 'slips'	• uses a wide range of structures with full flexibility and accuracy; rare minor errors occur only as 'slips'
8	• sufficiently addresses all parts of the task • presents a well-developed response to the question with relevant, extended and supported ideas	• sequences information and ideas logically • manages all aspects of cohesion well • uses paragraphing sufficiently and appropriately	• uses a wide range of vocabulary fluently and flexibly to convey precise meanings • skilfully uses uncommon lexical items but there may be occasional inaccuracies in word choice and collocation • produces rare errors in spelling and/or word formation	• uses a wide range of structures • the majority of sentences are error-free • makes only very occasional errors or inappropriacies
7	• addresses all parts of the task • presents a clear position throughout the response • presents, extends and supports main ideas, but there may be a tendency to over-generalise and/or supporting ideas may lack focus	• logically organises information and ideas; there is clear progression throughout • uses a range of cohesive devices appropriately although there may be some under-/over-use • presents a clear central topic within each paragraph	• uses a sufficient range of vocabulary to allow some flexibility and precision • uses less common lexical items with some awareness of style and collocation • may produce occasional errors in word choice, spelling and/or word formation	• uses a variety of complex structures • produces frequent error-free sentences • has good control of grammar and punctuation but may make a few errors
6	• addresses all parts of the task although some parts may be more fully covered than others • presents a relevant position although the conclusions may become unclear or repetitive • presents relevant main ideas but some may be inadequately developed/unclear	• arranges information and ideas coherently and there is a clear overall progression • uses cohesive devices effectively, but cohesion within and/or between sentences may be faulty or mechanical • may not always use referencing clearly or appropriately • uses paragraphing, but not always logically	• uses an adequate range of vocabulary for the task • attempts to use less common vocabulary but with some inaccuracy • makes some errors in spelling and/or word formation, but they do not impede communication	• uses a mix of simple and complex sentence forms • makes some errors in grammar and punctuation but they rarely reduce communication
5	• addresses the task only partially; the format may be inappropriate in places • expresses a position but the development is not always clear and there may be no conclusions drawn • presents some main ideas but these are limited and not sufficiently developed; there may be irrelevant detail	• presents information with some organisation but there may be a lack of overall progression • makes inadequate, inaccurate or over-use of cohesive devices • may be repetitive because of lack of referencing and substitution • may not write in paragraphs, or paragraphing may be inadequate	• uses a limited range of vocabulary, but this is minimally adequate for the task • may make noticeable errors in spelling and/or word formation that may cause some difficulty for the reader	• uses only a limited range of structures • attempts complex sentences but these tend to be less accurate than simple sentences • may make frequent grammatical errors and punctuation may be faulty; errors can cause some difficulty for the reader
4	• responds to the task only in a minimal way or the answer is tangential; the format may be inappropriate • presents a position but this is unclear • presents some main ideas but these are difficult to identify and may be repetitive, irrelevant or not well supported	• presents information and ideas but these are not arranged coherently and there is no clear progression in the response • uses some basic cohesive devices but these may be inaccurate or repetitive • may not write in paragraphs or their use may be confusing	• uses only basic vocabulary which may be used repetitively or which may be inappropriate for the task • has limited control of word formation and/or spelling; errors may cause strain for the reader	• uses only a very limited range of structures with only rare use of subordinate clauses • some structures are accurate but errors predominate, and punctuation is often faulty
3	• does not adequately address any part of the task • does not express a clear position • presents few ideas, which are largely undeveloped or irrelevant	• does not organise ideas logically • may use a very limited range of cohesive devices, and those used may not indicate a logical relationship between ideas	• uses only a very limited range of words and expressions with very limited control of word formation and/or spelling • errors may severely distort the message	• attempts sentence forms but errors in grammar and punctuation predominate and distort the meaning
2	• barely responds to the task • does not express a position • may attempt to present one or two ideas but there is no development	• has very little control of organisational features	• uses an extremely limited range of vocabulary; essentially no control of word formation and/or spelling	• cannot use sentence forms except in memorised phrases
1	• answer is completely unrelated to the task	• fails to communicate any message	• can only use a few isolated words	• cannot use sentence forms at all
0	• does not attend • does not attempt the task in any way • writes a totally memorised response			

APPENDIX E: GÖRÜŞME SORULARI – ÖĞRENCİLERİN ZİHİN HARİTALAMA STRATEJİSİ ÜZERİNE OLAN GÖRÜŞLERİ

Görüşme Soruları

A. Öğrencilerin kendi yazma becerilerine ilişkin düşünceleri, bakış açıları

1.Ne zamandır İngilizce öğreniyorsunuz?

2.Üniversite eğitimine başlamadan önce yoğun bir dil eğitimine maruz kaldınız mı?

3.Orta öğretim ve lise döneminizde İngilizce olarak yazı yazma üzerine eğitim aldınız mı?

4.Yazma konusunda zayıf bulduğunuz yönleriniz var mı?

B. Öğrencilerin Derste uygulanan Zihin Haritalama Tekniğine ilişkin Düşünceleri

1. Zihin Haritalama tekniğini nasıl tanımlarsınız?

2. Zihin haritalama tekniğiyle ilgili ilk deneyiminizden bahseder misiniz?

3. Zihin haritalama tekniğini faydalı buluyor musunuz? Neden?

4. Zihin haritama yöntemi, yazı yazma becerisi konusunda kendinize daha güvenli olmanızı sağladı mı?

5. Zihin haritalama, ana ve destekleyici fikirleri bulma konusunda faydalı mıydı?

6. Zihin haritalama yöntemini uygularken yeni fikirler geliştirebildiniz mi?

7. Bu yöntem, fikirleri veya örnekleri mantıklı bir sıraya koymanıza yardımcı oldu mu?

8. Bu düşüncelerin planlaması hakkında bu tekniğin size katkı sağladığını düşünüyor musunuz?

9. Zihin haritası yöntemi, güçlü veya zayıf yönlerinizi fark etmenizi sağladığını düşünüyor musunuz? Nasıl?

10. Zihin haritalama stratejisi, yazdığınız paragrafları değerlendirmek yani gözden geçirip analiz etmek için faydalı oldu mu?

11. Zihin haritalama tekniğinin olumsuz yönleri olduğunu düşünüyor musunuz?

12. Zihin haritalama yöntemini uygularken herhangi bir zorluk yaşadınız mı?

13. Zihin haritalama sürecini uygularken, zamanlama hakkındaki ne düşünüyorsunuz?

APPENDIX E: INTERVIEW QUESTIONS-STUDENTS' PERCEPTION ON MIND MAPPING STRATEGY

Interview Questions

A. Students' Thought and Perceptions on their Own Writing Skills

1. How long have you been learning English?

2. Were you exposed to intensive language training before starting your university studies?

3. Did you receive training in writing in English during tour secondary and high school years?

4. Do you have any weaknesses in terms of writing skills?

B. Questions about the Mind-Mapping Strategy Applied in the Class

1. How would you describe the Mind-Mapping technique?

2. Could you tell us about your first-time experience with the mind-mapping technique?

3. Do you find the mind-mapping useful? Why/Why not?

4. Did the mind-mapping technique made you more confident in writing?

5. Is mind mapping useful for finding main and supporting ideas?

6. Were you able to come up with new ideas?

7. Did the mind-mapping method help you to put the ideas or examples in a logical order?

8. Do you think this technique contributed to you in planning?

9. Did the mind-mapping helped you identify your strengths and weaknesses during writing process?

10. Was the mind-mapping strategy useful to evaluate the paragraphs you wrote?

11. Do you think there are negative sides of the mind mapping technique?

12. Did you have any difficulties during the application of mind-mapping technique?

13. What are your opinions about timing during the implementation process of mind mapping?

APPENDIX F: REFLECTION PAPERS ABOUT MIND MAPPING

Reflection Paper about Mind-Mapping Technique
Please write your reflections by answering these questions listed below. *** Questions Reflecting on your First Mind-mapping Experience** - How would you describe the Mind mapping technique you performed in the first two weeks? **-** Write about your first experience with mind-mapping technique *** Questions Reflecting on your Mind-Mapping Experience** **1. Describe the Experience :** -What was it like using a mind map? Was it easy or difficult? - Was it easier to start writing after making the mind map? -Did you use colors, pictures, or just words? 2. **Benefits and Drawbacks** - Did it help you come up with more ideas? - Did you have any difficulties during the application of mind-mapping technique? - What aspects of mind mapping do you find useful for?”

APPENDIX F: ZİHİN HARITALAMA TEKNİĞİ HAKKINDA YANSITMA YAZISI

Lütfen aşağıda listelenen soruları yanıtlayarak düşüncelerinizi yazın.

İlk Zihin Haritalama Deneyiminiz Üzerine Düşünceler

- İlk iki hafta boyunca gerçekleştirdiğiniz Zihin Haritalama tekniğini nasıl tanımlarsınız?

- Zihin haritalama tekniğiyle ilk deneyiminiz hakkında yazın.

Zihin Haritalama Deneyiminiz Üzerine Düşünceler

1. Deneyimi Tanımlayın:

- Bir zihin haritası kullanmak nasıldı? Kolay mıydı yoksa zor muydu?

- Zihin haritasını çıkardıktan sonra yazmaya başlamak daha mı kolaydı?

- Renkler, resimler veya sadece kelimeler mi kullandınız?

2. Faydaları ve Dezavantajları

- Daha fazla fikir bulmanıza yardımcı oldu mu?

- Zihin haritalama tekniğinin uygulanması sırasında herhangi bir zorlukla karşılaştınız mı?

- Zihin haritalamanın hangi yönlerini faydalı buluyorsunuz?

APPENDIX G. WEEKLY TREATMENT SCHEDULE

Weeks	Hours	Treatment of Experimental Group	Writing Topics and Essay Type	Treatment of Comparison G
Week 1		Administration of Pre-test & (Mind Mapping) and Transition from Paragraph to Essay Writing		Administration of Pre-test and Regular Writing İnstruction
Week 2	1.-2. Hour	Instructions about Developing Essay Format(Introduction, Body and Conclusion Paragraph) and	*"Computer Applications: Three Practical Uses" / "Talking on the Phone is the best way of Communication"*	Instructions about Developing Essay Format(Introduction, Body and Conclusion Paragraph) and
	3.-4. Hour	Description of Mind Mapping & Think Aloud Protocol and First Application of the techniqe collaboratively and individually. / Pre-Writing	*"One of the country's customs and explain these customs in detail."*	Overall information about Pre-writing,While Writing and Post Writing Phases
Week 3	1.-2. Hour	Instructions for Descriptive Essay &Useful Expression for Descriptive Essay	*"decribe a memorible celebration experienced with your friend or family"*	Instructions for Descriptive Essay &Useful Expression for Descriptive Essay
	3.-4. Hour	Mind Mapping Practice (pre-writing) & Writing Draft(While-writing) & Post-Writing (Homework)		Pre-writing,While Writing and Post Writing Phases
Week 4	1.-2. Hour	Instructions for Persuasive Essay &Useful Expression for Descriptive Essay	*" We should ban mobile phones in schools." To What extend do you agree or not?*	Instructions for Persuasive Essay &Useful Expression for Descriptive Essay
	3.-4. Hour	Mind Mapping Practice (pre-writing) & Writing Draft(While-writing) & Post-Writing (Homework)		Pre-writing,While Writing and Post Writing Phases
Week 5th - 13th	1st -2nd Hours & 3rd -4th Hours	Descriptive and Persuasive Writing Task Administration with Mind Mapping - (Pre-Writing, Writing, and Post-Writing Phases)	***PERSUASIVE WRITING TOPICS*** "It is a good idea to have an extended family" *"Knowledge is more important than intelligence"* *"University education should be free."* *"Gym class is more important than music class."* *"Chess is a real sport?"* ***DESCRIPTIVE WRITING TOPICS*** *"Memorable Film Scene"* *"Describe one of the celebrities that you admire mo* *"Describe your hometown"* *"Favorite Vacation"* *"Favourite Pet"*	Conventional Writing Phases
Week 14		Post-Tests (Descriptive and Persuaive Essay Topics) & Questionnare & Semi- Structured Interview(after class)		Post-Tests (Descriptive and Persuaive Essay Topics)

APPENDIX H: INFORMED CONSENT FORM

BİLGİLENDİRME

Sayın gönüllü;

Bu çalışma ………… ……………… ………… ……………… ……… amacıyla planlanmıştır. Bu çalışmada size ………… ………………… …………… …………………. uygulanacaktır. Araştırmaya katılımınız isteğe bağlıdır ve istediğiniz zaman, bir cezaya ya da yaptırıma maruz kalmaksızın ve hiçbir hakkınızı kaybetmeksizin, araştırmaya katılmayı reddedebilir veya araştırmadan çekilebilirsiniz. Kimliğinizi ortaya koyacak kayıtlar gizli tutulacaktır; kamuoyuna açıklanamaz; araştırma sonuçlarının yayımlanması halinde bile kimliğiniz gizli kalacaktır.

Araştırma Süresince 24 saat ulaşılabilecek kişi Adı / Soyadı / Telefonu:

GÖNÜLLÜ OLURU

Bilgilendirilmiş Gönüllü Olur Formundaki tüm açıklamaları okudum. Bana, yukarıda konusu ve amacı belirtilen araştırma ile ilgili yazılı ve sözlü açıklama, aşağıda adı belirtilen sorumlu araştırmacı tarafından yapıldı. Araştırmaya gönüllü olarak katıldığımı, istediğim zaman gerekçeli veya gerekçesiz olarak araştırmadan ayrılabileceğimi ve kendi isteğime bakılmaksızın araştırmacı tarafından araştırma dışı bırakılabileceğimi biliyorum. Söz konusu araştırmaya, hiçbir baskı ve zorlama olmaksızın kendi rızamla katılmayı kabul ediyorum.

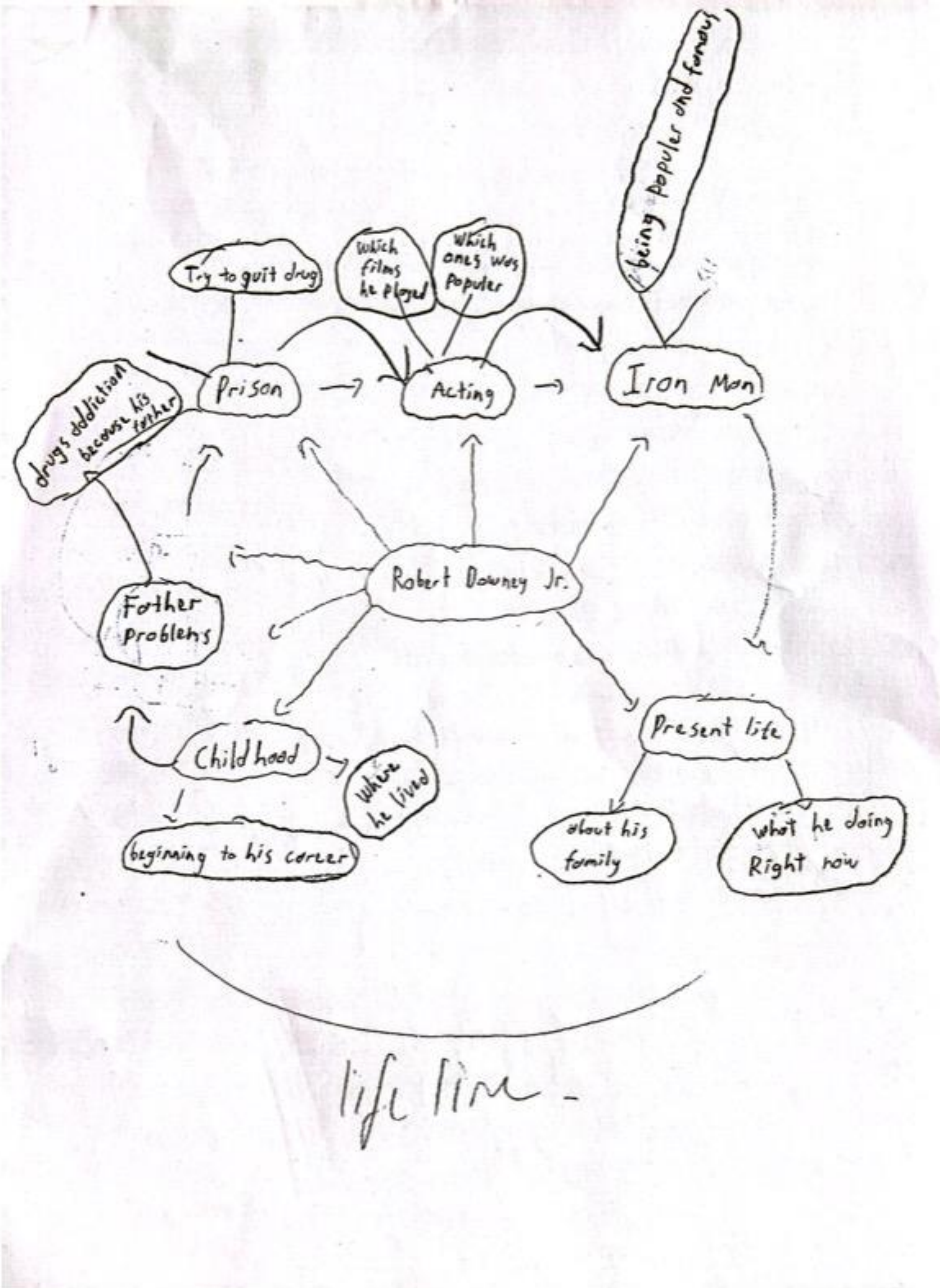
Gönüllünün Adı / Soyadı / İmzası / Tarih

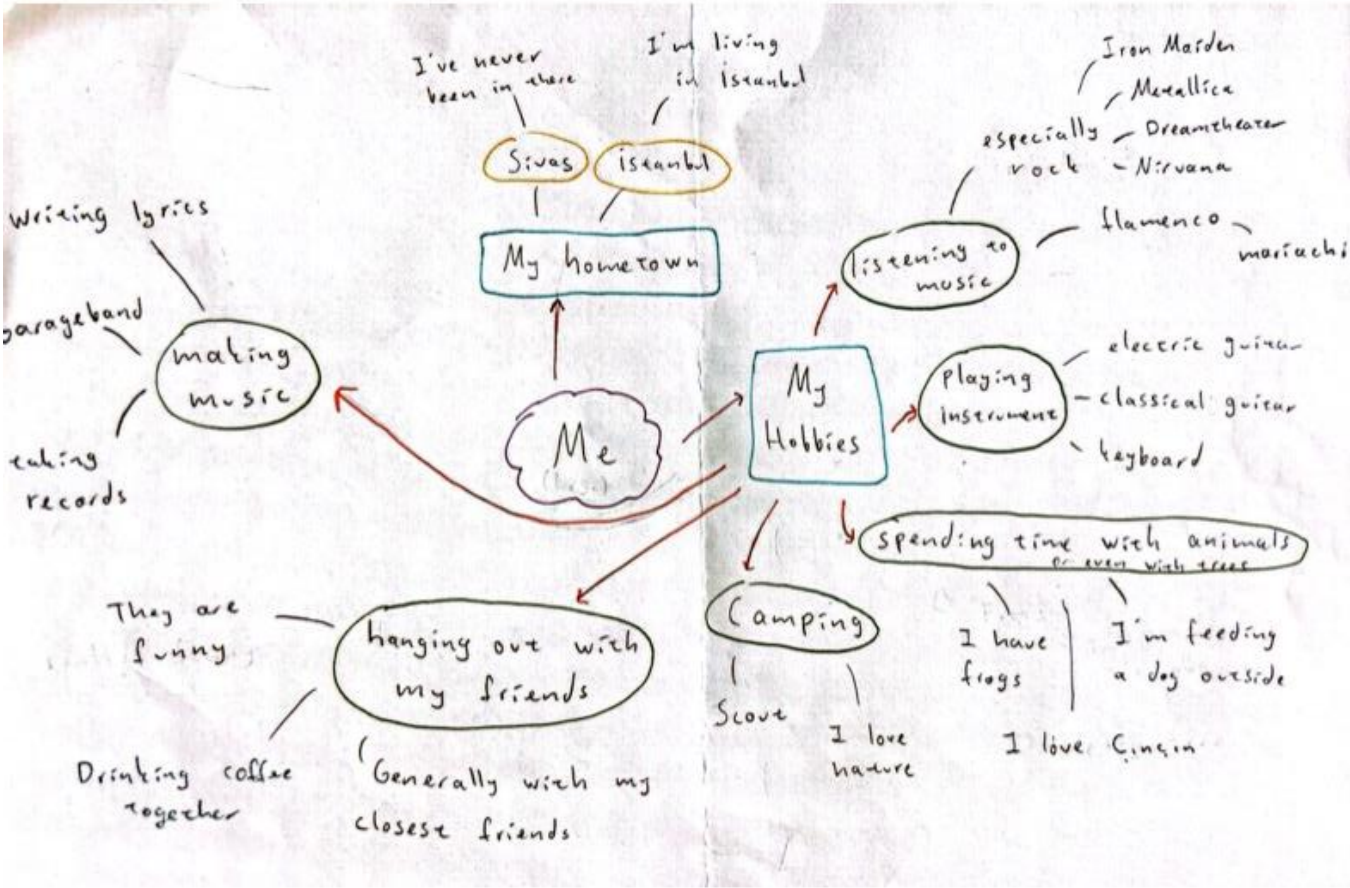
Açıklamaları Yapan Kişinin Adı / Soyadı / İmzası / Tarih

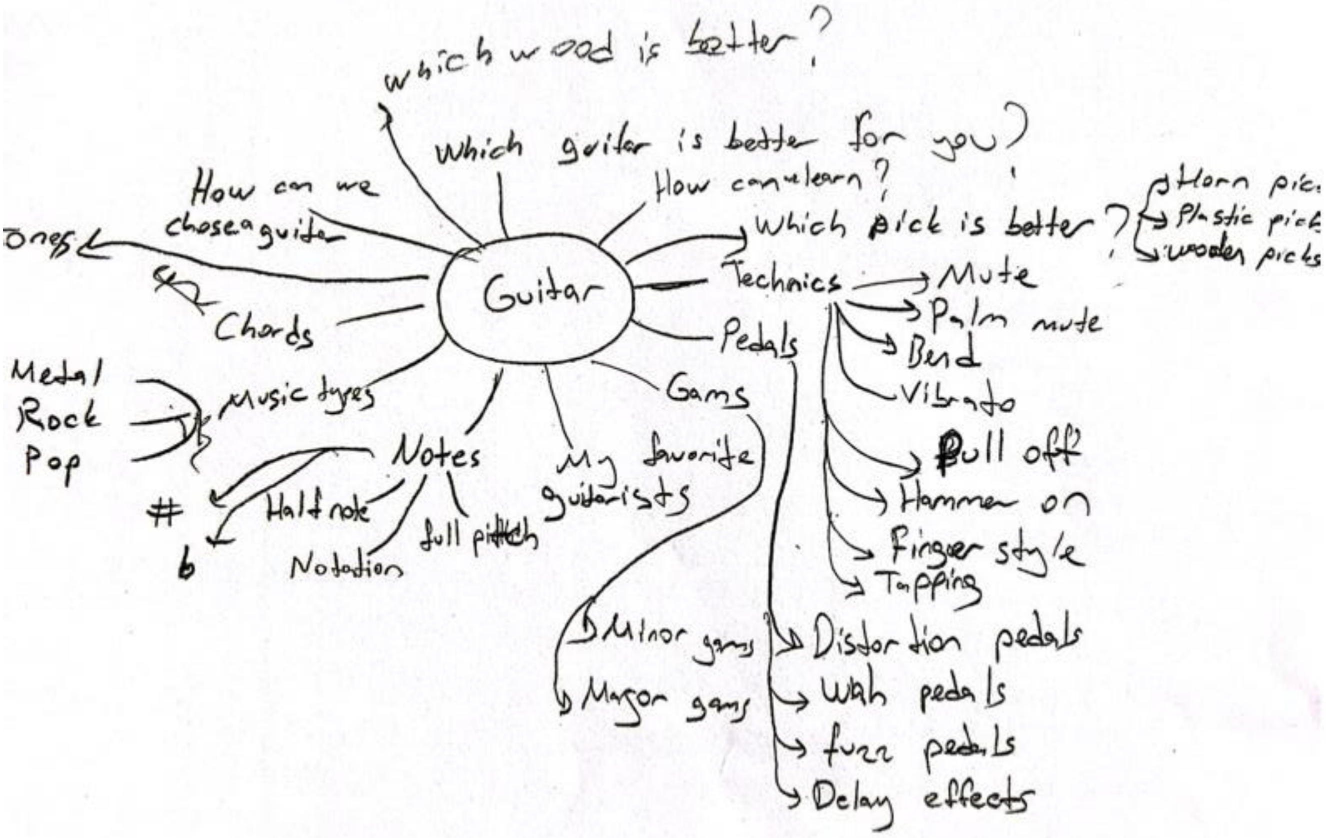
Gerekiyorsa Olur İşlemine Tanık Olan Kişinin Adı / Soyadı / İmzası / Tarih

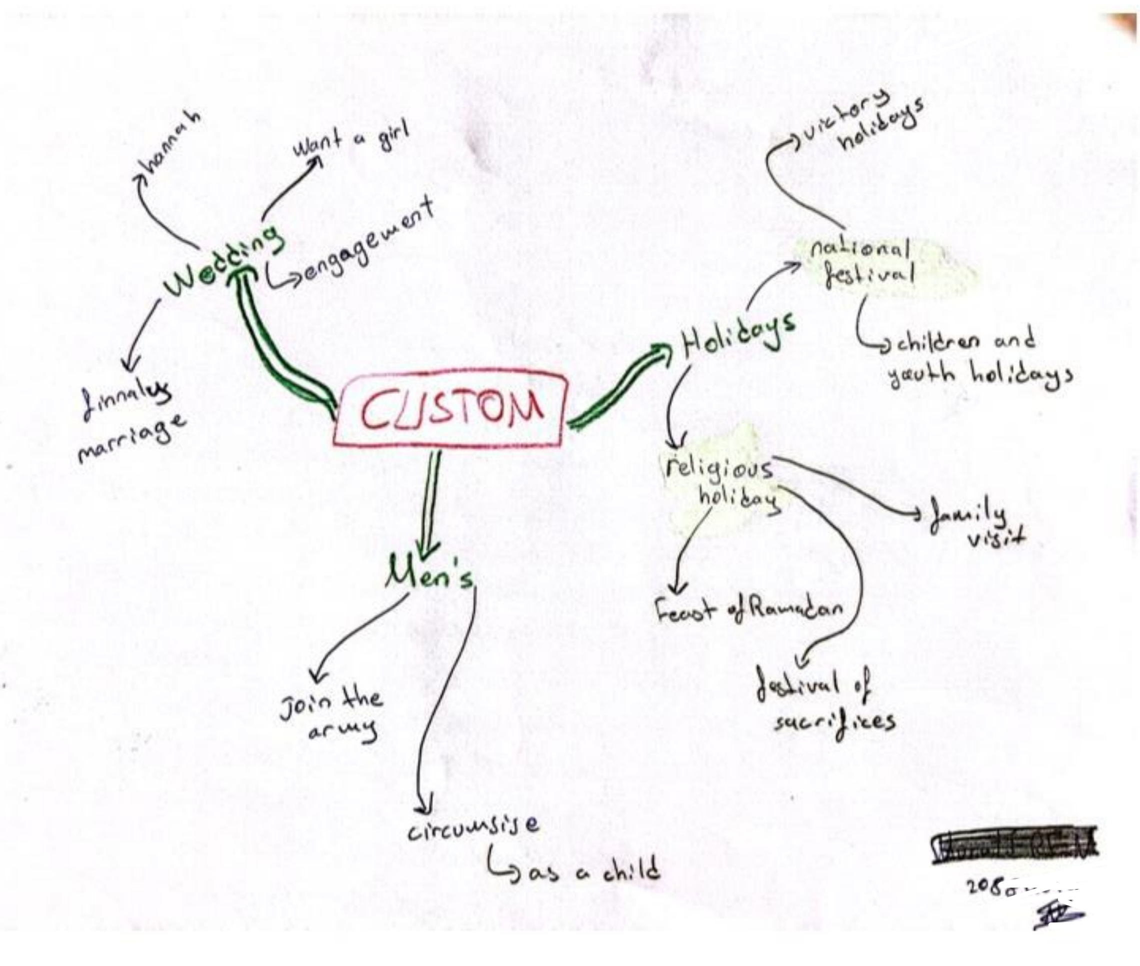
Gerekiyorsa Yasal Temsilcinin Adı / Soyadı / İmzası / Tarih

APPENDIX I: SAMPLE ARTIFACTS




I've never been in there
I'm living in Istanbul
Sivas
istanbul
My hometown
Iron Maiden
Metallica
Dreamtheater
Nirvana
especially rock
flamenco
mariachi
listening to music
writing lyrics
garageband
making music
taking records
Me
My Hobbies
playing instrument
electric guitar
classical guitar
keyboard
spending time with animals
or even with trees
Camping
Scout
I love nature
I have frogs
I'm feeding a dog outside
I love Çinçin
They are funny
hanging out with my friends
Drinking coffee together
Generally with my closest friends


which wood is better?
Which guitar is better for you?
How can we chose a guitar
ones
How can learn?
Which pick is better?
Horn pic
Plastic pick
wooden picks
Guitar
Technics
Mute
Palm mute
Bend
Vibrato
Pull off
Hammer on
Finger style
Tapping
Pedals
Distortion pedals
Wah pedals
fuzz pedals
Delay effects
Gams
Minor gams
Major gams
My favorite guitarists
Chords
Music types
Metal
Rock
Pop
Notes
Half note
full pitch
Notation
#
b


CUSTOM
Wedding
hannah
Want a girl
engagement
finnaly marriage
Holidays
national festival
victory holidays
children and youth holidays
religious holiday
family visit
Feast of Ramadan
festival of sacrifices
Men's
Join the army
circumsise
as a child
[redacted]