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EFFECTS OF THE WRITING INSTRUCTIONAL MODEL WITH INTEGRATION OF INQUIRY-BASED LEARNING AND VISUAL LITERACY ON 21ST CENTURY SKILLS OF EFL LEARNERS

Mr. Patsawut Sukserm

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in English as an International Language
Inter-Department of English as an International Language
GRADUATE SCHOOL
Chulalongkorn University
Academic Year 2022
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ผลของรูปแบบการสอนเขียนด้วยการบูรณาการของการเรียนรู้แบบสืบเสาะกับการอ่านภาพต่อทักษะแห่งศตวรรษที่ 21 ของผู้เรียนภาษาอังกฤษเป็นภาษาต่างประเทศ

นายพรรษวุฒิ สุขเสริม

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาศิลปศาสตรดุษฎีบัณฑิต
สาขาวิชาภาษาอังกฤษเป็นภาษานานาชาติ สหสาขาวิชาภาษาอังกฤษเป็นภาษานานาชาติ
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ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

Thesis Title	EFFECTS OF THE WRITING INSTRUCTIONAL MODEL WITH INTEGRATION OF INQUIRY-BASED LEARNING AND VISUAL LITERACY ON 21ST CENTURY SKILLS OF EFL LEARNERS
By	Mr. Patsawut Sukserm
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พรรษวุฒิ สุขเสริม : ผลของรูปแบบการสอนเขียนด้วยการบูรณาการของการเรียนรู้แบบสืบเสาะกับการอ่านภาพต่อทักษะแห่งศตวรรษที่ 21 ของผู้เรียนภาษาอังกฤษเป็นภาษาต่างประเทศ. (EFFECTS OF THE WRITING INSTRUCTIONAL MODEL WITH INTEGRATION OF INQUIRY-BASED LEARNING AND VISUAL LITERACY ON 21ST CENTURY SKILLS OF EFL LEARNERS) อ.ที่ปรึกษาหลัก : รศ. ดร.ปัญชลี วาสนสมสิทธิ์

แม้งานวิจัยในปัจจุบันจะแสดงให้เห็นถึงศักยภาพของการเรียนรู้แบบสืบเสาะในการส่งเสริมทักษะแห่งศตวรรษที่ 21 กับนักเรียนที่เรียนภาษาอังกฤษเป็นภาษาต่างประเทศ (AbuRezeq, 2018; Imansyan et al., 2019; Milatasari, 2013; Palupi et al., 2020; Tongjean et al., 2019) มีบางงานวิจัยบ่งชี้ถึงความล้มเหลวในการส่งเสริมความยึดมั่นผูกพันของนักเรียน (Duschl & Wright, 1989; Gill, 2005) ซึ่งส่งผลต่อความสำเร็จในการเรียนรู้ภาษา ปัญหานี้ชี้ให้เห็นถึงความจำเป็นในการใช้ประโยชน์จากกลยุทธ์การสอนในรูปแบบต่าง ๆ รวมถึงการอ่านภาพเพื่อเพิ่มประสิทธิภาพของการเรียนรู้แบบสืบเสาะหาความรู้ (Gonzalez-Ledo, 2015; Maricimoi, 2017; Navidinia et al., 2018; Rokhaniyah, 2019, Sulastri, 2019; Tayib, 2015; Villasor, 2018; Yeom, 2018; Yunus & Chien, 2016) งานวิจัยนี้มีวัตถุประสงค์เพื่อ 1) ศึกษาผลของรูปแบบการสอนการเขียนด้วยการบูรณาการการเรียนรู้แบบสืบเสาะกับการอ่านภาพต่อทักษะแห่งศตวรรษที่ 21 ได้แก่ การสื่อสารด้วยการเขียน การทำงานร่วมกัน การคิดเชิงวิพากษ์ และการคิดเชิงสร้างสรรค์ของผู้เรียนภาษาอังกฤษเป็นภาษาต่างประเทศ และ 2) สำรวจความคิดเห็นของผู้เรียนที่มีต่อรูปแบบการสอนการเขียนด้วยการบูรณาการการเรียนรู้แบบสืบเสาะกับการอ่านภาพ การออกแบบงานวิจัยนี้เป็นแบบผสมผสาน โดยใช้แบบทดสอบก่อนและหลังเรียนแบบกลุ่มเดียวด้วยรูปแบบ COPAE ซึ่งประกอบด้วย 5 ขั้นตอน ได้แก่ การเชื่อมโยง การวางโครงร่าง การนำเสนอ การประยุกต์ใช้ และการประเมิน กับนักเรียนมัธยมศึกษาตอนปลาย จำนวน 20 คน ที่โรงเรียนเอกชนแห่งหนึ่งในจังหวัดชัยภูมิ ในภาคตะวันออกเฉียงเหนือของประเทศไทย ในช่วงภาคการศึกษาที่ 1 ปีการศึกษา 2563 งานวิจัยนี้ใช้ระยะเวลาดำเนินการทั้งสิ้น 12 สัปดาห์ และใช้แบบทดสอบทักษะแห่งศตวรรษที่ 21 เกณฑ์การให้คะแนนทักษะแห่งศตวรรษที่ 21 แบบสอบถามการทำงานร่วมกันของนักเรียน แฟ้มผลงานทักษะแห่งศตวรรษที่ 21 บันทึกการสังเกตของผู้สอน แบบสอบถามความคิดเห็น WINVIS และการสัมภาษณ์กลุ่มในการเก็บรวบรวมข้อมูลวิจัย การวิเคราะห์ข้อมูลเชิงปริมาณใช้สถิติเชิงพรรณนา ประกอบด้วย ค่าเฉลี่ยและส่วนเบี่ยงเบนมาตรฐาน รวมทั้งสถิติเชิงอนุมาน Wilcoxon Signed-Rank Test และใช้การวิเคราะห์เนื้อหาเพื่อวิเคราะห์ข้อมูลเชิงคุณภาพ

ผลการวิจัยชี้ให้เห็นว่า การใช้รูปแบบการสอนการเขียนด้วยการบูรณาการการเรียนรู้แบบสืบเสาะกับการอ่านภาพมีประสิทธิภาพในการพัฒนาทักษะแห่งศตวรรษที่ 21 ของนักเรียน ได้แก่ การสื่อสารด้วยการเขียน การทำงานร่วมกัน การคิดเชิงวิพากษ์ และการคิดเชิงสร้างสรรค์ นอกจากนี้ นักเรียนยังแสดงทัศนคติในด้านดีต่อรูปแบบการสอนการเขียนนี้ในทุกด้านที่ได้รับการประเมิน ได้แก่ ความก้าวหน้าในการเรียนรู้และการเขียน วิธีการสอน สื่อการสอน บทบาทของผู้สอน และความพึงพอใจโดยรวมต่อการเรียนรู้ งานวิจัยนี้ จึงสรุปได้ว่ารูปแบบการสอนการเขียนด้วยการบูรณาการการเรียนรู้แบบสืบเสาะกับการอ่านภาพสามารถพัฒนาทักษะแห่งศตวรรษที่ 21 ของนักเรียนที่เรียนภาษาอังกฤษเป็นภาษาต่างประเทศ งานวิจัยนี้จึงมีส่วนช่วยเสริมองค์ความรู้ด้านการสอนที่มีอยู่ให้สมบูรณ์ยิ่งขึ้น โดยมุ่งเน้นให้เห็นความสำคัญของรูปแบบการสอนการเขียนด้วยการบูรณาการการเรียนรู้แบบสืบเสาะกับการอ่านภาพ

สาขาวิชา	ภาษาอังกฤษเป็นภาษานานาชาติ	ลายมือชื่อนิสิต .....
ปีการศึกษา	2565	ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

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Patsawut Sukserm : EFFECTS OF THE WRITING INSTRUCTIONAL MODEL WITH INTEGRATION OF INQUIRY-BASED LEARNING AND VISUAL LITERACY ON 21ST CENTURY SKILLS OF EFL LEARNERS. Advisor: Assoc. Prof. PUNCHALEE WASANASOMSITHI, Ph.D.

Although a body of research illustrates the potential of inquiry-based learning in promoting the 21st century skills among English as a Foreign Language (EFL) students (AbuRezeq, 2018; Imansyan et al., 2019; Milatasari, 2013; Palupi et al., 2020; Tongjean et al., 2019), other studies have indicated its occasional failure in eliciting students' engagement (Duschl & Wright, 1989; Gill, 2005), which affects students' success in language learning. This results in the need to leverage other pedagogical strategies, including visual literacy, to increase the efficacy of inquiry-based learning (Gonzalez-Ledo, 2015; Maricimoi, 2017; Navidinia et al., 2018; Rokhaniyah, 2019, Sulastri, 2019; Tayib, 2015; Villasor, 2018; Yeom, 2018; Yunus and Chien, 2016). The purposes of this study were 1) to determine the effects of the writing instructional model with integration of inquiry-based learning and visual literacy (WINVIS model) on the 21st century skills, including written communication, collaboration, critical thinking skill, and creative thinking skill, of EFL students and 2) to explore the students' opinions towards the WINVIS model. This mixed-methods research with a one-group pretest-posttest design was conducted using the five-step COPAE model, including Connecting, Outlining, Presenting, Applying, and Evaluating, with 20 high school students at a private school in Chaiyaphum province in the northeastern region of Thailand during the first semester of the 2020 academic year. The WINVIS model was implemented for 12 weeks, and data were collected using the 21st century skill pretest and posttest, the 21st century skill rubric, the students' collaboration questionnaire, the student's 21st century skill portfolio, the teacher's observation note, the WINVIS opinion questionnaire, and focus group interviews. Quantitative data were analyzed using descriptive statistics of mean and standard deviation, as well as inferential statistics of Wilcoxon Signed-Rank Test, while content analysis was used to analyze qualitative data.

The findings showed that the implementation of the WINVIS model had a positive effect on students' 21st century skills, namely written communication, collaboration, critical thinking skill, and creative thinking skill. Furthermore, students expressed favorable views of the model across all domains evaluated: learning and writing progress, instructional methods, materials, the teacher's role, and overall satisfaction with learning. Based on the findings, it could be concluded that the WINVIS model could improve the 21st century skills of EFL students. This research enriches the existing pedagogical literature by highlighting the importance of the writing instructional model with integration of inquiry-based learning and visual literacy.

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Field of Study:	English as an International Language	Student's Signature .....
Academic Year:	2022	Advisor's Signature .....

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Patsawut Sukserm

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CHAPTER I

INTRODUCTION

1.1 Background of the study

In recent decades, English has emerged as a global lingua franca (Rose & Galloway, 2019), facilitating communication among individuals from diverse linguistic backgrounds. The significance of English is amplified as the number of non-native speakers surpasses that of native speakers. English is extensively employed in various domains, including education, commerce, science and technology, and entertainment. Consequently, emphasis has been placed on English language teaching and learning at all educational levels, making it a compulsory subject in schools and universities as it has become evident that developing English language proficiency is essential for students to function effectively as global citizens.

However, acquiring English language skills alone is insufficient. The 12th National Plan for Economic and Social Development (2017-2021) recognizes the importance of developing the 21st century skills, comprising the four Cs: communication, collaboration, critical thinking, and creativity (The Partnership for 21st Century Learning, 2015). These skills enable students to effectively express thoughts and ideas, collaborate with diverse teams to achieve common goals, interpret information, draw conclusions through reasoning, and employ various techniques for idea generation. Communication skills involve the exchange of thoughts, questions, ideas, and messages (The Partnership for 21st Century Learning, 2015) and are crucial in English language teaching (ELT) contexts, as most classroom activities necessitate oral, written, and nonverbal communication for various purposes such as informing,

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motivating, instructing, and persuading. Written communication, in particular, is indispensable in both academic and professional settings (Grabe & Kaplan, 1996). Meanwhile, collaboration skills encompass the ability to cooperate with others, leveraging collective talent, expertise, and intelligence to achieve common objectives (The Partnership for 21st Century Learning, 2015). These skills are vital in English as a foreign language (EFL) context, as many ELT classroom activities require students to collaborate on assignments, tasks, or projects, potentially involving task delegation and/or conflict resolution.

Apart from that, critical thinking skills entail employing thinking skills to come up with different types of arguments and making judgments (The Partnership for 21st Century Learning, 2015), enabling individuals to evaluate evidence and make informed decisions. The Thai Basic Education Curriculum B.E. 2544 (A.D. 2001) emphasizes developing critical thinking skills as a fundamental component of broader educational objectives, including ELT. Also, creative thinking skills involve generating novel ideas by applying knowledge and experience through various creativity techniques (The Partnership for 21st Century Learning, 2015). Developing creative thinking skills is essential for problem-solving and innovation (Guilford, 1956), with applications in the ELT classroom.

Unfortunately, many students do not sufficiently develop the 21st century skills due to limited opportunities for practice in traditional classrooms (Muakyod, 2018). Although the Thai government has acknowledged the importance of the 21st century skills and attempted educational reform (Chantamart, 2014), some issues persist, primarily attributable to teaching methods and materials. Traditional, lecture-based instruction continues to dominate language classes, leading to passive learning and

impeding 21st century skill development (Tolley et al., 2012). Moreover, many commercial textbooks inadequately promote the 21st century skills and may not engage students due to irrelevant content. To enhance Thai students' 21st century skills, fundamental changes in teaching approaches and materials are required.

The two aforementioned primary issues are similarly present in the English course at a private school located in the northeast of Thailand. The school has implemented a specialized curriculum emphasizing Intensive Science, Math, and English (ISME), designed to promote excellence in these subjects. Despite this focus, some English classes continue to employ traditional teaching methods and conventional materials, inhibiting student engagement and the development of the 21st century skills. Consequently, the English achievement of students falls short of the set targets. For instance, most students taking the KKU KEPT exam, developed by the Language Institute of Khon Kaen University, score between 40% and 50% in English. In 2018-2019, a preliminary investigation conducted by the researcher of this study, who was assigned to support students' learning performance in all English skills, yielded similar findings, indicating the urgent need for alternative teaching approaches and materials.

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In light of the necessity to enhance the English language learning process, this study introduced a pedagogical model for writing instruction that incorporated inquiry-based learning and visual literacy (WINVIS) to cater to the needs of EFL students and aimed to promote their 21st century skills. This innovative framework incorporated the principles of inquiry-based learning (Rodriguez et al., 2019) and the tenets of visual literacy (Hattwig et al., 2013) to engender a comprehensive development of these competencies. The proposed model offered systematic and incremental steps that enabled learners to generate ideas effectively, leveraging the benefits of inquiry-based

learning (Bunwirat & Boonsathorn, 2018; Bybee et al., 2006; Rodriguez et al., 2019). As an embodiment of active learning, this approach immersed students in their educational journey, promoting knowledge retention and application. In stark contrast to the passive learning model typified by one-dimensional instruction and minimal student engagement that generally prevailed in the classroom, this approach fostered an environment of interaction, communication, and problem-solving, granting learners ample opportunities to utilize English in a wide array of contexts. It thereby enhanced the creation of a meaningful, learner-centered EFL ecosystem that not only bolstered language proficiency but also nurtured lifelong learning skills. Additionally, the study proposed the creation of instructional materials based on the ACRL Standards for Visual Literacy (Hattwig et al., 2013) to stimulate student curiosity and interest. This feature enhanced comprehension and communication skills by equipping learners with the ability to interpret and comprehend visual information—graphs, charts, and infographics—often encountered in academic, professional, and everyday life. Furthermore, visual literacy used in this study strengthened critical thinking by encouraging learners to dissect and assess visual messages for their explicit and implicit meanings. Moreover, it enhanced creativity and self-expression by providing learners with the tools to use visuals as an expressive and artistic medium.

To make it clearer, numerous studies have demonstrated the benefits of inquiry-based learning for teaching English and fostering the 21st century skills. However, the effectiveness of this approach may be limited if the materials employed do not pique students' curiosity or stimulate their interest in learning (Duschl & Wright, 1989; Gill, 2005). To address this limitation, visual materials may be incorporated into EFL instruction to foster student engagement, as they represent a common point of interest

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in learning (Bobek & Tversky, 2016). Visual aids can facilitate comprehension and heighten interest in lessons, assignments, and tasks, ultimately enhancing the classroom environment.

To effectively integrate visual aids into instruction and generate engaging materials, the concept of visual literacy should be introduced in the classroom (Burmark, 2002). Visual literacy encompasses the ability to interpret, understand, and communicate through visual materials (Kiss & Weninger, 2017; Weninger & Kiss, 2013). Consequently, visual literacy has gained increasing importance in education, including English language teaching (Bleed, 2005; Elshazly et al., 2019; Hekmati et al., 2018; Stafford, 2011).

Given these conceptual foundations, the writing instructional model with integration of inquiry-based learning and visual literacy (henceforth WINVIS) model could represent a promising teaching approach to promote the 21st century skills in English writing classrooms. However, limited empirical evidence exists regarding the integration of inquiry-based learning and visual literacy in English writing instruction. This study, therefore, sought to address this research gap by investigating the impact of the WINVIS model on the development of the 21st century skills.

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1.2 Research questions

1.2.1 What are the effects of the WINVIS model on the 21st century skills of EFL learners?

1.2.1.1 To what extent does the WINVIS model increase the written communication skills of EFL learners?

1.2.1.2 To what extent does the WINVIS model improve collaboration skills of EFL learners?

1.2.1.3 To what extent does the WINVIS model promote critical thinking skills of EFL learners?

1.2.1.4 To what extent does the WINVIS model develop creative thinking skills of EFL learners?

1.2.2 What are the students' opinions towards the WINVIS model?

1.3 Research objectives

1.3.1 To investigate the effects of the WINVIS model on the 21st century skills of EFL learners

1.3.1.1 To examine the extent to which the WINVIS model increases the written communication skills of EFL learners

1.3.1.2 To examine the extent to which the WINVIS model improves collaboration skills of EFL learners

1.3.1.3 To examine the extent to which the WINVIS model promotes critical thinking skills of EFL learners

1.3.1.4 To examine the extent to which the WINVIS model develops creative thinking skills of EFL learners

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1.3.2 To explore the students' opinions towards the WINVIS model

1.4 Research Hypothesis

Drawing on a comprehensive review of literature and prior research, it has been suggested that inquiry-based learning (Archer-Kuhn et al., 2020; Bybee et al., 2006; Damopolii et al., 2020; Doungklang & Boonprasitt, 2018; Keeratichamroen & Phonnong, 2020; Mutammimah et al., 2019; Oxford University Press ELT, 2020; Palupi et al., 2020; Rodriguez et al., 2019; Zahara et al., 2020) and visual literacy concepts (Avgerinou & Pettersson, 2011; Chen & Liu, 2019; Cooper & Zimmerman, 2020;

Elshazly et al., 2019; Gaciu, 2015; Hattwig et al., 2013; Michael et al., 2019; Parrish, 2018; Rokhaniyah, 2019; Sathongeay & Prasansaph, 2019; Sulastri, 2019; Tseng, 2020; Yeom, 2018; Zubaidah et al., 2017) can be integrated into language classrooms to improve the 21st century skills, including written communication, collaboration, critical thinking, and creative thinking skills. Therefore, based on such a review of literature, the following hypotheses was formulated:

1.4.1 The written communication skills of EFL learners will be increased after implementing WINVIS model.

1.4.2 The collaboration skills of EFL learners will be increased after implementing WINVIS model.

1.4.3 The critical thinking skills of EFL learners will be increased after implementing WINVIS model.

1.4.2 The creative thinking skills of EFL learners will be increased after implementing WINVIS model.

1.5 Scope of the Study

The present mixed-methods research examined the impact of the WINVIS model on the 21st century skills of EFL learners. The independent variable was the WINVIS model, while the dependent variables were the 21st century skills, namely written communication, collaboration, critical thinking, and creative thinking skills, of EFL learners. The study participants were an intact group of high school-level EFL learners at private school in the northeastern region in Thailand during the 2021 academic year. Quantitative data were collected using the 21st Century Skill Test, students' collaboration questionnaire, and WINVIS opinion questionnaire, while qualitative data were gathered through student's 21st century skill portfolio, teacher's

observation note, handouts, and focus group interviews. Descriptive and inferential statistics, including mean score, standard deviation, and the Wilcoxon Signed-Rank Test for dependent samples, were employed for quantitative data analysis, whereas thematic analysis was used for qualitative data analysis.

1.6 Definitions of Terms

1.6.1 WINVIS model

A writing instructional model with integration of inquiry-based learning and visual literacy combines two primary components: the 5E learning cycle (Rodriguez et al., 2019) and ACRL's visual literacy standards (Hattwig et al., 2013). The WINVIS model was designed to enhance the 21st century skills, specifically written communication, collaboration, critical thinking, and creative thinking skills. The model comprised five stages (connecting, outlining, presenting, applying, and evaluating or COPAE). Each unit within this model, including health, animals, and business, required three weeks of class per unit. In the connecting stage, students engaged with visual materials related to the unit's topic and discussed them in groups. The outlining stage involved students selecting a picture relevant to the unit and creating a mind map, concept map, or hyperbolic tree, to showcase their understanding of the topic. The teacher also emphasized the importance of crediting sources to avoid plagiarism. The presenting stage required students to write a paragraph on a chosen topic and explain a graphical organizer related to it. The teacher provided constructive feedback to help students improve their abilities. In the applying stage, the teacher introduced the concept of a visual organizer that helped in structuring writing. Students were then tasked with creating their own visual organizer. They revised and edited their work, applying their learned knowledge to improve their writing. The final stage, evaluating,

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was centered on peer assessment of writing tasks, where students evaluated each other's work using a rubric. Students learned to provide meaningful feedback, and they improved their writing abilities through self-assessment and constructive criticism from peers. After receiving the teacher's feedback, students stored their work in portfolios for future reference.

1.6.2 Inquiry-based learning

Inquiry-based learning is a student-centered process wherein learners actively engage in constructing meaningful knowledge based on their curiosity or interests (Bybee et al., 2006). This study incorporated the 5E learning cycle framework (Rodriguez et al., 2019), which consists of five steps. First, engaging fosters curiosity by utilizing tasks that access students' prior knowledge, creating connections between past and present learning experiences. Secondly, exploring provides students with the opportunity to think freely within the boundaries of the activity, embracing trials and errors as they test ideas, explore, and make mistakes. Thirdly, explaining enables learners to articulate their understanding of concepts based on their experiences. Fourthly, elaborating challenges students' conceptual understanding through novel experiences by applying their grasp of the concepts through additional activities. Finally, evaluating assesses understanding and abilities by allowing teachers to assess students' progress towards achieving the lesson objectives.

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1.6.3 Visual literacy

Visual literacy involves the ability to "read" images and extract meaning through a reading process. It also encompasses the skills needed to evaluate, apply, or create visual images as a means of communication (Burkhardt et al., 2003; Debes, 1969; Hattwig et al., 2013; Lengler & Eppler, 2007; Stafford, 2011). In this study, visual

literacy was grounded in the ACRL Standards for Visual Literacy (Hattwig et al., 2013), which included seven standards: 1) defining the need for images where students should be able to define the purpose, scope, and environment of images within a project and identify key concepts and terms that described the needed images; 2) effectively finding images where students should be able to select appropriate sources, use specialized online or in-person services to select image sources, and articulate the advantages and disadvantages of various types of image sources and retrieval systems; 3) interpreting and analyzing images where students should be able to identify relevant information for an image's meaning, examine relationships between images, participate in discussions about images, and validate interpretation and analysis of images; 4) evaluating images where students should be able to make judgments about image sources based on evaluations of image and information quality; 5) effectively using images where students should be able to plan for strategic use of images and visual media within a project, use images for various purposes, use visual thinking skills to clarify and solve problems, and communicate effectively with and about images, considering meaning, aesthetic criteria, visual impact, rhetorical impact, and audience; 6) making sense of images where students should be able to create images and visual media to represent and communicate concepts, narratives, and arguments for a defined audience, construct accurate and appropriate graphic representations of data and information, plan visual style and design in relation to objectives, and use creativity to incorporate existing image content into new visual products; and 7) ethically using and citing visual materials where students should be able to give attribution to image creators in citations and credit statements to acknowledge authorship and author rights by including source information in citations and credit statements.

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1.6.4 21st century skills

The 21st century skills refer to the four Cs: communication, collaboration, critical thinking, and creativity (The Partnership for 21st Century Learning, 2015). The 4Cs encompass essential skills and competencies for individuals in the modern era. Communication refers to the ability to effectively convey and exchange ideas, information, and meaning through various mediums and platforms. Collaboration involves working together with others to achieve common goals, fostering teamwork, cooperation, and shared decision-making. Critical thinking entails the process of analyzing, evaluating, and synthesizing information to make reasoned judgments and solve complex problems. Lastly, creativity encompasses the generation of original ideas, approaches, and solutions, utilizing imagination, innovation, and out-of-the-box thinking to address challenges and explore new possibilities. In this study, these skills were specifically defined as writing communication, collaboration, critical thinking, and creative thinking skills as follows:

Written communication skills entailed the ability to effectively convey thoughts and ideas using oral, written, and nonverbal forms for various purposes (The Partnership for 21st Century Learning, 2015). In other words, written communication encompassed organizing ideas, using appropriate language and tone, maintaining grammar and spelling accuracy, conveying complex ideas clearly, persuasive writing, adapting to different contexts, and effective proofreading. By honing these skills, students were expected to be able to communicate their thoughts and messages effectively in writing. In this study, written communication which was synthesized from several scholars (Aryadoust, 2016; Brown & Bailey, 1984; Cambridge English, 2014; Jacobs et al., 1981) focused on four abilities. Firstly, in terms of content, the piece of

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writing presented relevant ideas and addressed all given questions in the task. Thesis statements, topic sentences, body, and conclusions were clear. Secondly, as for organization, the piece of writing contained well-organized sequences of information arranged logically by using the proper transition words, linking words, or cohesive devices within paragraphs. Thirdly, grammatical structures meant the piece of writing consisted of a wide range of simple and some complex grammatical forms with a good degree of control and contained few, if any, errors in agreement, tense, word order, articles, punctuation, capitalization which did not impede communication. Finally, vocabulary meant the piece of writing comprises a wide range of vocabulary usage, was concise, and the register was clear, and the misspelling did not impede communication.

Collaboration skills involve the ability to cooperate with others to achieve shared goals by leveraging talent, expertise, and intelligence (The Partnership for 21st Century Learning, 2015). Collaboration skills encompass effective communication, interpersonal skills, active participation, time management, organizational skills, flexibility, and adaptability. By cultivating these skills, it is believed that students will be able to thrive in collaborative environments and contribute to the success of team-based endeavors. In this study, collaboration skills adapted from The Partnership for 21st Century Learning (2015) encompassed three abilities used in the WINVIS model. Firstly, working effectively and respectfully with diverse teams included accepting diversity, listening to opinions of group members when working together until achieving goals, and seeing the value of group members in working together. Secondly, flexibility in working together consisted of adapting to the variety of works assigned to achieve the goal and reconciling in collaborative work. Finally, shared responsibility

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for collaborative work included accepting the positive and negative effects of collaborative work.

Critical thinking skills require using various types of reasoning and interpreting information to draw conclusions based on analysis (The Partnership for 21st Century Learning, 2015). That is, critical thinking skills encompass analyzing information, evaluating arguments, thinking creatively, problem-solving, metacognition, and decision-making. By honing these skills, individuals can become more discerning, independent thinkers capable of navigating complex issues and making sound judgments in various contexts. In this study, critical thinking abilities synthesized from the works of academics (Fisher, 2001; The Partnership for 21st Century Learning, 2015) focused on the following five abilities. Firstly, reasoning was the ability to use inductive or deductive reasoning to explain the arguments, claims, or assumptions. Secondly, analyzing was the ability to identify the elements in a reasoned case. Thirdly, evaluating was the ability to judge the credibility, evidence, arguments, or claims. Fourthly, synthesizing was the ability to make connections among information and arguments. Finally, interpreting was the ability to make inferences or conclusions based on analysis.

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Creative thinking skills involve the capacity to generate new ideas or concepts (The Partnership for 21st Century Learning, 2015). That is, creativity skills encompass divergent thinking, making unique connections, originality, curiosity, resilience, collaboration, reflection, and revision. By developing and fostering these skills, individuals can unlock their creative potential, approach problems in innovative ways, and bring fresh perspectives to their personal and professional endeavors. In this study, creative thinking ability synthesized from several scholars (Batey, 2012; Bialik &

Fadel, 2015; Guidford, 1967; Sternberg, 2006) included fluency which was the ability to list a number of ideas, answers, or possibilities to a given issue; flexibility which was the ability to ability to develop alternative ideas, options, or possibilities to a given issue; and originality which was the ability to invent new unique or responses or possibilities within visual materials.

1.6.5 EFL learners

EFL (English as a Foreign Language) learners are individuals who do not use English as their first language. In this study, EFL learners referred to Thai high school students at a private school in the Northeastern region of Thailand, who were assigned to the researcher as an intact group in the first semester of the academic year 2021. All students possessed comparable educational backgrounds, in line with the standard English curriculum of the school, signifying similar levels of basic English knowledge and learning opportunities. The average English proficiency level of the students was intermediate, and they were obligated to undertake nine hours of English studies per week, as per the school's requirements.

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1.7 Significance of the study

The present study investigated the impact of the WINVIS model on promoting the 21st century skills among EFL learners. The findings could illuminate how the WINVIS model can be used to foster the 21st century skills in the following three aspects:

Theoretically, the research findings offer a foundation for English writing instruction as a new model focused on inquiry-based learning and visual literacy to promote the 21st century skills in EFL learners. The study was expected to provide

practical methods for incorporating inquiry-based learning and visual literacy in English teaching to enhance the 21st century skills of EFL learners.

Pedagogically, the study has yielded empirical evidence for alternative teaching methods that can help EFL learners improve their 21st century skills. This approach could be beneficial for English language teachers interested in a new instructional model to help students develop the 21st century skills. Additionally, it could contribute to teaching other language skills, alternative teaching approaches, and related subjects.

Regarding research relevance, the findings contribute to the field of language learning for EFL learners, particularly how they learn a foreign language and develop their 21st century skills. The present study also offers empirical evidence on the extent to which the WINVIS model can support EFL learners aiming to master the target language, as well as other 21st century skills, with the adoption of the WINVIS conceptual framework analyzed and synthesized in this study.

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CHAPTER II

LITERATURE REVIEW

In this chapter, theories and concepts, as well as previous research studies, related to inquiry-based learning and visual-literacy are reviewed.

2.1 Inquiry-based Learning

2.1.1 Definition of Inquiry-based Learning

Inquiry-based learning is grounded in the constructivist theory, where the learning process commences by sparking learners' curiosity about topics that interest them, leading them to generate questions, explore, and acquire knowledge to address these questions (Pedaste et al., 2012; Rooney, 2012). Castronova (2002) posits that learners actively participate in classroom activities that cater to their curiosity and support individual interests. This approach highlights the process of learner learning rather than solely focusing on outcomes. Uno (1999) characterizes inquiry as a method that encourages learners to independently discover or construct information rather than relying on teachers to provide it. Such learning is associated with formulating hypotheses and testing them through experimentation or observation, as opposed to utilizing texts, lectures, or secondary sources (Newell, 2003; Pedaste et al., 2012). Thus, inquiry-based learning refers to a student-centered learning process that actively involves learners in constructing meaningful information derived from their curiosity or interests, engaging in experiential learning with teachers who are acting as facilitators.

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2.1.2 Components of Inquiry-based Learning

Inquiry-based learning emphasizes the process of learning through inquiry. Various frameworks of inquiry-based learning have been proposed by scholars. This study examined specific concepts of inquiry-based learning based in two aspects: the frequency of use and updated framework over the past five years.

One of the more prevalent frameworks of inquiry-based learning is the 5E model, a learning cycle developed by Bybee et al. (2006) for the BCSE. This constructivist model aims to expose learners to experiences that encourage them to reevaluate their conceptions through self-reflection and interaction with peers. The 5E model provides a structured instructional sequence that engages learners in learning experiences and promotes exploration and construction of understanding, particularly in scientific concepts.

Another notable framework is the maker-centered 5E learning cycle, introduced by Rodriguez et al. (2019). This model incorporates a DIY mindset, allowing learners to express their knowledge through the act of creating meaningful products. This cycle engages learners in making products that foster valuable habits of mind, such as reflection, resilience, or playfulness, also known as the "maker mindset" (Martin, 2015). The Institute for Design at Stanford (2010) highlights that maker-centered learning promotes skills such as empathy, defining problems, and proficiency with technological tools required for testing and prototyping.

This study adapted the maker-centered 5E learning cycle due to its relevance to 21st-century skills, which were the focus of the study. This includes material production, collaboration, reasoning, and creation. Additionally, this up-to-date concept is based on Bybee et al. (2006), meaning that the maker-centered 5E learning cycle

(Rodriguez et al., 2019) can connect with Bybee et al.'s (2006) inquiry-based learning framework.

The synthesis of inquiry-based learning in this study was adapted based on the maker-centered 5E learning cycle (Rodriguez et al., 2019), with the following stages:

Engage: Teachers generate curiosity and support learners in activities, questions, or challenges that stimulate their curiosity and encourage deep thinking.

Explore: Learners have the opportunity to ask and answer their questions and experiment with their ideas, using trials and errors in a low-stake environment.

Explain: Learners describe their understanding of concepts and articulate their ideas, determining what is important to communicate.

Elaborate: Learners extend their knowledge through new experiences and refine their work by connecting it to real-world issues in their community or lives.

Evaluate: Learners engage in self-assessment, and teachers evaluate their progress toward lesson objectives.

In the present study, the adapted maker-centered 5E learning cycle emphasized the importance of students' active participation in the learning process, aligning with the goals of inquiry-based learning.

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Table 1:

The Synthesized Inquiry-based Learning

Stage	Characteristics	Teacher's roles	Students' roles
Engaging	The first stage aims to foster curiosity by utilizing tasks that access students' prior knowledge, creating connections between past and present learning experiences.	The teacher generates interest and spark curiosity among students by posing questions or challenges that promote deep thinking and stimulate intellectual engagement.	Students express interest in the topic by posing questions such as "Why did this happen?" and "What can I find out about this?"
Exploring	The second stage provides students with the opportunity to think freely within the boundaries of the activity, embracing trials and errors as they test ideas, explore, and make mistakes. At this stage, there is no right or wrong; every outcome serves as a learning opportunity, enabling students to draw conclusions from their observations and data.	The teacher creates a "need to know" environment by encouraging students to collaborate without direct instruction. Acting as consultants, the teacher uses probing questions and feedback to guide students' thinking and creative processes.	Students collaborate, share ideas, and engage in discussions while forming new predictions and hypotheses by exploring alternative approaches.
Explaining	The third stage emphasizes students' articulation of their understanding of	The teacher fosters students' comprehension by encouraging them to	Students communicate possible answers to their peers and strive to understand the

Stage	Characteristics	Teacher's roles	Students' roles
	concepts and ideas, based on their experiences. This stage offers the opportunity for the teacher to directly introduce a concept or skill, guiding students toward a deeper comprehension through explanation.	explain concepts in their own words and seeks clarification when necessary. The teacher introduces relevant vocabulary and formal labels as needed, while assessing students' growing understanding through opportunities to publicly present their creations.	explanations provided by the teacher. They actively listen, ask questions, and assess their own understanding.
Elaborating	The fourth stage challenges students' conceptual understanding and skills by exposing them to new experiences, expanding their boundaries. Students apply their grasp of the concepts through additional activities.	The teacher prompts students to apply their acquired concepts and skills in novel situations, referring to existing evidence and asking questions like, "What do you already know?" and "Why do you think…?"	Students apply newly acquired explanations and skills in similar situations, utilizing prior knowledge to formulate questions, propose solutions, and make decisions.
Evaluating	The fifth stage encourages students to engage in self-assessment to evaluate their understanding and abilities. This stage also allows teachers to assess students' progress towards	The teacher observes students' work, looking for evidence of understanding and shifts in thinking or behaviors. The teacher may assign tasks that provide insight into	Students showcase their understanding of the content through creation and engage in self-assessment, evaluating both their own progress and that of their classmates.

Stage	Characteristics	Teacher's roles	Students' roles
	achieving the lesson objectives.	students' progress and development.	

2.1.3 Teaching inquiry-based learning

Inquiry-based learning aims to stimulate learners to think independently and discover answers on their own, with teachers fostering curiosity and providing a suitable learning environment. Several scholars have proposed various levels of inquiry-based learning (Carin & Sund, 1975; Romey, 1968; Sund & Trowbridge, 1973), focusing on the roles of teachers and students. Romey (1968) points out that the level of inquiry-based learning is influenced by the amount of discussion and suggestions provided by teachers. Greater teacher involvement results in lower inquiry levels, while increased learner autonomy leads to higher inquiry levels.

In 1973, Sund and Trowbridge classified inquiry-based learning into two categories based on the roles of teachers and learners. Guided inquiry involves teachers playing a significant role in almost every step of the activity, while free inquiry requires learners to assume responsibility for all activities without teacher intervention. Carin and Sund (1975) subsequently introduced another type of inquiry-based learning called less guided-inquiry, which links the teacher's role in setting issues to investigate and the learners' role in finding answers. The teacher acts as a facilitator, providing situations or questions to stimulate learners' thinking.

In fact, inquiry-based learning is inherently associated with the roles of both teachers and learners (Massialas & Cox, 1968; Suchman, 1966). Teachers have several essential responsibilities: serving as a catalyst by setting problems and issues for

learners to investigate, reinforcing learning behavior with compliments and rewards, providing feedback on learners' answers, directing and guiding learners towards the correct solution, and organizing the classroom environment to encourage participation and discussion.

The primary roles of teachers are to stimulate learners' thinking, prepare materials, support independent thinking, facilitate questioning and discussion, and evaluate learners' understanding based on their claims and reasons. As for learners, their roles involve engaging in the inquiry process as experimenters, utilizing information gathering, identifying relationships, planning, observing, reporting, and drawing conclusions from their learning experiences.

2.1.4 Inquiry-based learning in writing classrooms

The inquiry-based writing instruction model adopts a comprehensive approach that consists of engagement, exploration, explanation, elaboration, assessment, and reflection. This holistic model nurtures a cycle of autonomous learning and persistent self-assessment, fostering learners' abilities to share their insights with peers, educators, and parents (Marshall, 2013). These elements of assessment and reflection are crucial and seamlessly integrated into each phase of the model.

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In the Engagement phase, learners' pre-existing knowledge is stimulated and challenged. Teachers aid this process by conducting brainstorming sessions, thus assisting learners in generating potential questions and ideas. To further facilitate this process, Writing Process Sheets (WPS) are employed, helping learners refine their writing topics and stimulate idea generation (Edward, 1983).

The Exploration phase involves learners critically assessing their existing knowledge, identifying knowledge gaps, and proactively seeking further information.

During this stage, teachers play an instrumental role by offering scaffolding through observation, questioning, and guidance, aiding learners in discerning the most relevant information for their writing topics.

The Explanation phase necessitates learners to articulate their understanding via written communication. They draft their texts with their intended audience in mind, while educators provide feedback to guide the revision and refinement process (Alberta Learning, 2004; Wale & Bishaw, 2020). In the Extension phase, learners translate their learning to real-world scenarios, thereby solidifying their conceptual understanding and creating lasting mental representations. Learners apply their new knowledge in unfamiliar contexts, enriching their understanding and promoting lifelong learning. This phase encourages the production of high-quality academic texts that reflect the caliber of professional researchers and writers.

Similarly, this comprehensive inquiry-based learning model is believed to enhance the writing quality of English (Kasmaini & Zahrida, 2022). The implementation stages are as follows:

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During the Orientation stage, the researcher created a conducive learning environment, outlined the study topics, set the learning objectives, and prepared learners for the inquiry-based learning model. In the Problem Formulation stage, learners were presented with a topic, such as an argumentative text, and were tasked with discussing it. During Hypothesis Formulation, learners sought answers to the characteristics of argumentative texts, while in the Data Collection stage required learners to gather as much information as possible to validate the previously obtained definition of the argumentative text. In the Hypothesis Testing stage, learners were asked to present and compare the definitions and characteristics of argumentative texts

with other text types, such as narratives. Finally, during the Conclusion Formulation stage, learners accurately presented the definition, generic structures, linguistic features, and purposes of the text. It was believed that this detailed and structured model fostered a comprehensive understanding and improvement in learners' writing capabilities.

In conclusion, the inquiry-based writing instruction model, consisting of engagement, exploration, explanation, elaboration, assessment, and reflection, cultivated a learning environment of autonomy and ongoing self-assessment. This framework engaged students by activating prior knowledge and promoting brainstorming, then encouraged exploration to identify knowledge gaps and find new information. Students articulated their understanding during the explanation phase and applied their learning in real-world contexts during the extension phase. This comprehensive model, with the teacher researcher providing guidance and feedback at every step, has been proven effective to improve students' writing quality, especially when it was tailored to specific tasks such as understanding and writing argumentative texts. By fostering a continuous cycle of learning, reflection, and application, inquiry-based writing instruction models equipped students with the skills and habits for lifelong learning.

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2.1.5 Previous studies related to inquiry-based learning with 21st century skills

A comprehensive literature review suggests that inquiry-based learning can be an effective pedagogical approach to enhance 21st century skills. Inquiry-based learning not only helps learners transform information into useful knowledge through direct experience or observation, but also enables them to acquire important skills for living

and working in a globalized world (Anderson, 2002; Bunwirat & Boonsathorn, 2018). Inquiry-based learning has been applied in various fields and educational levels, including science (Damopolii et al., 2020; Maxwell. et al., 2015), primary school (Palupi et al., 2020), secondary school (Imansyah et al., 2019; Milatasari, 2013), undergraduate and graduate social work programs (AbuRezeq, 2018; Archer-Kuhn et al., 2020), International Baccalaureate primary years' program (Mutammimah et al., 2019), vocational high school (Nurlaela et al., 2018), and across different level groups and genders (Nunaki et al., 2019; Tongjean et al., 2019).

Inquiry-based learning can also be applied in English teaching (Bunwirat et al., 2018; Mutammimah et al., 2019; Sari & Wati, 2017; Yogi et al., 2019). For instance, it has been shown to positively affected second-grade students' speaking ability, including vocabulary, grammar, fluency, and pronunciation (Yogi et al., 2019). Additionally, inquiry-based learning was found to enhance student' reading ability (Sari & Wati, 2017), as it encouraged them to take the initiative to ask questions, conduct field observations, analyze data, and draw conclusions. Inquiry-based learning can also improve students' writing ability by providing them with successful language learning experiences (Imansyah et al., 2019).

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Several studies have investigated the use of inquiry-based learning to promote 21st century skills (AbuRezeq, 2018; Imansyah et al., 2019; Milatasari, 2013; Palupi et al., 2020; Tongjean et al., 2019). For example, Palupi et al. (2020) found that the inquiry-based model was more effective in teaching explanatory writing than the problem-based learning model. Similarly, AbuRezeq (2018) found a significant improvement in 3rd year students' writing performance, including identifying main ideas, posing questions, paraphrasing, narrating, problem-solving, and argumentation.

Inquiry-based learning can also enhance students' writing ability by helping them develop more detailed ideas (Milatasari, 2013; Tongjean et al., 2019).

Furthermore, inquiry-based learning has been shown to be effective in improving both writing communication and collaboration skills. Kuhlthau et al. (2007) and Srepongpijid et al. (2018), for instance, found that inquiry-based learning provides students with opportunities to engage in discussions and collaborate with peers and teachers in a friendly atmosphere, thereby improving their social interaction skills. Additionally, Oxford University Press ELT (2020) explains that the core principle of inquiry-based learning is learning from peers and sharing ideas, which is achieved through group projects, discussions, and other forms of social interaction, promoting teamwork skills (Mutammimah et al., 2019; Scardamalia, 2002). Doungklang and Boonprasitt (2018) studied the effectiveness of the 5E model for inquiry-based teaching and found that most students preferred group work as it allowed them to help each other and share opinions.

Inquiry-based learning has also been shown to foster critical thinking skills, which are considered to be important 21st century skills. Research has revealed that inquiry-based learning activities have a significant impact on development of critical thinking skills (Doungklang & Boonprasitt, 2018; Duran & Dokme, 2016; Ghaemi & Ghazi, 2017; Srepongpijid et al., 2018). Duran and Dokme (2016) and Ghaemi and Ghazi (2017) found that inquiry-based activities increased critical thinking ability in students, explaining that it is related to problem-solving and the thinking and learning process. Srepongpijid et al. (2018) reported that inquiry-based learning helped students practice their reasoning skills and consider the credibility of their arguments logically to reach a conclusion. Doungklang and Boonprasitt (2018) found that analytical

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thinking skills, synthesis thinking skills, and critical thinking skills were improved in over 80% of the students in grade 11.

Inquiry-based learning has also been shown to promote creative thinking skills (Indarasati et al., 2019; Nurlaela et al., 2018; Sandika & Fitrihidajati, 2018; Zahara et al., 2020). Research has suggested that inquiry-based learning can significantly enhance students' creative thinking skills in various subjects such as basic biology (Sandika & Fitrihidajati, 2018) and mathematics (Indarasati et al., 2019). For example, Nurlaela et al. (2018) developed inquiry-based learning tools to enhance creative thinking skills in high school students and found a significant improvement in creative thinking skills.

In summary, a thorough review of the literature indicates that inquiry-based learning, which encourages learners to derive knowledge from direct experience or observation, is an efficacious pedagogical approach for fostering 21st century skills across various educational fields and levels. This approach has been successfully applied in English teaching, positively impacting learners' speaking, reading, and writing abilities by promoting active engagement, critical thinking, and a deeper understanding of the subject matter (Anderson, 2002; Bunwirat & Boonsathorn, 2018; Yogi et al., 2019). Studies further suggest that inquiry-based learning facilitates the development of writing communication, collaboration skills (Kuhlthau et al., 2007; Srepongpijid et al., 2018), critical thinking skills (Doungklang & Boonprasitt, 2018; Duran & Dokme, 2016; Srepongpijid et al., 2018), and creative thinking skills (Indarasati et al., 2019; Nurlaela et al., 2018; Sandika & Fitrihidajati, 2018), all of which are considered essential for success in the 21st century.

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2.2 Visual literacy

2.2.1 The definition of visual literacy

Although no single theory or conception has been directly cited to explain how visual literacy occurs in English language teaching, several theories and conceptions contribute to our understanding of visual literacy.

Historically, there was no clear consensus on the meaning of visual literacy. Some defined it as the ability to read, write, and create visual objects. The first definition was introduced by John Debes, the founder of the International Visual Literacy Association, in 1969. He described visual literacy as a visual competency developed through the use of one's eyes and other sensory experiences to become visually literate. Such skills enable individuals to distinguish and interpret visual objects, such as pictures, maps, symbols, diagrams, and natural or man-made images, for communication, comprehension, and enjoyment. Visually literate individuals can understand visual objects, particularly in their entirety, and interpret them based on their knowledge of cultural structures. Debes has also emphasized that visual literacy helps individuals evaluate the style and order of visual structures and explore different techniques for visual production.

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According to the Association of College and Research Libraries (ACRL; Hattwig et al., 2013), visual literacy is the ability to find, interpret, evaluate, and use visual materials to understand and analyze contexts and cultures, as well as to produce visual objects. This definition implies that visual literacy involves both consuming and sharing visual media. The International Visual Literacy Association (IVLA) further explains that visual literacy is a skill developed through vision and cognitive and sensory experiences, including interpreting images, searching and evaluating

information from visual media, and creating content using images as a medium (Lengler & Eppler, 2007). Burkhardt et al. (2003) from the North Central Regional Educational Laboratory (NCREL) define visual literacy in the 21st century as the ability to interpret, use, understand, and create products using advanced thinking skills, decision-making, communication, and learning. Stafford (2011) asserts that visual literacy is the process of reading, interpreting, understanding, and creating visual media. Developing visual knowledge requires practical application of principles to decipher meaning, analyze, and interpret images (Johnson, 2006).

In conclusion, visual literacy in the present study refers to the ability to perceive and understand the meaning of various forms or visual media using visual senses and other relevant sensory experiences to analyze and interpret visual objects. Additionally, it involves the ability to create and use visual objects for effective communication (Burkhardt et al., 2003; Debes, 1969; Hattwig et al., 2013; Lengler & Eppler, 2007; Stafford, 2011).

2.2.2 Components of visual literacy

According to Avgerinou and Pettersson (2011), the terms "visual literacy abilities, visual literacy competencies, and visual literacy skills" are often used interchangeably. They propose a cohesive theory of visual literacy comprising five components: visual language, visual perception, visual communication, visual thinking, and visual learning. These components are interconnected and play a crucial role in interpreting visual messages. They can be elaborated as follows:

1. Visual language consists of basic graphic elements such as dots, lines, areas, and volumes, which can form different images. This language is holistic, iconic, and requires learning, as it develops prior to and serves as the foundation for

verbal language. However, visual language is not universal and sometimes requires verbal support.

2. Visual perception is the ability to quickly recognize the content in an image. Although the meaning may be apparent on a basic level, true communication requires learning visual language. Prior experience and context significantly impact visual perception.
3. Visual communication is a powerful form of communication, often superior to verbal messages when content is immediate, spatial, or visual. Visually literate learners should be able to read, plan, and create visuals for communication and combine visuals with verbal information.
4. Visual thinking involves critical viewing and thinking. Clear thinking in business, engineering, and science is often analogous to visual thinking and visualization. Visuals may be the main source of communication and information in various cases.
5. Visual learning requires learners to actively and selectively engage with images. The learners should be able to build connections between verbal and visual representations when text or illustrations are held in memory simultaneously.

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Despite the existence of a cohesive theory of visual literacy, defining the abilities is challenging. The present study employs the ACRL's Visual Literacy Standards (Hattwig et al., 2013) as a framework for developing skills and proficiencies for learners to interact with images critically and produce visual materials. These standards provide observable learning outcomes, support measurable improvements in learners' visual literacy, and offer a common language for discussing learners use of visual materials in academic work and beyond.

In some educational levels, using one or more of the seven standards is possible, but not all (Elshazly et al., 2019). The adapted standards for the present study include determining the nature and extent of the visual materials needed, finding and accessing needed images and visual media effectively and efficiently, interpreting and analyzing the meanings of images and visual media, evaluating images and their sources, using images and visual media effectively, designing and creating meaningful images and visual media, and understanding ethical, legal, social, and economic issues surrounding the creation and use of images and visual media, as well as accessing and using visual materials ethically.

The ACRL's Visual Literacy Standards provide a more suitable framework than the cohesive theory of visual literacy due to the difficulties in defining abilities within the latter. These standards are adaptable to various educational contexts and offer comprehensive guidelines for developing visual literacy skills in learners.

1. Standard One: Learners should be able to define the purpose, scope, and environment of images within a project and identify key concepts and terms that describe the needed images.
2. Standard Two: Learners should be able to select appropriate sources, use specialized online or in-person services to select image sources, and articulate the advantages and disadvantages of various types of image sources and retrieval systems.
3. Standard Three: Learners should be able to identify relevant information for an image's meaning, examine relationships between images, participate in discussions about images, and validate interpretation and analysis of images.

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4. Standard Four: Learners should be able to make judgments about image sources based on evaluations of image and information quality.
5. Standard Five: Learners should be able to plan for strategic use of images and visual media within a project, use images for various purposes, use visual thinking skills to clarify and solve problems, and communicate effectively with and about images, considering meaning, aesthetic criteria, visual impact, rhetorical impact, and audience.
6. Standard Six: Learners should be able to create images and visual media to represent and communicate concepts, narratives, and arguments for a defined audience, construct accurate and appropriate graphic representations of data and information, plan visual style and design in relation to objectives, and use creativity to incorporate existing image content into new visual products.
7. Standard Seven: Learners should be able to give attribution to image creators in citations and credit statements to acknowledge authorship and author rights by including source information in citations and credit statements.

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In conclusion, the ACRL's Visual Literacy Standards offer a practical framework for educators to develop and assess learners' visual literacy skills across various disciplines. By incorporating these standards into their teaching strategies, educators can better prepare learners for the increasingly visually oriented world and enhance their abilities to communicate effectively using visual media.

2.2.3 Teaching visual literacy

Various methods can be employed to teach visual literacy concepts, as demonstrated by the periodic table developed by Lengler and Eppler (2007) from the Institute of Corporate Communication, University of Lugano. This table provides a

systematic overview of 100 visualization methods, categorized into six types: data visualization, information visualization, concept visualization, strategy visualization, metaphor visualization, and compound visualization.

In educational settings, numerous visual literacy techniques can be utilized, including pictures, images, mind maps, visual texts, semantic maps, videos, figures, photographs, illustrations, graphic organizers, symbols, and graphs (Alberto et al., 2007; Piro, 2002; Stafford, 2011; Zeyab, 2017). Two commonly employed visual tools in education are mind maps and concept maps.

On the one hand, as for a mind map, Frey (2016) defines a mind map as a hierarchical diagram used to visually organize information and depict relationships among pieces of a whole. Typically centered around a single concept, mind maps often include images, words, and parts of words. Key characteristics of mind maps include flexibility, the ability to divide the central topic into multiple aspects, and the incorporation of images and color for visual stimulation. Buzan and Buzan (1993) explains that mind mapping enables learners to generate ideas, take notes, organize thoughts, prioritize ideas, integrate materials, acquire vocabulary, aid memory, improve spelling, enhance writing, and develop conceptual understanding.

On the other hand, a concept map is defined by Frey (2016) as a visual mapping tool that illustrates relationships between different concepts. Widely used in various fields, concept maps typically present ideas and information as boxes or circles connected by labeled arrows in a downward-branching structure. The relationships between these boxes or circles can be articulated through linking phrases such as “causes,” “requires,” and “contributes to.” Concept maps are characterized by the organization and representation of tacit knowledge, hierarchical presentation of general

to specific concepts, keyword or phrase connections between ideas, and complex cross-linked relationships between topics.

2.2.4 Visual literacy in writing classrooms

In the evolving landscape of pedagogical practices, traditional teaching methods that rely heavily on text presentation are increasingly giving way to dynamic, interactive strategies intended to augment the learning process. The spotlight is currently on the pedagogical methods employed to instruct primary education learners in the domain of short story writing, a component of curriculum that presents considerable challenges to educators due to factors such as time restrictions, differing learner capabilities, and complex materials (Moses & Mohamad, 2019). These difficulties are further complicated by the lack of comprehensive understanding of the mechanics of short story writing among a portion of educators.

Regrettably, despite learners being introduced to short story writing in early grades, the mastery of this skill and the ability to discern its components often remain elusive due to insufficient instructional time. Furthermore, the learners' proficiency in initiating their writing tasks and their confidence in doing so can be significantly compromised without the provision of apt guidance (Abdullah, 2019).

However, visual presentation methods have been identified as a promising pedagogical strategy to assist learners in overcoming these challenges. Evidence has demonstrated that the integration of visual aids such as picture series into teaching can enhance learner motivation and interest, enliven the learning environment, and facilitate the indirect acquisition of skills (Samosa et al., 2021; Singh et al., 2017). Thus, visual-based instructional strategies could serve as an effective approach for teaching short story writing, enhancing not only the learning process but also the learning outcomes.

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The incorporation of visual literacy into English as a Foreign Language (EFL) writing classrooms stands to significantly improve the overall learning experience. The primary advantage of visual aids is their capacity to enhance comprehension. They can aid EFL learners in establishing quicker and more precise connections between English words and their meanings, thereby bolstering vocabulary acquisition and application. This strategy is particularly beneficial for novice learners as it helps to lessen the complexity of the language and boosts their confidence in using English.

Furthermore, visual literacy serves as a stimulant for learners' creativity and critical thinking abilities. As learners interpret visual content, they simultaneously acquire the ability to comprehend, analyze, and produce nuanced written content. For instance, a picture can serve as a springboard for descriptive or narrative writing tasks, thereby encouraging learners to think critically about the visual information and express it in a written form.

Lastly, visual literacy contributes to the development of cultural understanding. In an increasingly globalized world, it is not merely language proficiency that is important, but also cultural literacy. Visual content, such as images or videos from diverse cultures, can expose learners to various cultural aspects of English-speaking countries, thereby deepening their understanding and aiding them in writing more authentically in English.

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In conclusion, amidst shifting pedagogical paradigms, traditional text-based teaching methods are being surpassed by more interactive, dynamic strategies, particularly within the sphere of short story writing instruction in EFL classrooms. Challenges related to time constraints, diverse learner levels, and complex materials are being addressed through the utilization of visual presentation strategies (Abdullah,

2019; Moses & Mohamad, 2019). Notably, visual aids have been found to enhance comprehension, stimulate creativity and critical thinking, and foster cultural understanding, thereby augmenting learner engagement, motivation, and indirect skill acquisition (Samosa et al., 2021; Singh et al., 2017). This transition towards visual-based pedagogical strategies signifies a comprehensive approach to improving both the learning process and outcomes in teaching writing in EFL classrooms.

2.2.5 Previous studies related to visual literacy with 21st century skills

The concept of visual literacy can also be used in the classroom to make the materials more interesting (Burmark, 2002). Visual literacy can be used with learners at different levels of education and has been shown to have several benefits, including improving academic success (Cooper & Zimmerman, 2020; Elshazly et al., 2019; Khamhaengpol et al., 2019). Visual literacy concepts can also be used as active learning tools, including graphic organizers to activate learners' learning and help teachers make systematic evaluations of their teaching (Bernadowski et al., 2013; Gaciu, 2015). There are different types of graphic organizers that can be used across the curriculum, such as mind maps, concept maps, fishbone maps, and sequential maps (Supitch & Wijakkanaluk, 2015).

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In English as a foreign language (EFL) settings, visual aids have been shown to improve English proficiency skills (Kansızoğlu, 2017; Lewis, 2009; Parrish, 2018; Sathongeay & Prasansaph, 2019). For example, Kansızoğlu (2017) found that academic success, including listening, reading, writing, grammar, and vocabulary, could be better enhanced with the use of graphic organizers compared to traditional techniques. Parrish (2018) used YouTube clips as a source for authentic listening clips and a flow chart to improve students' critical reading skills, while Saindra and Mutiarani (2018) used a

graphic organizer to improve students' speaking skills in junior high school, both with success. Likewise, Sathongeay and Prasansaph (2019) found that critical reading skills of undergraduate students were significantly higher with the use of graphic organizers.

Teaching materials used in English as a foreign language (EFL) settings can be designed based on visual literacy concepts to enhance students' performance. Visual literacy encompasses a range of techniques and activities that can be useful for both teachers and students (Stafford, 2011). The desire for creative expression is increasing in human interaction, making the expansion of visual literacy an important aspect of education (Bleed, 2005). Graphic organizers are one of the most widely used visual literacy aids in language teaching, especially in writing (Gonzalez-Ledo et al., 2015; Maricimoi, 2017; Navidinia et al., 2018; Rokhaniyah, 2019; Sulastri, 2019; Tayib, 2015; Villasor, 2018; Yeom, 2018; Yunus & Chien, 2016).

Previous studies have shown that the use of graphic organizers can improve students' writing skills, including writing more words and producing fewer grammatical errors (Navidinia et al., 2018), generating ideas (Rokhaniyah, 2019; Wei et al., 2014), and improving the coherence of their essays (Wei et al., 2014). The use of visual aids, such as pictures, videos, and painting, can also enhance students' writing skills (Navidinia et al., 2018; Sulastri, 2019; Villasor, 2018; Yeom, 2018). The use of audiovisual media (Maricimoi, 2017) and mind mapping (Yunus & Chien, 2016) has been shown to improve students' writing skills as well.

Visual literacy elements can also enhance collaborative learning skills by promoting group interaction and coordination (Acai et al., 2017; Chen & Liu, 2019; Ferreira et al., 2016; Fox & Hoffman, 2011; Wei et al., 2014). For example, the use of art has been shown to improve teamwork skills for health professionals (Acai et al.,

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2017). Collaborative digital graphic writing based on semantic mapping has also been found to improve students' learning by allowing them to learn from each other's comments and suggestions (Chen & Liu, 2019).

Therefore, the use of visual literacy concepts and graphic organizers can be effective in enhancing students' writing and collaborative learning skills in EFL settings. Further research is needed to better understand the relationship between visual literacy and other 21st century skills.

Several studies have demonstrated the benefits of visual literacy on critical thinking skills (Cañas et al., 2017; Chunborvon, 2019; Supitch & Wijakkanaluk, 2015; Tseng, 2020). For instance, Chunborvon (2019) compared the analytical thinking abilities of high school students who underwent a learning program that integrated graphic organizer techniques with the Thai language and analytical thinking exercises. The results indicated that the implementation of graphic organizer techniques led to a higher level of thinking abilities as compared to the pre-learning stage. This is consistent with the findings of Tseng (2020), who used concept mapping activities to enhance the critical thinking skills of high school students in the English department in Taiwan. The study revealed that the group that engaged in construct-the-map activities obtained significantly higher scores in critical thinking skills, particularly inference, interpretation, analysis, evaluation, and explanation. The participants also reported that the concept mapping activities were effective in developing critical thinking skills. In addition, Cañas et al. (2017) found that concept mapping is a promising tool in enhancing critical thinking, analysis, reflective thinking, and synthesis. Also, it enables the translation of complex concepts into visual representations, leading to the development of holistic understanding. In short, these aforementioned studies highlight

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the fact that visual literacy can improve critical thinking skills of language learners (Cañas et al., 2017; Chunborvon, 2019; Supitch & Wijakkanaluk, 2015; Tseng, 2020).

Furthermore, visual literacy has been linked to fostering creative thinking skills (Alkilany, 2017; Miranti & Wilujeng, 2017; Wen-Cheng et al., 2010; Zubaidah et al., 2017). Miranti and Wilujeng (2017) studied the impact of mind mapping on creative thinking skills and found that it significantly promoted the students' creative thinking abilities. Wen-Cheng et al. (2010) also noted that mind mapping, as a pictorial representation, could be employed by young individuals to develop their creative thinking skills. Similarly, Zubaidah et al. (2017) conducted a study between male and female students and found that the mind map model, which provided a big picture and details at the same time, had a positive impact on creative thinking skills by making it easy to manage and understand the information effectively and systematically, while Alkilany (2017) reported that the conceptual map tool also had a positive effect on students' creativity as it allowed visualization of connections between creativity and meaningful learning. In summary, these studies provide empirical evidence that graphic organizers, such as mind maps (Miranti & Wilujeng, 2017; Wen-Cheng et al., 2010; Zubaidah et al., 2017) and concept maps (Alkilany, 2017), have a positive impact on students' creativity.

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2.3 21st century skills

The development of the 21st century skills is crucial for learners in order to become responsible citizens and be able to adapt to a rapidly changing world (The Partnership for 21st Century Learning, 2015). Educational systems should adhere to UNESCO's Educational Management Practices, encompassing "learning to know, learning to do, learning to live with others, and learning to be" (Sinthapanon, 2017).

Various scholars have identified essential skills for the 21st century, including the 3Rs (reading, writing, and arithmetic) and learning skills such as the 7Cs (Fadel & Trilling, 2009) and 8Cs (Panich, 2013; Sinthapanon, 2017).

The Partnership for 21st Century Learning (2015) emphasizes the importance of cultivating four primary skills: communication, collaboration, critical thinking, and creativity. This organization's framework, along with Engauge's (Lemke, 2002), addresses the need for individuals to adapt to societal changes and foster sustainable democratic development. While both frameworks share similarities, they differ in their target audiences and elements. The Partnership for 21st Century Learning focuses on K-12 education, whereas Engauge targets learners, teachers, and administrators.

When considering the two frameworks, it could be seen that The Partnership for 21st Century Learning (2015) provides a more comprehensive conceptualization of the 21st century skills. This study, therefore, utilized the four Cs as essential learning and innovation skills that learners should develop for the future. Creativity and innovation encompass thinking creatively, working creatively with others, and implementing innovations. Critical thinking and problem solving involve reasoning effectively, using systems thinking, making judgments and decisions, and solving problems. Communication and collaboration emphasize communicating clearly and collaborating with others.

The Partnership for 21st Century Learning (2015) argues that their framework can help learners master the 21st century skills by focusing on content knowledge, expertise, assessments, interdisciplinary themes, and community resources. The framework encourages teachers to integrate the 21st century skills, tools, and strategies into their classroom practices, which can foster differentiated teaching and learning.

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Additionally, the framework supports the creation of learning environments that promote the development of the 21st century skill outcomes and facilitate community and international involvement.

In conclusion, the framework provided by The Partnership for 21st Century Learning can aid learners in acquiring the knowledge and skills necessary for success in the present-day globally and digitally interconnected world.

2.3.1 Communication

2.3.1.1 Definition of communication

Effective communication is essential for success in school, work, and life (The Partnership for 21st Century Learning, 2015). Strong communication skills are associated with improved interpersonal relationships and higher graduation rates, and individuals with strong communication skills are highly sought after by employers. Generally, communication is a social process that involves exchanging information to convey meaning and achieve desired outcomes. Various forms of communication exist, such as writing papers, reading books, conversing, and presenting (The Partnership for 21st Century Learning, 2015).

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The Partnership for 21st Century Learning (2015) identifies seven core communication skills: 1) recognizing outcomes or consequences of communication, 2) creating clear messages in linguistic and nonlinguistic forms, 3) understanding others' perspectives based on knowledge, beliefs, or feelings, 4) adhering to conventions of communicative contexts, 5) considering social and cultural differences, 6) selecting appropriate communication channels, and 7) actively listening to monitor and clarify understanding.

Additionally, deep reading involves critically analyzing, questioning, or reflecting on texts or speeches to comprehend messages. This framework provides guidance for educators in designing tasks, activities, and assessment tools for teaching communication skills.

According to The Partnership for 21st Century Learning (2015), communication skills should be explicitly taught, not just implicitly addressed through communicative activities. Strategies such as assigning composition or report-writing tasks can be utilized in the classroom. It is important to integrate various forms of communication into the curriculum, providing opportunities for practice and feedback that target specific skills. Activities that support communication skills should be based on realistic communicative tasks that reflect learners' work and life experiences.

Instructional activities can be adapted to incorporate multiple skills, such as a book report that requires learners to evaluate their own writing. Providing ample time for planning and reflection is crucial, as both practice and feedback phases are valuable. Peer reviews can be used to facilitate communicative activities, with guidance provided to reviewers in the form of rubrics. Assessing learners can involve gathering feedback from multiple peers and incorporating that feedback into follow-up activities.

Assessment tools for communication skills should be tailored to specific educational contexts and objectives. The Partnership for 21st Century Learning (2015) recommends aligning assessment tools with the skills being assessed, the evidence of those skills, and the tasks designed to elicit such evidence. Real-world communicative scenarios should be employed, with evidence gathered

through direct observation or examination of tasks. Rating scales or rubrics can be utilized to assess communication skills, as they employ evidence-centered design to develop accurate assessment techniques.

Based on the review of the importance, definitions, instructional approaches, and assessment strategies for communication skills from The Partnership for 21st Century Learning (2015), written communication was an appropriate focus for the present study. Writing is a critical aspect of communication because it provides a tangible and lasting means of conveying information, ideas, feelings, and thoughts. As one of the primary methods of communication, writing has the unique ability to cross time and space, reaching diverse audiences and outlasting spoken words. It allows for precise expression of complex ideas and the opportunity to revise and perfect messages before they are communicated, minimizing potential misunderstanding. Furthermore, writing can convey not only factual information but also the nuances of tone, character, and culture, contributing to a rich tapestry of human communication. In addition, the accessibility and permanence of written communication make it a vital tool in various sectors, from education to business to social interactions. Therefore, writing forms an indispensable part of the broader communication landscape, serving as a key vehicle for sharing knowledge, ideas, and emotions across various contexts and platforms. The following sections explores the concepts of writing, teaching writing, and assessing writing ability.

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2.3.1.2 Definition of written communication

Written communication has been defined by numerous scholars (Brookes & Grundy, 1990; Hyland, 2014; Nunan, 1989; Richards & Miller,

2005; Richards & Renandya, 2002; Rohim, 2019; Tribble, 1996). For example, writing is defined as the capacity to produce texts that a writer assumes a reader will understand in their simplest form (Rohim, 2019; Tribble, 1996). This requires the ability to produce contextually appropriate, audience-specific, and purpose-driven writing. Richards and Renandya (2002) assert that writing involves the processes of generating, organizing, and interpreting ideas into text. As such, writing ability extends beyond mere message production; it is a complex cognitive activity that requires writers to demonstrate control of content, spelling, sentence structures, and the coherent combination of information (Nunan, 1989).

Brookes and Grundy (1990) argue that writers must be able to produce texts that exhibit grammatical correctness, stylistic appropriateness, and unity in order to meet the communicative purposes of various situations (Hyland, 2014). Richards and Miller (2005) emphasize the process-oriented nature of writing, as writers may employ multiple strategies simultaneously at different stages of the writing process. Consequently, writing ability entails managing various elements within the writing process, allowing learners to communicate complex ideas in a comprehensible manner.

In the 21st century, written communication has evolved to encompass a variety of published forms, such as blog posts, social media updates, and e-books. Heick (2013) proposes that learners' writing ability can be assessed through diverse formats, including revised video games and other media forms. Contemporary writing ability also necessitates proficiency in using search engines and social media platforms to gather information, collaborate, and form

opinions on various topics. Moreover, learners should be capable of conducting research using physical and digital resources, reviewing previous work, and sharing their findings through workshops or social media.

Effective feedback on writing should focus on the overall structure within a meaningful language context, rather than simply enforcing rules. Providing tools to help learners achieve their goals is crucial. In the 21st century, engaging in meaningful communicative activities that prioritize overall effectiveness over grammatical perfection is vital. Additionally, writing requires an awareness of context, with learners considering opportunities for using the language in meaningful communication situations.

According to Matsuda (2019), learners should experiment with language and understand the nuances of different aspects of writing. Activities that foster writing ability may include writing abstracts for articles or short instructions for operating classroom equipment. By engaging in realistic tasks, learners will learn that effective writing is not solely about adhering to conventional patterns, but rather adapting to diverse situations. Analyzing authentic texts, such as birthday cards or product packaging, can also help learners improve their writing ability by evaluating structure and function.

In terms of resources, grammar books and dictionaries can serve as useful tools for confirming learners' hypotheses about specific language features and offering options for production. Written communication also entails understanding and applying specific citation styles (e.g., MLA or APA). In the 21st century, assessing writing ability should focus on overall effectiveness, specific achievements, and potential areas for improvement.

Assessments should move beyond evaluating written texts and consider the development of awareness and intentionality.

In conclusion, 21st century written communication involves utilizing media for learning, engaging with social media, researching information to support work, providing meaningful feedback, participating in realistic activities, evaluating structures and functions, using references to verify hypotheses, and employing classroom assessments to track learner progress.

2.3.1.3 Approaches to teaching writing

Hyland (2003) identifies six principal orientations in second language writing instruction. These approaches provide a framework for understanding the various methods and perspectives utilized in teaching writing to second language learners. This section presents an overview of these principal orientations to L2 writing teaching.

1. **Product-oriented approach**: The product-oriented approach of teaching writing focuses on the end result of the writing process, emphasizing the formal aspects of writing, such as grammar, vocabulary, and organization.
2. **Process-oriented approach**: This approach emphasizes the various stages of writing, including planning, drafting, revising, and editing. This approach encourages learners to engage in activities that develop their writing skills and strategies.
3. **Genre-oriented approach**: The genre-oriented approach highlights the importance of understanding the social context and purpose of different types of texts. This approach helps learners become familiar with the conventions and

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structures of various genres, enabling them to produce contextually appropriate writing.

4. **Content-oriented approach**: This centers on the subject matter and ideas being conveyed in the writing with an aim to improve learners' ability to express their thoughts and knowledge effectively, prioritizing content development over language accuracy.
5. **Collaborative approach**: The collaborative approach to teaching writing encourages interaction and cooperation among learners during the writing process. It also fosters a supportive learning environment in which learners can share ideas, provide feedback, and work together to enhance their writing skills.
6. **Multimodal approach**: The last approach recognizes the increasing importance of digital technologies and media in writing, so it integrates various modes of communication, such as images, videos, and audio, to enrich learners' writing experiences and improve their ability to convey meaning effectively.

These principal orientations reflect diverse approaches to teaching writing that can be utilized in a second language context. Educators may choose to adopt or combine elements from multiple orientations to create an effective and engaging writing curriculum tailored to their learners' needs and learning preferences.

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2.3.1.4 Implementing writing instruction

In light of the six principal orientations of writing instruction identified by Hyland (2003), the process-oriented approach appears most suitable for the present study. This approach focuses on the writing process, enhancing cognitive thinking and allowing both teachers and learners to better understand

the thought process underlying the act of writing. Hyland (2003) emphasizes the relevance of process-based instruction, as it centers on the production and connection of ideas, rendering the writing process transparent and providing a solid foundation for teaching.

Wahdan and Buragohain (2019) have developed a process writing framework, synthesizing concepts from multiple researchers (Faraj, 2015; Hyland, 2003; Tribble, 1996)(. The steps of their framework are as follows:

1. **Prewriting**: This focuses on generating ideas and organizing them logically using graphic organizers such as mind maps, concept maps, and brain-writing.
2. **Drafting**: Drafting allows learners to translate ideas from graphic organizers into written text, emphasizing idea development and organization.
3. **Revising**: This step enhances draft quality by encouraging learners to examine various aspects, potentially adding or deleting content, rearranging ideas, or clarifying unclear concepts.
4. **Editing**: Editing gives learners the opportunity to make corrections regarding grammar, punctuation, and spelling errors using resources like dictionaries and grammar books/online resources.
5. **Publishing**: Publishing offers learners a chance to share completed writing with teachers for feedback as the final step in the process.

In this study, the process-based writing framework developed by Wahdan and Buragohain (2019) was employed, given its contemporary nature and the incorporation of multiple sources. With regard to genre, Hale et al. (1996) argue that writing courses should encompass various rhetorical types, such as comparison and contrast, cause and effect, and argumentation, as they

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foster the development of clear topic sentences, specific supporting details, and conclusions. However, the present study focused exclusively on expository writing, one of the eight genres identified by Macken-Horarik (2002) for secondary curriculum writing instruction. Expository writing, closely related to research content, aims to convey a specific viewpoint on a topic, supported by persuasive evidence or claims (Macken-Horarik, 2002; Ngamaramwarangkul, 2016).

Generally, expository writing is structured around a thesis, position and preview, arguments, and reiteration. It was considered well-suited for this study as it allowed students to concentrate on reason development using claims, evidence, and examples. Given the participant level and time constraints, paragraph writing was the primary focus. As Martin (1981) explains, a paragraph is a composition's basic unit, comprising a topic sentence, supporting sentences, and a concluding sentence. Korwatthana (2017) further clarifies that a paragraph consists of related sentences that expound on a particular topic.

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The topic sentence, usually placed at the beginning of a paragraph, highlights the paragraph's main idea. Supporting sentences provide additional information or examples relevant to the topic sentence. To construct a well-organized paragraph, unity and coherence are essential. A concluding sentence, though not always required, can summarize the main points or offer commentary on the topic. By focusing on expository writing and paragraph structure within the process-based writing framework, this study aimed to provide a comprehensive and effective approach to writing instruction.

2.3.1.5 Writing assessment

The present study aimed to assess students' writing abilities by emphasizing two aspects: elements of writing abilities and tools for assessing them. Although various frameworks for assessing writing abilities have been proposed by scholars such as Jacobs et al. (1981) and Brown and Bailey (1984), the present study synthesized these approaches, along with Cambridge English (2014) and Aryadoust (2016), to provide a comprehensive assessment of students' writing.

In this study, four aspects of writing abilities were considered: content, organization, grammatical structures, and vocabulary. Content referred to the relevance of ideas presented in the writing, addressing all given questions and maintaining clarity in thesis statements, topic sentences, and conclusions. Organization entailed the logical arrangement of information, using proper transition words, linking words, or cohesive devices within paragraphs. Grammatical structures involved the use of simple and complex grammatical forms with a good degree of control, ensuring that errors in agreement, tense, word order, articles, punctuation, capitalization, or pronouns did not impede communication. Lastly, vocabulary encompassed the appropriate use of diverse, concise, and well-registered words, with correct spelling that did not hinder communication.

To assess these four components of writing abilities, a rubric was employed, as suggested by Brown (2012). Among the three types of writing assessment—holistic scoring, primary trait scoring, and analytical scoring—analytical scoring was deemed most suitable for the present study as it provided

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detailed feedback on learners' strengths and weaknesses, offering a clearer picture of their writing abilities (Brown, 2004; Weigle, 2002).

Despite the time-consuming nature of creating an analytical scoring rubric, its benefits in providing diagnostic information and its close association with classroom language instruction made it the ideal approach for evaluating learners' writing abilities in this study. By synthesizing the frameworks of Jacobs et al. (1981), Brown and Bailey (1984), Cambridge English (2014), and Aryadoust (2016), this study aimed to provide a comprehensive and coherent assessment of writing abilities, considering all crucial aspects and using an appropriate tool for evaluation.

2.3.2 Collaboration

2.3.2.1 Definition of collaboration

Collaboration is essential for various reasons. The Partnership for 21st Century Learning (2015) highlights the benefits of developing collaboration skills, stating that collaboration can enhance enjoyment in team environments and lead to increased success in learning and career advancement post-graduation. Consequently, collaboration skills are vital for educational outcomes and serve as more than just a means of organizing instruction for other subjects.

From a pedagogical perspective, collaboration skills encompass several dimensions (The Partnership for 21st Century Learning, 2015). Collaboration skills are described as the capacity to work effectively and respectfully within teams to achieve common objectives while sharing responsibility (The Partnership for 21st Century Learning, 2015). This implies that collaboration

skills can facilitate efficient group work as learners can learn from one another. As Smith and MacGregor (1992) elucidate, in collaborative endeavors, learners must engage with diverse teams and navigate differing perspectives. This involves considering others' viewpoints, coordinating ideas with team members, and utilizing negotiation strategies to resolve conflicts (The Partnership for 21st century skills (P21), 2009). In essence, learners working in groups of two or more can seek understanding, solutions, or meaning while creating a product with others. They can also develop the ability to address unforeseen situations through collaborative efforts. Moreover, collaboration is sometimes defined as a set of teaching and learning strategies that encourage learners to collaborate in small groups, ranging from two to five individuals, to optimize their learning experiences (Johnson et al., 2007).

In this study, collaboration skills referred to the ability to work effectively and respectfully with others to achieve shared goals while considering others' perspectives and employing negotiation strategies to address conflicts.

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2.3.2.2 Components of collaboration

Various aspects of collaboration skills have been proposed (Salmons, 2019; The Partnership for 21st Century Learning, 2015), with a central focus on working with others in teams to achieve objectives. Salmons (2019) presents a taxonomy of collaboration as a conceptual framework for designing, planning, and assessing collaborative learning across six levels: reflection, dialogue, constructive review, parallel collaboration, sequential collaboration, and synergistic collaboration.

However, upon review, it became apparent that Salmons' (2019) taxonomy of collaboration, while innovative and clear, was too broad and challenging to assess in the present study. Consequently, the components of collaboration skills from The Partnership for 21st Century Learning (2015) was employed instead.

Accordingly, the adapted collaboration skills in this study were as follows:

1. Ability to work effectively and respectfully with diverse teams, including "accepting diversity, listening to opinions of group members in working together until achieving goals," and "recognizing the value of group members in work."
2. Flexibility in working together, including "adapting in a variety of work assigned to achieve the goal" and "reconciling in collaborative work."
3. Shared responsibility for collaborative work, including "accepting the positive and negative effects of collaborative work."

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2.3.2.3 Teaching collaboration

The Partnership for 21st Century Learning (2015) emphasizes the need for explicit collaboration instruction, asserting that merely placing learners into groups is insufficient for supporting learning. Teachers or instructors should encourage learner engagement through direct instruction, demonstrating desirable collaboration skill characteristics. This may involve explaining strategies for task management and conflict resolution in group settings while providing feedback on learner performance.

Three primary aspects of collaboration instruction are outlined by The Partnership for 21st Century Learning (2015). First, peer evaluation can foster improvement by rating teammates' collaboration skills and offering feedback. Utilizing rubrics or scales as part of collaboration skill assessment is essential. Second, group formation can impact learner interactions and learning experiences. Smaller and heterogeneous groups tend to be more effective; however, learners may prefer self-selected groups, which are harder to control. To address this, teachers can consider using self-selected groups for non-graded learning activities and teacher-selected groups for graded activities. Third, role assignment entails assigning learners specific roles, such as moderator or summarizer, during group work. This approach can encourage learners to exhibit targeted collaboration behaviors. Teachers should allow learners to experience various functional roles in group activities and rotate groups, so learners can gain experience working with diverse individuals or teams.

When designing activities for teaching collaboration, three elements should be considered: interpersonal communication, conflict resolution, and task management (The Partnership for 21st Century Learning, 2015). Different tasks entail varying levels of interdependence, coordination, or agreement. Task demands should be carefully designed to align with learners' levels and instructional objectives. For instance, if a task requires group-generated ideas without ranking importance, some learners may not contribute or participate effectively.

In this study, the collaborative learning environment was designed with three considerations: receiving feedback from teammates, forming groups, and

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rotating roles in group activities. Tasks designed for collaboration also aligned with students' levels of proficiency and course objectives.

2.3.2.4 Assessing collaboration

Assessing collaboration skills requires consistent tools to evaluate the effectiveness of collaboration instruction. Ishak et al. (2002) propose two types of collaboration skill assessment: during the process and at the end of the process. Assessment during the process can involve periodic collection of learners' work, such as reflections and progress reports, which can determine learners' current progress. Assessment of the end product, on the other hand, focuses on learners' performance upon goal completion, with individual or group grading. Cramer (1994) argues that combining grading methods results in more accurate assessment.

The Partnership for 21st Century Learning (2015) supports collecting a mix of evidence from group interactions, such as peer or teacher observations, and team processes, including planning documents or works demonstrating a group's approach to task management. These additional sources can supplement collaboration skill assessment.

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The goal of assessment in collaborative classrooms is to distinguish between passive and active learners. Teachers should be well-versed in the assessment process, and learners should be actively involved in their own assessment to enhance engagement. For this reason, this study employed both types of collaboration skill assessment: 1) during the process, using a portfolio containing students' work and teacher's observation field notes, and 2) at the

end of the process, utilizing tests, questionnaires, and interviews to evaluate collaboration skill progress.

2.3.3 Critical Thinking

2.3.3.1 Definition of critical thinking

In today's information-rich environment, critical thinking skills play a crucial role. Several scholars have defined critical thinking skills (Bernard et al., 2008; Ennis, 1992; Haase, 2010; Patitat, 2019; Quinton & Smallbone, 2010; The Partnership for 21st Century Learning, 2015). Essentially, critical thinking involves reasoned thinking focused on deciding what one should believe or do. Ennis (1992) describes critical thinking as an active and skillful process of conceptualizing, applying, analyzing, synthesizing, and/or evaluating information obtained through observation, experience, reflection, reasoning, or communication.

To clarify, critical thinking is the ability to process information using cognitive functions such as inference, recognition of assumptions, deduction, interpretation, and evaluation of assumptions, employing systems thinking to make judgments and decisions and to draw conclusions based on analyses (Bernard et al., 2008; The Partnership for 21st Century Learning, 2015). In the Thai educational context, Patitat (2019) defines critical thinking as the ability to think argumentatively with questioning to ascertain the truth and evaluate the credibility of information, necessitating empirical data to support arguments or claims.

In this study, critical thinking skills referred to the ability to interpret, apply, analyze, synthesize, evaluate, and draw conclusions from observation,

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reflection, and reasoning while providing evidence to support arguments or claims.

2.3.3.2 Components of critical thinking

A review of critical thinking definitions reveals its association with cognitive functions such as inference, recognition of assumptions, deduction, interpretation, and evaluation of assumptions so as to derive at judgments, decisions, and conclusions. Various scholars have proposed frameworks for these components (Dick, 1991; Fisher, 2001; Halpern, 1994; The Partnership for 21st Century Learning, 2015).

To begin with, Dick (1991) presents five fundamental skills in his framework: 1) identifying arguments, conclusions, and reasons; 2) analyzing arguments from assumptions; 3) considering external influences, such as emotional language; 4) employing scientific analytical reasoning with causality or statistical reasoning; and 5) using logical reasoning from deduction or induction. Most critical thinking skills in Dick's framework are related to identifying, analyzing, considering, and reasoning, which deal with arguments, assumptions, and/or evidence.

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Moreover, Halpern's (1994) framework classifies critical thinking skills into the following five aspects: 1) verbal reasoning skills; 2) argument analysis skills; 3) skills in thinking as hypothesis testing; 4) using likelihood and uncertainty; and 5) decision-making and problem-solving skills. This framework emphasizes language, thinking, and creating before drawing conclusions from arguments.

Fisher (2001), on the other hand, proposes nine elements of critical thinking skills, most of which are related to identifying reasons, evaluating assumptions, judging credibility and claims, analyzing explanations, and drawing inferences to produce arguments. The Partnership for 21st Century Learning (2015) condenses these elements into four aspects: 1) reasoning effectively; 2) using systematic thinking; 3) making judgments and decisions; and 4) solving problems.

In this study, the concepts proposed by Fisher (2001) and The Partnership for 21st Century Learning (2015) were adapted to represent critical thinking skills, as these were interconnected and effective for constructing a rubric to assess critical thinking skills. The proposed critical thinking skills are as follows:

1. Reasoning: The ability to use inductive or deductive reasoning to explain arguments, claims, or assumptions.
2. Analyzing: The ability to identify the elements in a reasoned case.
3. Evaluating: The ability to judge the credibility, evidence, arguments, or claims.
4. Synthesizing: The ability to make connections among information and arguments.
5. Interpreting: The ability to draw inferences or conclusions based on analysis

By integrating the concepts from Fisher (2001) and The Partnership for 21st Century Learning (2015), this study sought to provide a comprehensive and cohesive framework for assessing and understanding critical thinking skills. These skills are crucial for students to navigate the complexities of the modern world, make informed decisions, and engage in constructive problem-solving.

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The proposed critical thinking skills could serve as a valuable tool for educators to foster and assess students' cognitive development and application in various learning contexts.

2.3.3.3 Teaching critical thinking

Critical thinking skills can be developed through various thinking activities. The Hanen Center (2016) proposes an approach using the E's and P's framework to foster critical thinking in learners. The E's activity is divided into two aspects:

1. Explaining: This aims at encouraging learners to consider why things happen, drawing on their existing knowledge and reasoning skills to develop explanations and conclusions. For example, teachers might ask learners on a desert field trip, "Why do you think water is important in the desert?"
2. Evaluating: This focuses on encouraging learners to share their opinions about their preferences and the relationships among different objects, events, or experiences. For instance, teachers might display the sports section of a newspaper and ask learners to identify the most challenging sport to play and explain their reasoning.

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The P's framework includes three activities:

1. Predicting: Learners make plausible predictions about future events by commenting on what they think will happen next.
2. Projecting: Learners are encouraged to consider others' perspectives and feelings by posing questions that prompt them to put themselves in another person's shoes.

3. Problem-solving: Learners are asked to solve problems by drawing on their knowledge and experiences, offering alternative solutions and deciding on the best option.

In summary, critical thinking skills can be developed when learners are involved in activities that stimulate evaluation, forming opinions, understanding others' perspectives, and predicting consequences with creative solutions. Critical thinking skills are associated with evidence and judgments.

2.3.3.4 Assessment of critical thinking

As critical thinking skills involve reasoning, interpreting, analyzing, evaluating, synthesizing, and making inferences, thinking tests are appropriate for assessing these skills (Bernard et al., 2008; Chartrand et al., 2013; Nejmaoui, 2019; Washington State University, 2006). Washington State University (2006) proposes a chart-based rubric, offering a detailed six-point scale for rating critical and integrative thinking in seven criteria as follows:

1. Identifying and summarizing the problem, question, or issue.
2. Identifying and considering the influence of context and assumption.
3. Developing, presenting, and communicating one's perspective, hypothesis, or position.
4. Presenting, assessing, and analyzing appropriate supporting evidence and data.
5. Integrating the issue using other perspectives and positions.
6. Identifying and assessing conclusions, implications, and consequences.
7. Communicating effectively.

Chartrand et al. (2013) developed Pearson's Watson Glaser Critical Thinking Appraisal's "RED Model" which synthesizes critical thinking

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components from the previous version of the Watson Glaser model. The “RED” model features three elements: recognizing assumptions, evaluating arguments, and drawing conclusions.

Additionally, the Watson-Glaser Critical Thinking Appraisal (WGCTA) is a standardized test for critical thinking, consisting of items assessing five aspects of critical thinking: inference, recognizing assumptions, deduction, interpretation, and evaluating assumptions (Bernard et al., 2008).

Nejmaoui (2019) developed a student essay assessment for critical thinking skills based on the Illinois Critical Thinking Essay scoring Rubric from Finken and Ennis (1993). The rubric consists of five criteria: focus, supporting reasons, reasoning, organization, and integration. This demonstrates that designing assessment tools for critical thinking can be flexible, depending on the characteristics and contexts of the courses.

In summary, critical thinking skills can be assessed through thinking tests. Washington State University proposed a rubric with seven criteria for assessing such skills. The “RED Model” by Chartrand, Ishikawa, and Flander focuses on recognizing assumptions, evaluating arguments, and drawing conclusions. The Watson-Glaser Critical Thinking Appraisal is a standardized test assessing five aspects of critical thinking, and Nejmaoui developed an essay-based assessment tool. These various tools highlight the flexibility in assessing critical thinking based on course specifics and contexts.

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2.3.4 Creativity

2.3.4.1 Definition of creativity

Numerous scholars have attempted to explain what creativity is, resulting in varying characteristics of the term (Eragamreddy, 2013; Hennessey & Teresa, 2010; Robinson, 2011; The Partnership for 21st century skills (P21), 2009; West-Burnham, 2008). Generally, creativity involves using imagination to develop or modify products, processes, or outcomes through higher-order skills, knowledge, and qualities. Creativity necessitates the ability to enhance products in novel ways (West-Burnham, 2008), thereby generating new perspectives and thoughts (Eragamreddy, 2013). The Partnership for 21st Century Skills (2009) has expanded this definition by emphasizing the integration of old and new experiences to effectively discover alternatives. Often referred to as divergent thinking (Barbara, 2009; Patitat, 2019), creativity requires imaginative and intuitive thinking, generating multiple ideas, and establishing new connections (Barbara, 2009). According to Hennessey and Teresa (2010), creative thinking involves developing products, ideas, and solutions that are valuable individually or socially. Essentially, creativity facilitates inventive problem-solving.

In 2015, The Partnership for 21st Century Skills proposed new elements for creative thinking, including using idea creation techniques like brainstorming to refine, analyze, and evaluate original ideas and collaborating with others to learn new and diverse perspectives. This indicates that creativity now encompasses not only generating novel ideas but also learning from interactive activities with others (Robinson, 2011).

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Regarding types of creativity, four main elements have been identified (Baer, 2012; Potisuk, 1994 as cited in Dankongrak, 2018; Felder, 1988): innovation, synthesis, extension, and duplication. Innovation refers to developing entirely new ideas, theories, or inventions, while synthesis involves integrating existing sources, information, or ideas to create new items or knowledge. Extension combines innovation and synthesis to enhance and develop existing objects more effectively. Duplication, on the other hand, involves adopting beneficial characteristics from existing objects into new environments.

In summary, creative thinking is the ability to connect old and new ideas to develop novel alternatives and inventions while employing creation techniques individually or collaboratively.

2.3.4.2 Components of creativity

Creativity is the ability to think divergently, deviating from traditional approaches, and is comprised of four primary elements as identified by scholars in the field (Batey, 2012; Bialik & Fadel, 2015; Guidford, 1967; Sternberg, 2006). These scholars have reached a consensus that creativity consists of originality, fluency, flexibility, and elaboration.

Originality refers to the capacity to conceive novel ideas that differ from those of others. This involves adapting and applying existing concepts to create new innovations (Guidford, 1967). Bialik and Fadel (2015) posit that individuals possessing originality can independently generate unique solutions, exemplified by Steve Jobs' invention of the smartphone. Originality, however, is not innate; it can be cultivated through studying information and engaging

with existing objects, supported by applied imagination. Three factors have been identified to encourage originality (Batey, 2012; Sternberg, 2006): the ability to think differently from others, the ability to think positively to express ideas in personally acceptable ways, and the ability to conceive inventions that are both accepted by others and beneficial to society. Thus, originality encompasses not only divergent thinking but also the acceptance of others.

Fluency is the ability to rapidly generate a variety of ideas within a limited timeframe. The ideas should be diverse, and multiple forms of fluency have been identified. Word fluency (Bialik & Fadel, 2015; Guidford, 1967; Sternberg, 2006) involves using words, phrases, or sentences to express ideas within a time constraint, such as producing words beginning with the letter "P" within three minutes. Associational fluency (Bialik & Fadel, 2015; Guilford, 1967; Sternberg, 2006) pertains to the ability to link ideas related to a given situation or object, such as comparing and contrasting papaya and watermelon. Expressional fluency (Bialik & Fadel, 2015; Guilford, 1967; Sternberg, 2006) refers to the capacity to quickly articulate phrases or sentences in an organized manner, accurately conveying one's thoughts, such as interpreting an image and describing its meaning. Although most researchers agree on these three fluency types, Bialik and Fadel (2015) do not mention ideational fluency (Batey, 2012; Guidford, 1967; Sternberg, 2006), which involves generating numerous valid and beneficial perspectives or aspects, such as listing the advantages of cars within three minutes.

Flexibility denotes the ability to produce diverse solutions or approaches. It can manifest in various situations (Bialik & Fadel, 2015;

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Guilford, 1967; Sternberg, 2006) and can be categorized into spontaneous flexibility and adaptive flexibility. The former involves freely generating diverse solutions for the same problem or concept, which can be further divided into distinct idea groups. The latter refers to the capacity to adapt one concept to another by leveraging knowledge and experience to create multiple beneficial outcomes, such as devising different ways to cook with durian.

Elaboration is the skill of thoroughly considering every detail and expanding upon a core concept to create a more comprehensive understanding within a limited time. However, assessing this skill is challenging as it is predominantly found among artists and musicians (Batey, 2012; Sternberg, 2006). As a result, the present study did not include elaboration as an evaluative element, focusing instead on education that emphasized idea management rather than detailed artistic or musical expression.

Consequently, this concept of creativity or creative thinking skills in the present study utilized three elements to assess students' abilities: fluency, which was the capacity to generate numerous ideas, answers, or possibilities for given issues within a limited time; flexibility, which involved developing alternative ideas, options, or potential solutions for given issues within a restricted timeframe; and originality, or the ability to create unique or novel responses that have likely not been previously conceived. These elements are grounded in the theories of prominent scholars (Batey, 2012; Bialik & Fadel, 2015; Guidford, 1967; Sternberg, 2006).

In conclusion, creativity is a multifaceted concept that encompasses originality, fluency, flexibility, and elaboration. By focusing on the first three

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elements, researchers and educators can assess and foster creative thinking skills in learners, empowering them to generate innovative solutions and approaches to various problems and situations. It is important to recognize that creativity is not a static trait, but rather a dynamic and adaptable skill that can be nurtured and enhanced through proper guidance and practice.

2.3.4.3 Teaching creativity

When developing courses or materials aimed at fostering creativity, it is crucial to consider factors related to creative potential and environments that support creative expression (The Partnership for 21st Century Skills, 2015). Creativity can indeed be nurtured within the classroom setting. The Partnership for 21st Century Skills (2009) identifies various approaches for teaching creativity, including 1) creative problem-solving through divergent thinking, 2) collaborative learning with others, 3) in-depth case-based learning with rich examples, 4) observational learning by watching others, and 5) role-play. All these ideas relate to processes that learners can engage in during activities. Brainstorming or conceptual combination techniques can be employed in the classroom, particularly in introductory courses, to facilitate more divergent thinking among learners. Osborn (1963) emphasizes that brainstorming is a technique for gathering diverse ideas about a given topic before reaching a conclusion. When teaching creativity, it is essential to create an environment where no one criticizes ideas as good or bad, allowing learners the freedom to think expansively. Ideas are later ranked in terms of their importance.

Moreover, teaching creativity should involve formulating explanations and hypotheses by applying knowledge in new contexts. Effective creativity

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teaching should avoid punitive grading consequences (The Partnership for 21st Century Skills, 2009) as this can hinder learner learning. In other words, students should be allowed to make mistakes and consider less optimal ideas without punishment so that enjoyment and higher academic achievement can be fostered.

In the Thai context, Patitat (2019) proposes several approaches to enhance creativity. Firstly, an inquiry approach allows students to freely explore their curiosity without prescribed patterns for finding answers. Secondly, an analogy approach requires students to compare at least two objects to identify differences and similarities, creating new ideas for improvement. Furthermore ,attribution listing enables students to record their observations, helping them adapt their ideas within given situations. Dankongrak (2018) emphasizes the importance of role-play activities in which students play different roles, practicing thinking and expression. Additionally, group relationships and teaching through processes are considered effective in fostering creativity.

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In summary, effective teaching for creativity may involve learner interaction in groups and the use of creation techniques such as brainstorming to stimulate and organize ideas.

2.3.4.4 Assessment of creativity

Assessing creative thinking skills is uniquely challenging, with no universally accepted consensus. However, scholars suggest considering factors based on specific contexts and using study results for support. In the Thai context, Patitat (2019) suggests that divergent thinking variables may be an appropriate method to assess creative thinking skills. Although divergent

thinking encompasses four elements (originality, fluency, flexibility, and elaboration), this study focused only on the first three, excluding elaboration.

In addition to the elements of creativity assessment, tools must also be considered. The Partnership for 21st Century Skills (2009) categorizes tools into two aspects: divergent-thinking tasks and creative-work products, both of which are interconnected. While the Minnesota Test of Creative Thinking and the Torrance Test of Creative Thinking are popular, cultural differences should be carefully considered. Assessment tools should be suitable for specific contexts as no single tool can measure every aspect of creativity.

Researchers have suggested and employed various methods for assessing creativity (Alkilany, 2017; Dankongrak, 2018; Indarasati et al., 2019; Miranti & Wilujeng, 2017; Nurlaela et al., 2018; Patitat, 2019; Sandika & Fitrihidajati, 2018; Zahara et al., 2020; Zubaidah et al., 2017), including observation, drawing, art creation, and testing. Observation involves recording behavior related to creative thinking skills, while drawing tasks involve learners creating images based on their imagination. Moreover, art creation allows learners to design innovative works, and testing presents questions that learners can answer with suitable responses. Tests are often chosen due to their convenience, high reliability, and resource-saving properties.

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In Thailand, Dankongrak (2018) proposes six types of questions for assessing creativity: 1) questions that prompt learners to think about given situations or objects, 2) guessing the causes of given situations, 3) predicting the consequences of particular situations, 4) problem-solving tasks that require learners to find solutions, 5) assuming roles with reasoning, and 6) identifying

purposes or benefits from given situations. These questions engage learners in creative thinking by requiring them to generate new ideas, approaches, reasons, and supporting evidence.

Based on the reviews of definitions, components, instruction, and assessment of creativity, a rubric for assessing creative thinking skills was constructed with the following components:

1. Originality: The ability to generate new and unique ideas, options, or answers to given problems within a limited time frame.
2. Fluency: The ability to list multiple ideas, options, or answers to given problems within a limited time frame.
3. Flexibility: The ability to develop various types of ideas, options, or answers to given problems within a limited time frame.

In summary, assessing creative thinking skills can be difficult due to the lack of universally accepted standards. However, some suggest the consideration of specific contexts and the usage of study results for validation. In the Thai context, for instance, it's proposed that divergent thinking variables could be a good method for assessing creativity, though the emphasis is on originality, fluency, and flexibility, excluding elaboration. Assessment tools should also be considered, including divergent-thinking tasks and creative-work products. The Minnesota Test of Creative Thinking and the Torrance Test of Creative Thinking are popular, but cultural differences should be taken into account. As a result, a rubric for assessing creative thinking skills has been developed, focusing on originality (generating new ideas), fluency (listing multiple ideas), and flexibility (developing diverse ideas).

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2.4 The summary of conceptual framework of the WINVIS model

The WINVIS model, developed through the synthesis of core themes related to inquiry-based learning, visual literacy, and the 21st century skills, served as the bedrock of the study's conceptual framework. This multidimensional model intertwined several pivotal elements including the Maker-centered 5E learning cycle, the ACRL visual literacy standards, and a spectrum of the 21st century skills, each contributing uniquely to the model's holistic and pragmatic approach to learning. The Maker-centered 5E learning cycle, as posited by Rodriguez et al. (2019), formed the progressive, cyclical journey of learning in this model, encapsulating five sequential stages: Engagement, Exploration, Explanation, Elaboration, and Evaluation. This meticulously structured process guided students in developing a profound and comprehensive understanding of the subject matter. Simultaneously, the model underscored the application of the ACRL Visual Literacy Standards (Hattwig et al., 2013), an eminent framework of seven standards. These standards delineated critical processes such as defining image needs, effective image discovery, interpreting and analyzing images, image evaluation, effective image usage, designing meaningful images, and ethical image usage along with appropriate citation of imagery.

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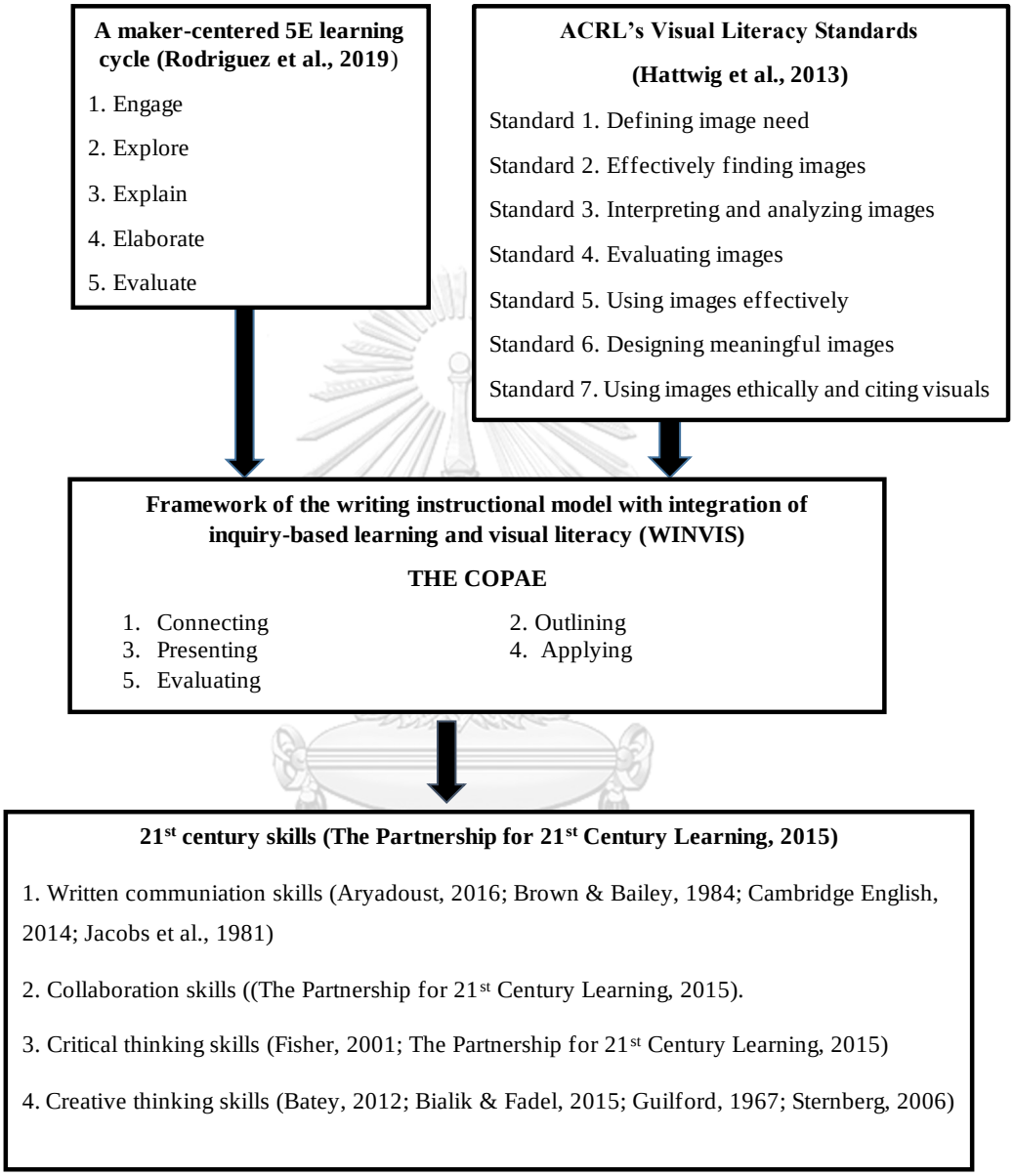
Integral to the WINVIS model was the COPAE concept—an acronym representing the stages of Connecting, Outlining, Presenting, Applying, and Evaluating. This concept, implemented throughout the learning process, amplified students' proficiency in key 21st century skills, thereby preparing students to meet the evolving demands of the 21st century landscape.

Figure 1:

Summary of the Conceptual Framework in This Present Study



CHAPTER III

METHODOLOGY

3.1 Introduction

This chapter elucidates the research design and methodology employed in the present study, which aimed to investigate the effects of the writing instruction model that integrated inquiry-based learning and visual literacy (WINVIS) on development of the 21st century skills of EFL learners. The developmental stages of the WINVIS model are delineated, followed by an account of participant selection and the development of research instruments. The research procedures are explained in detail, and information on data collection and analysis is provided. Ethical considerations are also discussed.

3.2 Research Design

The study employed a quasi-experimental design with an intact group to compare students' 21st century skills before and after the implementation of the WINVIS model. While the quasi-experimental design does not involve strict random assignment of participants, it endeavors to provide treatments to approximately equal-sized classes without the use of a control group (Rose & Galloway, 2019). Consequently, the study was conducted with a group of high school students enrolled in an English course at a private school in the northeastern region of Thailand. Furthermore, a single-group pretest-posttest design was utilized as it was an effective means to measure the students' skills not only after exposure to the treatment but also prior to the intervention (Wasanasomsithi, 2015).

The research design of this study was as follows:

O represents the dependent variable, namely the 21st century skills.

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X represents the independent variable, namely the WINVIS model.

Table 2:

The One-Group Pretest-Posttest Design

Pre-test	**Treatment**	**Post-test**
O_1	X_1	O_2

3.3 Participants

The current study used an intact group of 20 senior high school students, consisting of eight males and 12 females aged between 16 and 17 years old. All participants were recruited from a private school in northeastern Thailand, and they were enrolled in an English course in the 2021 academic year. Their average English proficiency was at the intermediate level, and they had nine hours of English learning weekly as mandated by the school's curriculum. The primary objective of the course was to develop these students' written communication skills, with an emphasis on well-structured paragraph creation. Based on the CEFR framework (2001), the participants were presumed to have a minimum of A2 proficiency, having completed lower secondary school or Matthayomsuksa 3 (Grade 9).

Although Fraenkel and Wallen (2000) suggest that 30 subjects are optimal for experimental studies, the current study's justification of only 20 participants is valid due to stringent control measures. Even without random sampling, providing participant data like age, gender, English learning background, and years of English education allows readers to evaluate the results' validity (Wasanasomsithi, 2015). To protect the rights of human subjects of the studies, each student was assigned a numerical identifier from #1 to #20, following the approval from the Chulalongkorn

University Ethical Review Board for Research with Human Subjects (IRB No. 153/2564). The students also gave informed consent for data collection during class sessions, specifically for research purposes, publications, and conference presentations.

The pilot study involved ten students purposively selected from the same private school, sharing similar demographic characteristics, including English proficiency, age, and English course enrollment. These students, however, were not involved in the main study, but they participated in the pilot study's research instrument evaluation. Additionally, a focus group interview was conducted with six students chosen based on their posttest performance—two students each from the highest, medium, and lowest scoring brackets.

However, it is worth nothing that the study had three exclusion criteria: participants who were absent more than three times, those who did not participate in the pretest or posttest, and those who did not complete the questionnaire.

3.4 Research Instruments

The research instruments in this study aimed to evaluate the 21st century skills of the participants, encompassing written communication, collaboration, critical thinking, and creative thinking skills. The researcher developed all instruments, which are summarized in Table 3 below, detailing their research objectives and distribution schedule.

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Table 3:

Research Instruments

Research instruments	Research objectives	Time of distribution
1. 21st century skill test	1.3.1.1 To examine the extent to which the WINVIS model increases the written communication skills of EFL learners 1.3.1.3 To examine the extent to which the WINVIS model promotes critical thinking skills of EFL learners 1.3.1.4 To examine the extent to which the WINVIS model develops creative thinking skills of EFL learners	Before and after the treatment
2. 21st century skill rubric	1.3.1.1 To examine the extent to which the WINVIS model increases the written communication skills of EFL learners 1.3.1.3 To examine the extent to which the WINVIS model promotes critical thinking skills of EFL learners 1.3.1.4 To examine the extent to which the WINVIS model develops creative thinking skills of EFL learners	Before and after the treatment
3. Student's collaboration questionnaire	1.3.1.2 To examine the extent to which the WINVIS model improves collaboration skills of EFL learners	Before and after the treatment
4. Student's 21st century skill portfolio	1.3.1 To investigate the effects of the WINVIS model on the 21st century skills of EFL learners	During instruction in each unit lesson
5. Teacher's observation note	1.3.1 To investigate the effects of the WINVIS model on the 21st century skills of EFL learners	After each unit lesson
6. WINVIS opinion questionnaire	1.3.2 To explore the students' opinions towards the WINVIS model	After the treatment
7. Focus group interview	1.3.2 To explore the students' opinions towards the WINVIS model	After the treatment

3.4.1 21st Century Skill Test

The 21st century skill Test was devised to assess the impact of the WINVIS model on writing communication, critical thinking, and creative thinking skills. The

test was administered before and after instructional implementation and required 60 minutes to complete. It consisted of three parts: "*Select Your Own Choice*," "*Outline Your Ideas*", and "*Compose Your Work*."

The first part, "*Select Your Own Choice*," required test-takers in each group to collaboratively choose a given topic to write about as part of the "*Our 21st Century Era*" project. Test-takers selected an illustration from one of the provided sources, such as an image, a screenshot from a video, or an infographic to support their work. Additionally, they answered five critical thinking questions, namely reasoning, analyzing, evaluating, synthesizing, and interpreting. In this part, test-takers were allowed to write in Thai to reduce language barriers and facilitate full expression of their opinions.

The second part, "*Outline Your Ideas*," required test-takers to help each other find ideas, topics, or questions they wished to present. Each test-taker then designed a graphic organizer, such as a mind map, concept map, or hyperbolic tree as a node, on the topic they wanted to write about. This part assessed creative thinking skills in three aspects: fluency, flexibility, and originality. Test-takers were allowed to write in Thai in this part to minimize language barriers and to facilitate their effort to express their opinions.

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The final part, "*Compose Your Work*," required each test-taker to individually write a 120-150-word paper on a paragraph with the topic of their choice. They also provided a title for their work related to the character they had chosen. In the written work, they presented their views on the topic and provided commentary. This part assessed written communication skills in four aspects: content, organization, grammar, and vocabulary. Test-takers wrote their paragraph in English in this part.

In terms of validation, after constructing the 21st century skill test, the test was validated by three experts to ensure content validity. The experts' suggestions pertained to content appropriateness, language use, and form.

For "Task 1: *Select your own choice*," One expert advised revising the situation to suit upper secondary level students, ensuring that the language was easily comprehensible. They also suggested altering word choices and tenses in some parts of the questions. Following the experts' suggestions, questions in this task were modified as follows:

- "Why do you select this figure to write for the project of 'New world in 21st century era?'" was changed to "Why did you select this figure to write about for the project 'Our 21st Century Era?'"
- "What is the most important element or part in the figure you have selected?" was changed to "What is the most important element or part in the figure that you have selected?"
- "After analyzing the figure, what can be concluded from it?" was replaced with "What can be inferred from the chosen figure?"

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Additionally, one expert recommended enlarging the images in Task 1, as they were too small to discern elements clearly. They also suggested providing more space for students to write their answers to accommodate varying response lengths.

3.4.2 21st Century Skill Rubric

The 21st century skill rubric was designed to assess 21st century skills, including written communication, critical thinking, and creative thinking skills, for students taught using the WINVIS model. In general, the characteristics of the 21st century skill rubric are divided into three aspects (Weigle, 2002). In terms of dividing the

components, it may be more appropriate to have separate scales. More details on different aspects of language use would be appropriate, especially when the focus of the assessment is on the acquisition of specific language sub-skills. As for the number of items, it may be that fewer items are needed (Weigle, 2002). Therefore, in this study, the points were divided into 4 points because Bachman and Palmer (1996) recommend that the more points the better, as the rating is never completely reliable and because more experienced raters may be able to use more points on a scale reliably. For descriptors, the most important thing is to have unique descriptors for each rating level (e.g., "excellent, very good, good, etc.). Descriptors can be tested in practice among raters. In other words, the descriptors in this study could be added, deleted, or modified until raters agreed on the majority of cases.

In addition, the selection of raters is crucial (Jacobs et al., 1981). McColly (1970) affirms that the more competent essay raters are, the more they agree, and the more valid their judgments would be. Therefore, the criteria in this study were the selection of experienced English composition teachers with similar backgrounds because this helped ensure that all raters interpreted and applied the criteria and standards of the assessment consistently. In addition, they had not recently taught students in the test group (Jacobs et al., 1981; Meiron & Schick, 2000). To ensure rating reliability, a rating rubric was used that explicitly listed the criteria for rating, and each script had to be rated independently by at least two raters who rated at the same place and time, with the third rater deciding in case of discrepancies (White, 1984, cited in Weigle, 2002). Another way to ensure rating reliability is to have the same item rated by more than one rater, which is called inter-rater reliability. Jonsson and Svingby (2007) explain that consensus agreement is used as a measure of inter-rater reliability

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and report it as a percentage of agreement. This refers to the tendency of different raters to rate the same scripts similarly, or the degree to which a rater agrees with other raters in rating the same script (Brown, 2004; Jacobs et al., 1981). For the number of raters, Blok and de Glopper (1992) emphasize that the more raters are used, the more difficult it is to maintain consistency in the criteria used. Therefore, the expected rating reliability in this study could be achieved by using two carefully instructed and supervised raters as suggested by Blok and Glopper (1992). The calculation of inter-rater reliability derived from the rubric scores demonstrated a Cronbach's Alpha value of 0.866 for the writing part. Furthermore, as for the critical thinking and creative thinking parts, the values registered were 0.815 and 0.812 respectively.

The 21st century skill rubric was divided into three aspects adapted from different sources. In this study, written communication skills focused on four abilities, including content, organization, grammatical structures, and vocabulary (Aryadoust, 2016; Brown & Bailey, 1984; Cambridge English, 2014; Jacobs et al., 1981). Critical thinking skills included situational reasoning, analyzing visuals, evaluating visuals, synthesizing between visuals and arguments, and interpreting conclusions (Fisher, 2001; The Partnership for 21st Century Learning, 2015), and creative thinking skills consisted of fluency, flexibility, and originality (Batey, 2012; Bialik & Fadel, 2015; Guilford, 1967; Sternberg, 2006).

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Table 4: Criteria for 21st Century Skills

Aspects	Features
	Written communication skills (Aryadoust, 2016; Brown & Bailey, 1984; Cambridge English, 2014; Jacobs et al., 1981)
Content	The piece of writing presents the relevant ideas to the task and addresses all given questions in the task. Thesis statements, topic sentences, body, and conclusions are clear.
Organization	The piece of writing contains well-organized sequences of information arranged logically by using the proper transition words, linking words, or cohesive devices within paragraphs.
Grammatical structures	The piece of writing consists of a wide range of simple and some complex grammatical forms with a good degree of control. It contains few if any errors in agreement, tense, word order, articles, punctuation, capitalization, or pronouns and does not impede communication.
Vocabulary	The piece of writing comprises a wide range of vocabulary usage, is concise, and the register is clear. The spelling does not impede communication.
	Critical thinking skills (Fisher, 2001; The Partnership for 21st Century Learning, 2015)
Reasoning	The ability to use inductive or deductive reasoning to explain the arguments, claims, or assumptions.
Analyzing	The ability to identify the elements in a reasoned case.
Evaluating	The ability to judge the credibility, evidence, arguments, or claims

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Aspects	Features
Synthesizing	The ability to make connections among information and arguments.
Interpreting	The ability to make inferences or conclusions based on analysis.
Creative thinking skills (Batey, 2012; Bialik & Fadel, 2015; Guidford, 1967; Sternberg, 2006)	
Fluency	The ability to list a number of ideas, answers, or possibilities to a given issue.
Flexibility	The ability to ability to develop alternative ideas, options, or possibilities to a given issue.
Originality	The ability to invent new unique or responses or possibilities.

In terms of validation, the 21st century skill rubric was validated by three experts to ensure content validity. The experts' suggestions pertained to content appropriateness, language use, and form.

One expert recommended adjusting the adverbs for each level in the 21st century skill rubric to better distinguish between student levels. They suggested changing "excellently, well, hardly, and poorly" to "excellent, good, fair, and poor" for clearer differentiation in each scale. For instance, the statements in the "reasoning" aspect, an element of critical thinking skills, were altered accordingly.

Table 5:

The Revised Statements of the 21st Century Skill Rubric in Terms of Written Communication Skills

Original statements	Revised statements
Writer excellently shows the ability to use inductive or deductive reasons to explain the arguments, claims, or assumption.	Writer shows an excellent ability to use inductive or deductive reasoning to explain the arguments, claims, or assumptions.
Writer well shows the ability to use inductive or deductive reasons to explain the arguments, claims, or assumption.	Writer shows a good ability to use inductive or deductive reasoning to explain the arguments, claims, or assumptions.
Writer hardly shows the ability to use inductive or deductive reasons to explain the arguments, claims, or assumption.	Writer shows a fair ability to use inductive or deductive reasoning to explain the arguments, claims, or assumptions.
Writer poorly shows the ability to use inductive or deductive reasons to explain the arguments, claims, or assumption.	Writer shows a poor ability to use inductive or deductive reasoning to explain the arguments, claims, or assumptions.

Another example is that the statements in the fluency aspect as one of the elements of creative thinking skills was changed as follows:

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Table 6:

The Revised Statements of the 21st Century Skill Rubric in Terms of Creative Thinking Skills

Original statements	Revised statements
Writer excellently shows the ability to list as many ideas, answers, or possibilities to a given issues.	Writer shows an excellent ability to list a number of ideas, answers, or possibilities to a given issue.
Writer well shows the ability to list as many ideas, answers, or possibilities to a given issues.	Writer shows a good ability to list a number of ideas, answers, or possibilities to a given issue.
Writer hardly shows the ability to list as many ideas, answers, or possibilities to a given issues.	Writer shows a fair ability to list a number of ideas, answers, or possibilities to a given issue.
Writer poorly shows the ability to list as many ideas, answers, or possibilities to a given issues.	Writer shows a poor ability to list a number of ideas, answers, or possibilities to a given issue.

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In addition, the statements in the content aspect as one of the elements of written communication skills were modified as follows:

Table 7:

The Revised Statements of the 21st Century Skill Rubric in Terms of Critical Thinking Skills

Original statements	Revised statements
The piece of paragraph writing excellently presents the relevant ideas to the task and addresses all given questions in the task. Thesis statements, topic sentences, body, and conclusions are clear.	The piece of writing presents the relevant ideas to the task and addresses all given questions in the task. Thesis statements, topic sentences, body, and conclusions are clear.
The piece of paragraph writing well presents the relevant ideas to the task and addresses all given questions in the task. Thesis statements, topic sentences, body, and conclusions are clear.	The piece of writing presents the relevant ideas to the task and addresses all given questions in the task. Thesis statements, topic sentences, body, and conclusions are clear.
The piece of paragraph writing hardly presents the relevant ideas to the task and addresses all given questions in the task. Thesis statements, topic sentences, body, and conclusions are clear.	The piece of writing fairly presents the relevant ideas to the task and addresses all given questions in the task. Thesis statements, topic sentences, body, and conclusions are fairly clear.
The piece of paragraph writing poorly presents the relevant ideas to the task and addresses all given questions in the task. Thesis statements, topic sentences, body, and conclusions are clear.	The piece of writing poorly presents the relevant ideas to the task and addresses all given questions in the task. Thesis statements, topic sentences, body, and conclusions are not clear.

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3.4.3 Students' Collaboration Questionnaire

The students' collaboration questionnaire was designed to investigate the impact of the WINVIS model on the collaboration skills of the participants. The students' collaboration questionnaire was administered twice: first during week 1, before the implementation of the WINVIS model, and second at the end of the implementation in week 11.

The questionnaire consisted of closed-ended questions arranged in a four-point Likert scale. The questionnaire was divided into two main parts: students' personal information and self-assessed collaboration-ability questions. A set of 24 questionnaire items was constructed according to the collaboration skills framework (The Partnership for 21st Century Learning, 2015). Items 1 to 11 measured students' group work in two aspects: 1) accepting diversity and listening to a group member's opinion in work (items 1-7) and 2) seeing the value of group members in work (items 8-11). Additionally, items 12 to 19 measured students' flexibility in collaboration in two aspects: 1) adaptation in a variety of assigned work to achieve the goal (items 12-15) and 2) reconciliation in collaboration (items 16-19). Furthermore, questionnaire items 20-24 assessed students' co-responsibility concerning their ability to accept the positive and negative implications of collaboration.

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In terms of the rating scale, many variations of the Likert scale exist, but the most common scale is a five-point scale ranging from "strongly disagree" to "strongly agree," with "neither agree nor disagree" in the middle. However, Cummins and Gullone (2000) suggest avoiding a five-point Likert scale because most respondents tend to answer only on a limited part of the conventional scale, which appears neutral in the middle. Therefore, the present study employed a four-point scale that excluded a

neutral option, resulting in a forced-choice measure where no indifferent option was available. The items were arranged in a four-point Likert scale, with response options ranging from 1 (poor implementation) to 4 (full implementation). A four-point rating scale was chosen to reduce the tendency of participants to choose a neutral response (Dörnyei & Taguchi, 2010) and to avoid participants choosing not to express their opinions. In other words, without a neutral option, it was more likely that a more specific or accurate response could be elicited from participants.

The survey was written in both Thai and English, as Oscarson (1997) has pointed out that self-assessment is generally perceived to be more accurate when conducted in the participants' native language.

Table 8:

Constructs, Objectives, and Questionnaire Items

Collaboration skills (The Partnership for 21st Century Learning, 2015)	**Measured objectives**	**Questionnaire items**
1. Ability to work effectively and respectfully with diverse teams	1. Accepting diversity, listening to opinions of group members in working together until achieving goals	1. I accept rules while working with others. 2. I can accept group members from different groups. 3. I understand my role while working with others. 4. I accept comments from those with whom I work. 5. I can work with others to achieve goals. 6. I listen to and apply what those I work with recommend. 7. I am able to successfully adjust to working with others.

Collaboration skills (The Partnership for 21st Century Learning, 2015)	Measured objectives	Questionnaire items
	2. Seeing the value of group members in working together	8. I accept the abilities of those with whom I work. 9. I give encouragement when those I work with feel discouraged. 10. I show positive feelings toward those with whom I work. 11. I do not behave offensively toward those I work with while they are asking questions.
2. Flexibility in working together	1. Adapting to the variety of work assigned to achieve the goal	12. I can work with others for a period of time. 13. I can respond to questions with different ideas. 14. I understand and listen to the different opinions of others. 15. I explain things to those I work with to make sure they understand.
	2. Reconciling in collaborative work	16. I use polite words when I have problems working with others. 17. I express myself appropriately to those with whom I work. 18. I talk with others kindly while working together and treat them well. 19. I can control my emotions while working with others.
3. Shared responsibility for collaborative work	1. Accepting the positive and negative effects of collaborative work.	20. I can answer questions asked by others. 21. I understand my role and responsibilities in collaborative work. 22. I can achieve mutual goals when working with others.

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Collaboration skills (The Partnership for 21st Century Learning, 2015)	Measured objectives	Questionnaire items
		23. I make recommendations and can explain them to those with whom I work. 24. I have learned the lessons assigned to me as instructed.

Upon constructing the students' collaboration questionnaire, it was validated by three experts to ensure content validity. Their suggestions concerned content appropriateness, language use, and form. All three experts concurred that some questions should be revised to better align with natural-sounding Thai:

Table 9:

The Revised Statements of Students' Collaboration Questionnaire

No.	Original statements	Revised statements
1	I accept rules while working in group. (ฉันยอมรับกฎขณะทำงานเป็นกลุ่ม)	1. I accept rules while working with others. (1. ฉันยอมรับกฎระเบียบขณะทำงานร่วมกับผู้อื่น)
2	I can accept group members from different groups. (ฉันสามารถรับสมาชิกจากกลุ่มต่างๆได้)	2. I can accept group members from different groups. (2. ฉันยอมรับเพื่อนสมาชิกที่มาจากกลุ่มอื่น ๆ ได้)
3	I understand the role when working with group members. (ฉันเข้าใจบทบาทเมื่อทำงานกับสมาชิกในกลุ่ม)	3. I understand my role while working with others. (3. ฉันเข้าใจหน้าที่ของฉันขณะทำงานร่วมกับผู้อื่น)
4	I accept comments from group members. (ฉันยอมรับความคิดเห็นจากสมาชิกในกลุ่ม)	4. I accept comments from those with whom I work. (4. ฉันยอมรับความคิดเห็นของผู้อื่น)
5	I can work together with group members to achieve the goals. (ฉันสามารถทำงานร่วมกับสมาชิกในกลุ่มเพื่อให้บรรลุเป้าหมาย)	5. I can work with others when working with others . (5. ฉันสามารถทำงานได้เมื่อต้องทำร่วมกับผู้อื่น)
6	I listen to what group members recommend and apply it.	6. I listen to what those I work with recommend.

No.	Original statements	Revised statements
	(ฉันรับฟังสิ่งที่สมาชิกในกลุ่มแนะนำและนำไปใช้)	(6. ฉันรับฟังสิ่งที่ผู้อื่นแนะนำฉัน)
7	I was able to successfully adapt to working with group members. (ฉันสามารถปรับตัวเข้ากับการทำงานร่วมกับสมาชิกในกลุ่มได้สำเร็จ)	7. I am able to successfully adjust to working with others. (7. ฉันสามารถปรับตัวในการทำงานร่วมกับผู้อื่นได้)
8	I understand and accept the ability of group members. (ฉันเข้าใจและยอมรับความสามารถของสมาชิกในกลุ่ม)	8. I accept the abilities of those with whom I work. (8. ฉันยอมรับความสามารถของผู้อื่น)
9	I give encouragement when group members feel discouraged. (ฉันให้กำลังใจเมื่อสมาชิกในกลุ่มรู้สึกท้อแท้)	9. I give encouragement when those I work with feel discouraged. (9. ฉันให้กำลังใจผู้อื่นเมื่อพวกเขารู้สึกท้อแท้)
10	I show positive feelings towards group members. (ฉันแสดงความรู้สึกเชิงบวกต่อสมาชิกในกลุ่ม)	10. I show positive feelings toward those with whom I work. (10. ฉันแสดงความรู้สึกในเชิงบวกต่อผู้ที่ฉันทำงานด้วย)
11	I do not use bad behavior to group members while they ask. (ฉันไม่ใช้พฤติกรรมที่ไม่ดีกับสมาชิกในกลุ่มในขณะที่พวกเขาถาม)	11. I do not behave offensively toward those I work with while they are talking. (11. ฉันแสดงประพฤติที่เหมาะสมขณะที่คนอื่นกำลังพูด)
12	I do not use bad behavior to group members while explaining to them. (ฉันไม่ใช้พฤติกรรมที่ไม่ดีต่อสมาชิกในกลุ่มในขณะที่อธิบายให้พวกเขาฟัง)	
13	I can work together with group members for a specified amount of time. (ฉันสามารถทำงานร่วมกับสมาชิกกลุ่มได้ตามระยะเวลาที่กำหนดได้)	12. I can work with others for a specified period of time. (12. ฉันสามารถทำงานร่วมกับผู้อื่นขณะที่มีระยะเวลากำหนดได้)
14	I can work towards achieving goals within a specified time period. (ฉันสามารถทำงานให้บรรลุเป้าหมายภายในระยะเวลาที่กำหนดได้)	
15	I can answer questions with different ideas. (ฉันสามารถตอบคำถามด้วยแนวคิดที่แตกต่างกัน)	13. I can respond to questions with different ideas. (13. ฉันสามารถตอบคำถามด้วยแนวคิดที่หลากหลายได้)
16	I understand and listen to the different opinions of group members. (ฉันเข้าใจและรับฟังความคิดเห็นที่แตกต่างของสมาชิกในกลุ่ม)	14. I listen to the different opinions of others. (14. ฉันรับฟังความคิดเห็นของผู้อื่น)

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No.	Original statements	Revised statements
17	I can explain to each group member to understand. (ฉันสามารถอธิบายให้สมาชิกกลุ่มแต่ละคนเข้าใจได้)	15. I explain things to those I work with. (15. ฉันสามารถอธิบายสิ่งต่าง ๆ ให้กับผู้ที่ฉันทำงานได้)
18	I use polite words when I have problems in group work. (ฉันใช้คำพูดที่สุภาพเมื่อฉันมีปัญหาในการทำงานกลุ่ม)	16. I use polite words when I have problems working with others (16. ฉันใช้คำสุภาพเมื่อฉันมีปัญหาในการทำงานร่วมกับผู้อื่น)
19	I have an expression of working towards group members with appropriate behaviors. (ฉันแสดงออกถึงการทำงานต่อสมาชิกในกลุ่มด้วยพฤติกรรมที่เหมาะสม)	17. I express myself friendly to those with whom I work. (17. ฉันแสดงออกอย่างเป็นมิตรขณะทำงานร่วมกับผู้อื่น)
20	I use words in the collaborative work to treat kindness in group members. (ฉันใช้คำพูดในการทำงานร่วมกันเพื่อรักษาความกรุณาต่อสมาชิกในกลุ่ม)	18. I talk with others kindly while working together. (18. ฉันพูดคุยอย่างสุภาพเสมอขณะทำงานร่วมกับผู้อื่น)
21	I can control the emotions while working. (ฉันสามารถควบคุมอารมณ์ขณะทำงานได้)	19. I can control my emotions while working with others. (19. ฉันสามารถควบคุมอารมณ์ได้ขณะทำงานร่วมกับผู้อื่น)
22	I can answer questions that group members have asked correctly. (ฉันสามารถตอบคำถามที่สมาชิกในกลุ่มถามได้อย่างถูกต้อง)	20. I can answer questions asked by others. (20. ฉันสามารถช่วยตอบคำถามที่คนอื่นสงสัยได้)
23	I understand my role and responsibilities in group collaboration. (ฉันเข้าใจบทบาทและความรับผิดชอบของฉันในการทำงานร่วมกันเป็นกลุ่ม)	21. Responsibility in collaborative work is important. (21. ความรับผิดชอบขณะทำงานร่วมกับผู้อื่นเป็นสิ่งสำคัญ)
24	I can achieve the group's goals. (ฉันสามารถบรรลุเป้าหมายของกลุ่มได้)	22. I can achieve mutual goals when working with others. (22. ฉันทำงานให้บรรลุเป้าหมายได้เมื่อต้องทำงานร่วมกับผู้อื่น)
25	I recommend my lessons and can teach to group members. (ฉันแนะนำบทเรียนของฉันและสามารถสอนกับสมาชิกในกลุ่มได้)	23. While working collaboratively, I can give recommendations to those with whom I work. (23. ขณะทำงานร่วมกับผู้อื่น ฉันให้คำแนะนำคนอื่นได้)
26	I can explain the knowledge that I have been assigned completely.	Deleted for redundant statement 15

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No.	Original statements	Revised statements
	(ฉันสามารถอธิบายความรู้ที่ฉันได้รับมอบหมายได้อย่างสมบูรณ์)	
27	I studied my assigned lessons as targeted. (ฉันศึกษาบทเรียนที่ได้รับมอบหมายตามเป้าหมาย)	24. I have learned the lessons assigned to me. (24. ฉันได้บทเรียนจากการทำงานร่วมกับผู้อื่น)
28	Other comments about your collaboration skills (ความคิดเห็นอื่น ๆ เกี่ยวกับทักษะการทำงานร่วมกันของคุณ)	Could you describe your strengths and weaknesses in relation to your collaborative skills? (คุณช่วยอธิบายจุดแข็งและจุดอ่อนของคุณที่เกี่ยวกับทักษะการทำงานร่วมกับผู้อื่น)

The student's collaboration questionnaire was validated by three experts to ensure content validity. Their suggestions concerned content appropriateness, language use, and form. All three experts concurred that some questions should be revised to better align with natural-sounding Thai as follows:

Table 10:

The Revised Statements of Students' Collaboration Questionnaire

No.	Original statements	Revised statements
1	I accept rules while working in group. (ฉันยอมรับกฎขณะทำงานเป็นกลุ่ม)	1. I accept rules while working with others. (1. ฉันยอมรับกฎระเบียบขณะทำงานร่วมกับผู้อื่น)
2	I can accept group members from different groups. (ฉันสามารถรับสมาชิกจากกลุ่มต่างๆได้)	2. I can accept group members from different groups. (2. ฉันยอมรับเพื่อนสมาชิกที่มาจากกลุ่มอื่น ๆ ได้)
3	I understand the role when working with group members. (ฉันเข้าใจบทบาทเมื่อทำงานกับสมาชิกในกลุ่ม)	3. I understand my role while working with others. (3. ฉันเข้าใจหน้าที่ของฉันขณะทำงานร่วมกับผู้อื่น)
4	I accept comments from group members. (ฉันยอมรับความคิดเห็นจากสมาชิกในกลุ่ม)	4. I accept comments from those with whom I work. (4. ฉันยอมรับความคิดเห็นของผู้อื่น)
5	I can work together with group members to achieve the goals. (ฉันสามารถทำงานร่วมกับสมาชิกในกลุ่มเพื่อให้บรรลุเป้าหมาย)	5. I can work when working with others. (5. ฉันสามารถทำงานได้เมื่อต้องทำร่วมกับผู้อื่น)

6	I listen to what group members recommend and apply it. (ฉันรับฟังสิ่งที่สมาชิกในกลุ่มแนะนำและนำไปใช้)	6. I listen to what those I work with recommend. (6. ฉันรับฟังสิ่งที่ผู้อื่นแนะนำฉัน)
7	I was able to successfully adapt to working with group members. (ฉันสามารถปรับตัวเข้ากับการทำงานร่วมกับสมาชิกในกลุ่มได้สำเร็จ)	7. I am able to successfully adjust to working with others. (7. ฉันสามารถปรับตัวในการทำงานร่วมกับผู้อื่นได้)
8	I understand and accept the ability of group members. (ฉันเข้าใจและยอมรับความสามารถของสมาชิกในกลุ่ม)	8. I accept the abilities of those with whom I work. (8. ฉันยอมรับความสามารถของผู้อื่น)
9	I give encouragement when group members feel discouraged. (ฉันให้กำลังใจเมื่อสมาชิกในกลุ่มรู้สึกท้อแท้)	9. I give encouragement when those I work with feel discouraged. (9. ฉันให้กำลังใจผู้อื่นเมื่อพวกเขารู้สึกท้อแท้)
10	I show positive feelings towards group members. (ฉันแสดงความรู้สึกเชิงบวกต่อสมาชิกในกลุ่ม)	10. I show positive feelings toward those with whom I work. (10. ฉันแสดงความรู้สึกในเชิงบวกต่อผู้ที่ฉันทำงานด้วย)
11	I do not use bad behavior to group members while they ask. (ฉันไม่ใช้พฤติกรรมที่ไม่ดีกับสมาชิกในกลุ่มในขณะที่พวกเขาถาม)	11. I do not behave offensively toward those I work with while they are talking. (11. ฉันแสดงประพฤติที่เหมาะสมขณะที่คนอื่นกำลังพูด)
12	I do not use bad behavior to group members while explaining to them. (ฉันไม่ใช้พฤติกรรมที่ไม่ดีต่อสมาชิกในกลุ่มในขณะที่อธิบายให้พวกเขาฟัง)	
13	I can work together with group members for a specified amount of time. (ฉันสามารถทำงานร่วมกับสมาชิกกลุ่มได้ตามระยะเวลาที่กำหนดได้)	12. I can work with others for a specified period of time. (12. ฉันสามารถทำงานร่วมกับผู้อื่นขณะที่มีระยะเวลากำหนดได้)
14	I can work towards achieving goals within a specified time period. (ฉันสามารถทำงานให้บรรลุเป้าหมายภายในระยะเวลาที่กำหนดได้)	
15	I can answer questions with different ideas. (ฉันสามารถตอบคำถามด้วยแนวคิดที่แตกต่างกัน)	13. I can respond to questions with different ideas. (13. ฉันสามารถตอบคำถามด้วยแนวคิดที่หลากหลายได้)
16	I understand and listen to the different opinions of group members. (ฉันเข้าใจและรับฟังความคิดเห็นที่แตกต่างของสมาชิกในกลุ่ม)	14. I listen to the different opinions of others. (14. ฉันรับฟังความคิดเห็นของผู้อื่น)

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17	I can explain to each group member to understand. (ฉันสามารถอธิบายให้สมาชิกกลุ่มแต่ละคนเข้าใจได้)	15. I explain things to those I work with. (15. ฉันสามารถอธิบายสิ่งต่าง ๆ ให้กับผู้ที่ฉันทำงานได้)
18	I use polite words when I have problems in group work. (ฉันใช้คำพูดที่สุภาพเมื่อฉันมีปัญหาในการทำงานกลุ่ม)	16. I use polite words when I have problems working with others (16. ฉันใช้คำสุภาพเมื่อฉันมีปัญหาในการทำงานร่วมกับผู้อื่น)
19	I have an expression of working towards group members with appropriate behaviors. (ฉันแสดงออกถึงการทำงานต่อสมาชิกในกลุ่มด้วยพฤติกรรมที่เหมาะสม)	17. I express myself in a friendly manner to those with whom I work. (17. ฉันแสดงออกอย่างเป็นมิตรขณะทำงานร่วมกับผู้อื่น)
20	I use words in the collaborative work to treat kindness in group members. (ฉันใช้คำพูดในการทำงานร่วมกันเพื่อรักษาความกรุณาต่อสมาชิกในกลุ่ม)	18. I talk with others kindly while working together. (18. ฉันพูดคุยอย่างสุภาพเสมอขณะทำงานร่วมกับผู้อื่น)
21	I can control the emotions while working. (ฉันสามารถควบคุมอารมณ์ขณะทำงานได้)	19. I can control my emotions while working with others. (19. ฉันสามารถควบคุมอารมณ์ได้ขณะทำงานร่วมกับผู้อื่น)
22	I can answer questions that group members have asked correctly. (ฉันสามารถตอบคำถามที่สมาชิกในกลุ่มถามได้อย่างถูกต้อง)	20. I can answer questions asked by others. (20. ฉันสามารถช่วยตอบคำถามที่คนอื่นสงสัยได้)
23	I understand my role and responsibilities in group collaboration. (ฉันเข้าใจบทบาทและความรับผิดชอบของฉันในการทำงานร่วมกันเป็นกลุ่ม)	21. Responsibility in collaborative work is important. (21. ความรับผิดชอบขณะทำงานร่วมกับผู้อื่นเป็นสิ่งสำคัญ)
24	I can achieve the group's goals. (ฉันสามารถบรรลุเป้าหมายของกลุ่มได้)	22. I can achieve mutual goals when working with others. (22. ฉันทำงานให้บรรลุเป้าหมายได้เมื่อต้องทำงานร่วมกับผู้อื่น)
25	I recommend my lessons and can teach to group members. (ฉันแนะนำบทเรียนของฉันและสามารถสอนกับสมาชิกในกลุ่มได้)	23. While working collaboratively, I can give recommendations to those with whom I work. (23. ขณะทำงานร่วมกับผู้อื่น ฉันให้คำแนะนำคนอื่นได้)
26	I can explain the knowledge that I have been assigned completely. (ฉันสามารถอธิบายความรู้ที่ฉันได้รับมอบหมายได้อย่างสมบูรณ์)	Deleted for redundant statement 15
27	I studied my assigned lessons as targeted. (ฉันศึกษาบทเรียนที่ได้รับมอบหมายตามเป้าหมาย)	24. I have learned the lessons assigned to me. (24. ฉันได้บทเรียนจากการทำงานร่วมกับผู้อื่น)

28	Other comments about your collaboration skills (ความคิดเห็นอื่น ๆ เกี่ยวกับทักษะการทำงานร่วมกันของคุณ)	Could you describe your strengths and weaknesses in relation to your collaborative skills? (คุณช่วยอธิบายจุดแข็งและจุดอ่อนของคุณที่เกี่ยวกับทักษะการทำงานร่วมกับผู้อื่น)

3.4.4 Student's 21st Century Skill Portfolio

The student's 21st century skill portfolio was created to track students' progress in developing the 21st century skills. Students used the portfolio to collect assignments from each unit. The portfolio also required students to reflect on their feelings and thoughts, which were not easily observable by the researcher, at the end of each unit. The portfolio consisted of four parts as follows:

1. Students were asked to fill in their personal information and the details of the unit of study, including the date and the title of the chosen topic for each unit.
2. After completing the group assignment, each member of the group collected their worksheet in the portfolio to demonstrate their work.
3. Students were asked to evaluate their feelings and thoughts about the lessons in the WINVIS model. They were asked to reflect on both their actions and feelings about each unit's tasks and the process they underwent while trying to complete those tasks. This part explored the 21st century skills in depth, with questions based on these skills.
4. Students were asked to write down what they planned to do to improve their 21st century skills and how they addressed their own weaknesses in preparation for the next unit.

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The student's 21st century skill portfolio was validated by three experts to ensure content validity, as well as language appropriateness, appropriateness for students' levels of proficiency, and form.

Part 1: Personal Information: While the IOC index scores were not below 0.667 for each item, one expert advised adding group name and time and using an informal font and layout to better capture students' interest.

Part 2: Your Task: Although the IOC index scores for each item were not below 0.667, one expert recommended adding instructions, such as "Please attach your work from the 'Applying stage' in the box below," and providing more space for students to respond in this section.

Part 3: Your Reflection: Except for appropriate language use and form, the IOC index scores for each item were not below 0.667. One expert suggested supplementing "how to improve the 21st century skills" with a table for students to rate scores ranging from 0% to 100% across four aspects: written communication, collaboration, critical thinking, and creative thinking. Additionally, they advised adding the "happy, neutral, and sad" options to gauge students' feelings and making questions more concise.

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Part 4: Your Plan for the Next Unit: While the IOC index scores for each item were not below 0.667, one expert suggested simplifying the question statements for students and having them write down each 21st century skills instead of an overall plan for clearer analysis.

3.4.5 Teacher's Observation Note

The teacher's observation note was used to record students' cooperative behavior. The observation would be conducted three times in Unit 1 "Health," Unit 2 "Animals," and Unit 3 "Business." The teacher's observation sheet consisted of five

lessons: Connecting, Outlining, Presenting, Applying, and Evaluating. The teacher's observation note was used to record students' cooperative behavior during the activities. The rate and quality of their comments during the lessons would be studied to improve the understanding of collaboration skills.

In terms of the teacher's observation note, three experts validated them for content validity. Their suggestions related to content appropriateness, language use, student level, and form across five sections. The IOC index scores were not below 0.667 for each item, except for the corresponding form. One expert recommended making teacher's observation note clearer, providing a detailed list of collaboration skills and related behaviors for more in-depth data collection, and making questions more concise.

3.4.6 The WINVIS Opinion Questionnaire

The WINVIS opinion questionnaire was administered to collect students' opinions about the lessons, activities, and materials in the form of written questions. The survey was administered at the end of the study after the implementation of the model. The questionnaire consisted of questions with a four-point scale where there was no neutral option, thus creating a forced-choice measure where no indifferent option was available. In other words, without a neutral option, it was more likely that a more specific or accurate answer could be elicited from the participants.

The questions in the WINVIS opinion questionnaire were divided into three parts, with both closed-ended questions and open-ended questions. The closed-ended questions were easy to use and code for analysis because all participants responded to the same questions, while the open-ended questions allowed for more individualized responses, more freedom in answers, and simpler writing, as suggested by Fraenkel and Wallen (2000).

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Part 1 included questions on demographic characteristics including gender, age, educational background, number of years studying English, English O-NET scores, and perception of English proficiency.

In Part 2, three aspects were asked: 1) learning and writing developments with four questions (items 1-4), 2) teaching methods, materials, and the teacher with eight items (items 5-12), and 3) learning satisfaction and general attitudes with eight questions (items 13-20).

In Part 3, there were four questions asking students to write about their satisfaction with the WINVIS course, the teaching methods, the handout, and the teaching materials.

The questionnaire was written in both Thai and English because Oscarson (1997) suggests that self-evaluation is generally perceived to be more accurate when conducted in the participants' native language. This consideration ensured that students felt comfortable providing honest and accurate feedback about their experiences with the WINVIS model, ultimately allowing for a more comprehensive analysis of the model's effectiveness.

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After constructing the WINVIS opinion questionnaire, three experts validated it for content validity, language appropriateness, and form. Although the IOC index scores for each item were not below 0.667, the three experts recommended that certain questions should be revised

After constructing the WINVIS opinion questionnaire, three experts validated it for content validity. Their suggestions pertained to content appropriateness, language use, and form. Although the IOC index scores for each item were not below 0.667, the

three experts concurred that certain questions should be revised. However, specific revisions were not provided in the original text.

Table 11:

The Revised Statements of the WINVIS Opinion Questionnaire

Original statements	Revised statements
Part 1: Personal Information	
4. In your opinion, how much do you like to study English?	Do you like studying English?
5. In your opinion, how important it is for you to know writing in English class?	In your opinion, how important is it for you to know about English writing?
6. ONET score in grade 9	Did you take the O-NET examination in grade 9?
Part 2: Questions about learning	Statements about learning
1. How much did you understand paragraph writing after taking this course? (1. คุณเข้าใจการเขียนย่อหน้ามากน้อยเพียงใดหลังจากเรียนหลักสูตรนี้)	1. I understand paragraph writing after taking this course. (1. ฉันเข้าใจการเขียนย่อหน้าหลังจากเรียนรายวิชานี้)
2. To what extent can you explain about the components of paragraph writing? (2. คุณสามารถอธิบายเกี่ยวกับส่วนประกอบของการเขียนย่อหน้าได้ในระดับใด)	2. I can explain the components of paragraph writing. (2. ฉันสามารถอธิบายเกี่ยวกับส่วนประกอบของการเขียนย่อหน้าได้)
3. To what extent do you understand an opinion paragraph? (3. คุณเข้าใจการเขียนย่อหน้าแสดงความคิดเห็นมากน้อยเพียงใด)	3. I understand opinion paragraph writing. (3. ฉันเข้าใจการเขียนย่อหน้าแสดงความคิดเห็น)

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Original statements	Revised statements
4. To what extent can you write an opinion paragraph? (4. คุณสามารถเขียนย่อหน้าแสดงความคิดเห็นได้ในระดับใด)	4. I can write an opinion paragraph. (4. ฉันสามารถเขียนย่อหน้าแสดงความคิดเห็นได้)
5. To what extent is the teaching method suitable for learning this course? (5. วิธีการสอนเหมาะสมกับการเรียนหลักสูตรนี้มากน้อยเพียงใด)	5. The instructional method suitable for learning on this course. (5. วิธีการสอนเหมาะสมกับการเรียนหลักสูตรนี้มากน้อยเพียงใด)
6. To what extent has the teaching method helped you with learning this course? (6. วิธีการสอนช่วยให้คุณเรียนรู้รายวิชานี้ได้มากน้อยเพียงใด)	6. The instructional method has helped me with learning on this course. (6. วิธีการสอนช่วยให้ฉันเรียนรู้รายวิชานี้)
7. To what extent is the handout suitable for learning this course? (7. เอกสารที่แจกเหมาะสำหรับการเรียนรู้หลักสูตรนี้ในระดับใด)	7. The handouts are suitable for learning on this course. (7. เอกสารที่แจกเหมาะสำหรับการเรียนรู้รายวิชานี้)
8. To what extent are the learning materials suitable for learning this course? (8. สื่อการเรียนรู้เหมาะสมกับการเรียนรายวิชานี้ในระดับใด)	8. The learning materials are suitable for learning on this course . (8. สื่อการเรียนรู้เหมาะสมกับการเรียนรายวิชานี้)
9. To what extent does the instructor understand paragraph writing? (9. ผู้สอนเข้าใจการเขียนย่อหน้าในระดับใด)	9. The instructor understands paragraph writing. (9. ผู้สอนเข้าใจการเขียนย่อหน้า)
10. To what extent can the instructor explain clearly and systematically? (10. ผู้สอนสามารถอธิบายได้อย่างชัดเจนและเป็นระบบในระดับใด)	10. The instructor can explain clearly and systematically. (10. ผู้สอนสามารถอธิบายได้อย่างชัดเจนและเป็นระบบ)
11. To what extent does the instructor allow you to practice as well as providing useful suggestions?	11. The instructor allows me to practice. (11. ผู้สอนได้ให้ฉันฝึกฝน)

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Original statements	Revised statements
(11. ผู้สอนได้ให้คุณฝึกฝนและให้คำแนะนำที่เป็นประโยชน์ในระดับใด)	12. The instructor provides useful suggestions. (12. ผู้สอนได้ให้คำแนะนำที่เป็นประโยชน์)
12. To what extent are you satisfied with your learning in this course? (12. คุณพอใจกับการเรียนในรายวิชานี้มากน้อยเพียงใด)	13. I am satisfied with my learning in this course. (13. ฉันพอใจกับการเรียนในรายวิชานี้)
13. To what extent are you satisfied with the instructional method? (13. คุณพอใจกับวิธีการเรียนการสอนในระดับใด)	14. I am satisfied with the instructional method. (14. ฉันพอใจกับวิธีการเรียนการสอน)
14. To what extent are you satisfied with the instructor? (14. คุณพอใจกับการสอนของผู้สอนมากน้อยเพียงใด)	15. I am satisfied with the instructor's teaching. (15. ฉันพอใจกับการสอนของผู้สอน)
15. To what extent are you satisfied with the classroom atmosphere? (15. คุณพอใจกับบรรยากาศในห้องเรียนในหลักสูตรนี้มากน้อยเพียงใด)	16. I am satisfied with the classroom atmosphere in this course. (16. ฉันพอใจกับบรรยากาศในห้องเรียนในรายวิชานี้)
16. To what extent are you satisfied with the learning and teaching materials? (16. คุณพอใจกับสื่อการเรียนการสอนในระดับใด)	17. I am satisfied with the learning and teaching materials. (17. ฉันพอใจกับสื่อการเรียนการสอน)
17. To what extent are you confident in your paragraph writing? (17. คุณมั่นใจในการเขียนย่อหน้าในระดับใด)	18. I am confident in my paragraph writing. (18. ฉันมั่นใจในการเขียนย่อหน้า)
18. To what extent have you developed your paragraph writing? (18. คุณพัฒนาการเขียนย่อหน้าไปได้มากน้อยเพียงใด)	19. I have developed my paragraph writing. (19. ฉันได้พัฒนาการเขียนย่อหน้า)
19. To what extent is this course useful for you? (19. รายวิชานี้มีประโยชน์สำหรับคุณมากน้อยเพียงใดในอนาคต)	20. This course will be useful to me in the future. (20. รายวิชานี้มีประโยชน์กับฉันในอนาคต)

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Original statements	Revised statements
Part 3: Additional Comments	
1. Evaluate your satisfaction with WINVIS course. (ประเมินความพึงอใจต่อหลักสูตร WINVIS)	Please evaluate your overall satisfaction with the WINVIS course. (กรุณาประเมินความพึงพอใจต่อหลักสูตร WINVIS โดยรวม)
2. Comments on instruction methods. (แสดงความคิดเห็นเกี่ยวกับวิธีการเรียนการสอน)	Please comment on the instructional methods. (กรุณาแสดงความคิดเห็นเกี่ยวกับวิธีการสอน)
3. Comments on the handout and the teaching materials. (แสดงความคิดเห็นเกี่ยวกับเอกสารแจกและสื่อการสอน)	Please comment on the handouts and the teaching materials. (กรุณาแสดงความคิดเห็นเกี่ยวกับเอกสารที่แจกและสื่อการสอน)
4. Other comments. (ความคิดเห็นอื่น ๆ)	Please leave additional comments. (กรุณาแสดงคิดเห็นอื่นนอกเหนือที่กล่าวไป)

In addition to the previously mentioned revisions, one expert recommended altering the scale for the level of agreement. The terms “least, little, much, and most” were replaced with “strongly agree, agree, disagree, and strongly disagree.”

3.4.7 Focus Group Interview

To complement the data collected from the WINVIS opinion questionnaire, triangulation, a technique that involves the use of multiple methods or data sources to develop a comprehensive understanding of phenomena, was employed (Fraenkel & Wallen, 2000). A focus group interview was designed by the researcher in the present study to obtain in-depth information about the students’ 21st century skills and their opinions on the WINVIS model.

Given the qualitative nature of this method, data were collected from a small number of cases, with the aim of exploring themes in detail and depth (Anderson, 2010). Six students, selected and representing various achievement levels (two high-scoring students, two middle-scoring students, and two low-scoring students), were asked questions regarding their 21st century skill development and their opinions on the WINVIS model.

The focus group interview questions were divided into four parts: 1) introductory questions, 2) the WINVIS model, 3) 21st century skills, and 4) exit questions. These categories were adapted from basic question types outlined by Patton (1990, cited in Wasanasomsithi, 2015), which included background, knowledge, experience, opinion, feeling, and sensory questions.

During the interview sessions, the researcher asked for participants' permission to audio-record the conversations to enhance validity and reliability in qualitative research (Fraenkel & Wallen, 2000). Each interview lasted approximately 15 to 20 minutes. Furthermore, the interviews were conducted in the participants' native language to overcome language barrier, as communicating in the language of the group being studied is often advantageous (Fraenkel & Wallen, 2000).

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The focus group interview questions were submitted to a panel of three experts to ensure content validity. The experts gave suggestions regarding content and language of the questions. While the IOC index scores for each item were not below 0.667, the experts commented that some questions needed to be revised as follows:

1. "3. How do you think about the teaching method? What do you think about the instructor? and How are they important for your learning and writing development?" was changed to "3. What do you think about the instructional

method and the instructor's teaching? How are they important for your learning and writing development?"

2. "4. What do you think about the handout or the other learning materials?" was changed to "4. What do you think about the handouts or other learning materials?"
3. "5. Have you found the course successful? Does it help you develop the writing skills as you expected?" was changed to "5. Do you think the course was a success? Did it help you develop the writing skills you expected?"
4. "7. What are your suggestions for the course, the teaching methods and materials, and the instructor?" was replaced with "7. What are your suggestions for improving this course, regarding the instructional methods, materials, and the instructor?"

3.5 Research Procedure

This study employed a modified research and development (R&D) cycle based on Gall et al. (2003). Due to time constraints, the research method adapted only the first five steps of Gall et al. (2003), which included:

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1. Review of literature, articles, and classroom observation.
2. Formulating skills, setting goals, sorting materials, and conducting a small field test. In this stage, the current curriculum was analyzed, and specific learning objectives were established. These objectives were the foundation for developing learning courses that could be tested and revised to meet the set learning goals.
3. Teaching tools, consisting of instructional materials such as a lesson plan and instructional manual, were evaluated by experts in English language instruction,

writing teaching, inquiry-based learning, visual literacy, and middle school teaching for revision advice.

4. Student testing, focusing on a qualitative assessment of the new instructional product, was conducted at a private school in Chaiyaphum province, Thailand, during the academic year 2021.
5. Revision of the product based on feedback from experts, teachers, and student tests was conducted.

This research was divided into two main phases: 1) the development of the instructional model for writing with the integration of inquiry-based learning and visual literacy and 2) the implementation of the WINVIS model.

In Phase 1, the procedure began with a study of theories and research related to teaching writing, inquiry-based learning, visual literacy, and 21st century skills. Following this, the instructional model was created, and the necessary instruments were developed and validated by experts. A test was conducted with ten students of similar backgrounds as the participants, and necessary revisions were made according to the experts' suggestions.

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In Phase 2, during the implementation phase, participants were asked to take part in the class, and pre-assessments were conducted using the 21st century skill test and students' collaboration questionnaire. Participants studied three units, each consisting of five lessons: Connecting, Outlining, Presenting, Applying, and Evaluating. Throughout the implementation, participants were evaluated using the teacher's observation note, and students compiled their work in the student's 21st century skill portfolio. Post-assessments were conducted using the 21st century skill test and student's collaboration questionnaire. Finally, the researcher investigated

students' opinions of the model through the WINVIS opinion questionnaire and focus group interviews. The study design is illustrated in Figure 2.

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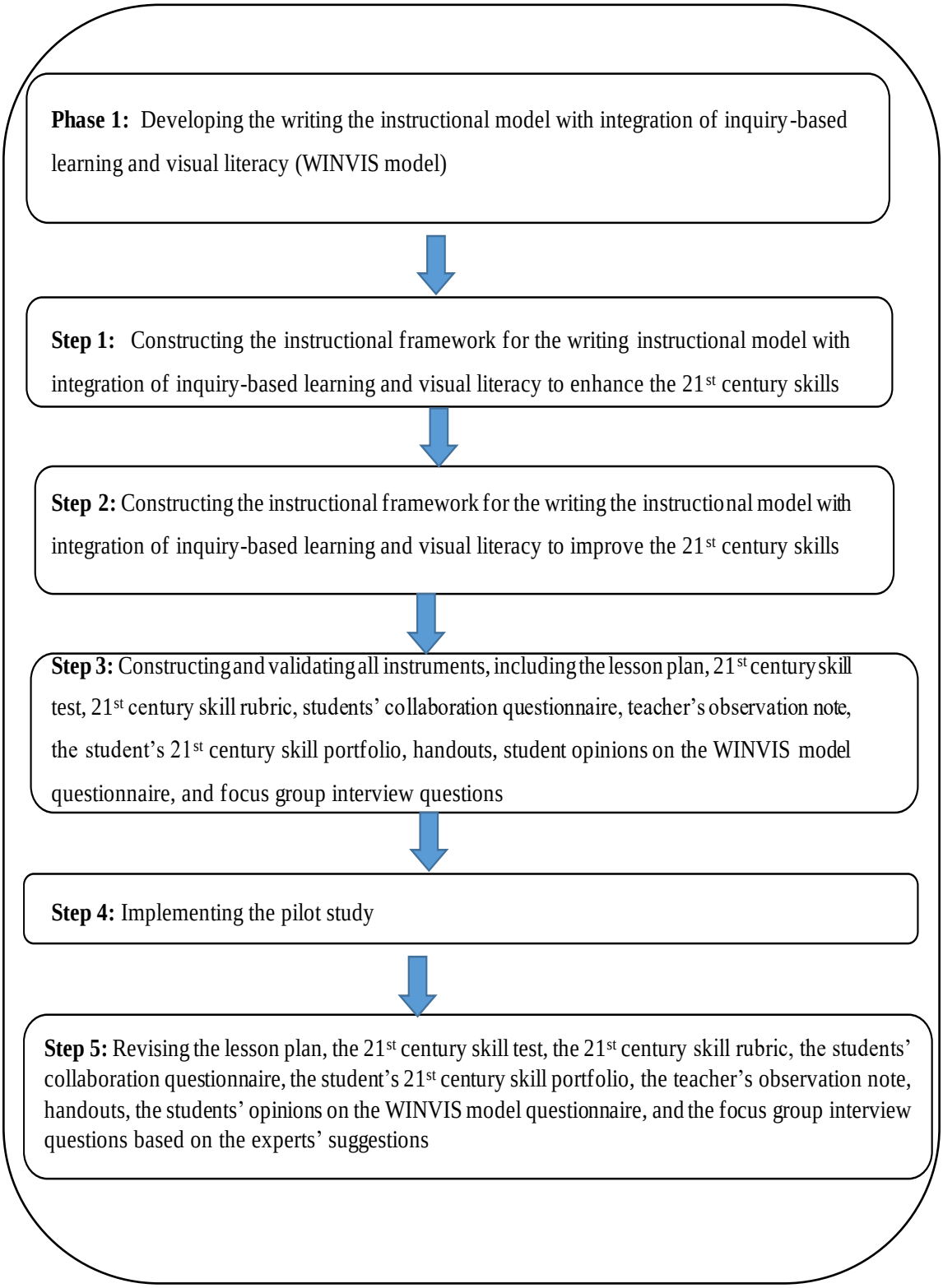
Figure 2:
The Diagram of the Design of the Study



The diagram of the design of the study (Cont.)

Phase 2: Implementing the written instructional model with integration of inquiry-based learning and visual literacy (WINVIS model)

Step 1: Assessing the students' 21st century skills and student collaboration prior to implementation of the WINVIS model

Step 2: Implementing the WINVIS model and collecting data using the student's 21st century skill portfolio and the teacher's observation note

Step 3: Conducing the posttest using the 21st century skill test and student collaboration questionnaire after implementation of the WINVIS model

Step 4: Administering the questionnaire and conducing the focus group interviews

Based on the previous figures, the details of each phase are described as follows:

3.5.1 Phase 1: Developing the WINVIS model.

Step 1: Studying the theories and research related to teaching writing, inquiry-based learning, visual literacy, and the 21st century skills

The researcher examined related theories and research on second language writing, inquiry-based learning, **visual** literacy, and the 21st century skills from textbooks, journals, and websites to obtain information relevant to the research study. The researcher then analyzed and synthesized the information to apply appropriate concepts in developing the writing instructional model integrated with inquiry-based learning and visual literacy.

Step 2: Constructing the instructional framework for the writing instructional model with the integration of inquiry-based learning and visual literacy to improve 21st century skills

Drawing on the information acquired from the theories and research explored in Step 1, the researcher followed the 5E learning cycle (Rodriguez et al., 2019) and ACRL's Visual Literacy Standards (Hattwig et al., 2013) to create the conceptual framework for constructing the lesson plan and activities.

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Students were taught using the writing instructional model integrated with inquiry-based learning and visual literacy in each lesson. The WINVIS model was divided into five stages, referred to as "COPAE": Connecting, Outlining, Presenting, Applying, and Evaluating.

Connecting stage

The Connecting stage focused on engagement within the 5E learning cycle, visual literacy standards (Standard 3: The visually literate student interpreted and

analyzed the meanings of images and visual media, and Standard 4: The visually literate student evaluated images and their sources). Activity A, “Think of an interesting topic,” was based on the 5E learning cycle, wherein the teacher stimulated students’ interest and curiosity by posing questions using visual materials, such as videos, pictures, posters, and infographics, and challenges that encouraged profound thinking. Students were required to display interest in a specific topic and comprehend the messages conveyed by visual materials. This activity aligned with Standard 3, as students had to interpret visual materials, and Standard 4, as students had to judge visual sources based on credibility, perspectives, and information quality. As students had to create an outline before writing, listing ideas derived from visual materials to identify topics in a brainwriting table. In this stage, critical thinking skills were addressed in various aspects, depending on the unit.

Outlining stage

The Outlining stage emphasized exploration in the 5E learning cycle, visual literacy standards (Standard 2: The visually literate student found and accessed needed images and visual media effectively and efficiently, Standard 6: The visually literate student designed and created meaningful images and visual media, and Standard 7: The visually literate student understood many of the ethical, legal, social, and economic issues associated with the creation and use of images and visual media, and accessed and used visual materials ethically), and preparation in the process-oriented writing approach. Activity B, “Design your own interest,” encouraged students to work in pairs, exploring their interests and desired outcomes without direct instruction. Students selected a figure to incorporate into their assignment and gathered additional information to prepare for writing. The teacher acted as a consultant, posing questions

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and providing feedback to stimulate students' thinking. This activity was associated with Standards 2 and 7, as students had to choose appropriate visual sources and acknowledged creators and authorship rights, and with Standard 6, as students produced visual materials to communicate their ideas, using design strategies and creativity. In this stage, creative thinking skills were addressed in various aspects, depending on the unit, along with new vocabulary introduced to students.

Presenting stage

The Presenting stage concentrated on the explanation within the 5E learning cycle, visual literacy standards (Standard 5: The visually literate student uses images and visual media effectively). In this stage, the teacher encouraged students to explain their perspectives in writing, related to the visuals, demonstrating their understanding of each topic through collaboration. Emphasizing Standard 5, students had to effectively use graphic organizers, such as mind maps, concept maps, or hyperbolic trees, before writing. Students transferred information from visual aids into written form, focusing on idea development rather than grammar or spelling. In this stage, sentence structure was addressed, with the teacher providing feedback.

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Applying stage

The Applying stage highlighted elaboration in the 5E learning cycle, visual literacy standards (Standards 1, 5, and 6). Students applied their understanding of concepts and skills in new situations, working with different graphic organizers and individually composing their writing. The activity emphasized Standards 1 and 6, as students defined the purpose of the new graphic organizer, identified key concepts, designed, and created meaningful images and visuals. Standard 5 was also stressed, as

students used graphic organizers for writing purposes. Students improved their writing drafts by rethinking and reorganizing their ideas.

Evaluating stage

The Evaluating *stage* focused on evaluation in the 5E learning cycle, visual literacy standards (Standards 3 and 4). Students assessed their partners' work, providing feedback to enhance the writing task, while examining their partners' visual aids to understand the connection to writing, as per Standard 3. Emphasizing Standard 4, students judged image sources based on evaluations of image and information quality with students proofreading, correcting errors, and submitting their work for teacher feedback as shown in the following table:

Table 12:

The Relationship of WINVIS Conceptual Framework with "COPAE"

Stages	Activities	A 5E learning cycle (Rodriguez et al., 2019)	Visual Literacy Standards (Hattwig et al., 2013)
Connecting	Activity *A: Think of an interesting topic*	Engaging	Standard 3. Interpreting and analyzing images Standard 4. Evaluating images
Outlining	Activity B: *Design your way*	Exploring	Standard 2. Effectively finding images Standard 6. Designing meaningful images Standard 7. Using images ethically and citing visuals
Presenting	Activity C: *Compose your writing*	Explaining	Standard 5. Using images effectively
Applying	Activity D: *Improve your writing*	Elaborating	Standard 1. Defining image need Standard 5. Using images effectively Standard 6. Designing meaningful images

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Stages	Activities	A 5E learning cycle (Rodriguez et al., 2019)	Visual Literacy Standards (Hattwig et al., 2013)
Evaluating	*E: Check the component of paragraph*	Evaluating	Standard 3. Interpreting and analyzing images Standard 4. Evaluating images

Step 3: Constructing and validating instruments

Instruments including lesson plans, 21st century skill test, rubrics, questionnaires, teacher's observation note, the student's 21st century skill portfolio, handouts, student opinions on WINVIS model, and focus group interview questions were developed and validated. These instruments were designed to measure students' 21st century skills (written communication, collaboration, critical thinking, and creative thinking skills) and gathered opinions on the writing instructional model with the integration of inquiry-based learning and visual literacy. Expert validation was sought, with suggestions for revisions and additional comments needed to ensure validity. Data analysis was conducted using mean and standard deviation, with the Item-Objective Congruence Index (IOC) summarizing experts' opinions.

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Figure 3:

The Item-Objective Congruence Index (IOC)

$$IOC = R / N$$

IOC : the index of congruence

R : total score from the experts

Step 4: Conducting the pilot study

The WINVIS model and research instruments were piloted to ensure their effectiveness. Participants who were ten senior high school students from a private school situated in Chaiyaphum province participated in the pilot study, which lasted three weeks and focused only on one unit, “Unit 1 Health.” The pilot study tested the adequacy of the lesson plan and the appropriateness of the 21st century skill test items and timing. Additionally, the student’s collaboration questionnaire, teacher’s observation notes, the student’s 21st century skill portfolio, handouts, student opinions on the WINVIS model questionnaire, and focus group interview questions were examined for clarity.

The pilot study consisted of two stages. The first ensured the test’s suitability and appropriateness for the students’ English proficiency, while the second focused on addressing errors and weaknesses for test improvement. Based on the pilot results, adjustments were made to the WINVIS instruction process and the explanation of the five steps. Furthermore, the reliability values of the questionnaire were calculated using Cronbach’s alpha coefficient, with values greater than 0.7 considered acceptable.

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Step 5: Revising instruments based on experts’ suggestions and pilot results

After **receiving** feedback from experts and the pilot study participants, all lesson plans and instruments were revised before being used in the main study.

3.5.2 Phase 2: Implementing the WINVIS model

The study utilized the lesson plan, 21st century skill test, 21st century skill rubric, student collaboration questionnaire, teacher’s observation notes, the student’s 21st century skill portfolio, handouts, student opinions on the WINVIS model questionnaire, and focus group interview questions to investigate the model’s effectiveness. The 21st century skill test and student collaboration questionnaire were administered at the

beginning and end of the study to measure changes in students' skills. During implementation, teacher's observation notes, the student's 21st century skill portfolio, and handouts were utilized for each unit. Lastly, students' opinions on the WINVIS model were gathered through questionnaires and focus group interviews after the implementation.

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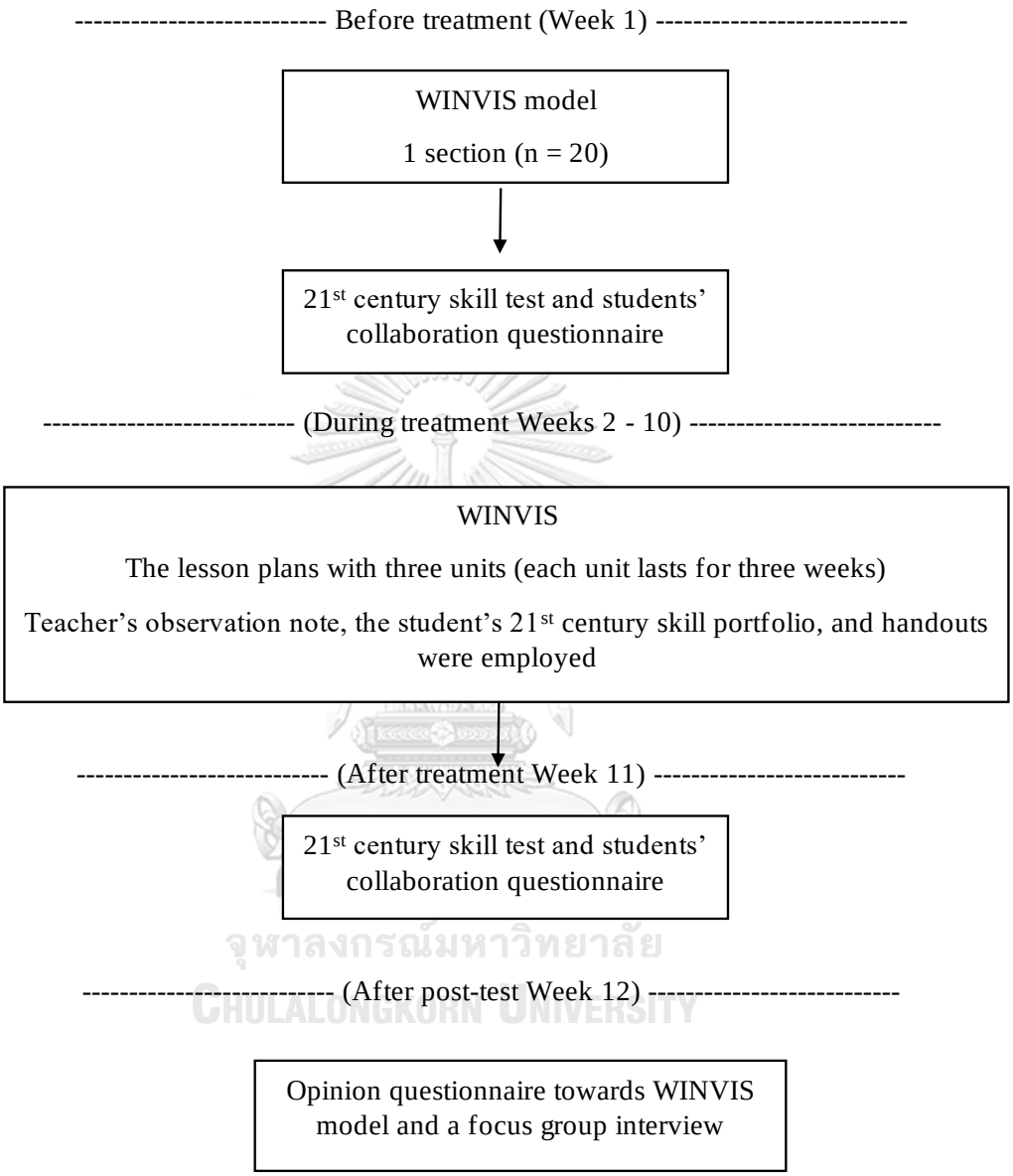
Figure 4:

Outline of 12-Week Implementation



3.5.3 Instructional Plan

The instructional model for writing, integrating inquiry-based learning and visual literacy, comprised three lesson plans targeting health, animals, and business topics. Spanning 12 weeks, the model allowed for significant progress through

continuous and effective instruction. The WINVIS lesson plan was grounded in the 5E learning cycle (Rodriguez et al., 2019) and ACRLs Visual Literacy Standards (Hattwig et al., 2013).

3.5.3.1 Lesson Plan

The unit comprised five lessons: Connecting, Outlining, Presenting, Applying, and Evaluating.

Lesson 1: Connecting: Students were engaged in activities with visual aids and were divided into groups of four or five to brainstorm ideas based on the visual aids. Each group then presented their work to the class.

Lesson 2: Outlining: Focusing on specific topics, students worked in pairs to choose a visual aid to connect and justify their selected topic. Pairs outlined areas to explore using graphic organizers, such as mind maps for unit 1, concept maps for unit 2, and hyperbolic trees for unit 3.

Lesson 3: Presenting: Students adapted their ideas from relational graphic organizers to create a coherent writing assignment. They drafted an opinion paragraph based on the graphic organizer.

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Lesson 4: Applying: This lesson emphasized applying knowledge from previous lessons to new situations, using graphic organizers like hamburgers for unit 1, OREOs for unit 2, and sequence charts for unit 3. Students learned components of paragraph writing and incorporated ideas from the new graphic organizers into their writing activities to improve their paragraphs and created revised versions.

Lesson 5: Evaluating: Focusing on evaluating students' writing assignments, students provided feedback on their partner's work before completing all aspects of their writing. The teacher served as the final evaluator for each paragraph.

Each unit in this study consisted of five lesson plans, with each unit spanning three weeks and a total time allotment of 150 minutes per unit.

In terms of validation of lesson plans and instructional manual, they were validated by three experts to ensure content validity. The experts provided suggestions related to content appropriateness, language use, and form as well.

Expert A recommended simplifying and shortening the handouts to facilitate student understanding. Additionally, she suggested making the handouts engaging and more visually appealing. Consistency in layout and language use, information on grammatical elements, and time allocations for each activity were also advised. Expert A also commented that images in Activity B should be enlarged, and relevant references should be included.

Expert B emphasized the need to demonstrate expected language use and include text images related to the genre in the connection stage. She also suggested that demonstrations and examples in the outline phase be provided and clearer instructions be given. Expert B further suggested that assessment criteria be included to inform students of assignment expectations.

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Expert C advised revising some questions and instructions and providing more space for graphic organizer creation in the applying activity. She also suggested clarifying vocabulary and grammar activities and allotting time limits for each task.

Beyond individual suggestions, the experts agreed that course objectives should be revised for greater clarity and the scope and sequence of lesson plans should be specified for ease of understanding. They also recommended separating Activity A questions for each unit, providing definitions of critical thinking skills, and rephrasing some questions to facilitate student comprehension.

As for the outlining lesson, the experts advised supplying visual materials for student selection and adding definitions of creative thinking skills. In the presentation lesson, they suggested including content and feedback on grammatical structures.

Regarding the application lesson, the experts recommended enlarging the graphic organizer image and providing additional space for drawing. They also suggested including written communication skills criteria for student reference.

Finally, for the evaluation lesson, they proposed adding space for comments on written communication skills and rephrasing the question “How do I work with you?” to “What do you think about me as I work with you?” along with a checklist of response options.

All suggestions and comments from the three experts were carefully considered, and both the lesson plans and instructional manual were revised accordingly.

Table 13:

Relationship between COPAE Stages and Lesson Plan

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	COPAE		
Stage	**Health**	**Animal**	**Business**
Connecting - Looking at the visual objects, such as pictures, infographics, etc. - Writing about what students want to do	1. Critical thinking skills - Reasoning - Analyzing - Evaluating 2. Collaboration skills	1. Critical thinking skills - Analyzing - Evaluating - Synthesizing - Interpreting 2. Collaboration skills	1. Critical thinking skills - Reasoning - Synthesizing - Interpreting 2. Collaboration skills
Outlining - Selecting visual objects from a list of ten items provided	1. Organizer: Mind Map 2. Creative thinking: Fluency	1. Organizer: Concept Map 2. Creative thinking: Flexibility	1. Organizer: Hyperbolic Tree 2. Creative thinking: Originality

COPAE			
Stage	**Health**	**Animal**	**Business**
- Giving the reasons to pick one of them - Drawing organizer: Node-link Approaches	3. Written communication skills: Vocabulary 4. Collaboration skills	3. Written communication skills: Vocabulary 4. Collaboration skills	3. Written communication skills: Vocabulary 4. Collaboration skills
Presenting - Writing an opinion paragraph in group - Checking students' group work	1. Written communication skills - Grammar: Simple Sentence 2. Collaboration skills	1. Written communication skills - Grammar: Compound Sentence 2. Collaboration skills	1. Written communication skills - Grammar: Complex Sentence 2. Collaboration skills
Applying - Drawing graphic organizers in group - Writing an opinion paragraph based on their own interest	1. Graphic organizer: Hamburger 2. Creative thinking 3. Collaboration skills 4. Written communication skills - Content - Organization	1. Graphic organizer: OREO 2. Creative thinking 3. Collaboration skills 4. Written communication skills - Content - Organization	1. Graphic organizer: Sequence chart 2. Creative thinking 3. Collaboration skills 4. Written communication skills - Content - Organization
Evaluating - Assessing others' work - Giving comments	1. Written communication skills 2. Critical thinking skills 3. Collaboration skills	1. Written communication skills 2. Critical thinking skills 3. Collaboration skills	1. Written communication skills 2. Critical thinking skills 3. Collaboration skills

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3.6 Data Collection

The study collected both quantitative and qualitative data to investigate the effectiveness of the writing instruction model with the integration of inquiry-based

learning and visual literacy (WINVIS). Quantitative data included results from the 21st century skill test, student collaboration questionnaire, and the WINVIS opinion questionnaire, while qualitative data were gathered from the student's 21st century skill portfolio, teacher's observation notes, handouts, the WINVIS opinion questionnaire, and focus group interviews. Data collection was organized based on the research questions:

Research Question 1.2.1.1 To what extent does the WINVIS model increase the written communication skills of EFL learners?

Data were obtained from the 21st century skill test scores with the 21st century skill rubric. Additionally, data were obtained from the student's 21st century skill portfolio, student handouts, WINVIS opinion questionnaire, and focus group interviews.

Research Question 1.2.1.2 To what extent does the WINVIS model improve collaboration skills of EFL learners?

Data were derived from the students' collaboration questionnaire before and after the study. Also, the data were obtained from teacher's observation note, the student's 21st century skill portfolio, and student handouts.

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Research Question 1.2.1.3 To what extent does the WINVIS model promote critical thinking skills of EFL learners?

Data were obtained from the 21st century skill test scores with the 21st century skill rubric, the student's 21st century skill portfolio, student handouts, the WINVIS opinion questionnaire, and focus group interviews.

Research Question 1.2.1.4 To what extent does the WINVIS model develop creative thinking skills of EFL learners?

Data were obtained from the 21st century skill test scores with the 21st century skill rubric, the student's 21st century skill portfolio, student handouts, the WINVIS opinion questionnaire, and focus group interviews.

Research Question 1.2.2 What are the students' opinions towards the WINVIS model? Data were obtained from the WINVIS opinion questionnaire and focus group interviews.

3.7 Data Analysis

The study employed a mixed-methods research design. Quantitative data consisted of students' scores from the pre- and post-21st century skill tests, student collaboration questionnaires, and the WINVIS opinion questionnaire. Descriptive statistics of means and standard deviation were used to analyze the data. Moreover, inferential statistics of the Wilcoxon signed rank test was employed due to a small sample size ($n < 30$) (Kuntz, 1997). According to Field (2009), the Wilcoxon signed rank test is suitable for comparing two sets of scores derived from the same participants. Field (2009) further argues that non-parametric tests, such as the Wilcoxon signed rank test, do not rely on assumptions regarding the distribution of data and are therefore less restrictive compared to parametric tests. Consequently, non-parametric tests do not necessitate the assumption of a normally distributed population. Thus, distributional assumptions were not applied to the non-parametric tests employed in this study. Given the small sample size, the Wilcoxon signed rank test was employed to evaluate the disparities between the ranked scores of the 21st century skill test and students' collaboration questionnaire.

On the other hand, qualitative data were gathered using the student's 21st century skill portfolios, teacher's observation notes, handouts, the WINVIS opinion

questionnaire, and focus group interviews. Data analysis was done based on the research questions as follows:

Research Question 1.2.1.1 To what extent does the WINVIS model increase the written communication skills of EFL learners?

Data were obtained from the 21st century skill test scores with the 21st century skill rubric. Descriptive statistics of mean, standard deviation, percentage, and median, and inferential statistics of Wilcoxon Signed-Rank Test were used. Inter-rater reliability was tested using Pearson Correlation Coefficient. In addition, qualitative data elicited using the student's 21st century skill portfolio, student handouts, the WINVIS opinion questionnaire, and focus group interviews were coded and analyzed by means of content analysis.

Research Question 1.2.1.2 To what extent does the WINVIS model improve collaboration skills of EFL learners?

Data derived from the student collaboration questionnaire administered before and after the study were analyzed using mean, standard deviation, percentage, median, and Wilcoxon Signed-Rank Test. Qualitative data gathered with the teacher's observation note, the student's 21st century skill portfolio, and student handouts were coded and analyzed by means of content analysis.

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Research Question 1.2.1.3 To what extent does the WINVIS model promote critical thinking skills of EFL learners?

Quantitative data obtained from the 21st century skill test scores with the 21st century skill rubric were analyzed using mean, standard deviation, percentage, median, and Wilcoxon Signed-Rank Test. Inter-rater reliability was tested using Pearson Correlation Coefficient. Also, qualitative data obtained with the student's 21st century

skill portfolio, student handouts, the WINVIS opinion questionnaire, and focus group interviews were coded and analyzed with content analysis.

Research Question 1.2.1.4 To what extent does the WINVIS model develop creative thinking skills of EFL learners?

Quantitative data derived from the 21st century skill test and the 21st century skill rubric were analyzed using descriptive statistics of mean, standard deviation, percentage, and median and inferential statistics of Wilcoxon Signed-Rank Test. Inter-rater reliability was tested using Pearson Correlation Coefficient. Qualitative data elicited using the student's 21st century skill portfolio, student handouts, the WINVIS opinion questionnaire, and focus group interviews were coded and analyzed.

Research Question 1.2.2 What are the students' opinions towards the WINVIS model?

Data gathered using the WINVIS opinion questionnaire were quantitatively analyzed in terms of mean, standard deviation, and percentage, while qualitative data from focus group interviews were analyzed using content analysis.

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3.8 Ethical Considerations

The researcher strictly adhered to the ethical codes of conduct and addressed various ethical concerns throughout this study to protect the rights and well-being of the participants including the following:

1. Informed consent: All participants would be asked to give informed consent before participating in the research study. They would have the option to either participate in the study or decline involvement. Participants also had the right to withdraw from the research at any time without fear of penalties or adverse academic consequences.

2. No harm: Participants would be informed that they would not be exposed to any situation where they may be harmed, physically or emotionally.
3. Transparency: Participants would be provided with information regarding the nature of the study, its objectives, data collection procedures, and instruments used. This transparency ensured that participants fully understand the research process and their involvement.
4. Privacy and confidentiality: The privacy of participants would be guaranteed, and their individual identities would not be disclosed. Data collected would be anonymized to protect participants' confidentiality.

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CHAPTER 4
RESEARCH FINDINGS

4.1 Introduction

This chapter presents the results and findings based on two main research questions. The first research question was "What are the effects of the WINVIS model on the 21st century skills of EFL learners?" This question was divided into four sub-questions: 1.1) To what extent does the WINVIS model increase the written communication of EFL learners?; 1.2) To what extent does the WINVIS model improve collaboration skills of EFL learners?; 1.3) To what extent does the WINVIS model promote critical thinking skills of EFL learners?; and 1.4) To what extent does the WINVIS model develop creative thinking skills of EFL learners?. The results for the first research question were analyzed using the 21st century skill test, students' collaboration questionnaire, the students' 21st century skill portfolio, the teacher's observation note, and some parts of the focus group interview. The second research question was: "What are the students' opinions towards the WINVIS model?" The results for this research question were analyzed using the results of the WINVIS opinion questionnaire, the students' 21st century skill portfolio, the teacher's observation notes, and some parts of the focus group interview.

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4.2 Effects of the WINVIS model on written communication

The first research question sought to investigate the effects of the WINVIS model in promoting written communication skills of EFL learners. To test the hypothesis that the written communication skills of EFL students improved after the implementation of the WINVIS model, the results of the posttest were compared with

those of the pretest using descriptive statistics, including minimum and maximum scores, mean, and standard deviation.

Table 14:

Descriptive Statistics of the Written Communication Skills of 21st Century Skill Test

	N	Total score	Minimum	Maximum	Mean	S.D.
Pretest	20	16	4.00	6.00	4.93	0.57
Posttest	20	16	9.00	11.50	10.55	0.60

Table 14 compares students' written communication skills scores on the 21st century skill test before and after implementing the WINVIS model. The pretest mean score was 4.93 (*SD = 0.57*) out of the full score of 16 points. After implementing the WINVIS model, the posttest scores significantly improved, with the mean score of 10.55 (*SD = 0.60*).

Table 15:

21st Century Skill Scores of Overall Aspects of Written Communication Skills

Aspects	Pretest		Posttest		Wilcoxon Signed Rank Test		Effect Size
	M	SD	M	SD	Z	P (2-tailed)	r
Overall	4.93	0.57	10.55	0.60	-3.95	.00*	-0.62
Content	1.23	0.34	2.68	0.29	-3.99	.00*	-0.63
Organization	1.13	0.41	2.68	0.29	-4.03	.00*	-0.64
Grammatical structures	1.28	0.41	2.60	0.35	-3.96	.00*	-0.63
Vocabulary	1.30	0.38	2.60	0.31	-3.99	.00*	-0.63

*p < .05

The effectiveness of the WINVIS model in enhancing students' written communication skills is demonstrated in Table 15. Following a 12-week implementation of the model, there was a significant improvement in students' written communication skills, as indicated by a significant difference between the pretest and posttest scores ($Z = -3.95, p < .05$). The effect size (r) for the median scores was -0.62, indicating a large effect size according to Cohen (1988) and Rosenthal (1996). Furthermore, the WINVIS model had a significant impact on various aspects of written communication skills, including content, organization, grammatical structures, and vocabulary. The Wilcoxon Signed Rank Test revealed a significant difference between the pretest and posttest scores for each aspect (Z = -3.99, Z = -4.03, Z = -3.96, and Z = -3.99, respectively, $p < .05$), with effect sizes (r) of the median scores ranging from -0.62 to -0.64, indicating a large effect size.

In addition to the quantitative findings, qualitative data from students' 21st century skills portfolio, teacher's observation note, and focus group interviews were analyzed. The data were categorized into four elements: content, organization, grammatical structures, and vocabulary as follows:

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I. Content

During the content creation process, students engaged in several steps within the WINVIS model. In the Connecting stage, visual prompts were used to stimulate their thoughts and generate ideas. One student mentioned remembering childhood memories to share *(student #4*), while another acknowledged that looking at pictures helped generate more thoughts *(student #8*). The Outlining stage played a crucial role in organizing ideas before writing. Graphic organizers and mind maps were employed to enhance clarity and elaboration. Students found this process beneficial as it allowed

them to gather information and expand their content. For example, one student mentioned being able to write more with sufficient information *(student #16*), while another highlighted how mind maps helped expand ideas *(student #18*).

However, some students faced challenges in content creation, particularly in selecting and presenting information effectively. Difficulty in choosing relevant information was noted by one student (*student #3*). Additionally, presenting content in English posed challenges for some students, despite their ability to express themselves well in Thai (*student #L2*). In this study, participant interviews were analyzed across different proficiency levels based on students' writing test scores. Results indicated that students with high and medium proficiency levels demonstrated more effective development of content creation skills, especially in the "Business" unit where they were familiar with the stages and information management. Students mentioned the benefits of familiarity with the stages in selecting information (*student #H1*) and the importance of using credible sources in the Outlining stage (*student #M2*).

II. Organization

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The use of graphic organizers, such as concept maps in the Outlining stage or hamburger paragraphs in the Applying stage, was effective in improving students' written communication skills, particularly in terms of organization. One student highlighted the advantages of using concept maps, stating that it made writing easier and more convenient *(student #10*). Another student acknowledged the benefits of having a plan, especially in the Presenting and Applying stages, where graphic organizers were used: "*Having a plan helps me write more efficiently, especially in the Presenting and Applying stages*" *(student #12*). However, some students faced challenges in connecting information using hyperbolic trees in the "Business" unit.

They found it difficult to determine which parts to connect (*student #7*). Additionally, students in the middle and lower proficiency groups suggested the need for alternative types of graphic organizers to better organize information and make the lessons more interesting *(student #M1*). Despite these challenges, students still found value in using graphic organizers across various stages. High proficiency students recognized that the ability to connect ideas to different contexts could be applied in all writing-related subjects. They even considered using the concept of association in writing subjective exams in other subjects (*student #H2*).

III. Grammatical Structures

The results indicated that the Evaluating stage within the model could enhance students' grammatical structures. Reviewing and commenting on peers' work allowed students to learn from mistakes and improve their own writing skills. One student described how he could become a better reviewer and learning what to look for in one's work through this process *(student #14*). Another student recognized the application of learned content in evaluating her friends' work (*#student 4*).

However, some students still faced difficulties with grammatical structures, particularly in areas such as subject-verb agreement and tense usage, which were not extensively covered in the model. These challenges were evident in the Presenting stage, where teacher feedback was provided to help students improve. Students expressed the need for additional instruction and practice in these grammar areas. For example, one student mentioned struggles with subject-verb agreement *(student #9*), while another suggested addressing subject-verb agreement before each lesson *(student #L2*). The limited focus on certain grammar content, such as subject-verb agreement and tense usage, may have contributed to these challenges, and additional support and

guidance could be beneficial for these students to enhance their writing skills. Another student expressed confusion about using the present or past tenses in certain contexts *(student #M1*), as these aspects were only briefly addressed in the model. Despite the limited focus on specific grammar content, students still improved their writing skills through feedback on grammatical structures in the Evaluating stage. One student noted increased carefulness in her own writing and a better understanding of what the teacher expected when evaluating her peers' work *(#student H2*).

IV. Vocabulary

Vocabulary improvement was evident in each stage of the model. In the Connecting stage, participants introduced vocabulary related to visual aids. New vocabulary words were identified during the Outlining stage based on students' work. Students reported expanding their vocabulary through peer interaction during group work and by reading their peers' written work. Some students mentioned learning vocabulary from their friends *(student #4*) and secretly noting down expressions or phrases for future use *(student #12*). The Presenting stage also encouraged vocabulary enhancement by generating additional ideas for incorporation into paragraphs.

However, some students expressed concerns about limited vocabulary and a lack of knowledge in paraphrasing techniques during individual writing in the Applying stage. Students had to use repetitive words *(student #1*) and recognized the need for paraphrasing skills to improve their writing *(student #7*). Despite the somewhat limited impact on expanding vocabulary knowledge, students reported an increase in vocabulary through interactions with peers. Collaborating with classmates provided opportunities to expand vocabulary without relying on memorization. One students agreed that this approach allowed her to learn vocabulary naturally *(#student H1*).

During the Evaluating stage, students evaluated peers' work using graphic organizers and learned new vocabulary usage. In addition, the data from the interviews revealed that high-achieving groups tended to employ less common vocabulary more frequently, recognizing its advantages for standardized tests like IELTS and TOEFL. Using less common words was seen as beneficial for scoring criteria in these tests (*student #H2*). This reflected the engagement fostered by inquiry-based learning, which encouraged students to improve their work.

In summary, the content creation process, including stages like Connecting, Outlining, Applying, Evaluating, and Presenting, facilitated idea generation, organization, and effective writing. Graphic organizers were instrumental in enhancing writing organization across all proficiency levels, with high proficiency students developing superior skills in connecting ideas. Despite some grammatical struggles, peer review in the Evaluating stage improved students' writing skills and grammar understanding. Lastly, the process fostered vocabulary expansion across all stages, with high-achieving students utilizing uncommon vocabulary for standardized tests, exemplifying the benefits of inquiry-based learning.

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4.3 Effects of the WINVIS model on collaboration skills

The second research question sought to investigate the effectiveness of the WINVIS model in promoting the collaboration skills of EFL learners. To test the hypothesis that the collaboration skills of EFL students improved after the implementation of the WINVIS model, the results of the posttest were compared with those of the pretest using descriptive statistics, including minimum and maximum scores, mean, and standard deviation.

Table 16:

Descriptive Statistics of the Collaboration Skills of Students' Collaboration Questionnaire

	N	Minimum	Maximum	Mean	S.D.
Pre-questionnaire	20	3.13	3.50	3.31	0.11
Post-questionnaire	20	3.38	3.67	3.50	0.08

Table 16 compares students' collaboration skills scores before and after implementing the WINVIS model. The pre-questionnaire mean score was 3.31 (*SD = 0.11*). After the implementation of the model, the post-questionnaire mean score showed a slight improvement, with the mean score of 3.50 (*SD = 0.08*). Thus, the findings supported the hypothesis that the WINVIS model could enhance collaboration skills.

Table 17:

Pretest and Posttest Scores of Students' Collaboration Questionnaire of Collaboration Skills

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Aspects	Pretest		Posttest		Wilcoxon Signed Rank Test		Effect size
	M	SD	M	SD	Z	P (2-tailed)	
Overall	3.31	0.11	3.50	0.08	-3.931	.00*	-0.62
Ability to work effectively and respectfully with diverse teams	3.48	0.17	3.66	0.13	-3.524	.00*	-0.56
Flexibility in working together	3.08	0.09	3.28	0.15	-3.719	.00*	-0.59
Shared responsibility for collaborative work	3.33	0.25	3.52	0.15	-2.840	.01*	-0.45

*p < .05

Table 17 compares students' scores for each collaboration skill component before and after implementing the WINVIS model. The "Ability to collaborate effectively and respectfully with diverse teams" had the pre-questionnaire mean score of 3.48 (SD = 0.17), which slightly improved to the post-questionnaire mean score of 3.66 (SD = 0.13). For "Flexibility in collaboration," the pre-questionnaire mean score was 3.08 (SD = 0.09), increasing to the post-questionnaire mean score of 3.28 (SD = 0.15). In terms of "Shared responsibility for collaborative work," the pre-questionnaire mean score was 3.33 (SD = 0.25), significantly improving to the post-questionnaire mean score of 3.52 (SD = 0.15). These findings supported the hypothesis that the WINVIS model could enhance students' collaboration skills. Furthermore, the before-and-after measurements of collaboration skill components for each participant showed overall improvement. The average ranks for the post-questionnaire were significantly higher than the pre-questionnaire ranks (Z = -3.524, Z = -3.719, and Z = -2.840, respectively, $p < .05$). Such findings further supported the effectiveness of the WINVIS model in enhancing collaboration skills, as depicted in Table 17.

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Table 18:

Pretest and Posttest Scores of Students' Collaboration Questionnaire in Terms of the Component of "Accepting Diversity, Listening to Opinions of Group Members in Working Together until Achieving Goals"

Questions	Pretest		Posttest		Wilcoxon Signed Rank Test		Effect size
	M	SD	M	SD	Z	P (2-tailed)	
1. I accept rules while working with others.	3.40	0.50	3.65	0.49	-2.236	.025*	-0.35
2. I can accept group members from different groups.	3.50	0.51	3.75	0.44	-2.236	.025*	-0.35
3. I understand my role while working with others.	3.50	0.51	3.65	0.49	-1.732	.083	-0.27
4. I accept comments from those with whom I work.	3.45	0.51	3.55	0.51	-1.414	.157	-0.22
5. I can work with others to achieve goals.	3.35	0.49	3.40	0.50	-1.000	.317	-0.16
6. I listen to and apply what those I work with recommend.	3.60	0.50	3.80	0.41	-2.000	.046*	-0.32
7. I am able to successfully adjust to working with others.	3.35	0.49	3.50	0.51	-1.732	.083	-0.27
Total	3.45	0.21	3.62	0.18	-3.325	.001*	-0.53

*p < .05

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Table 18 compares students' scores for the aspect of "Accepting diversity, listening to opinions of group members while working together towards achieving goals" before and after implementing the WINVIS model, as assessed by the student collaboration questionnaire. The post-implementation overall mean score was 3.62 (SD = 0.18). Question 6, "I listen to and apply what those I work with recommend," had the highest mean score (mean = 3.80, SD = 0.41), while question 5, "I can work with others to achieve goals," had the lowest mean score (mean = 3.40, SD = 0.50).

The before-and-after assessment of components for each participant indicated an increased ability after the intervention, with an average rank of 0 compared to pre-intervention average ranks ranging from 1.00 to 7.50. The Wilcoxon Signed-Rank Test revealed that post-questionnaire ranks were significantly higher than pre-questionnaire ranks for the total score, item 1, item 2, and item 6 ($Z = 3.325$, $Z = -2.236$, $Z = -2.236$, and $Z = 2.000$, respectively, $p < .05$). These findings suggested that the WINVIS model significantly enhanced specific components of collaboration skills related to working effectively and respectfully with diverse teams in students.

Table 19:

Pretest and Posttest Scores of Students' Collaboration Questionnaire in Terms of the Component of "Seeing the Value of Group Members in Working Together"

Questions	Pretest		Posttest		Wilcoxon Signed Rank Test		Effect size
	M	SD	M	SD	Z	P (2-tailed)	
8. I accept the skills of those with whom I work.	3.45	0.51	3.60	0.50	-1.732	.083*	-0.27
9. I give encouragement when those I work with feel discouraged.	3.50	0.51	3.70	0.47	-2.000	.046	-0.32
10. I show positive feelings toward those with whom I work.	3.60	0.50	3.75	0.44	-1.732	.083	-0.27
11. I do not behave offensively toward those I work with while they are asking questions.	3.50	0.51	3.75	0.44	-2.236	.025	-0.35
Total	3.51	0.27	3.70	0.19	-3.066	.002	-0.48

*p < .05

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Table 19 compares students' scores for the aspect of "Seeing the value of group members in working together" before and after implementing the WINVIS model, as assessed by the student collaboration questionnaire. The post-implementation overall mean score was 3.70 (*SD = 0.19*). Question 10, "I show positive feelings toward those with whom I work," and question 11, "I do not behave offensively toward those I work with while they are asking questions," had the highest mean scores (both *M = 3.75, SD = 0.44*), while question 8, "I accept the skills of those with whom I work," had the lowest mean score (*M = 3.60, SD = 0.50*).

The before-and-after assessment of components for each participant indicated an increased ability after the intervention, with an average rank of 0 compared to pre-intervention average ranks ranging from 2.00 to 6.00. The Wilcoxon Signed-Rank Test showed that post-questionnaire ranks were significantly higher than pre-questionnaire ranks for the total score, item 9, and item 11 ($Z = 3.066$, $Z = 2.000$, and $Z = 2.236$, respectively, $p < .05$). Based on these findings, it could be concluded that the WINVIS model significantly enhanced specific components related to seeing the value of group members in working together in students.

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Table 20:

Pretest and Posttest Scores of Students' Collaboration Questionnaire in Terms of the Component of "Adapting to the Variety of Work Assigned to Achieve the Goal"

Questions	Pretest		Posttest		Wilcoxon Signed Rank Test		Effect size
	M	SD	M	SD	Z	P (2-tailed)	
12. I can work with others for a period of time.	3.35	0.49	3.70	0.47	-2.646	.008*	-0.42
13. I can respond to questions with different ideas.	3.35	0.49	3.55	0.51	-2.000	.046*	-0.32
14. I understand and listen to the different opinions of others.	3.40	0.50	3.55	0.51	-1.732	.083	-0.27
15. I explain things to those I work with to make sure they understand.	3.30	0.47	3.55	0.51	-2.236	.025*	-0.35
Total	3.35	0.19	3.59	0.20	-3.275	.001*	-0.52

*p < .05

Table 20 compares student scores for "Adapting to the variety of work assigned to achieve the goal" before and after implementing the WINVIS model, as assessed by the student collaboration questionnaire. The post-implementation overall mean score was 3.59 (*SD = 0.20*). Question 12 had the highest mean score (*M = 3.70, SD = 0.47*), while questions 13, 14, and 15 shared the same mean score of 3.55.

The before-and-after assessment showed an increased ability after the intervention, with an average rank of 0 compared to pre-intervention average ranks ranging from 2.00 to 7.00. The Wilcoxon Signed-Rank Test indicated that post-questionnaire ranks were significantly higher than pre-questionnaire ranks for the total score, item 12, item 13, and item 15 (Z = 3.275, Z = 2.646, Z = 2.000, and Z = 2.236,

respectively, p < .05). These findings reflected the effectiveness of the WINVIS model to enhance specific components related to adapting to assigned work in students.

Table 21:

Pretest and Posttest Scores of students' Collaboration Questionnaire in Terms of the Component of "Reconciling in Collaborative Work"

Questions	Pretest		Posttest		Wilcoxon Signed Rank Test		Effect size
	M	SD	M	SD	Z	P (2-tailed)	
16. I use polite words when I have problems working with others.	2.65	0.59	2.75	0.55	-1.414	.157	-0.22
17. I express myself appropriately to those with whom I work.	3.30	0.47	3.55	0.51	-2.236	.025*	-0.35
18. I talk with others kindly while working together and treat them well.	2.50	0.51	2.75	0.44	-2.236	.025*	-0.35
19. I can control my emotions while working with others.	2.75	0.44	2.80	0.41	-1.000	.317	-0.16
Total	2.80	0.19	3.59	0.20	-3.127	.002*	-0.49

*p < .05

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Table 21 compares student scores for "Reconciling in collaborative work" before and after implementing the WINVIS model, as assessed by the student collaboration questionnaire. The post-implementation overall mean score was 3.59 (*SD = 0.20*). Question 17, "I express myself appropriately to those with whom I work," had the highest mean score (*M = 3.55, SD = 0.51*), while question 16, "I use polite words when I have problems working with others," recorded the lowest mean score (*M = 2.75, SD = 0.55*).

The before-and-after assessment of components for each participant in Table 21 suggested an increased ability after the intervention, with an average rank of 0 compared to pre-intervention average ranks ranging from 1.00 to 6.00. According to Table 21, the observed difference between the two measurements was statistically significant. Post-questionnaire ranks were higher than pre-questionnaire ranks for the total score, item 17, and item 18 (Z = 3.127, Z = 2.236, and Z = 2.236, respectively, $p < .05$). This indicated that the WINVIS model significantly enhanced certain components related to reconciling in collaborative work in students.

Table 22:

Pretest and Posttest Scores of Students' Collaboration Questionnaire in Terms of the Component of "Accepting the Positive and Negative Effects of Collaborative Work"

Questions	Pretest		Posttest		Wilcoxon Signed Rank Test		Effect Size
	M	SD	M	SD	Z	P (2-tailed)	r
20. I can answer questions asked by others.	2.65	0.49	2.85	0.37	-2.000	.046*	-0.32
21. I understand my role and responsibilities in collaborative work.	3.80	0.41	3.90	0.31	-1.414	.157	-0.22
22. I can achieve mutual goals when working with others.	3.30	0.57	3.55	0.60	-2.236	.025*	-0.35
23. I make recommendations and can explain them to those with whom I work.	3.40	0.50	3.55	0.51	-1.732	.083	-0.27
24. I have learned the lessons assigned to me as instructed.	3.50	0.51	3.75	0.44	-2.236	.025*	-0.35
Total	3.33	0.25	3.52	0.15	-2.840	.005*	-0.45

*p < .05

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Table 22 compares students' scores for "Accepting the positive and negative effects of collaborative work" before and after implementing the WINVIS model. The post-implementation mean score was 3.52 (*SD = 0.15*). Question 21 had the highest mean score (*M = 3.90, SD = 0.31*), while question 20 had the lowest mean score (*M = 2.85, SD = 0.37*).

The assessment showed an increased ability after the intervention, with an average rank of 0 compared to pre-intervention average ranks ranging from 1.50 to 5.50. The observed difference was statistically significant, with post-questionnaire ranks higher than pre-questionnaire ranks for the total score, item 20, item 22, and item 24 ($Z = 2.840$, $Z = 2.000$, $Z = 2.236$, and $Z = 2.236$, respectively, $p < .05$). The WINVIS model significantly enhanced specific components related to accepting the positive and negative effects of collaborative work in students as shown in Table 22.

In addition to the quantitative findings, qualitative data from the student's 21st century skills portfolio, teacher's observation notes, and focus group interviews were analyzed. The data were categorized into three elements: 1) ability to work effectively and respectfully with diverse teams, 2) flexibility in working together, and 3) shared responsibility for collaborative work as follows:

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I. Ability to work effectively and respectfully with diverse teams

Regarding the "ability to work effectively and respectfully with diverse teams," students demonstrated increased acceptance of collaborating with peers from different groups. They acknowledged their responsibilities when working together and showed receptiveness to their classmates' opinions. Positive feelings towards teammates were observed during the collaboration process (student #6). However, challenges arose

during information searches, leading to delays and pressure on peers. With continued collaboration, students learned to address issues and adapt to teamwork *(student #17*).

Interviews with high, middle, and weak performance groups highlighted the benefits of collaboration, including improved interpersonal interactions, task delegation based on peers' skills, and enhanced listening skills. Collaborative activities also fostered a more enjoyable work environment *(student #H1*). Students from the weak performance group sometimes felt hindered and lacked confidence in leadership roles. However, they received encouragement from peers, boosting morale and improving group dynamics *(student #W2*).

II. Flexibility in working together

In terms of "flexibility in working together," students demonstrated the ability to complete tasks efficiently, dividing responsibilities effectively *(student #10*). The presence of a group leader was noted as valuable for task explanation *(student #2*). However, some students experienced impolite behavior or impatience from peers during problem-solving *(student #7*). Despite initial challenges, students learned to work effectively and control their emotions.

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Interviews with high, middle, and weak performance groups revealed that middle and weak groups found group work to yield better and timelier results compared to individual work. They appreciated peer support and saw it as an opportunity to handle diverse opinions and problem-solving *(student #M2*). High-achieving students recognized the practice of emotional control in collaboration but weaker students felt pressure, leading to disengagement *(student #H1*). Fostering a supportive and understanding environment was crucial for effective collaboration and growth in a group setting.

III. Shared responsibility for collaborative work

In terms of shared responsibility for common work, students recognized the benefits of group work in practicing communication skills and gaining confidence in their understanding of the content *(student #20*). However, some students expressed concerns about their ability to contribute effectively, leading to delays in group work *(student #3*).

Interviews with high, middle, and weak performance groups revealed that all groups acknowledged the importance of responsiveness and taking responsibility for tasks in group work. They also learned to provide constructive suggestions to their peers *(student #H2*). However, students in the weak-performance group reported lower confidence levels in offering advice or answering challenging questions due to concerns about their input quality *(student #H1*). This highlighted the need for a supportive environment that encouraged active participation from all students.

In this study, the teacher's observation notes were used to observe students' collaborating behavior. The observation would be conducted three times in Unit 1 "Health," Unit 2 "Animals," and Unit 3 "Business." The teacher's observation notes consisted of five lessons: Connecting, Outlining, Presenting, Applying, and Evaluating. The notes were used to observe students' cooperative behavior during the activities. The rate of the comments and the quality of the comments during the lessons were studied. This would help to improve the understanding of collaboration skills of students better.

a. Connecting stage

Qualitative analysis of the students' responses regarding their collaboration skills during the Connecting stage provided comprehensive

insights. Students were found to actively engage in group work, demonstrating the ability to allocate tasks, listen to diverse viewpoints, and appreciate each other's skills. Supportive work atmospheres and mutual encouragement were also noted. However, challenges included a lack of confidence in peers' skills, unclear task division, and instances of pressure and distrust among team members. In terms of flexibility in collaborating, groups effectively generated ideas and responded within given time frames. Open-mindedness and efficient time management were observed in some groups, but disruptive behavior, unsympathetic language usage, and lack of emotional control were identified as negative factors.

Regarding shared responsibility for joint work, students actively participated in group discussions, answered questions collectively, and understood their roles. Leadership skills and prompt task division were recognized. However, limited participation, difficulty providing coherent responses, and the inability to offer constructive advice were noted among some students.

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b. Outlining stage

Qualitative analysis of the students' responses regarding their collaboration skills during the Outlining stage provided comprehensive insights. Students demonstrated a clear division of tasks, improved listening skills, and created a positive working atmosphere through activities like singing. However, time constraints, inadequate task division, rushing behavior, and negative emotions were identified as challenges. In terms of flexibility in collaboration, some groups excelled in drawing graphic organizers and describing their work

within the agreed timeframe. Continued collaboration fostered better emotional connections and improved relationships within the group. However, the use of informal and impolite language, disruptive behavior, and informality in communication were noted as issues of concern.

Regarding shared responsibility for collaborative work, students learned to work cohesively, understood individual roles and responsibilities, and practiced reasoning. Effective task execution with a clear division of responsibilities was recognized. However, disagreements, time management issues, and difficulties in providing advice and feedback were encountered.

c. Presenting stage

Qualitative analysis of the students' responses regarding their collaboration skills during the Presenting stage provided concise and comprehensive insights. Students demonstrated respect for others' decisions and contributions, offering assistance in vocabulary searches and grammar checks. Positive collaboration and effective performance within group roles were observed. However, some groups faced challenges due to lack of writing experience, although they showed improved adaptability. Flexibility in working together was evident through timely task completion, active listening, and rational acceptance of opinions. Impolite behavior and pressure during group work were identified as issues. Shared responsibility was demonstrated through improved writing skills, answering questions, and providing suggestions. Challenges included difficulties in providing feedback and unclear task functions.

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d. Applying stage

Qualitative analysis of the students' responses regarding their collaboration skills during the Applying stage provided concise and comprehensive insights. Despite the independent nature of the stage, students still offered guidance and support to their peers, creating a positive working environment. Casual conversations and sharing of work fostered collaboration and mutual understanding. However, disruptive behavior and challenges in working independently and managing time were observed. Role reversal in group work was highlighted as beneficial. Students' progress in time management skills was also acknowledged.

The qualitative findings supplemented the quantitative data, providing a comprehensive understanding of students' collaboration skills during the Applying stage. The presence of mutual assistance, supportive communication, and sharing of work were identified, while challenges and the importance of role reversal and time management skills were emphasized. These insights contributed to areas for further improvement and intervention.

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e. Evaluating stage

The qualitative analysis shed light on students' collaboration skills during the Evaluating stage. It was observed that students needed to improve their feedback skills, particularly in providing constructive criticism and using appropriate language. The activity helped foster openness to others' opinions and boosted morale through compliments. However, the ability to provide feedback varied among individuals, indicating room for improvement. Many students demonstrated flexibility in evaluating their peers' work and handling

different opinions. They were able to provide comprehensive feedback accurately reflecting their friends' writing. However, some informal and rude language was still observed in the feedback, highlighting the need for more formal and respectful communication. In terms of shared responsibility, students effectively responded to questions and demonstrated an understanding of their roles as evaluators. They practiced collaboration with diverse individuals, even in the face of differing opinions. However, challenges arose in justifying evaluations to avoid conflicts and clarifying the distinction between evaluator and friend roles, which could impact relationship dynamics. The findings contributed to a comprehensive understanding of students' collaboration skills, emphasizing areas for improvement and strategies to cope with feedback and conflicts.

The qualitative analysis of students' collaboration skills during the Evaluating stage supported the quantitative data, highlighting their progress in working effectively and respectfully with diverse teams, flexibility in collaboration, and shared responsibility for collaborative work. However, areas for improvement included providing constructive feedback, using formal language, and navigating conflicts. These findings contributed to a comprehensive understanding of students' collaboration skills and informed future interventions.

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4.4 Effects of the WINVIS model on critical thinking skill

The third research question sought to investigate the effectiveness of the WINVIS model in promoting the critical thinking skill of EFL learners. To test the hypothesis that the critical thinking skill of EFL students improved after the

implementation of the WINVIS model, the results of the posttest were compared with those of the pretest using descriptive statistics, including minimum and maximum scores, mean, and standard deviation.

Table 23:

Descriptive Statistics of the Critical Thinking skill of the 21st Century Skill Test

	N	**Total score**	**Minimum**	**Maximum**	**Mean**	**S.D.**
Pretest	20	20	5.50	7.50	5.95	0.58
Posttest	20	20	12	14.5	13.10	0.60

The critical thinking skill scores of students obtained before and after implementing the WINVIS model were compared. As for the pretest, the mean score was 5.95 points (*SD = 0.58*), and the posttest mean score significantly improved to 13.10 points (*SD = 0.60*). Such findings supported the hypothesis that the WINVIS model effectively enhanced students' critical thinking skill, with a substantial improvement observed in their posttest scores.

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Table 24:

21st Century skill Scores of Overall Aspects of Critical Thinking skill

Aspects	Pretest		Posttest		Wilcoxon Signed Rank Test		Effect Size
	M	**SD**	**M**	**SD**	**Z**	**P (2-tailed)**	**r**
Overall	5.95	0.58	13.10	0.60	-3.941	.00*	-0.62
Reasoning	1.18	0.24	2.78	0.30	-3.999	.00*	-0.63
Analyzing	1.15	0.24	2.63	0.28	-3.981	.00*	-0.63
Evaluating	1.25	0.26	2.78	0.26	-4.008	.00*	-0.63
Synthesizing	1.18	0.24	2.55	0.32	-3.972	.00*	-0.63
Interpreting	1.20	0.25	2.38	0.28	-3.980	.00*	-0.63

*p < .05

According to Table 24, the Wilcoxon Signed Rank Test revealed a significant improvement in critical thinking skill after implementing the WINVIS model for 12 weeks (Z = -3.941, p < .05). The effect size (r) indicated a large effect size (-0.62), demonstrating substantial improvement. Each aspect of critical thinking skill, including reasoning, analyzing, evaluating, synthesizing, and evaluating, significantly improved post-implementation (Z = -3.999, Z = -3.981, Z = -4.008, Z = -3.972, and Z = -3.980, respectively, p < .05). The effect size (r) for each aspect ranged from -0.62 to -0.64, highlighting a large effect size. These findings provided comprehensive evidence that the WINVIS model significantly enhanced all components of critical thinking skill.

In addition to the quantitative findings, qualitative data from the student's 21st century skills portfolio, teacher's observation notes, and focus group interviews were analyzed. The data were categorized into five elements, including reasoning, analyzing, evaluating, synthesizing, and interpreting as follows:

I. Reasoning

The connection phase of the content creation process was found to enhance both inductive and deductive reasoning skills among students. Students practiced arguing and providing justifications for their choices during this phase *(student #10*). The presentation, applying, and evaluating phases further contributed to reasoning skill development, as students expressed opinions, provided evidence, and justified their assessments *(student #18*). However, some students faced challenges in providing reasons, particularly with unfamiliar images. Inductive reasoning was preferred by middle and weak performance groups for pattern identification, while high-performing students demonstrated proficiency in both inductive and deductive reasoning *(student #H1*). Weak students expressed difficulties and concerns regarding justification, highlighting the need for ongoing support and guidance in developing reasoning skills for all students, especially those facing difficulties in this area *(student #W1*).

II. **Analyzing**

The Connecting phase in the WINVIS model helped students develop their analysis skills by identifying the most important aspects of pictures and stories. Students used various techniques, such as examining different parts of the picture or analyzing key elements, to determine importance (student #18, student #20, student #4). The Application phase further strengthened analytical skills as students selected crucial information for graphic organizers and evaluated their peers' work *(student #12*). However, some students struggled with selecting the right information and distinguishing main points from supporting details. This could lead to confusion and a misinterpretation of the main ideas (*student #9*). Furthermore, focus group interviews revealed that high and medium groups were more proficient in identifying important

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elements and using tools like mind maps for better organization *(student #H2*). Weak students, on the other hand, faced challenges in identifying important aspects of pictures and selecting relevant information for writing tasks *(student #W1*).

II. Evaluating

In the WINVIS model, students develop the ability to evaluate the credibility of images and information throughout different phases. During the Connecting phase, they learned to judge the credibility of images, while in the Outline phase, they practiced selecting engaging images for their peers. In the Presentation phase, students evaluated the information they used to support their arguments *(student #20 & student #4*).

Throughout these phases, students understand the importance of reliable references and credible evidence. They recognize that choosing the right information is crucial for producing reliable work and supporting their opinions. However, some students struggled with selecting credible information or lacked experience in evaluating their peers' work, leading to less credible assignments *(student #11*). Focus group interviews revealed that high-performing students paid attention to the sources and references used by their peers, while students in the middle group prioritized checking for a written element. Weak students, on the other hand, struggled with evaluating their peers' work at a deeper level and lacked confidence in expressing their opinions fully (*student #W2*).

III. Synthesizing

In the Connecting phase, students developed synthesis skills by linking images to their own experiences and opinions. They also used synthesis to read from multiple sources and identified similarities and differences in the Outline phase. In the Application phase, students applied their learning to new contexts, while in the

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Assessment phase, they compared their work with their classmates' and provided feedback to improve synthesis skills *(students #10, student #12, student #16, student #4, and student #6*).

While many students exceled at connecting ideas and identifying similarities and differences, some struggled when they lacked experience or encountered an overwhelming amount of information. Weak students may have found it challenging to summarize data or connect ideas, even with the use of tables or visual aids (*student #19, student #17, student #H1, student #H2, student #W2, & student #W1*).

IV. Interpreting

During the learning process, students engaged in interpretive tasks to analyze and summarize images. In the connection phase, they deciphered emotions and hidden messages. In the outline and presentation phases, students collaboratively identified important topics and analyzed information before writing. In the application phase, they summarized data using graphic organizers to enhance their interpretive skills. During the assessment phase, students evaluated their peers' work based on various criteria, requiring interpretive abilities (*student #6, student #18, and student #10*).

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However, some students faced challenges in interpreting images due to limited understanding or difficulty in drawing conclusions. They relied on personal imagination or asked themselves questions to aid interpretation. In the focus group interviews, high-performing students demonstrated interpretive skills but struggled with drawing conclusions. Middle group students sometimes struggled with interpreting written content, while weak students had difficulty making inferences or reaching conclusions *(student #13, student #15, student #H1, student #H2, student #M2, student #W2, student #M1*).

In summary, the content creation process enhanced students' critical thinking skill, including reasoning, analysis, evaluation, synthesis, and interpretation. Challenges arose when dealing with unfamiliar visuals, deductive reasoning, providing justifications, identifying essential information, analyzing tasks, evaluating credibility, and drawing conclusions. High-performing students exceled in synthesizing and connecting ideas, while all groups struggled with excessive information. Moreover, weak performers faced difficulties across multiple areas. Supporting skill development, especially for weak performers, was crucial. The WINVIS model was effective in developing critical thinking skill, but challenges remained in certain areas such as reliable information, reasoning with images, and making inferences.

4.5 Effects of the WINVIS model on creative thinking skill

The fourth research question sought to investigate the effectiveness of the WINVIS model in promoting the creative thinking skill of EFL learners. To test the hypothesis that the critical thinking skill of EFL students improved after the implementation of the WINVIS model, the results of the posttest were compared with those of the pretest using descriptive statistics, including minimum and maximum scores, mean, and standard deviation.

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Table 25:

Descriptive Statistics of the Creative Thinking skill of the 21st Century Skill Test

	N	Total score	Minimum	Maximum	Mean	S.D.
Pretest	20	12	3	4.5	3.55	0.54
Posttest	20	12	6.5	8.5	7.60	0.62

Table 25 demonstrates the significant improvement in students' creative thinking skill after implementing the WINVIS model. The posttest scores showed a substantial increase, with the mean score of 7.60 points compared to the pretest mean score of 3.55 points. The standard deviation also increased from 0.54 to 0.62, indicating greater variability in the posttest scores. These results aligned with the research hypothesis that the WINVIS model enhanced creative thinking skill of students.

Table 26:

21st Century skill Scores of Overall Aspects of Creative Thinking Skill

Aspects	Pretest		Posttest		Wilcoxon Signed Rank Test		Effect Size
	M	SD	M	SD	Z	P (2-tailed)	r
Overall	3.55	0.54	7.60	0.62	-3.931	.00*	-0.62
Fluency	1.23	0.26	2.75	0.30	-3.992	.00*	-0.63
Flexibility	1.20	0.25	2.60	0.35	-3.968	.00*	-0.63
Originality	1.13	0.22	2.25	0.26	-3.985	.00*	-0.63

*p < .05

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Table 26 demonstrates a significant improvement in creative thinking skills after implementing the WINVIS model. The Wilcoxon Signed Rank Test indicated higher posttest ranks compared to pretest ranks, with a Z-score of -3.931 and $p < .05$. The effect size r of the median scores was -0.62, signifying a large effect size. Specifically, the model enhanced fluency, flexibility, and originality, with posttest ranks being statistically higher than pretest ranks ($Z = -3.992$, $Z = -3.968$, and $Z = -3.985$, respectively, $p < .05$). The effect size r for each aspect was -0.63, indicating a large effect size. These findings highlighted the significant enhancement of each component of creative thinking skill through the WINVIS model.

In addition to the quantitative findings, qualitative data from the student's 21st century skills portfolio, teacher's observation notes, and focus group interviews were analyzed. The data were categorized into three elements, including fluency, flexibility, and originality as follows:

I. Fluency

Fluency, as discussed by Batey (2012), Bialik and Fadel (2015), Guilford (1967), and Sternberg (2006), refers to the ability to generate a wide range of ideas or solutions to a given problem. Students can enhance their fluency by engaging in the connection phase, where they build upon their friends' ideas, and by asking questions that prompt reflection on past experiences. Visualizing ideas using graphic organizers can also expand their understanding of a topic. In this study, the outlining phase allowed students to explore the topic more extensively, leading to the generation of additional ideas. In the application phase, students were able to apply previously generated ideas to broaden the scope of their writing. During the assessment phase, students provided constructive criticism and positive feedback to their peers' work.

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Student testimonials highlighted the benefits of these strategies. Students reported being inspired by their friends' ideas *(student #12*), increasing their answer options through questioning *(student #10*), generating more ideas using mind maps *(student #4*), gaining depth in their work through ample research and presentation time *(student #16*), enjoying collaborative writing with classmates *(student #18*), applying ideas from previous lessons to improve their work *(student #20*), and developing rich vocabulary and grammatical structures through group work *(student #2*).

However, time constraints posed challenges for some students, hindering their ability to contribute ideas. They felt overwhelmed and struggled to generate ideas when

pressed for time *(student #5 & student #11*). Additionally, some students relied heavily on others' ideas, perceiving idea generation as a skill they lacked. This dependence discouraged them from expressing their own opinions in group settings *(student #19*).

High-performing students excelled in generating a diverse range of ideas, particularly when given ample time during the outlining phase to delve deeper into the topic. Middle group students often derived ideas from their peers' written and developed ideas. One high-performing student acknowledged the value of gathering information from websites before generating ideas *(student #H1*), while a student from the middle group mentioned relying on friends' ideas *(student #M2*). In contrast, weak-proficiency students struggled with time constraints, which impeded their ability to finish their work. Limited time management resulted in a paucity of generated ideas *(student #L1, student #L2*).

II. Flexibility

Flexibility in idea generation involved creating outlines and using graphic organizers to organize thoughts into different groups and categories. This step, as referenced by Batey (2012), Bialik and Fadel (2015), Guilford (1967), and Sternberg (2006), helps students classify and expand their ideas. The application phase required organizing knowledge into paragraphs, fostering flexibility in thesis statements, supporting details, and concluding sentences. In the assessment phase, students provided feedback on various aspects of writing, including content, structure, and grammar.

Students highlighted the benefits of these strategies. Students found concept maps helpful for organizing scattered ideas (*student #20*) and mind maps for visual clarity *(student #14*). The use of hamburger paragraphs aided systematic organization

of thoughts *(student #2*). Students also appreciated the consistency in evaluating peer work during feedback sessions *(student #10*). However, challenges arose in grouping ideas, particularly in the 'Connecting' phase. Some students struggled to identify similar ideas or assign them to appropriate categories *(student #17*).

In addition, the focus group interview revealed that all three student groups successfully used mind maps and concept maps to organize similar ideas. Hamburger paragraphs and flowcharts were particularly helpful for grouping ideas. High-performing students expressed motivation to write when ideas were arranged neatly in mind maps *(student #H1*), while weak-performing students relied on flowcharts to organize their thoughts before writing *(student #W2*). Nevertheless, some students found flowcharts challenging, especially when linking similar ideas in specific topics, as mentioned by a student from the weak group *(student #W1*).

III. Originality

Originality is crucial in idea generation. The "Connecting" and "Outlining" steps exposed students to their peers' ideas, allowing them to approach their own ideas from unique perspectives. Conducting research before writing also contributed to the creation of new knowledge. In the assessment phase, students' roles as evaluators provided them with a fresh perspective to develop distinct writing skills.

Students emphasized the value of these strategies. They reshaped their friends' ideas into something new *(student #16*), generated novel ideas by recognizing limitations in the original ideas *(student #12*), and developed a different writing style through the feedback process *(student #6*). However, some students tended to rely on repetitive ideas across multiple texts, reducing the originality of their work. They

struggled to connect new ideas with questions, hindering their ability to generate fresh perspectives *(student #9 & student #15*).

The focus group interview revealed that all student groups faced challenges in generating ideas significantly different from their peers. Limited discussion points for certain topics contributed to this issue. However, high-performing students incorporated their unique writing style to distinguish themselves even when ideas were similar *(student #H1*). Middle group students used examples to infuse uniqueness into their writing *(student #M2*). However, weak students found it difficult to generate distinctive ideas. They lacked the ability to synthesize knowledge and invent original ideas *(student #W2*). Some struggled to write differently from their peers, while others struggled to combine various pieces of information into their own ideas *(student #W2*).

In conclusion, fluency, flexibility, and originality played vital roles in student assignments and idea generation. Collaboration and the use of graphic organizers enhanced fluency and flexibility, but time constraints and reliance on others' ideas could be obstacles. High-performing students demonstrated diverse idea generation, while weak performers struggled due to time limitations. Tools like mind maps aided in flexibility by organizing thoughts, yet identifying similar ideas for grouping could be challenging, especially for weaker students. Originality was fostered through peer contributions and extensive research. However, repetitive ideas and a rigid mindset could hinder originality. Providing sufficient time, fostering collaboration, and offering support were crucial for students to overcome challenges related to time management, idea organization, and promoting original thinking.

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The comments from the question "What did you notice from students" in the Connecting stage would be analyzed in three elements, including fluency, flexibility, and originality, are discussed.

a. Connecting stage

During group work sessions, students demonstrated improved fluency in presenting their ideas and expanding upon them through visual aids and questioning. However, there was a dispersion of ideas in terms of flexibility, with some concepts detached from the group framework. In terms of originality, a few students amalgamated ideas from peers and presented them as their own.

The students' idea generation capacity grew over time, with questioning and visual aids facilitating the development of ideas for those initially lacking. However, time constraints limited some students to only producing a few ideas, while others resorted to copying their classmates' concepts. Delayed presentation of information by certain students during group work impacted the timely completion of tasks by peers. These challenges in idea generation, development, and presentation within a collaborative setting highlighted the complexities of fostering creativity and original thinking among students.

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b. Outlining stage

During this phase, students utilized graphic tools like mind maps, concept maps, and hyperbolic trees to enhance brainstorming skills. These visual aids provided tangible representations of thoughts and facilitated flexible organization of ideas into coherent categories. Mind Maps allowed effective clustering of ideas, while seeking additional information stimulated originality. Individualized graphic organizers promoted uniqueness in student work.

However, some student groups faced challenges in effectively grouping ideas and lacked coherence in presentations. Some relied on well-known ideas without introducing new insights. Misinterpretation of similar ideas required revisions for accuracy. Works needed more comprehensive details to establish connections between ideas.

The use of graphic tools supported creativity and original thinking. However, challenges persisted in organizing ideas, ensuring comprehensive coverage and avoiding overreliance on common concepts. These observations highlighted the complexities of fostering idea generation and organization within a collaborative educational setting

c. Presenting stage

In this stage, students applied their outlined ideas to their written texts. They demonstrated the use of diverse sentence structures, including simple, compound, and complex sentences, as well as a wider vocabulary range. Improved organization skills were evident as students presented information in a clear and structured manner. Originality was showcased through different perspectives explored by each group, focusing on either the merits or drawbacks of the subject matter.

Students employed varied sentence structures and vocabulary in their compositions, reflecting growth in their writing abilities. They also demonstrated an understanding of effective paragraph organization. Each paper exhibited a unique style, with some groups emphasizing supporting arguments and others prioritizing opposing viewpoints. However, time constraints posed challenges for some groups to complete their texts within the given timeframe and align their

narratives with the concepts in their graphic organizers. Some planned ideas may not have been fully incorporated into the writing.

Time limitations and the need for alignment between graphic organizers and written texts continued to be ongoing challenges for students in this phase. Nevertheless, students showed improvement in sentence construction, vocabulary usage, organization skills, and exploring diverse perspectives.

d. Applying stage

In terms of fluency, students benefited from constructing their own graphic organizers, leading to a greater number of ideas. Some students exceeded word limits, allowing for more in-depth exploration. They also employed a wider range of grammatical structures. In terms of flexibility, students demonstrated effective organization of ideas within paragraphs, enhancing readability. Flowcharts and diagrams aided in visually coherent data representation. Writing individual papers fostered increased originality and distinct writing styles.

However, some assignments remained unfinished, and the originality from the presentation phase may not have been adequately reflected in written papers, obscuring students' uniqueness. In some cases, ideas presented during the presentation phase were not effectively grouped, resulting in mixed content. Some assignments fell below the word limit, potentially limiting topic exploration. Some papers relied heavily on sentences from group work, hindering students' ability to showcase their own writing styles. In certain instances, ideas that should have been grouped together were presented as separate paragraphs, affecting coherence. While students demonstrated improved fluency, flexibility, and originality, challenges persisted in completing assignments as specified and accurately reflecting

individuality. Emphasizing effective grouping of ideas and proper paragraph structure would enhance overall cohesiveness.

e. Evaluating stage

The evaluation process in this stage encouraged student creativity by generating numerous ideas for feedback. Students provided feedback on various aspects, including content, organization, grammar, and vocabulary. Feedback commonly focused on expanding examples, enhancing coherence, and offering content suggestions. Each student developed an individualized evaluation style, showcasing their unique language usage, thought processes, and feedback delivery.

Engaging in the evaluation process enhanced idea generation among students, as they commented on their friends' work. Comprehensive feedback evaluation encompassed content, coherence, grammar, and vocabulary. However, some individuals struggled to provide an adequate number of comments and failed to expand on ideas in their feedback. Incoherent grouping of ideas within comments hindered feedback comprehensibility. Some students provided minimal comments without explaining their reasoning, while others faced challenges in effectively grouping ideas, impacting clarity and understanding.

While the evaluation process fostered student creativity, challenges persisted in providing comprehensive and coherent feedback. Encouraging students to substantiate their comments and improve idea grouping would enhance the effectiveness of the evaluation stage.

4.6 Students' opinions on the WINVIS model

To explore students' opinions on the WINVIS model, results from the WINVIS opinion questionnaire and the focus group interview were utilized. The following

section presents the results of the questionnaire in terms of 1) learning and writing development, 2) teaching method, materials, and instructor, and 3) learning satisfaction and overall opinion.

I. Learning and Writing Development

Table 27:

Learning and Writing Development

Questionnaire Items	M	SD	Interpretation
1. I understand paragraph writing after taking this course.	3.45	0.51	very high
2. I can explain the components of paragraph writing.	3.30	0.47	very high
3. I understand opinion paragraph writing.	3.50	0.51	very high
4. I can write an opinion paragraph.	3.20	0.41	high
Mean score	3.36	0.48	very high

Note: 1.00 – 1.75 = very low, 1.75 – 2.50 = low, 2.51 – 3.25 = high, 3.26 – 4.00 = very high.

Table 27 presents the results of the questionnaire in relation to 1) learning and writing development, 2) teaching method, materials, and instructor, and 3) learning satisfaction and overall opinion. The data indicated that students held a positive attitude towards learning and developing writing skills (*M = 3.36, SD = 0.48*). Items with mean scores exceeding 3.26 (items 1, 2, and 3) demonstrated strong agreement among students regarding their understanding of paragraph writing, components of paragraph writing, and opinion paragraph writing.

II. Instructional Method, Materials and Instructor

Table 28:

Instructional Method, Materials and Instructor

Questionnaire Items	M	SD	Interpretation
5. The instructional method is suitable for learning in this course.	3.55	0.51	very high
6. The instructional method has helped me learn in this course.	3.55	0.51	very high
7. The handouts are suitable for learning in this course.	3.15	0.37	high
8. The learning materials are suitable for learning in this course.	3.25	0.44	high
9. The instructor understands paragraph writing.	3.70	0.47	very high
10. The instructor can explain lessons clearly and systematically.	3.75	0.44	very high
11. The instructor allows me to practice.	3.25	0.44	very high
12. The instructor provides useful suggestions.	3.20	0.41	high
Mean score	3.43	0.50	very high

Note: 1.00 – 1.75 = very low, 1.75 – 2.50 = low, 2.51 – 3.25 = high, 3.26 – 4.00 = very high.

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Items 5 to 12 focused on students' opinions on the instructional method, materials, and instructor. The findings are presented in Table 28. The data revealed that students held a positive opinion of the teaching method, materials, and instructor (*M = 3.43, SD = 0.50*). Students strongly agreed that the teaching method employed in the course was appropriate and helpful for learning. They also agreed that the materials, including the handouts and learning materials, were useful. Students also expressed strong agreement regarding the instructor's understanding of paragraph writing, clear

and systematic explanations, and the opportunity for practice. Finally, they agreed that the instructor provided useful suggestions.

III. Learning Satisfaction and Overall Opinions

Table 29:

Learning Satisfaction and Overall Opinions

Questionnaire Items	M	SD	Interpretation
13. I am satisfied with my learning in this course.	3.70	0.47	very high
14. I am satisfied with the instructional method.	3.45	0.51	very high
15. I am satisfied the instructor's teaching.	3.55	0.51	very high
16. I am satisfied the classroom atmosphere.	3.20	0.41	high
17. I am satisfied with the learning and teaching materials.	3.60	0.50	very high
18. I am confident in my paragraph writing.	3.20	0.41	high
19. I have developed my paragraph writing.	3.60	0.50	very high
20. This course will be useful to me in the future.	3.85	0.37	very high
Mean score	3.52	0.50	very high

Note: 1.00 – 1.75 = very low, 1.75 – 2.50 = low, 2.51 – 3.25 = high, 3.26 – 4.00 = very high.

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Table 29 indicates that students generally held positive views about their learning satisfaction and overall experience, with the mean of 3.52 and standard deviation of 0.50. The items that garnered mean scores exceeding 3.26 (items 13,14, 15,17, 19, and 20) demonstrated that students were highly satisfied with learning in this course (item 13*: M = 3.70, SD = 0.47*), the teaching methodology employed (Item 14: *M = 3.45, SD = 0.51*), the instruction provided by the teacher (Item 15: *M = 3.55, SD = 0.51*), and the learning and teaching materials utilized (Item 17: *M = 3.60, SD = 0.50*).

Furthermore, students were satisfied with the classroom atmosphere within this course (Item 16: *M = 3.20, SD = 0.41*). Additionally, the majority of the students concurred with the assertion that this course would prove useful for them in the future (Item 20: *M = 3.85, SD = 0.37*), and they exhibited reasonable confidence in writing paragraphs (Item 18: *M = 3.20, SD = 0.41*).

In summary, students' responses to the WINVIS opinion questionnaire unveiled their perspectives regarding various facets of the WINVIS model. Generally speaking, most students expressed positive views about the WINVIS course, including aspects such as writing development, teaching methodology, materials, instructor, and overall opinion.

IV. Qualitative Analysis from open-ended questions and interviews

Further analysis of open-ended questions and interviews yielded insight into the students' views on two critical components of the WINVIS model: inquiry-based learning and visual literacy, detailed as follows:

Inquiry-based learning

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The findings underscored the significance of inquiry-based learning in the course under consideration, as evidenced by students' engagement with a wide spectrum of topics, their collaboration with peers, and their continuous refinement of understanding. They expressed a desire for practical application of their knowledge, reflective thought before responding, and exploration of diverse learning techniques, such as the use of graphic organizers. Furthermore, the students also highlighted the importance of materials and instruction tailored to their proficiency levels, facilitating comprehension and fostering an active learning environment.

Responses also underscored the importance of an instructional method that promoted constant participation and incorporated a diverse range of writing activities, leading to an active and engaging learning environment. Students also expressed a desire for sequential, self-paced learning opportunities, indicating their preference for an instructional approach that promoted individual exploration and comprehension.

Feedback indicated the students' desire for practical engagement with topics of personal interest and current events. This supported the development of critical thinking and reflective skills, important facets of inquiry-based learning. Feedback also suggested that students valued inquiry-based learning for fostering not just writing skills but other competencies such as critical thinking, creativity, and collaboration.

The students in the present study appreciated the variety of activities and opportunities for camaraderie, but also noted the need for adjustments in time allocation and task distribution, in order to further adhere to optimize the principles of inquiry-based learning. The desire for deeper engagement, additional challenges, and an introductory course on basic writing were other suggestions that aligned with an inquiry-based learning approach.

In conclusion, the students' feedback consistently reflected their recognition of the benefits of an inquiry-based learning approach in the course. They valued the variety of topics, practical application of knowledge, collaborative learning, tailored materials, and diverse teaching methods. At the same time, they suggested improvements for deeper engagement, additional

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challenges, and more foundational lessons, indicating their eagerness for a more intensive inquiry-based learning experience.

Visual literacy

The analysis emphasized the importance of visual literacy in the course under study, as highlighted by key phrases like "the utility of graphic organizers," "the use of visuals as a tool for thought," and "the use of non-textbook resources for learning." Students appreciated the visual tools used, emphasizing their role in structuring thoughts and enhancing the learning process. Comments such as "*The use of graphic organizers which I learned in this class is applicable in my everyday life*" further exemplified their value and utility in the learning process.

Furthermore, phrases like "use of diverse visual aids," "photographs, texts, illustrations, and infographics," and "various images" reflect the importance of visuals in learning materials. The students' responses suggested that these visual aids facilitated faster comprehension and inspired creative thinking. Furthermore, the students' desire to learn more about graphic organizers reflected their recognition of the value of visual aids in learning, reinforcing the significance of visual literacy.

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The analysis also revealed that students acknowledged the role of visual aids in simplifying their understanding and in the context of writing, as evident in phrases like "incorporation of visual aids" and "utilizing images as a learning tool in writing." However, some excerpts did not explicitly mention visual literacy or were not directly associated with visual aids. In these cases, while visuals could potentially aid language comprehension and instruction on

paragraph construction, the direct relevance of visual literacy was not explicitly indicated.

Key terms like “frequent use of visual aids,” “increased interest in learning,” and “inclusion of images,” signified the relevance of visual literacy in fostering an engaging learning environment. On the other hand, while the term “instructional materials” might imply a role for visual literacy, without further context, the connection remained speculative.

Finally, phrases like “proficiency with images,” “design my flowchart,” and “adding a variety of images” suggested students’ recognition of visual literacy’s value. They showed that students understood the importance of interpreting visual information and its value in educational settings. This feedback solidified the crucial role that visual literacy played in the students’ learning process.

Therefore, it could be concluded that with implementation of the WINVIS model, the students’ feedback reaffirmed the significant role of both inquiry-based learning and visual literacy in the educational process. Inquiry-based learning, characterized by active participation, collaboration, and the application of knowledge in practical contexts, was deemed valuable by students, enhancing their cognitive and academic capabilities, fostering a deeper understanding of course contents, and enabling diverse forms of instruction. Visual literacy also played a key role in the learning process, with visual aids such as graphic organizers, contemporary images, and other visual materials being recognized as vital tools that facilitated comprehension, inspired creativity, and eased understanding, particularly in the context of writing.

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However, the relevance of visual aids was not explicitly mentioned in all feedback, leaving room for interpretation. Overall, the importance of these pedagogical strategies in fostering an engaging, diverse, and enriching educational experience was highlighted, underpinning the necessity for their incorporation in language learning environments.

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CHAPTER 5
SUMMARY, DISCUSSION, AND RECOMMENDATIONS

This concluding chapter is divided into six parts, namely 1) summary of the study, 2) summary of the findings, 3) discussion of the research findings, 4) implications of the findings, 5) limitations of the study, and 6) recommendations for further research.

5.1 Summary of the study

This study aimed to examine the effects of the writing instructional model with integration of inquiry-based learning and visual literacy (henceforth WINVIS) on the 21st century skills of EFL students and to investigate students' opinions towards this model. The study adopted a mixed-methods approach, with a one-group pre-test and post-test design, to examine the development of the students' 21st century skills, namely written communication, collaboration, critical thinking skill, and creative thinking skill, before and after to the implementation of the WINVIS model. Students' viewpoints about this pedagogical model were also examined. The study participants were 20 high school students in Matthayomsuksa 5 (Grade 11) at a private school in Chaiyaphum province in the northeastern region of Thailand. The implementation of the WINVIS lasted 12 weeks during the second semester of the 2021 academic year.

The WINVIS model was implemented in two main phases: the initial phase involved the development of the model, entailing the study of related theories and research, constructing lesson plans, developing and validating study instruments, and conducting a pilot study. The subsequent phase was the implementation of the model or the main study.

5.2 Summary of the findings

The study findings revealed that the WINVIS model positively affected the development of the students' 21st century skills, namely written communication, collaboration, critical thinking skill, and creative thinking skill. In addition, the model created an engaging learning environment that fostered comprehension, creativity, and collaboration while enabling constructive feedback on part of the teacher and reflective learning on part of the students.

Following the implementation of the WINVIS instructional model, statistical tests have shown significant improvements in various skills. Written communication skills, for instance, considerably improved in terms of content and organization post-implementation. Analysis of the teacher's observation notes and student's 21st century skill portfolios indicated that students showed improvement in all writing elements, though some students continued to face challenges with vocabulary and grammatical structures.

Similarly, students' collaboration skills significantly increased, particularly students' ability to work effectively and respectfully with diverse teams. The analysis reflected positive progress across all aspects of collaborative work, although some students faced ongoing issues with flexibility in collaboration.

Critical thinking skills also saw an improvement after the WINVIS model was implemented, with reasoning and evaluating showing the most improvement. The five-stage process of the model resulted in progress across all elements of critical thinking skills; however, some students still encountered difficulties when it came to interpretation.

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In the domain of creative thinking, a notable increase was found in the fluency of the students, with less improvement seen in originality. Despite these disparities, an overall progression in all elements of creative thinking skill, including fluency, flexibility, and originality, could be observed after the implementation of the five-stage process of the WINVIS model.

Finally, regarding students' opinions towards the WINVIS model, the data showed positive opinions across all domains: learning and writing development, instructional method, materials and the instructor, and learning satisfaction. They identified the advantages of the WINVIS model and expressed a generally positive view towards its use. In conclusion, the WINVIS model showed potential for developing key 21st century skills, including written communication, collaboration, critical thinking, and creative thinking skills of EFL learners.

5.3 Discussion of the research findings

This section presents the discussion of major research findings in accordance with research objectives. There are two main aspects, namely 1) the effects of WINVIS model on improvement of the 21st century skills, including written communication, collaboration, critical thinking, and creative thinking skills, and 2) students' opinion towards the WINVIS model.

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5.3.1 The effects of WINVIS model on improvement of written communication skills

The study findings showed that WINVIS model could enhance students' written communication, including content, organization, grammatical structures, and vocabulary. This could be explained that the combination of these two approaches contributed to these improvements. As for inquiry-based learning, it stimulated students

to ask and answer questions to develop ideas for writing. With clear ideas of what to write about, students were enabled to write better pieces of writing, as confirmed by previous studies (AbuRezeq, 2018; Imansyah et al., 2019; Milatasari, 2013; Navidinia et al., 2018; Palupi et al., 2020; Sulastri, 2019; Tongjean et al., 2019; Villasor, 2018; Yeom, 2018). Moreover, when visual literacy was used, particularly in the Connecting stage, students were encouraged to analyze images and express their thoughts about the visual content. This process significantly contributed to enhancing their content-related skills that helped them write better. Similarly, numerous research studies have demonstrated the positive impact of employing graphic organizers on students' writing skills. These benefits include increased word count and reduced grammatical errors (Navidinia et al., 2018), improved idea generation (Rokhaniyah, 2019; Wei et al., 2014), and enhanced essay coherence (Wei et al., 2014). Additionally, the utilization of visual aids such as pictures, videos, and paintings has been found to contribute to improved writing skills (Navidinia et al., 2018; Sulastri, 2019; Villasor, 2018; Yeom, 2018). Furthermore, incorporating audiovisual media (Maricimoi, 2017) and mind mapping techniques (Yunus & Chien, 2016) have also been shown to positively impact students' writing capabilities. Moreover, engaging in collaborative activities allowed students to learn how to exchange ideas and gain insights into the ideas of others, which they could subsequently adapt and apply in their own writing.

Visual literacy can also significantly contribute to the development of written communication skills, especially when it comes to the organization of ideas. In this study, during the outlining stage, students utilized graphic organizers which allowed them to visualize the overall concepts and arrange their thoughts more coherently. This helped them present their ideas more clearly, which certainly led to a better quality of

their writing. Moreover, in the Applying stage, students could practice organizing their thoughts through graphic organizers while they were learning to design how to structure their work, thus improving their organizational skills, which significantly influenced the quality of their writing. These findings were in line with earlier studies (Milatasari, 2013; Rokhaniyah, 2019; Tongjean et al., 2019; Wei et al., 2014), which have similarly reported that graphic organizers enhance writing skills by facilitating idea generation, supporting arguments, and organizing essay content.

5.3.2 The effects of WINVIS model on improvement of collaboration skills

The interplay between inquiry-based learning and visual literacy holds potential for fostering critical collaboration. The integration of these educational approaches, based on our findings, seemed to have had a promising impact on students' collaboration skills, including effective teamwork with diverse groups, flexibility in collaboration, and shared responsibility. These skills aligned with the criteria outlined by The Partnership for 21st Century Learning (2015). One plausible explanation is that when inquiry-based learning was implemented, students were required to collaborate with group members to complete various activities. In so doing, they had a chance to learn how to be a group member who were working to achieve a common goal. In other words, they had to learn and develop better ways of working with others. Falk and Margolin (2005) have pointed out that students' collaboration skills could be improved through inquiry-based methods that involve questioning, problem-solving, and teamworking. For example, in the WINVIS model, during the Connecting stage, students were required to answer questions as a group about what they saw, so it was possible that their sense of mutual support and assistance among them was promoted. Similarly, during the Presenting stage, students needed to engage in conversations and

exchange ideas with each other to effectively complete their writing tasks. This helped them develop the ability to collaborate with others. As a result, they were enabled to achieve higher levels of performance, build friendships, and experience lifelong interactions from collaboration with the opportunity to collaborate with others (Felicia, 2019; Hernández, 2012), which was abundant in a classroom where the WINVIS model was implemented. A previous study conducted by Doungklang and Boonprasitt (2018) on inquiry-based teaching highlighted the importance of group work, emphasizing the mutual support and exchange of opinions it fostered. Moreover, the acceptance of group members from other groups was greatly improved, which may be because students learned to be more accepting of others' abilities when working together. Furthermore, when working in groups, respect for each other's ideas was strongly encouraged, especially during the connection and presentation phases, where everyone had to share their work and help each other write the essay. All of these reasons helped explain why the WINVIS model could positively affect development of students' collaboration skill.

In terms of visual literacy, students in the study reported a high level of understanding regarding their roles and responsibilities within the group, which may be attributed to the activities designed to enhance their collaborative skills when visual literacy was used. For instance, the Connection phase engaged students in answering questions through visual aids, while the Outline and Presentation phases encouraged teamwork and coordination among group members. The study's findings aligned with Bernadowski et al. (2013), who emphasized the significance of visual literacy tools, such as graphic organizers, in facilitating active learning. Doungklang and Boonprasitt (2018) similarly found that students preferred group work due to the opportunities for mutual support and opinion sharing. The Evaluation phase in this study also highlighted

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the development of students' evaluative skills. Chen and Liu (2019) discovered that collaborative digital graphic writing using semantic mapping could enhance student learning by promoting the exchange of comments and suggestions among peers.

5.3.3 The effects of WINVIS model on improvement of critical thinking skills

Inquiry-based learning and visual literacy have been linked to improvements in critical thinking skill, notably reasoning, analyzing, evaluating, synthesizing, and interpreting (Fisher, 2001; The Partnership for 21st Century Learning, 2015). Various research studies in the past (Alkilany, 2017; Miranti & Wilujeng, 2017; Wen-Cheng et al., 2010; Zubaidah et al., 2017) have attempted to explain their importance and potential of the use of inquiry-based learning and visual literacy on development of critical thinking skill.

To begin with, inquiry-based learning actively engaged learners in the process of knowledge construction. When questions were used, students were enabled to analyze, reason, evaluate, and synthesize information. They were also encouraged to consider the credibility of their own arguments, which is important for fostering critical thinking (Doungklang & Boonprasitt, 2018; Duran & Dokme, 2016; Ghaemi & Ghazi, 2017; Srepongpijid et al., 2018). To explain further, this method of learning developed students' reasoning and evaluation as they were trying to logically dissect their topics, scrutinize information, and provide justifications for their assessments. For example, in the connecting stage in the present study, students needed to provide reasons to support their judgement, which also promoted the development of reasoning skills. Furthermore, when they collaborated with their classmates on group assignments in the presenting stage, students needed to select the information to use in their writing,

requiring them to understand how to analyze and evaluate what they needed to use to convince others. In addition, in the explaining stage, when students presented their work, they needed to undergo analytical thinking with group members before presenting the group consensus. For this reason, the findings of this study yielded support to the finding of Srepongpijid et al. (2018) that inquiry-based learning can bolster critical thinking.

Visual literacy complemented this process of critical thinking skill development by encouraging learners to logically evaluate their thought processes and values (Cañas et al., 2017; Chunborvon, 2019; Supitch & Wijakkanaluk, 2015; Tseng, 2020). It enhance students' critical thinking ability by prompting them to deconstruct arguments or identify crucial elements within images. Since the tasks in the WINVIS model involved the evaluation of credibility, evidence, arguments, or claims generated from visual aids used, it could be said that visual literacy could foster critical thinking. This was consistent with the findings of Tseng (2020) and Cañas et al. (2017) that concept mapping activities can enhance critical thinking skills, including analysis, evaluation, and explanation. Moreover, Chunborvon (2019) has explained that integration of graphic organizer techniques, for instance, resulted in an enhancement in thinking abilities. Similarly, according to Tseng (2020), application of concept mapping activities led to a considerable increase in critical thinking skills among high school students, particularly in areas such as inference, interpretation, analysis, evaluation, and explanation. Therefore, despite potential challenges in fully developing some skills, the implementation of specific strategies of visual literacy could be beneficial for students' critical thinking skill development.

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5.3.4 The effects of WINVIS model on improvement of creative thinking skills

The integration of inquiry-based learning and visual literacy was found to have a positive effect on improving students' creative thinking skill, especially in terms of fluency, flexibility, and originality in the present study. Such findings offered support to a number of previous studies (Alkilany, 2017; Batey, 2012; Bialik & Fadel, 2015; Guidford, 1967; Miranti & Wilujeng, 2017; Sternberg, 2006; Wen-Cheng et al., 2010; Zubaidah et al., 2017).

Such a finding could be explained that inquiry-based learning encouraged students to use their creativity to generate a multitude of ideas for subsequent use in writing. For instance, during the connecting phase, students were stimulated with questions to think deeply about what to write, prompting them to come up with diverse ideas. Moreover, when students were in the stage of seeking various information in the outlining stage for their writing, the development of their thoughts was further promoted. This was a crucial characteristic of inquiry-based learning, which helped stimulate students' creative thinking development through various activities. This has been backed by previous research. For example, Nurlaela et al. (2018) have reported improvement in creative thinking of students after an inquiry-based learning approach was employed.

As regards visual literacy, visual aids like mind maps and concept maps appeared to stimulate creativity among students. Put another way, when visual aids were used, students worked with them to generate new ideas or further expand existing ideas (Alkilany, 2017; Miranti & Wilujeng, 2017; Wen-Cheng et al., 2010; Zubaidah et al., 2017). Specifically, Miranti and Wilujeng (2017) found that mind mapping, which

was a visual literacy technique, significantly enhanced students' creative thinking. In this study, for example, during the outlining stage, students were asked to use graphic organizers to enhance their own ideas by grouping them together. This allowed them to see the overall dimensions of their thoughts and identify what they had in mind. In the applying stage, when students were asked to draw graphic organizers once again, they had to learn to further organize their ideas, and this enabled them to generate related thoughts and manage information more comprehensively and effectively. As a result, their creatively could be fostered. Zubaidah et al. (2017) have confirmed that mind maps promoted creative thinking by facilitating effective and systematic information management.

5.3.5 Students' opinion towards WINVIS model

The present study found that students positively responded to the WINVIS model. A majority of students reported a better understanding of paragraph writing following exposure to the model. This could be explained that the way the WINVIS model was designed with integration of inquiry-based learning and visual literacy, and with incorporation of both individual and group learning, contributed to the improvement of students' writing skills. For example, the outlining phase of the learning model played a significant role in enhancing students' brainstorming abilities, a view consistent with Guilford's (1950) emphasis on idea generation. Meanwhile, the application phase might have deepened students' understanding of the various components of writing, including the use of creative thinking to generate pieces of writing, an assertion aligning with the work of Guilford (1967) and Sternberg (2003). The study also supported previous research by Mutammimah et al. (2019), suggesting

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the integration of inquiry-based learning into English instruction could indeed be beneficial for students' development of writing ability.

Regarding instructional methods, materials, and the teacher's role, a significant number of students agreed that the instructor's proficiency in delivering clear and systematic content was significant. One of the possible explanations could be that the teacher's comprehensive language skills greatly contributed to the effectiveness of the classes he taught. This aligns with Tsang's (2017) research which suggested that one of the crucial factors that resulted in the success of language teachers was their general linguistic competence.

Furthermore, feedback played a crucial role in the WINVIS model, enhancing students' motivation and performance by identifying areas for improvement. Many high-performing students mentioned that when they got to review their peers' work and provided feedback, it made them more interested in the course. Simply put, feedback helped make the students felt that they learned more from the class. Furthermore, when students felt that they had an active role in learning, they may have been ready to learn more and learned better. This corresponds with Gan's (2020) research which emphasizes the connection between students' preference for process-oriented feedback and their active role in the classroom and learning process. Therefore, it could be stated that feedback was another factor that resulted in students' positive opinion toward the WINVIS model implemented in this study.

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5.4 Implications of the findings

For teachers and educators seeking to enhance students' 21st century skills through the WINVIS model, several pedagogical implications should be taken into consideration.

1. Careful attention must be paid to the selection of the teaching topic. To ensure that the lessons can captivate students and make them focus on studying, topics must be carefully selected. To ensure that the topics can attract students' interest, a simple needs analysis may be conducted when teachers ask students to choose what topics they want to work on. This can significantly increase the success of the implementation of the WINVIS model. Furthermore, even though a topic might seem interesting, it may be beyond the reach of students current knowledge. For instance, in the present study, a business-related topic selected by the researcher tuned out to be beyond students' comprehension. This was because some students lacked the necessary background knowledge in this field, making it difficult for them to follow. Therefore, in addition to students' interest, teachers should be careful when selecting the topics to make sure that they are suitable for students' levels of proficiency and background knowledge as well to ensure effectiveness of the WINVIS model.

2. In this study, it was discovered that some activities did not work out as planned due to time constraints. Therefore, it is important to allocate adequate time for each phase of the WINVIS model. Some steps, like the outlining stage, required considerable time as students needed to gather information beforehand. For this reason, if the teachers do not plan properly and rush students to complete the task within the class hour, students' performance in the subsequent presenting stage can be affected.

3. Attention must be given to the students' feedback during the evaluating stage. In order for feedback to be effectively given, students need prior training so that they know how to provide feedback when they are required to review their peers' work. As a result, teachers who plan to utilize the WINVIS model in their classrooms may have to consider if the students need preliminary instruction and training on how to give

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feedback before giving the students assignments to ensure successful implementation of the model.

5.5 Limitations of the Study

The present study had limitations that should be acknowledged. Firstly, the implementation of the WINVIS model lasted only 12 weeks in a semester. This was because there were some components of the course that students had to study as required by the school curriculum. For this reason, some stages of the WINVIS model might not have been fully implemented due to time constraints. This may have affected the findings of the study regarding the effectiveness of the model on students' development of the 21st century skills.

Besides, the present study was conducted with an intact group of only 20 students. The students' levels of proficiency varied, but the WINVIS model's instructional materials and activities were designed for the majority of the students whose level of proficiency was at the intermediate level. Therefore, the study findings might not reflect the actual effectiveness of the WINVIS model on development of students' 21st century skills as it might not have been suitable for all of the students who participated in the study, particularly those with a lower level of proficiency who may have had to struggle with the tasks included in the model.

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5.6 Recommendations for Future Research

Based on the study findings, the following recommendations could be made:

1. Given the crucial role of visual literacy in enhancing students' 21st century skills, namely written communication, collaboration, critical thinking, and creative thinking skills, it is recommended that future research should be conducted to explore

other graphic organizers that can be integrated into the model to determine which organizers are more effective for improving students' 21st century skills.

2. Further research should investigate whether the inquiry-based learning and visual literacy model can enhance the 21st century skills of EFL students with varying levels of English proficiency. This study found that high-proficiency students benefited from using graphic organizers and receiving grammatical feedback, while middle and low-proficiency students may require alternative organizers and linguistic support, for instance.

3. It was discovered in this study that feedback played an important role when the WINVIS model was implemented to promote students' 21 century skills. Therefore, research should be undertaken to further investigate the types of feedback that most effectively enhance learning outcomes in this context.

4. Longitudinal research should be carried out to look into the long-term effects of the WINVIS model on students' 21st century skill development so as to shed more light on how the model can be utilized to promote continued learning achievement and success of EFL students who are trying to develop their 21st century skills.

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APPENDIX

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APPENDIX A

Course Structure

Details of the writing instructional model with integration of inquiry-based learning and visual literacy (WINVIS) course

1. Goal

The goal of the course is to cultivate essential 21st century skills, specifically focusing on the development of writing, collaboration, critical thinking, and creative thinking skills among EFL students.

2. Course objectives

By the end of the course, students will be able to:

1. Express their ideas effectively through written paragraphs.
2. Engage in productive group work and collaboration.
3. Apply critical thinking skills to analyse and evaluate information.
4. Demonstrate creativity in solving design-based tasks.

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2. Course structure

The course follows a structured approach that combines elements of inquiry-based learning, visual literacy, and writing instruction. It is designed for high school students attending a private school and consists of 12 sessions per semester, with each session being 50 minutes in duration.

3. Course content

The writing instructional model, which incorporates inquiry-based learning and visual literacy, is structured into three units:

Unit 1: Health : Health disasters

Unit 2: Animals : Plastic monsters

Unit 3: Business : Business crisis

Each unit consists of five lessons, with a total of three sessions dedicated to implementing each unit. The time allocated for each unit is 150 minutes. The unit plans follow the following structure:

Lesson 1: Connecting

In this lesson, the teacher utilizes various visual materials, such as videos, infographics, images, and other visual aids, to engage students' interest in the topic. Students are then divided into groups and collaborate on a writing activity, responding to five questions related to the unit topic. After completing the task, the teacher facilitates a class discussion to gather ideas and topics from the unit.

The connecting lesson serves as an engaging stage within the 5E learning cycle, as it stimulates students' curiosity and interest in the specific topic. Furthermore, the use of visual materials aligns with standard 3, "Interpreting and analyzing images," as students are required to interpret and evaluate visual resources. Additionally, students generate ideas before engaging in the writing process.

This stage contributes to the improvement of various 21st-century skills. Firstly, written communication skills are enhanced through the writing activity, which promotes the development of content, organization of ideas, and understanding of structure and vocabulary. Secondly, collaboration skills are fostered as students work together in groups, learning to cooperate and resolve conflicts effectively. Thirdly,

critical thinking skills are honed through the analysis of visual materials, as students are encouraged to provide reasons supported by evidence. Lastly, creative thinking skills are cultivated as students generate ideas based on the visual materials and create mind maps.

Overall, this unit structure combines visual literacy, inquiry-based learning, and writing instruction to enhance students' skills in writing, collaboration, critical thinking, and creative thinking.

Lesson 2: Outlining

During the outlining lesson, the teacher instructs students to choose a topic of interest within their respective groups. The students then conduct research to gather additional information and create an outline of opinions and facts to present. Each group is also tasked with finding a relevant picture that represents their chosen topic, providing references and justifications for their selection. Furthermore, the students collaboratively create a mind map related to the selected issue.

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This outlining lesson aligns with the exploration step of the 5E learning cycle, as students engage in research and locate visual materials, such as pictures, to support their work. The concept of visual literacy is evident as students select and find images, which corresponds to standard 2, "Effectively finding images." Additionally, students are required to provide proper references for their sources, demonstrating adherence to standard 7, "Using images ethically and citing visuals." The students' task of creating their own graphic organizers reflects standard 6, "Designing meaningful images." Moreover, the outlining stage necessitates students to organize their ideas within the graphic organizers before proceeding to the writing phase.

This stage of the instructional model also fosters the development of various 21st-century skills. Written communication skills are enhanced as students articulate detailed explanations for their choice of pictures. Collaboration skills are nurtured through group work, as students cooperate, make decisions, and delegate responsibilities to achieve their objectives. Critical thinking skills are honed as students evaluate and justify their chosen information using reasoning skills. They must collaboratively draw conclusions and select a single picture for the activity. Furthermore, creative thinking skills are stimulated through the design and creation of their mind maps, encouraging students to think creatively and present information in their own unique way.

In summary, the outlining lesson integrates elements of inquiry-based learning, visual literacy, and collaborative work to improve students' written communication, collaboration, critical thinking, and creative thinking skills.

Lesson 3: Presenting

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During the presenting lesson, students in each group will collectively write an opinion paragraph based on the selected picture and the ideas generated from their mind map. They will review their mind map, choose relevant information to include, and collaboratively construct the paragraph. The teacher will provide feedback to enhance their writing skills.

This presenting lesson aligns with the explanation stage of inquiry-based learning, as students articulate their opinions on the chosen topic. Standard 5, "Using images effectively," is relevant in this stage as students leverage the graphic organizer

(mind map) to support their paragraph writing. They must develop ideas and organize them coherently within the written task.

The presenting stage of the instructional model also contributes to the improvement of various 21st-century skills. Written communication skills are significantly enhanced as students compose the opinion paragraph, refining their ability to effectively convey their thoughts with well-developed content, organized structure, appropriate grammatical usage, and rich vocabulary. Collaboration skills continue to be fostered as students work together to write the paragraph, allowing for further skill development through group work. Critical thinking skills are exercised as students must select and analyze ideas to include in their writing, evaluating and justifying their choices. Additionally, creative thinking skills come into play as students must consider how to present the information in an engaging manner, employing creative word choices and techniques to capture the reader's attention.

In summary, the presenting lesson within the instructional model integrates inquiry-based learning, visual literacy, and collaborative work to improve students' written communication, collaboration, critical thinking, and creative thinking skills. By collectively writing an opinion paragraph based on their mind map, students refine their writing skills and engage in thoughtful analysis and evaluation, while also utilizing creative strategies to effectively present their ideas.

Lesson 4: Applying

The applying lesson focuses on integrating previously acquired knowledge and connecting it with a new concept. Specifically, students will learn about hamburger writing or paragraph diagrams, studying the components of a written paragraph. They

will design their own organizational structure using hamburger writing or a paragraph diagram, and then apply the concepts to enhance their paragraph writing. Students will individually rewrite their paragraphs, incorporating the modifications.

This applying lesson aligns with the elaboration stage in the 5E learning cycle as students connect their prior learning with the new concept introduced by the teacher. The visual literacy concept is relevant in this stage. Standard 1, "Defining image need," comes into play as the teacher explains how the hamburger paragraph works, providing a visual representation. Additionally, students engage with standards 6, "Designing meaningful images," and 5, "Using images effectively," as they design their own hamburger diagrams to aid their writing process. Furthermore, students revise and edit their paragraphs, applying their own personalized approach.

The applying stage of the instructional model also promotes the development of various 21st-century skills. Firstly, written communication skills are further honed as students individually write opinion paragraphs on topics of personal interest, focusing on enhancing content, organization, grammatical structure, and vocabulary usage. Secondly, collaboration skills are fostered as students work together within their groups to assist one another in constructing hamburger paragraphs, engaging in planning, consensus-building, and conflict resolution. Thirdly, students are required to justify their topic choices, stimulating reasoning skills and critical thinking skills. Finally, the act of creating their own hamburger paragraphs encourages creative thinking as students devise unique ways to present their ideas.

In summary, the applying lesson within the instructional model integrates previously learned knowledge with the introduction of hamburger writing or paragraph

diagrams. Students apply their understanding by designing and utilizing their own organizational structures, improving their individual paragraph writing through modification and refinement. This stage aligns with the elaboration phase and incorporates visual literacy elements, fostering written communication, collaboration, critical thinking, and creative thinking skills. By individually writing opinion paragraphs, students enhance their writing proficiency while reasoning and justifying their topic choices, all while demonstrating their creative thinking skills.

Lesson 5: Evaluating

The evaluating lesson focuses on assessing students' writing tasks and providing feedback. Students are required to evaluate their classmates' work by offering comments and providing evidence-based reasons for their judgments. The teacher will also assess each piece of paragraph writing, serving as the final assessor.

This evaluating lesson aligns with the evaluation stage in the 5E learning cycle, allowing students to assess and provide feedback on their peers' writing. The visual literacy concept comes into play as students interpret and analyze the hamburger paragraphs, which are connected to the paragraph writing. Additionally, students evaluate images as they assess and provide feedback on their classmates' work. Furthermore, students publish their work to showcase their achievements to their peers and the teacher.

In terms of 21st-century skills, the evaluating stage facilitates the improvement of various skills. Firstly, written communication skills are enhanced as students write comments on their peers' work. They need to develop their ideas, organize their messages effectively, and consider grammatical structure and vocabulary usage to

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ensure clarity and comprehension. Collaboration skills are developed as students support one another through peer feedback, helping their peers achieve their goals and fostering a collaborative learning environment. Critical thinking skills are exercised as students provide reasons for their assessments and locate evidence to support their viewpoints. They also engage in inferential thinking as they draw conclusions based on their peers' writing. Creative thinking skills are nurtured as students find innovative ways to comment on their friends' work and offer suggestions for improvement, promoting creativity and originality in their feedback.

In summary, the evaluating lesson within the instructional model focuses on the assessment of students' writing tasks. It enables students to evaluate their peers' work, providing comments and evidence-based judgments. The stage aligns with the evaluation phase of the 5E learning cycle, encompassing visual literacy elements and involving the interpretation and evaluation of hamburger paragraphs. Written communication skills are honed through the provision of feedback, while collaboration skills are developed through peer support. Critical thinking skills are enhanced as students provide reasons and evidence, and creative thinking skills are nurtured as students find innovative ways to offer suggestions for improvement. By engaging in peer assessment and feedback, students actively contribute to the learning process and refine their own writing skills.

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4. Audience

The target audience for this course comprises 20 students at the high school level attending a private school. These students enrolled in the English course during the academic year of 2021.

5. Lesson plan

The course is structured into three units, encompassing a total of 15 lessons. Each lesson is designed based on the Writing Instructional Model with Integration of Inquiry-Based Learning and Visual Literacy (WINVIS) to effectively enhance the students' 21st century skills.

Each lesson will be delivered in a face-to-face classroom setting. The instructional approach will follow the COPAE model, which includes the stages of connecting, outlining, presenting, applying, and evaluating. A sample lesson plan can be found in Appendix B.

By following the WINVIS model and incorporating the COPAE framework, the course aims to provide a comprehensive and engaging learning experience for the students. Through a combination of inquiry-based learning, visual literacy, and various instructional methods, the course seeks to develop the students' writing skills and foster the acquisition of essential 21st century skills.

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APPENDIX B
Sample Lesson Plan
Unit 1: Health

Overview: The focus of this unit is to teach students how to compose a paragraph. The duration of the unit is three weeks, with a total of 150 minutes allocated for instruction. The topic for this unit is "Health disasters in Thailand." The target audience consists of 20 upper secondary school students.

Terminal objective

The terminal objective of this unit is to equip EFL students with essential 21st century skills through the process of composing a paragraph related to the given health topic. The specific 21st century skills targeted for improvement are writing, collaboration, critical thinking, and creative thinking skills

Enabling objectives:

By the end of this unit, the students will be able to:

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1. Share ideas by writing a paragraph on the given health topic, effectively conveying their thoughts and opinions;
2. Engage in group work to collaboratively develop a well-structured paragraph related to the given health topic;
3. Demonstrate critical thinking skills through the process of writing a paragraph, analyzing and evaluating information to support their ideas;
4. Apply creative thinking skills by designing and crafting a unique and engaging paragraph based on the given health topic.

Materials:

1. Written texts: handout

2. Visual aids: pictures, video clip, infographic, graphic organizers, and other visual materials

3. Internet and Computer: PowerPoint

Evaluation/ Assessment: Handout

Role: Teacher – discussion leader, facilitator, and observer

Students – active learners

Setting:

1. Location A private school in northeastern Thailand,
2. ESL/EFL EFL context
3. Age 16 – 18 years of age
4. Grade level Mattayomsuksa 5 (Grade 11)
5. Student Needs Increasing levels of 21st century skills

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Scope and Sequence

Time (mins)	Stage/Principle	Description	Materials
0 – 50	**Connecting** - The 5E learning cycle (Engaging) - Visual Literacy Standards (Standard 3. Interpreting and analysing images; Standard 4. Evaluating images)	1. The teacher presents three visual materials depicting current health disasters in Thailand to the class. The teacher then poses three questions to engage the students in discussion: **(Engaging: the 5E learning cycle)** a. What are your thoughts on the three visual materials, and what is the reasoning behind your thoughts? b. Which element or part of the visual materials stands out as the most important in your opinion? c. What are the strengths and weaknesses of each visual material that you have observed? These questions aim to stimulate critical thinking and prompt students to interpret and analyze the images **(related to Standard 3: Interpreting and analyzing images) as well as evaluate their effectiveness (related to Standard 4: Evaluating images).** 2. The teacher instructs students to form groups consisting of approximately 4-5 members. 3. In their respective groups, students collaboratively answer the questions by writing down their responses in a table format.	**Handout UNIT 1**

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Time (mins)	Stage/Principle	Description	Materials
		4. Once the group work is completed, students share their ideas with the whole class. The teacher writes these ideas on the whiteboard, taking the opportunity to highlight health-related vocabulary words and provide pronunciation guidance. Additionally, the teacher explains the essential components of critical thinking skills, including reasoning, analysis, and evaluation. 5. Each group in the class selects a topic of interest for further exploration and research. This step allows students to delve deeper into a specific health-related issue and begin gathering more information about their chosen topic.	
	Outlining - The 5E learning cycle (Exploring) - Visual Literacy Standards (Standard 2. Effectively finding images; Standard 6. Designing meaningful images; Standard 7. Using images ethically and citing visuals)	1. Each group is tasked with selecting a picture that is relevant to the discussion of health disasters in Thailand. They must also answer the following questions about their chosen picture: Why did your group select this picture? And is it a reliable source? This step involves exploring different visual sources and evaluating their reliability and relevance. **(Related to Standard 2: Effectively finding images and Standard 7: Using images ethically and citing visuals)**	

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Time (mins)	Stage/Principle	Description	Materials
		2. The teacher emphasizes the importance of giving proper credit to avoid plagiarism when using visual materials. This emphasizes the ethical aspect of using images and citing sources. **(Related to Standard 7: Using images ethically and citing visuals)** 3. Each group is assigned the task of designing a mind map based on the ideas and opinions derived from their chosen picture, focusing on health disasters in Thailand. The teacher explains that this task aligns with the element of creative thinking known as fluency, which involves generating a wide range of ideas. **(Related to Standard 6: Designing meaningful images)** 4. The teacher provides an explanation of the concept of fluency as one of the elements of creative thinking skills. 5. Students work collaboratively within their groups to design the mind map. The mind map should have at least three branches, ensuring that all relevant aspects are covered. This activity reinforces the skills of designing meaningful images and encourages comprehensive exploration of the chosen topic. **(Related to Standard 6: Designing meaningful images**)	

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Time (mins)	Stage/Principle	Description	Materials
		6. After completing the task, each group presents their mind map to the class, sharing what their chosen picture conveys and the insights they have gained from it. 7. Following the group presentations, the teacher provides feedback to help improve each mind map. Additionally, the teacher takes note of any new vocabulary words that emerge from the students' work, further enriching their understanding of health disasters in Thailand.	
51 - 100	**Presenting** - The 5E learning cycle (Explaining) - Visual Literacy Standards (Standard 5. Using images effectively)	1. Students are given the task of writing a paragraph based on selecting a topic they find interesting. This step involves explaining the process of paragraph writing and applying the knowledge gained from previous stages. **(Related to Explaining: the 5E learning cycle)** 2. Students are provided with a relationship diagram and instructed to analyze and interpret its content. They are then asked to explain their understanding of the diagram in detail. This activity enhances their ability to effectively use images and visual representations to extract meaning and convey information. **(Related to Standard 5: Using images effectively)** 3. The teacher explains the concept of simple sentences to the class and collects	

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Time (mins)	Stage/Principle	Description	Materials
		the students' paragraph writings. The teacher provides comments and feedback on each piece of writing to help students improve their writing skills. This feedback serves as guidance for enhancing content, organization, grammatical structure, and vocabulary usage. **(Related to writing instruction and providing constructive feedback)** 4. Students are encouraged to generate additional ideas and expand upon their initial writing. They are prompted to think critically and creatively about their topic and consider incorporating new elements into their paragraphs. This step fosters the development of critical thinking and creative thinking skills.	
	Applying - A 5E learning cycle (Elaborating) - Visual Literacy Standards (Standard 1. Defining image need Standard 5. Using images effectively Standard 6. designing meaningful images)	1. The teacher delivers explicit instruction on the concept of the hamburger paragraph to the class, providing clear explanations and examples. The purpose is to ensure that students understand the structure and function of a hamburger paragraph. **(Related to Elaborating: the 5E learning cycle)** 2. The teacher engages students in a discussion by asking questions to assess their understanding of the hamburger paragraph. This allows students to reflect	

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Time (mins)	Stage/Principle	Description	Materials
		on the concept and share their thoughts, opinions, and alternative ideas for visual organizers. The teacher encourages active participation and critical thinking. **(Related to Standard 6: Designing meaningful images)** 3. Students collaboratively answer the teacher's questions in the classroom, exchanging ideas, providing feedback, and making suggestions to improve the hamburger paragraph. This group interaction fosters a collaborative learning environment where students can learn from one another. **(Related to collaborative learning and peer interaction)** 4. Each group is tasked with applying the newly acquired knowledge to create a hamburger paragraph that effectively organizes the presentation of their chosen topic. The teacher assumes the role of an observer, monitoring students' behavior and progress during their group work. This step allows students to apply their understanding of the hamburger paragraph in a practical context. **(Related to Standard 6: Designing meaningful images)** 5. The teacher provides an explanation of the criteria for writing, specifically	

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Time (mins)	Stage/Principle	Description	Materials
		focusing on content and organization. This ensures that students understand the importance of developing relevant and well-structured paragraphs. 6. Students individually revise and edit their opinion paragraphs based on the hamburger paragraph structure. They may make additions, deletions, or rearrange ideas to improve the content and organization of their writing. This step encourages students to critically review and refine their work. **(Related to Standard 5: Using images effectively, as the hamburger paragraph serves as a visual organizer for paragraph revision)**	
101-150	**Evaluating** - The 5E learning cycle (Evaluating) - Visual Literacy Standards (Standard 3. Interpreting and analysing images; Standard 4. Evaluating images)	1. The teacher introduces a rubric for paragraph writing, which includes four aspects: content, organization, grammatical structure, and vocabulary. This rubric serves as a guideline for students to assess their own writing and understand the criteria for evaluating paragraph quality. **(Related to Evaluating: the 5E learning cycle and writing assessment)** 2. Students are given the opportunity to evaluate their peers' work by providing feedback on the four elements mentioned in the rubric. Students use the criteria from the rubric to assess their friends' paragraphs,	

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Time (mins)	Stage/Principle	Description	Materials
		focusing on content, organization, grammatical structure, and vocabulary. This peer feedback process promotes active learning and allows students to develop critical evaluation skills. **(Related to Evaluating: the 5E learning cycle and peer assessment)** 3. Students carefully read the feedback received from their peers and ask clarifying questions to ensure understanding. This step encourages students to engage in a dialogue about their writing and the specific areas that need improvement. It fosters a collaborative and supportive learning environment. 4. The teacher collects all the students' work and provides individual comments on their paragraphs. The teacher's feedback helps students understand their strengths and areas for improvement, providing guidance for future writing tasks. The feedback supports students' growth and development as writers.	

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APPENDIX C

Instructional Manual

Writing instructional Model with integration of inquiry-based learning and visual literacy (WINVIS Model)

I. Rationale

In recent years, the global importance of English as a means of communication among individuals from diverse linguistic backgrounds has been widely recognized (Rose & Galloway, 2019). As a result, English has become a mandatory foreign language subject in schools and universities, emphasizing the need for students to develop proficiency in the language to effectively participate in the global community. However, simply acquiring language skills is no longer sufficient in today's rapidly changing world. The 12th National Economic and Social Development Plan (2017 - 2021) places significant emphasis on the development of 21st century skills (Office The National Economic and Social Development Board, 2016). These skills, commonly referred to as the four Cs - communication, collaboration, critical thinking, and creativity - are essential for individuals to articulate their thoughts, collaborate with others, analyze information, draw conclusions, and generate innovative ideas (The Partnership for 21st Century Learning, 2015).

Communication skills play a vital role in the English language teaching (ELT) context, as most classroom activities involve interaction, information sharing, and presentations among students (The Partnership for 21st Century Learning, 2015). Additionally, writing skills are of particular importance as they serve as a means of communication in various real-life situations, such as letter writing, journaling, completing forms, or crafting proposals (Grabe & Kaplan, 1996). Collaboration skills, on the other hand, enable individuals to work effectively with others, leveraging their diverse talents, expertise, and intelligence to achieve common goals (The Partnership for 21st Century Learning, 2015). Critical thinking skills involve the ability to analyze various arguments and make informed judgments based on evidence (The Partnership for 21st Century Learning, 2015), enabling individuals to evaluate information and make sound decisions. Lastly, creative thinking skills foster the ability to think innovatively and employ a range of creative techniques to approach tasks from unique

perspectives (The Partnership for 21st Century Learning, 2015), thereby promoting novel solutions to life and work challenges.

Unfortunately, due to limited opportunities for practice, students often struggle to develop proficiency in 21st century skills. Traditional classroom settings rarely facilitate the application of these skills. According to Muakyod (2018), 21st century skills are not sufficiently promoted in Thai classrooms, where traditional teaching methods prevail and hinder student interactions. However, efforts have been made to address these challenges. The Thai government acknowledges the significance of 21st century skills for students, leading to curriculum reforms aimed at enhancing these skills and improving education quality (Chantamart, 2014). Nevertheless, Thai students, including those in the ELT context, still lack sufficient development of 21st century skills. This can be attributed to teaching methods and materials employed in Thai schools. Many English teachers continue to rely on lecture-based instruction, resulting in passive and disengaged students (Tolley et al., 2012). Such instructional approaches restrict student interactions, impeding effective communication and reducing student motivation.

Moreover, English lessons often rely on commercial textbooks that may not align with students' interests or promote 21st century skills. Some textbooks prioritize grammatical aspects over the development of these skills, failing to engage students effectively. Consequently, teaching methods and materials need to be revamped to enhance students' acquisition of 21st century skills.

This study proposes a teaching model, the WIM-IV model, designed to foster 21st century skills among EFL students. The model integrates two resources - inquiry-based learning (Rodriguez et al., 2019) and the concept of visual literacy (Hattwig et al., 2013) - to enhance these skills. The instructional steps of the model facilitate the gradual and systematic generation of ideas, a hallmark of inquiry-based learning (Bunwirat & Boonsathorm, 2018; Bybee et al., 2006; Rodriguez et al., 2019). Furthermore, the instructional materials align with the ACRL Standards for Visual Literacy (Hattwig et al., 2013), fostering students' interest in language learning.

II. Theoretical Framework

The development of the writing learning model with the integration of inquiry-based learning and visual literacy is grounded in two key theoretical perspectives: inquiry-based learning and visual literacy.

Inquiry-based learning

Inquiry-based learning is a pedagogical approach that emphasizes student-directed learning and active engagement in the classroom. It encourages students to construct meaningful knowledge by exploring their own curiosity and interests (Bybee et al., 2006). In this approach, students are encouraged to participate in hands-on activities and draw on their own experiences, while teachers take on the role of facilitators to support and guide student learning. The model incorporates the 5E learning cycle framework (Rodriguez et al., 2019), which consists of five key steps: Engaging, Exploring, Explaining, Elaborating, and Evaluating. These steps provide a structured framework for organizing and sequencing instructional activities within the model.

Visual Literacy

Visual literacy, on the other hand, recognizes the power of visual images as a means of communication and understanding. It emphasizes the ability to interpret, evaluate, apply, and create visual images (Burkhardt et al., 2003; Debes, 1969; Hattwig et al., 2013; Lengler & Eppler, 2007; Stafford, 2011). In the context of this study, visual literacy refers to the development of skills in visual reading and writing based on the ACRL visual literacy standards (Hattwig et al., 2013). These standards encompass seven aspects: defining visual needs, finding images, interpreting and analyzing images, evaluating images, using images effectively, creating meaningful images, using images ethically, and citing visual materials. By integrating visual literacy into the writing learning model, students are equipped with the necessary skills to engage with visual materials, critically analyze them, and effectively incorporate them into their writing.

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Together, the integration of inquiry-based learning and visual literacy provides a comprehensive theoretical framework for the development of the writing learning model. This framework emphasizes active student engagement, the construction of knowledge through inquiry, and the development of visual literacy skills to enhance students' 21st century skills.

III. Context and Setting

The context of an English course implementing the writing instruction model with integration of inquiry-based learning and visual literacy (WINVIS) is high school students learning in a private school in Thailand. Thus, they are EFL learners. They are 20 students in grade 11 (Mattayomsuksa 5) who enroll in an English course. The average age is 16 - 18 years old. The language level ranges from A2 to B1 based on the CEFR. Participants are assumed to have sufficient prior knowledge of English, having already taken a course in the subject.

IV. Objectives

The Instructional Model for writing with Integration of Inquiry-Based Learning and Visual Literacy (WINVIS) aims to provide EFL students with an alternative approach to teaching writing. The model focuses on process-based writing, guiding students through the construction of a coherent text. The primary goal of the WINVIS model is to enhance students' 21st century skills, specifically written communication, collaboration, critical thinking, and creativity. These skills will be developed through both individual and collaborative work on writing tasks. The WINVIS model places particular emphasis on the development of English paragraph writing skills.

By the end of the implementation of the WINVIS model, students are expected to demonstrate their ability to write an opinion paragraph. This achievement will equip them with valuable skills that can be applied in various aspects of their lives, beyond the classroom setting. The WINVIS model serves as a platform for students to enhance their writing skills and cultivate the essential 21st century skills necessary for success in the globalized world.

V. Materials

Topic Selection

The content of the WINVIS model will be structured around two units, with the selection of topics based on two primary sources. The first source is the textbook "Contemporary Topics 1, Intermediate," which is specifically designed for intensive English courses. The topics included in this textbook are aligned with the Global Scale of English and the Common European Framework of Reference (CEFR), providing a progression from CEFR A2+ to B1 proficiency levels.

The second source of topic selection is the study conducted by Takeuchi and Nakatsuka (2019) on Topics and Activities in the EFL classroom. This study examined learners' preferences regarding topics used in the classroom. The findings of this study serve as a valuable guide in determining the topics that resonate with learners and engage them effectively during the course.

By combining the carefully chosen topics from the textbook and incorporating insights from the learners' preferences identified in Takeuchi and Nakatsuka's study, the WINVIS model ensures that the content is relevant, engaging, and aligned with the learners' language proficiency levels. This approach contributes to a meaningful and effective learning experience, enhancing the students' overall language development within the context of the course.

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Contemporary Topics 1		Takeuchi and Nakatsuka (2019)	
Unit	**Topics**	**Topics**	**Ranking**
1	Psychology - Happiness	**Animal**	1
2	Linguistics – A time to learn	Travel	2
3	**Public Health – Sleep**	Sports	3
4	**Business – Negotiating for success**	**Shopping**	4
5	Art History – Modern art	Festival/Tradition	5
6	Engineering - Robots	**Family**	6
7	Media Studies – Interactive games	History	7
8	**Biology – Genetically modified food**	University life	8
9	**Business – Design thinking**	Clothing	9
10	History - Shackleton	Place / Countries	10
11	Philosophy - Ethics	Nature / Environment	11
12	Information technology – Big data	**Daily life**	12

Only overlapping topics were selected. There are two units which are constructed from the ideas of two sources as follows:

Unit 1: Health: Health disaster comes from the ideas of Unit 3: Public Health (Contemporary Topic 1) and Family and Daily Life (Takeuchi & Nakatsuka, 2019).

Unit 2: Animal: Plastic monsters comes from the ideas of Unit 8: Biology (Contemporary Topic 1) and Animal (Takeuchi & Nakatsuka, 2019).

Unit 3: Business: Business crisis comes from the ideas of Unit 4: Business and Unit 9 (Contemporary Topic1) and Shopping (Takeuchi & Nakatsuka, 2019).

VI. The Role of the Teacher

The implementation of the WINVIS model takes place within the classroom, where the teacher assumes the role of a facilitator or coordinator. During the initial phase of the learning process, known as orientation, the teacher provides students with the WINVIS guide and offers a comprehensive explanation of how the model functions. Students are guided on how to optimize their learning experience with the WINVIS

model and are given time to familiarize themselves with its structure and components. As students engage in discussions and activities, the teacher assumes the role of a skilled facilitator, assisting students in generating ideas and promoting effective communication. As the activities progress, the teacher's involvement diminishes, transitioning into the role of an observer who refrains from unnecessary intervention while students actively work.

VII. The role of the student

The learning process facilitated by the WINVIS model places significant emphasis on the active involvement of students. Student-centeredness is a fundamental principle within the classroom setting. In this model, students assume an active role, participating in both collaborative group work and individual tasks. The WINVIS model accommodates diverse learning styles, allowing students to engage in discussions and share their thoughts and ideas within their groups or pairs. By actively participating in the learning process, students take ownership of their education, fostering a sense of autonomy and empowering them to contribute meaningfully to their learning journey.

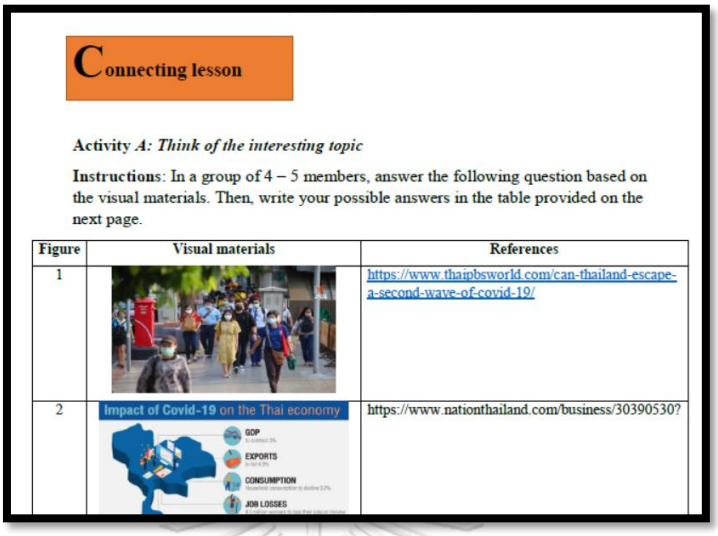
VIII. Instruction Procedure

A. Duration of instruction:

Week	Instruction
1	Orientation for the WINVIS model, Pretest
2 – 4	Unit 1: Health: Health disaster
5 – 7	Unit 2: Animal: Plastic monsters
8 – 10	Unit 3: Business: Business crisis
11	Posttest
12	Focus group interviews

Note: Each week is 50 minutes long.

Activity A: Think of the interesting topic



Connecting lesson

Activity *A: Think of the interesting topic*

Instructions: In a group of 4 – 5 members, answer the following question based on the visual materials. Then, write your possible answers in the table provided on the next page.

Figure	Visual materials	References
1		https://www.thaipbsworld.com/can-thailand-escape-a-second-wave-of-covid-19/
2	Impact of Covid-19 on the Thai economy GDP EXPORTS CONSUMPTION JOB LOSSES	https://www.nationthailand.com/business/30390530?

1. The teacher presents three visual materials depicting current health disasters in Thailand to the class. Subsequently, the teacher poses the following questions to the students, initiating the engaging stage of the 5E learning cycle:

(Engaging: the 5E learning cycle)

a. What are your thoughts on the three visual materials, and what is the rationale behind your perspective?
b. Among the visual materials, what stands out as the most significant element or part?
c. In your analysis of the visual materials, what are the shared strengths and weaknesses observed?

(Standard 3. Interpreting and analysing images & Standard 4. Evaluating images)

2. The teacher instructs the students to form groups consisting of approximately 4 to 5 members.
3. Within their respective groups, students collaboratively respond to the questions by documenting their answers in a table format. This step serves as the prewriting stage of the writing process.

4. Following the group discussion, students are encouraged to share their ideas with the whole class. The teacher records the shared ideas on the whiteboard,

taking the opportunity to provide additional information related to health vocabulary, including pronunciation. Furthermore, the teacher highlights the key elements of critical thinking skills, such as reasoning, analysis, and evaluation.

5. Each group within the class subsequently selects a topic of interest for further investigation and information gathering. This topic selection process sets the stage for subsequent learning activities and research.

Activity B: Design your own interest

Outlining lesson

Activity B: ***Design your own interest***

Instructions: In each group, each member individually select one visual materials that is interesting to discuss about _____ from the different sources. Then you share **orally** to your group and answer following questions in group.

Figure	Visual materials	References
1		https://www.naccho.org/blog/articles/planning-for-healthy-resilient-and-sustainable-communities-after-disasters
2		https://www.tfah.org/report-details/ready-or-not-protecting-the-publics-health-from-diseases-disasters-and-bioterrorism-2019/

1. Each group selects a picture that is intriguing and relevant to the discussion of health disasters in Thailand. Additionally, the group must address the following question for each picture:

   Why did your group choose this picture? And is it a reliable source?

   (Exploring: the 5E learning cycle)

   (Standard 2. Effectively finding images)

   (Standard 7. Using images ethically and citing visuals)

2. The teacher emphasizes the importance of giving credit to avoid plagiarism, highlighting the ethical aspect of using images and citing sources.

   (Standard 7. Using images ethically and citing visuals)

3. The teacher assigns each group the task of designing a mind map based on the ideas derived from their chosen picture, including opinions related to health disasters in Thailand.

(Standard 6. designing meaningful images)

4. The teacher provides an explanation of one of the elements of creative thinking skills, specifically fluency, to enhance students' understanding and application of creative thinking.
5. Students collaborate within their groups to design the mind map, ensuring it consists of at least three branches and covers all the aspects presented.

(Standard 6. Designing meaningful images)

6. Upon completing the task, each group presents their mind map to the class, showcasing the insights conveyed by their chosen picture.
7. After the presentations, the teacher offers feedback to improve each mind map, providing guidance on enhancing their visual representations. Additionally, the teacher lists new vocabulary words derived from the students' work.

Activity C: Compose your writing

Presenting lesson

Activity C: Compose your writing

Instructions: Each group has to compose a paragraph to express opinions about the chosen picture by using the information in group's mind map along with naming the title. Write at least 100 – 120 words in English.

Title: _____
....

1. Students are given the task of writing a paragraph on a topic they find interesting.

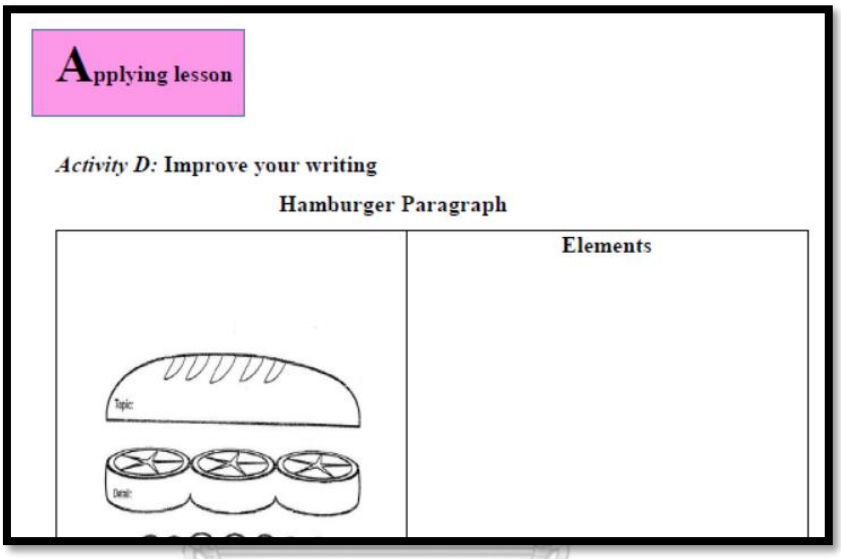
(Explaining: the 5E learning cycle)

2. Students are required to read the relationship diagram and provide a detailed explanation of their interpretation.

(Standard 5. Using images effectively)

3. The teacher explains the concept of simple sentences to the class, collects the students' written paragraphs, and provides comments on each piece to guide students in improving their writing.
4. Students are prompted to generate additional ideas that they can incorporate into their paragraphs, expanding their content and enhancing their written work.

Activity D: Improve your writing



1. The teacher delivers explicit instruction on the concept of the hamburger paragraph to the class.
2. To assess understanding, the teacher poses questions such as "What does each part of the hamburger paragraph represent?", "What are your thoughts on the hamburger paragraph?", or "Can you suggest alternative visual organizers?"

(Elaborating: the 5E learning cycle)

3. Students collaboratively respond to the teacher's questions, sharing ideas, providing feedback, and proposing improvements to enhance the hamburger paragraph.
4. Each group applies their newfound knowledge by creating a hamburger paragraph to effectively structure their presentation on the chosen topic. The

teacher assumes an observational role to monitor students' group dynamics and behaviour.

(Standard 6. Designing meaningful images)

5. The teacher provides an explanation of the criteria for effective writing, particularly emphasizing the importance of content and organization.
6. Individually, students revise and edit their opinion paragraphs, incorporating insights gained from the hamburger paragraph activity. They may add relevant information, remove unnecessary content, or reorganize their ideas to improve the overall quality of their writing.

(Standard 5. Using images effectively)

Activity E: Check the component of paragraph

Evaluating lesson

E: Check the component of paragraph

Instructions: Your writing will be assessed from your group member in four aspects and give some comments about how you work in group.

Elements	Assessor			
	No. 1	No. 2	No. 3	No. 4
Content				
Organization				
Grammatical structure				
Vocabulary				

1. The teacher introduces a rubric for paragraph writing, encompassing four aspects: content, organization, grammatical structure, and vocabulary.
2. Students are tasked with evaluating their peers' work by providing feedback on these four elements, which are aligned with the concepts explored in the hamburger paragraph activity.

(Evaluating: the 5E learning cycle & Standard 4. Evaluating images)

3. Students carefully read and consider the feedback they receive from their peers, seeking clarification through questions and discussions to ensure a thorough understanding of the comments provided.
4. The teacher collects all the students' work and offers additional comments and suggestions to further enhance their writing. This final step aims to provide constructive guidance and encourage continuous improvement in students' paragraph writing skills.

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APPENDIX D

Handout

Handout

“WINVIS COURSE”

Name : ……

Nickname : ……

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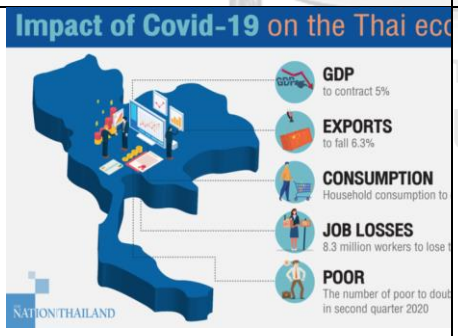
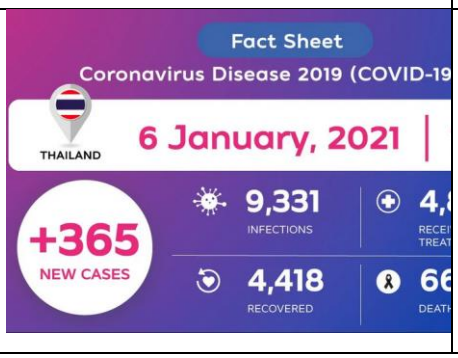
Unit 1: "Health disasters"

Connecting lesson

Activity A: *Think of an interesting topic*

Instructions: In a group consisting of 4 to 5 members, collaboratively respond to the following questions based on the provided visual materials. Subsequently, record your group's answers in the table provided on the subsequent page.

Figure	Visual materials	References
1		https://www.thaipbsworld.com/can-thailand-escape-a-second-wave-of-covid-19/
2		https://www.nationthailand.com/business/30390530?
3		https://www.tatnews.org/2021/01/coronavirus-disease-2019-covid-19-situation-in-thailand-as-of-6-january-2021-11-30-hrs/

The questions are as follows:

1. What are your thoughts on the three visual materials, and what is the rationale behind your perspective?
2. Among the visual materials, what stands out as the most significant element or part?
3. In your analysis of the visual materials, what are the shared strengths and weaknesses observed?

Write the answers in the table. You are allowed to write in English or Thai.

Member	Question 1	Question 2	Question 3
ONE			
TWO			
THREE			
FOUR			
FIVE			

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Critical thinking skills

1. Reasoning refers to the ability to use inductive or deductive reasons to explain your arguments, claims, or assumptions.

2. Analyzing refers to the ability to identify the elements in a reasoned case.

3. Evaluating refers to the ability to judge the credibility, evidence, arguments or claims.

After reviewing the table summarizing the ideas about the three visual materials, collaborate with your group members to synthesize what you have learned. Identify the main points and key insights derived from the discussions. Following the summary, engage in a consensus-building process to determine the topic that your group finds most intriguing and wishes to explore further.

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YOUR GROUP INTEREST:

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Outlining lesson

Activity B: *Design your own interest*

Instructions: In your assigned group, each group member should individually select one of the visual materials that they find interesting to discuss about _____ (topic). Once everyone has made their selection, share your choices orally within the group and proceed to answer the following questions collectively:

1. Why did each group member select their chosen visual material?
2. What elements or aspects of the visual materials caught your attention?
3. What are the strengths and weaknesses of each visual material?
4. How do these visual materials relate to the chosen topic?

Figure	Visual materials	References
1		https://www.naccho.org/blog/articles/planning-for-healthy-resilient-and-sustainable-communities-after-disasters
2		https://www.tfah.org/report-details/ready-or-not-protecting-the-publics-health-from-diseases-disasters-and-bioterrorism-2019/

3		https://www.sfcdcp.org/infectious-diseases-a-to-z/coronavirus-2019-novel-coronavirus/vaccine/
4		https://www.msf.org/msf-update-2019-ncov-coronavirus-outbreak?component=image-277349
5		https://childhub.org/en/child-protection-multimedia-resources/stay-safe-during-covid-19-infographic

In your group, you are required to select one appropriate picture, identified as Figure ..... Please discuss and provide reasons why your group chose this particular picture. Consider its relevance, visual appeal, and its ability to effectively represent the chosen topic

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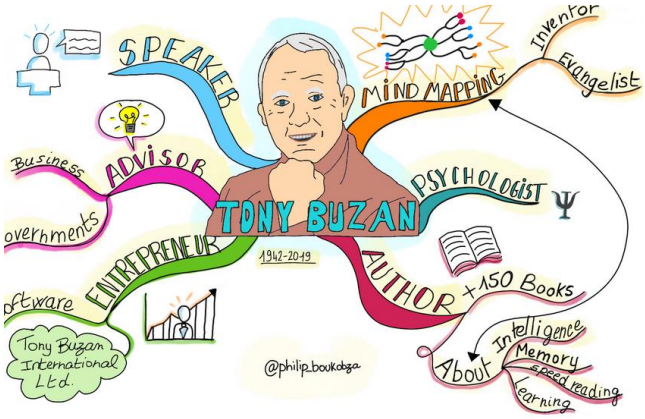
Then, watch the video about how to create the mind maps from this link: *https://www.youtube.com/watch?v=kCKZ75VDaSI*

NOTE:

Then, outline the ideas related to your chosen picture in the form of a mind map. In the mind map, you should cover all of the aspects that you want to discuss.

Example:



(Reference: https://www.visual-mapping.com/2019/04/goodby-tony-buzan.html)

Creative thinking skills

1. Fluency refers the ability to list ideas, options, or answers to given issues within a limited amount of time.

As a group, please utilize the provided space to create a mind map based on your shared interest. In your mind map, aim to generate a comprehensive list of ideas related to your chosen topic. Explore various ways to present and share these ideas within the mind map, fostering creativity and encouraging the generation of unique and unconventional concepts. Your goal is to produce a rich and diverse mind map that encompasses a wide range of ideas.

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New Vocabulary Words	Meaning

Presenting lesson

Activity C: *Compose your writing*

Instructions: Each group is required to construct a paragraph that articulates their opinions concerning the selected picture. The composition should be based on the information derived from the group's mind map, and the paragraph should include a title. The expected length of the paragraph is a minimum of 100 to 120 words in the English language.

Title: ______________

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Simple Sentence

A simple sentence comprises the fundamental components necessary for it to be considered a complete sentence: a subject, a verb, and a coherent thought. Illustrative instances of simple sentences are as follows:

Joe waited for the train.

"Joe" = subject, "waited" = verb

The train was late.

"The train" = subject, "was" = verb

Mary and Samantha took the bus.

"Mary and Samantha" = compound subject, "took" = verb

I looked for Mary and Samantha at the bus station.

"I" = subject, "looked" = verb

Mary and Samantha arrived at the bus station early but waited until noon for the bus.

"Mary and Samantha" = compound subject, "arrived" and "waited" = compound verb

Although simple sentences can be extended through the use of compound subjects, compound verbs, prepositional phrases (such as "at the bus station"), and other elements, they typically remain concise. Excessive use of simple sentences can result in disjointed writing, impeding the smooth flow of the text.

A simple sentence is also known as an independent clause. It is labeled as "independent" because, while it may be part of a compound or complex sentence, it can function as a complete sentence on its own.

Teacher's feedback

Aspect	Comments
Content	…… …… …… …… …… …… ……
Organization	…… …… …… …… …… …… ……
Grammatical structure	…… …… …… …… …… …… ……
Vocabulary	…… …… …… …… …… …… ……

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Instructions: Share your group work in class about how you have been assessed by the teacher. Write down the new ideas that you can apply to your paragraph.

Aspect	Simple Sentence	Comments & Notes
Content	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……
Organization	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……
Grammatical structure	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……
Vocabulary	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……

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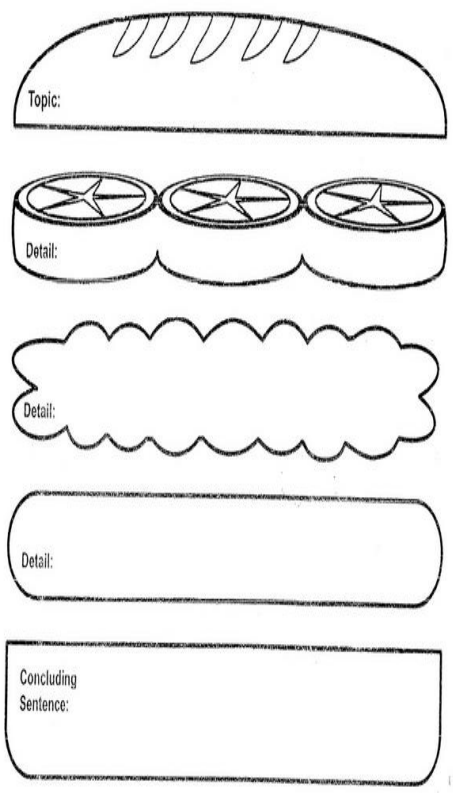
Applying lesson

Activity D: *Improve your writing*

Hamburger Paragraph

	Elements
	

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Instructions: Create a hamburger paragraph visual to articulate your group's opinions on the selected picture related to the group interest.

Your hamburger paragraph

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Content

A well-constructed paragraph should encompass pertinent ideas that are directly related to the task and address all of the questions posed. It should feature clear thesis statements, topic sentences, a coherent body of supporting information, and a well-defined conclusion.

Organization

An effective paragraph demonstrates a coherent structure with well-organized sequences of information. It achieves this by employing appropriate transition words, linking words, or cohesive devices to ensure a logical flow of ideas within the paragraph.

Following the completion of your individual hamburger paragraph on the selected topic, each group member must independently express their opinion on the chosen picture using their unique writing style. The written response should consist of a minimum of 120 to 150 words, and it should include a title that reflects the content and context of the picture.

Title: ______________
………………………………………………………………………   …………………………………………………………………

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Evaluating lesson

Activity E: *Check the components of your paragraph*

Instructions: Your writing will be evaluated by your group members based on four aspects, and they will provide feedback on your group collaboration and individual contribution.

Elements	Assessor			
	No. 1	No. 2	No. 3	No. 4
Content	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……
Organization	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……
Grammatical structure	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……
Elements	**Assessor**			
	No. 1	**No. 2**	**No. 3**	**No. 4**
Vocabulary	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……	…… …… …… …… …… …… …… ……

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What is your perception of my collaboration and contribution during our work together?	☐ Excellent ☐ Good ☐ Fair ☐ Poor …… …… …… …… …… …… …… ……	☐ Excellent ☐ Good ☐ Fair ☐ Poor …… …… …… …… …… …… …… ……	☐ Excellent ☐ Good ☐ Fair ☐ Poor …… …… …… …… …… …… …… ……	☐ Excellent ☐ Good ☐ Fair ☐ Poor …… …… …… …… …… …… …… ……

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APPENDIX E

21st Century test

Students answer on the question paper. 60 minutes

No Additional Materials required.

Name	
ID number	

THE SECTIONS are divided into three tasks:

Task 1: Select your own choice.

Task 2: Outline your ideas.

Task 3: Compose your work.

INSTRUCTIONS:

- Write your student number and name on this page.
- You are allowed to take notes on the test paper
- The score from the raters on this test **<u>does not affect</u>** your academic results.

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This document consists of 6 printed pages.

Task 1: Select your own choice

Directions: Within a time limit of 15 minutes, you and your peers will collectively choose a visual material (such as a picture, screen shot from a video, or infographic) from any source. It is essential that you utilize information from your selected material to substantiate your assertions.

Situation: During daylight hours at your school, you have observed three posters displayed in the library, as depicted in Figures 1-3. Your school has initiated a project called "Our 21st-Century Era," where students are expected to submit a written paragraph expressing their viewpoints. As a result, it is now your opportunity to share your perspective by crafting a paragraph. Prior to commencing your writing, you and your friends have conducted research together to gather relevant information. Regrettably, you have discovered only three captivating visual materials that support your work, namely health, animals, and business. However, you must choose a single topic. Ultimately, you and your companions have determined that _____ (insert your chosen topic) is the most intriguing subject to explore in your writing..

Figure	Visual materials	References
1		https://www.dreamstime.com/kanchanaburi-thailand-april-unidentified-people-mouth-mask-against-air-smog-pollution-pm-prevent-germs-covid-riding-image179042305
2		https://hilight.kapook.com/view/190642
3		https://www.matichon.co.th/social/news_1766960

TOPIC: …… is our choice. Please answer the following questions in the box. In this part, you are allowed to write your answer in **Thai**.

1. What motivated your decision to choose this particular figure as the focus of your writing for the "Our 21st Century Era" project?

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2. Within the selected figure, what is the most crucial element or component that caught your attention?

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3. What are the notable strengths and weaknesses associated with the chosen figure?

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4. How does the chosen figure relate to your personal experiences or prior knowledge?

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5. Based on the chosen figure, what conclusions or implications can be drawn?

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	Rater 1	Rater 2	Total
Question 1			
Question 2			
Question 3			
Question 4			
Question 5			

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Task 2: Outline your ideas

Directions: Following the selection of your chosen topic, you and your peers are tasked with crafting an outline that captures the key ideas you wish to incorporate into your written piece. This outline should take the form of a graphic organizer, such as a mind map, concept map, or flow chart. It is essential to generate a comprehensive list of ideas, share insights in diverse manners, and foster the development of unique and innovative concepts. Please note that for this portion of the activity, you may provide your response in the Thai language.

Rater 1	**Fluency**		**Flexibility**		**Originality**	
Rater 2						
Total						

Task 3: Compose your work

Directions: Following the completion of Task 2, you and your peers are to choose the captivating ideas that align with your individual writing styles. Compose a written piece consisting of 120 to 150 words, focusing on one of the visual images that you and your friends have collectively selected. Provide a suitable title and present your perspectives on the chosen topic. Please note that for this section, your response should be written in English.

Title: _____

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Rater 1	**Content**		**Organization**		**Grammar**		**Vocabulary**	
Rater 2								
Total								

-- End of the test -

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APPENDIX F

Student's collaboration questionnaire

แบบสอบถามการทำงานร่วมกันของนักเรียน

คำแนะนำ โปรดอ่านข้อความแต่ละข้ออย่างละเอียด แล้วทำเครื่องหมาย " ✓ " ในช่องของระดับความคิดเห็นที่ตรงกับคุณมากที่สุด

ระดับ 4 หมายถึง เห็นด้วยมากที่สุด ระดับ 3 หมายถึง เห็นด้วยมาก

ระดับ 2 หมายถึง เห็นด้วยน้อย ระดับ 1 หมายถึง เห็นด้วยน้อยที่สุด

ข้อ	ข้อความ	ระดับความคิดเห็น			
		เห็นด้วยมากที่สุด (4)	เห็นด้วยมาก (3)	เห็นด้วยน้อย (2)	เห็นด้วยน้อยที่สุด (1)
1	ฉันยอมรับกฎระเบียบขณะทำงานร่วมกับผู้อื่น				
2	ฉันยอมรับเพื่อนสมาชิกที่มาจากกลุ่มอื่น ๆ ได้				
3	ฉันเข้าใจหน้าที่ของฉันขณะทำงานร่วมกับผู้อื่น				
4	ฉันยอมรับความคิดเห็นของผู้อื่น				
5	ฉันสามารถทำงานได้เมื่อต้องทำร่วมกับผู้อื่น				
6	ฉันรับฟังสิ่งที่ผู้อื่นแนะนำฉัน				
7	ฉันสามารถปรับตัวในการทำงานร่วมกับผู้อื่นได้				
8	ฉันยอมรับความสามารถของผู้อื่น				
9	ฉันให้กำลังใจผู้อื่นเมื่อพวกเขารู้สึกท้อแท้				
10	ฉันแสดงความรู้สึกในเชิงบวกต่อผู้ที่ฉันทำงานด้วย				
11	ฉันแสดงประพฤติที่เหมาะสมขณะที่คนอื่นกำลังพูด				
12	ฉันสามารถทำงานร่วมกับผู้อื่นขณะที่มีระยะเวลากำหนดได้				
13	ฉันสามารถตอบคำถามด้วยแนวคิดที่หลากหลายได้				
14	ฉันรับฟังความคิดเห็นของผู้อื่น				
15	ฉันสามารถอธิบายสิ่งต่าง ๆ ให้กับผู้ที่ฉันทำงานได้				
16	ฉันใช้คำสุภาพเมื่อฉันมีปัญหาในการทำงานร่วมกับผู้อื่น				
17	ฉันแสดงออกอย่างเป็นมิตรขณะทำงานร่วมกับผู้อื่น				
18	ฉันพูดคุยอย่างสุภาพเสมอขณะทำงานร่วมกับผู้อื่น				

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ข้อ	ข้อความ	ระดับความคิดเห็น			
		เห็นด้วยมากที่สุด (4)	เห็นด้วยมาก (3)	เห็นด้วยน้อย (2)	เห็นด้วยน้อยที่สุด (1)
19	ฉันสามารถควบคุมอารมณ์ได้ขณะทำงานร่วมกับผู้อื่น				
20	ฉันสามารถช่วยตอบคำถามที่คนอื่นสงสัยได้				
21	ความรับผิดชอบขณะทำงานร่วมกับผู้อื่นเป็นสิ่งสำคัญ				
22	ฉันทำงานให้บรรลุเป้าหมายได้เมื่อต้องทำงานร่วมกับผู้อื่น				
23	ขณะทำงานร่วมกับผู้อื่น ฉันให้คำแนะนำคนอื่นได้				
24	ฉันได้บทเรียนจากการทำงานร่วมกับผู้อื่น				

25. คุณช่วยอธิบายจุดแข็งและจุดอ่อนของคุณที่เกี่ยวกับทักษะการทำงานร่วมกับผู้อื่น

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APPENDIX G

21st century Rubric

Criteria	Degree of skills			
	4	3	2	1
Task 1: Select your own choice				
Reasoning	Writer shows an excellent ability to use inductive or deductive reasoning to explain the arguments, claims, or assumptions.	Writer shows a good ability to use inductive or deductive reasoning to explain the arguments, claims, or assumptions.	Writer shows a fair ability to use inductive or deductive reasoning to explain the arguments, claims, or assumptions.	Writer shows a poor ability to use inductive or deductive reasoning to explain the arguments, claims, or assumptions.
Analyzing	Writer shows an excellent ability to identify the elements in a reasoned case.	Writer shows a good ability to identify the elements in a reasoned case.	Writer shows a fair ability to identify the elements in a reasoned case.	Writer shows a poor ability to identify the elements in a reasoned case.
Evaluating	Writer shows an excellent ability to judge the credibility, evidence, arguments or claims	Writer shows a good ability to judge the credibility, evidence, arguments, or claims.	Writer shows a fair ability to judge the credibility, evidence, arguments, or claims.	Writer shows a poor ability to judge the credibility, evidence, arguments, or claims.
Synthesizing	Writer shows an excellent ability to make connections among information and arguments.	Writer shows a good ability to make connections among information and arguments.	Writer shows a fair ability to make connections among information and arguments.	Writer shows a poor ability to make connections among information and arguments.
Interpreting	Writer shows an excellent ability to make inferences or conclusions based on analysis.	Writer shows a good ability to make inferences or conclusions based on analysis.	Writer shows a fair ability to make inferences or conclusions based on analysis.	Writer shows a poor ability to make inferences or conclusions based on analysis.

Criteria	Degree of skills			
	4	3	2	1
Task 2: Outline your ideas				
Fluency	Writer shows an excellent ability to list a number of ideas, answers, or possibilities to a given issue.	Writer shows a good ability to list a number of ideas, answers, or possibilities to a given issue.	Writer shows a fair ability to list a number of ideas, answers, or possibilities to a given issue.	Writer shows a poor ability to list a number of ideas, answers, or possibilities to a given issue.
Flexibility	Writer shows an excellent ability to develop alternative ideas, options, or possibilities to a given issue.	Writer shows a good ability to develop alternative ideas, options, or possibilities to a given issue.	Writer shows a fair ability to develop alternative ideas, options, or possibilities to a given issue.	Writer shows a poor ability to develop alternative ideas, options, or possibilities to a given issue.
Originality	Writer shows an excellent ability to invent new unique or responses or possibilities.	Writer shows a good ability to invent new unique responses or possibilities.	Writer shows a fair ability to invent new unique responses or possibilities.	Writer shows a poor ability to invent new unique responses or possibilities.
Task 3: Compose your work				
Content	The piece of writing presents the relevant ideas to the task and addresses all given questions in the task. Thesis statements, topic sentences, body, and conclusions are clear.	The piece of writing presents the relevant ideas to the task and addresses all given questions in the task. Thesis statements, topic sentences, body, and conclusions are clear.	The piece of writing fairly presents the relevant ideas to the task and addresses all given questions in the task. Thesis statements, topic sentences, body, and conclusions are fairly clear.	The piece of writing poorly presents the relevant ideas to the task and addresses all given questions in the task. Thesis statements, topic sentences, body, and conclusions are not clear.
Organization	The piece of writing contains well-organized sequences of information arranged	The piece of writing contains well-organized sequences of information arranged	The piece of writing contains fairly well-organized sequences of information	The piece of paragraph writing contains poorly organized sequences of information not

Criteria	Degree of skills			
	4	3	2	1
	logically by using the proper transition words, linking words, or cohesive devices within paragraphs.	logically by using the proper transition words, linking words, or cohesive devices within paragraphs.	arranged logically by using the proper transition words, linking words, or cohesive devices within paragraphs.	logically arranged and failing to use the proper transition words, linking words, or cohesive devices within paragraphs.
Grammatical structure	The piece of writing consists of a wide range of simple and some complex grammatical forms with a good degree of control. Contains few if any errors in agreement, tense, word order, articles, punctuation, capitalization, or pronouns and does not impede communication.	The piece of writing consists of a range of simple and some complex grammatical forms with a good degree of control. Contains few errors of agreement, tense, word order, articles, punctuation, capitalization, or pronouns which partly impedes communication.	The piece of writing consists of a limited range of simple and some complex grammatical forms with a moderate degree of control. Contains some errors of agreement, tense, word order, articles, punctuation, capitalization, and pronouns which impedes communication.	The piece of writing consists of a limited range of simple and some complex grammatical forms with a poor degree of control. Contains multiple errors of agreement, tense, word order, articles, punctuation, capitalization, or pronouns which impedes communication.
Vocabulary	The piece of writing comprises a wide range of vocabulary usage, is concise, and the register is clear. The spelling does not impede communication.	The piece of writing comprises a range of vocabulary usage, is concise, and the register is clear. The spelling partly impedes communication.	The piece of writing comprises a limited range of vocabulary usage, is concise, and the register is clear. The spelling impedes communication.	The piece of writing comprises a limited range of vocabulary usage, is not concise, and the register is clear. The spelling greatly impedes communication.

APPENDIX H

Student's 21st Century Portfolio

STUDENT' S 21st CENTURY PORTFOLIO

Directions: Please write your information in the blank below.

Name				ID	M.	Group
Date		UNIT		TOPIC		
Members in my group		1.				
		2.				
		3.				
		4.				
		5.				

Directions: Please attach your work from "Applying stage" in the box below.

My paragraph writing

Directions: Please fill the information and reflect yourself in the table below.

<table>
<tr><th>Stages</th><th>My 21st Century skills</th><th>My actions</th><th>My feelings</th></tr>
<tr><td>Connecting</td><td>
<table>
<tr><th>Skills</th><th>0-25</th><th>26-50</th><th>51-75</th><th>76-100</th></tr>
<tr><td>Writing</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Collaboration</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Critical thinking</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Creative thinking</td><td></td><td></td><td></td><td></td></tr>
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<tr><td>Outlining</td><td>
<table>
<tr><th>Skills</th><th>0-25</th><th>26-50</th><th>51-75</th><th>76-100</th></tr>
<tr><td>Writing</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Collaboration</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Critical thinking</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Creative thinking</td><td></td><td></td><td></td><td></td></tr>
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<tr><td>Presenting</td><td>
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<tr><th>Skills</th><th>0-25</th><th>26-50</th><th>51-75</th><th>76-100</th></tr>
<tr><td>Writing</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Collaboration</td><td></td><td></td><td></td><td></td></tr>
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<tr>
<td>Applying</td>
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<table>
<tr><th>Skills</th><th>0-25</th><th>26-50</th><th>51-75</th><th>76-100</th></tr>
<tr><td>Writing</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Collaboration</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Critical thinking</td><td></td><td></td><td></td><td></td></tr>
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<td>Evaluating</td>
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<tr><th>Skills</th><th>0-25</th><th>26-50</th><th>51-75</th><th>76-100</th></tr>
<tr><td>Writing</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Collaboration</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Critical thinking</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Creative thinking</td><td></td><td></td><td></td><td></td></tr>
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Directions: Please write your plan towards the future work.

After you have reflected yourself, what will you do to improve your 21st century skills from this unit for better quality of a future work?

☐ Writing by

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☐ Collaboration by

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☐ Critical thinking by

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☐ Creative thinking by

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แฟ้มสะสมผลงานแห่งศตวรรษที่ 21

คำแนะนำ: โปรดเขียนข้อมูลของคุณในช่องว่างด้านล่าง

ชื่อ				เลขที่	ระดับชั้น	กลุ่ม
วันที่		บทเรียน		หัวข้อ		
สมาชิกในกลุ่มของฉัน		1.				
		2.				
		3.				
		4.				
		5.				

คำแนะนำ: **โปรดแนบผลงานของคุณจากขั้น "Applying" ในช่องด้านล่าง**

งานเขียนของฉัน

คำแนะนำ: โปรดกรอกข้อมูลและสะท้อนตัวเองในตารางด้านล่าง

<table>
<tr><th>ขั้น</th><th>ทักษะศตวรรษที่ 21 ของฉัน</th><th>สิ่งที่ฉันทำ</th><th>ความรู้สึกของฉัน</th></tr>
<tr><td>“Connecting”</td><td>
<table>
<tr><th>ทักษะ</th><th>0-25</th><th>26-50</th><th>51-75</th><th>76-100</th></tr>
<tr><td>การเขียน</td><td></td><td></td><td></td><td></td></tr>
<tr><td>การทำงานร่วมกับผู้อื่น</td><td></td><td></td><td></td><td></td></tr>
<tr><td>การคิดเชิงวิพากย์</td><td></td><td></td><td></td><td></td></tr>
<tr><td>การคิดสร้างสรรค์</td><td></td><td></td><td></td><td></td></tr>
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<tr><td>“Outlining”</td><td>
<table>
<tr><th>ทักษะ</th><th>0-25</th><th>26-50</th><th>51-75</th><th>76-100</th></tr>
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<tr><td>การคิดสร้างสรรค์</td><td></td><td></td><td></td><td></td></tr>
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เหตุผล: ……
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คำแนะนำ: โปรดเขียนแผนของคุณเกี่ยวกับงานในอนาคต

หลังจากที่คุณได้ไตร่ตรองตัวเองแล้ว คุณจะทำอะไรเพื่อพัฒนาทักษะในศตวรรษที่ 21 จากหน่วยนี้เพื่อคุณภาพที่ดีขึ้นของงานในอนาคต

☐ การเขียนโดย

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☐ การทำงานร่วมกับผู้อื่นโดย

.....

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☐ การคิดเชิงวิพากย์โดย

.....

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☐ การคิดสร้างสรรค์โดย

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APPENDIX I

Teacher's Observation Note

Directions: Please write students' details in the box below.

Group				**M.**	
Date		**UNIT**		**TOPIC**	
Students' name		**1.**			
		2.			
		3.			
		4.			
		5.			

Directions: Please document your observations in item 1 and assess your collaborative skills on a scale of 0 to 10 in item 2, along with a rationale for your rating.

Stages	**1. What did you notice from students?**	**2. How do you think about the students' collaboration skills during session?**			
		Aspects	**Characteristics**	**Rate (1-10)**	**Comments**
Connecting	.....	1. Ability to work effectively and respectfully with diverse teams	1.1 Accepting diversity, listening to opinions of group members in working together until achieving goals		
			1.2 Seeing the value of group members in work		
		2. Flexibility in working together	2.1 Adapting in a variety of work assigned to achieve the goal.		
			2.2 Reconciling in collaboration work		
		3. Shared responsibility for collaborative work	3.1 Accepting the positive and negative effects of collaborative work.		

Stages	1. What did you notice from students?	2. How do you think about the students' collaboration skills during session?
Outlining	.....	
Presenting	.....	

Outlining

Aspects	Characteristics	Rate (1-10)	Comments
1. Ability to work effectively and respectfully with diverse teams	1.1 Accepting diversity, listening to opinions of group members in working together until achieving goals		
	1.2 Seeing the value of group members in work		
2. Flexibility in working together	2.1 Adapting in a variety of work assigned to achieve the goal.		
	2.2 Reconciling in collaboration work		
3. Shared responsibility for collaborative work	3.1 Accepting the positive and negative effects of collaborative work.		

Presenting

Aspects	Characteristics	Rate (1-10)	Comments
1. Ability to work effectively and respectfully with diverse teams	1.1 Accepting diversity, listening to opinions of group members in working together until achieving goals		
	1.2 Seeing the value of group members in work		
2. Flexibility in working together	2.1 Adapting in a variety of work assigned to achieve the goal.		
	2.2 Reconciling in collaboration work		
3. Shared responsibility for collaborative work	3.1 Accepting the positive and negative effects of collaborative work.		

Stages	1. What did you notice from students?	2. How do you think about the students' collaboration skills during session?			
		Aspects	**Characteristics**	**Rate (1-10)**	**Comments**
Applying	....	1. Ability to work effectively and respectfully with diverse teams	1.1 Accepting diversity, listening to opinions of group members in working together until achieving goals		
			1.2 Seeing the value of group members in work		
		2. Flexibility in working together	2.1 Adapting in a variety of work assigned to achieve the goal.		
			2.2 Reconciling in collaboration work		
		3. Shared responsibility for collaborative work	3.1 Accepting the positive and negative effects of collaborative work.		
		Aspects	**Characteristics**	**Rate (1-10)**	**Comments**
Evaluating	....	1. Ability to work effectively and respectfully with diverse teams	1.1 Accepting diversity, listening to opinions of group members in working together until achieving goals		
			1.2 Seeing the value of group members in work		
		2. Flexibility in working together	2.1 Adapting in a variety of work assigned to achieve the goal.		
			2.2 Reconciling in collaboration work		
		3. Shared responsibility for collaborative work	3.1 Accepting the positive and negative effects of collaborative work.		

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APPENDIX J

WINVIS Opinion Questionnaire

(แบบสอบถามความคิดเห็นหลักสูตรการเขียนที่ผู้วิจัยนำมาทดลองใช้)

This questionnaire aims to investigate student opinions on learning for the research of the writing instructional model with integration of inquiry-based learning and visual literacy. Please complete the following parts and return it to the interviewer.

(แบบสอบถามนี้มีจุดมุ่งหมายเพื่อศึกษาความคิดเห็นในการเรียนรู้สำหรับการวิจัยหลักสูตรการเขียนที่ผู้วิจัยนำมาทดลองใช้ กรุณากรอกคำถามต่อไปนี้และส่งให้ผู้สัมภาษณ์)

Part 1: Personal information (ส่วนที่ 1: ข้อมูลส่วนบุคคล)

Directions: Please provide your information by marking your choice with (x) or writing a response where necessary. (คำแนะนำ: โปรดให้ข้อมูลของคุณโดยเลือกตัวเลือกที่ให้ไว้ (x) หรือเขียนคำตอบเมื่อจำเป็น)

1. Sex (เพศ): Male (เพศชาย) Female (เพศหญิง)
2. Age (อายุ): ☐ 16 ☐ 17 ☐ 18 ☐
   ☐ Other (Please specify ……) (อื่นๆ โปรดระบุ……)
3. Number of years of studying English: (จำนวนปีที่เรียนภาษาอังกฤษ)_____ years (ปี)
4. Do you like studying English?
   (คุณชอบเรียนภาษาอังกฤษไหม)
   ☐ I like it very much (ฉันชอบมาก) ☐ I like it (ชอบ) ☐ I don't like it (ฉันไม่ชอบ)
5. In your opinion, how important is it for you to know about English writing?
   (ในความเห็นของคุณ การรู้การเขียนภาษาอังกฤษมีความสำคัญแค่ไหน)
   ☐ Very important (สำคัญมาก) ☐ Important (สำคัญ) ☐ Not important (ไม่สำคัญ)
6. Did you take the O-NET examination in grade 9?
   (คุณเคยสอบ O-NET ตอนมัธยมศึกษาปีที่ 3 ไหม)
   ☐ Yes (เคย) ☐ No (ไม่เคย)

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Part 2: Statements about learning (ส่วนที่ 2: ข้อความเกี่ยวกับการเรียนรู้)

Directions: Please read each statement carefully, and then mark your response with a " ✓ " in the space corresponding to what extent you agree with each statement.

(คำแนะนำ: โปรดอ่านข้อความแต่ละข้ออย่างละเอียด แล้วทำเครื่องหมายคำตอบของคุณด้วย " ✓ " ในช่องที่เกี่ยวข้องว่าคุณเห็นด้วยกับแต่ละข้อความมากน้อยเพียงใด)

Statement ข้อความ	**Level of agreement** ระดับความเห็นด้วย			
	4 Strongly agree	**3 agree**	**2 disagree**	**1 Strongly disagree**
Learning and Writing Development การพัฒนาการเรียนรู้และการเขียน				
1. I understand paragraph writing after taking this course (1. ฉันเข้าใจการเขียนย่อหน้าหลังจากเรียนรายวิชานี้)				
2. I can explain the components of paragraph writing (2. ฉันสามารถอธิบายเกี่ยวกับส่วนประกอบของการเขียนย่อหน้าได้)				
3. I understand opinion paragraph writing (3. ฉันเข้าใจการเขียนย่อหน้าแสดงความคิดเห็น)				
4. I can write an opinion paragraph (4. ฉันสามารถเขียนย่อหน้าแสดงความคิดเห็นได้)				
Instructional Method, Materials and Instructor วิธีการสอน สื่อ และผู้สอน				
5. The instructional method suitable for learning on this course (5. วิธีการสอนเหมาะสมกับการเรียนหลักสูตรนี้มากน้อยเพียงใด)				
6. The instructional method has helped me with learning on this course (6. วิธีการสอนช่วยให้ฉันเรียนรู้รายวิชานี้)				
7. The handouts are suitable for learning on this course (7. เอกสารที่แจกเหมาะสำหรับการเรียนรู้รายวิชานี้)				
8. The learning materials are suitable for learning on this course (8. สื่อการเรียนรู้เหมาะสมกับการเรียนรายวิชานี้)				

Statement ข้อความ	Level of agreement ระดับความเห็นด้วย			
	4 Strong agree	3 Agree	2 Disagree	1 Strong disagree
Instructional Method, Materials and Instructor วิธีการสอน สื่อ และผู้สอน				
9. The instructor understands paragraph writing (9. ผู้สอนเข้าใจการเขียนย่อหน้า)				
10. The instructor can explain clearly and systematically. (10. ผู้สอนสามารถอธิบายได้อย่างชัดเจนและเป็นระบบ)				
11. The instructor allows me to practice. (11. ผู้สอนได้ให้ฉันฝึกฝน)				
12. The instructor provides useful suggestions. (12. ผู้สอนได้ให้คำแนะนำที่เป็นประโยชน์)				
Learning Satisfaction and Overall Opinions ความพึงพอใจในการเรียนรู้และความคิดเห็นโดยรวม				
13. I am satisfied with my learning on this course. (13. ฉันพอใจกับการเรียนในรายวิชานี้)				
14. I am satisfied with the instructional method (14. ฉันพอใจกับวิธีการเรียนการสอน)				
15. I am satisfied the instructor's teaching (15. ฉันพอใจกับการสอนของผู้สอน)				
16. I am satisfied the classroom atmosphere on this course (16. ฉันพอใจกับบรรยากาศในห้องเรียนในรายวิชานี้)				
17. I am satisfied the learning and teaching materials. (17. ฉันพอใจกับสื่อการเรียนการสอน)				
18. I am confident in my paragraph writing (18. ฉันมั่นใจในการเขียนย่อหน้า)				
19. I have developed my paragraph writing. (19. ฉันได้พัฒนาการเขียนย่อหน้า)				
20. This course will be useful to me in the future. (20. รายวิชานี้มีประโยชน์กับฉันในอนาคต)				

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Part 3: Additional comments (ส่วนที่ 3: ความคิดเห็นเพิ่มเติม)

Directions: Please read each item carefully, and then write your response below. You can write in English or Thai language depending on your preference.

(คำแนะนำ: โปรดอ่านคำถามแต่ละข้ออย่างละเอียด แล้วเขียนคำตอบของคุณด้านล่าง คุณสามารถเขียนเป็นภาษาอังกฤษหรือภาษาไทยได้ขึ้นอยู่กับความต้องการของคุณ)

1. Please evaluate your overall satisfaction with the WINVIS course (กรุณาประเมินความพึงพอใจต่อหลักสูตรการเขียนที่ผู้วิจัยนำมาทดลองใช้โดยรวม)

_____
_____
_____
_____
_____
_____

2. Please comment on the instructional method (กรุณาแสดงความคิดเห็นเกี่ยวกับวิธีการสอน)

_____
_____
_____
_____
_____
_____

3. Please comment on the handouts and the teaching materials (กรุณาแสดงความคิดเห็นเกี่ยวกับเอกสารที่แจกและสื่อการสอน)

_____
_____
_____
_____
_____
_____

4. Please leave any other comments not covered above (กรุณาแสดงคิดเห็นอื่นนอกเหนือที่กล่าวไป)

_____
_____
_____
_____
_____
_____

Thank you for your cooperation (ขอบคุณสำหรับความร่วมมือของคุณ**)**

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APPENDIX K

Semi-Structured Focus Group Questions

Research Title: *Effects of the writing instructional model with integration of inquiry-based learning and visual literacy on 21st century skills of EFL learners*

Interview Schedule	Expected duration: _____ mins
Interviewee: _____	Interview began: _____
Date: _____	Interview finished: _____
Place: _____	Actual duration: _____ mins

Questions:

1. What have you learnt from the course? Describe your learning development if possible.

   (คุณได้เรียนรู้อะไรจากรายวิชานี้บ้าง อธิบายพัฒนาการการเรียนรู้ของคุณ)

2. What do you think about the course? How is this course important for your development of paragraph writing?

   (คุณคิดอย่างไรเกี่ยวกับรายวิชานี้ รายวิชานี้มีความสำคัญต่อการพัฒนาการเขียนย่อหน้าอย่างไร)

3. What do you think about the instructional method and what do you think about the instructor's teaching? How are they important for your learning and writing development?

   (คุณคิดอย่างไรเกี่ยวกับวิธีการสอน คุณคิดอย่างไรเกี่ยวกับผู้สอนในการสอน และคิดว่าวิธีการสอนกับผู้สอนมีความสำคัญต่อพัฒนาการด้านการเรียนรู้และการเขียนของคุณอย่างไร)

4. What do you think about the handouts or other learning materials?

   (คุณคิดอย่างไรเกี่ยวกับเอกสารที่แจกหรือสื่อการเรียนรู้อื่นๆ)

5. Do you think the course was a success? Did it help you develop the writing skills as you expected?

   (คุณคิดว่ารายวิชานี้ ประสบความสำเร็จหรือไม่ ช่วยให้คุณพัฒนาทักษะการเขียนได้อย่างที่คุณคาดหวังหรือไม่)

6. What are the advantages of this course? What are the disadvantages of this course?

   (ข้อดีของรายวิชานี้คืออะไร ข้อเสียของรายวิชานี้คืออะไร)

7. What are your suggestions for improving this course, regarding the instructional method and materials, and the instructor?

   (คุณมีข้อเสนอแนะอะไรเกี่ยวกับรายวิชานี้ วิธีการสอนและสื่อการสอน และอาจารย์ผู้สอน)

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APPENDIX L

List of Experts Validating Instruments

A. Expert Validating instructional manual, lesson plans, and handout

1. Rin Cheep-aranai, Ph.D.
   Faculty of Education, Silpakorn University
2. Assist. Prof. Piboon Sukvijit Barr, Ph.D.
   School of Liberal Arts, Sripatum University
3. Patricia Visser, Ph.D.
   Language Centre, Srinakharinwirot University

B. Expert Validating 21st century test, 21st century rubric, and students' collaboration questionnaire.

1. Nattharmma Thong-iam, Ph.D.
   Faculty of Education, Burapha University
2. Sasithorn Limkomolvilas, Ph.D.
   Chulalongkorn University Language Institute, Chulalongkorn University
3. Nutchayaporn Jaritngarm, Ph.D.
   Chulalongkorn University Language Institute, Chulalongkorn University

C. Expert Validating student's 21st century portfolio and Teacher's observation Field note

1. Thapanee Wongprom, Ph.D.
   Director of Punjadee School, Punjadee School
2. Suparuthai It-ngarm, Ph.D.
   Burapha University Language Institute, Burapha University,
3. Sawaros Jaiprasong, Ph.D.
   Language Centre, Srinakharinwirot University

D. Expert validating WINVIS opinion questionnaire and Semi-structure interview questions

1. Chariya Prapobratanakul, Ph.D.
   Chulalongkorn University Language Institute, Chulalongkorn University
2. Abhinan wongkittiporn, Ph.D.
   Faculty of Liberal Arts, Rangsit University
3. Nattharath Leenakitti, Ph.D.
   Chulalongkorn University Language Institute, Chulalongkorn University

APPENDIX M

The Certificate for Proofread the Research

ไอเดียล พาร์ทเนอร์ กรุ๊ป
Ideal Partner Group

No. IDP049/2021

Ideal Partner Group Ltd., Part.
299/4 Moo 14, Wangsapung,
Wangsapung, Loei, Thailand 42130

June 08, 2021

To whom it may concern,

Please kindly accept this letter as confirmation that we have proofread the research mentioned in my capacity as English Native Speaker on behalf of the author: **Patsawut Sukserm**

Research title:

EFFECTS OF THE WRITING INSTRUCTIONAL MODEL WITH INTEGRATION OF INQUIRY-BASED LEARNING AND VISUAL LITERACY ON 21ST CENTURY SKILLS OF EFL LEARNERS

The editor who worked on this document was:

Mr. John Ross

Should you have any questions regarding the service provided, please do not hesitate to contact us.

Best Regards,

(Miss Tansuta Buabanbut)
Sales Manager
Ideal Partner Group Ltd., Part.
Mobile: (+66) 87-8314-785
Email: translationfind@gmail.com
Website:www.proofreading.translationfind.com

APPENDIX N

The IOC Index Results

A. Instructional manual, lesson plans, and handout

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
Lesson Layout and Design					
1.	The layout and design of the lesson plan are appropriate and clear.	-1	1	0	0
2.	The sequence of the lesson plan is appropriate.	-1	1	0	0
3.	The language used in the lesson plan is accurate and clear.	1	1	1	1
Total					0.33
Objectives					
4.	The terminal objective is appropriate.	0	1	0	0.33
5.	The enabling objectives are related to the terminal objective.	1	1	0	0.67
6.	The enabling objectives are appropriate.	0	1	0	0.33
	Total				0.44
Class session					
7.	Time allotment of each activity is appropriate.	-1	1	0	0
8.	The materials used in the lesson plan are appropriate.	0	1	1	0.67
9.	The pedagogical procedures in the lesson plan are appropriate.	0	1	1	0.67
10.	Activity A: Think of the interesting topic is appropriate.	0	1	0	0.33
11.	Activity B: Design your own interest is appropriate.	0	1	0	0.33
12.	Activity C: Compose your writing is appropriate.	0	1	0	0.33
13.	Activity D: Improve your writing is appropriate.	0	0	0	0
14.	Activity E: Check the component of paragraph is appropriate.	0	1	1	0.67
15.	The pedagogical procedures in the lesson plan are appropriate to develop written communication skills (content, organization, grammatical structure, and vocabulary)	-1	0	0	0

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No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
16.	The pedagogical procedures in the lesson plan are appropriate to develop collaboration skills (ability to work effectively and respectfully with diverse teams, flexibility in working together, and shared responsibility for collaborative work)	1	1	1	1
17.	The pedagogical procedures in the lesson plan are appropriate to develop Critical thinking skills (reasoning as appropriate to the situation, analyzing visual materials, evaluating visual materials, synthesizing between visual materials and arguments, interpreting conclusions)	0	1	1	0.67
18.	The pedagogical procedures in the lesson plan are appropriate to develop Creative thinking skills (fluency, flexibility, and originality)	-1	1	0	0
	Total				0.39

B. 21st century test

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
Task 1: Select your own choice					
1.1	The task assesses the test takers' critical thinking skills	1	1	1	1
	1.1.1 Reasoning (Why do you select this figure to write for the project of "New world in 21st century era"?)	1	1	1	1
	1.1.2 Analyzing (What is the most important element or part in the figure you have selected?)	1	1	0	0.67
	1.1.3 Evaluating (What are the pros and cons of the chosen figure?)	1	1	0	0.67
	1.1.4 Synthesizing (What is the relationship between the chosen figure and your experiences ?)	1	1	-1	0.33
	1.1.5 Interpreting (After analyzing the figure, what can be concluded from it?)	1	1	1	1
Total					0.78
Task 2: Outline your ideas					
2.1	The task assesses the test takers' creative thinking skills				

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
	2.1.1 Fluency	1	1	1	1
	2.1.2 Flexibility	1	1	1	1
	2.1.2 Originality	1	1	1	1
Total					1
Task 3: Compose your work					
3.1	The task assesses the test takers' written communication skills				
	3.1.1 Content	1	1	1	1
	3.1.2 Organization	1	1	0	0.67
	3.1.3 Grammatical structure	1	1	1	1
	3.1.4 Vocabulary	1	1	1	1
Total					0.89
Others					
4.1	The time allocation (60 minutes) is appropriate for the test tasks to complete the three tasks.	0	1	0	0.67
4.2	Appropriate content	1	1	1	1
4.3	Appropriate language use	1	1	1	1
4.4	Appropriate students' level	1	1	1	1
4.5	Appropriate form	1	1	1	1
Total					0.93

C. Students' collaboration questionnaire

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
Aspect 1: Ability to work effectively and respectfully with diverse teams					
1.1	Accepting diversity, listening to opinions of group members in working together until achieving goals				
1	I accept rules while working in group. (ฉันยอมรับกฎขณะทำงานเป็นกลุ่ม)	1	1	1	1
2	I can accept group members from different groups. (ฉันสามารถรับสมาชิกจากกลุ่มต่างๆได้)	1	1	1	1
3	I understand the role when working with group members.	1	1	1	1

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
	(ฉันเข้าใจบทบาทเมื่อทำงานกับสมาชิกในกลุ่ม)				
4	I accept comments from group members. (ฉันยอมรับความคิดเห็นจากสมาชิกในกลุ่ม)	1	1	1	1
5	I can work together with group members to achieve the goals. (ฉันสามารถทำงานร่วมกับสมาชิกในกลุ่มเพื่อให้บรรลุเป้าหมาย)	1	1	1	1
6	I listen to what group members recommend and apply it. (ฉันรับฟังสิ่งที่สมาชิกในกลุ่มแนะนำและนำไปใช้)	1	1	1	1
7	I was able to successfully adapt to working with group members. (ฉันสามารถปรับตัวเข้ากับการทำงานร่วมกับสมาชิกในกลุ่มได้สำเร็จ)	0	1	1	0.67
1.2	Seeing the value of group members in work				
8	I understand and accept the ability of group members. (ฉันเข้าใจและยอมรับความสามารถของสมาชิกในกลุ่ม)	1	1	1	1
9	I give encouragement when group members feel discouraged. (ฉันให้กำลังใจเมื่อสมาชิกในกลุ่มรู้สึกท้อแท้)	1	1	1	1
10	I show positive feelings towards group members. (ฉันแสดงความรู้สึกเชิงบวกต่อสมาชิกในกลุ่ม)	1	1	1	1
11	I do not use bad behavior to group members while they ask. (ฉันไม่ใช้พฤติกรรมที่ไม่ดีกับสมาชิกในกลุ่มในขณะที่พวกเขาถาม)	0	1	1	0.67
12	I do not use bad behavior to group members while explaining to them. (ฉันไม่ใช้พฤติกรรมที่ไม่ดีต่อสมาชิกในกลุ่มในขณะที่อธิบายให้พวกเขาฟัง)	0	1	1	0.67
	Aspect 2: Flexibility in working together				
2.1	Adapting in a variety of work assigned to achieve the goal.	1	1	1	1
13	I can work together with group members for a specified amount of time. (ฉันสามารถทำงานร่วมกับสมาชิกกลุ่มได้ตามระยะเวลาที่กำหนดได้)	1	1	1	1
14	I can work towards achieving goals within a specified time period. (ฉันสามารถทำงานให้บรรลุเป้าหมายภายในระยะเวลาที่กำหนดได้)	1	1	1	1
15	I can answer questions with different ideas. (ฉันสามารถตอบคำถามด้วยแนวคิดที่แตกต่างกัน)	1	1	0	0.67

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
16	I understand and listen to the different opinions of group members. (ฉันเข้าใจและรับฟังความคิดเห็นที่แตกต่างของสมาชิกในกลุ่ม)	1	1	1	1
17	I can explain to each group member to understand. (ฉันสามารถอธิบายให้สมาชิกกลุ่มแต่ละคนเข้าใจได้)	1	1	1	1
	2.2 Reconciling in collaboration work	1	1	1	1
18	I use polite words when I have problems in group work. (ฉันใช้คำพูดที่สุภาพเมื่อฉันมีปัญหาในการทำงานกลุ่ม)	1	1	1	1
19	I have an expression of working towards group members with appropriate behaviors. (ฉันแสดงออกถึงการทำงานต่อสมาชิกในกลุ่มด้วยพฤติกรรมที่เหมาะสม)	1	1	1	1
20	I use words in the collaborative work to treat kindness in group members. (ฉันใช้คำพูดในการทำงานร่วมกันเพื่อรักษาความกรุณาต่อสมาชิกในกลุ่ม)	0	0	0	0*
21	I can control the emotions while working. (ฉันสามารถควบคุมอารมณ์ขณะทำงานได้)	1	1	1	1
	Aspect 3: Shared responsibility for collaborative work				
3.1	accepting the positive and negative effects of collaborative work.	1	1	1	1
22	I can answer questions that group members have asked correctly. (ฉันสามารถตอบคำถามที่สมาชิกในกลุ่มถามได้อย่างถูกต้อง)	1	1	1	1
23	I understand my role and responsibilities in group collaboration. (ฉันเข้าใจบทบาทและความรับผิดชอบของฉันในการทำงานร่วมกันเป็นกลุ่ม)	1	1	1	1
24	I can achieve the group's goals. (ฉันสามารถบรรลุเป้าหมายของกลุ่มได้)	1	1	1	1
25	I recommend my lessons and can teach to group members. (ฉันแนะนำบทเรียนของฉันและสามารถสอนกับสมาชิกในกลุ่มได้)	1	1	1	1
26	I can explain the knowledge that I have been assigned completely. (ฉันสามารถอธิบายความรู้ที่ฉันได้รับมอบหมายได้อย่างสมบูรณ์)	1	1	0	0.67
27	I studied my assigned lessons as targeted. (ฉันศึกษาบทเรียนที่ได้รับมอบหมายตามเป้าหมาย)	1	1	1	1
28	Other comments about your collaboration skills	1	1	1	1

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
	Total				0.91

D. 21st century rubric

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
Task 1: Select your own choice					
Critical thinking skills					
Reasoning	The ability to use inductive or deductive reasons to explain the arguments, claims, or assumption.	1	0	1	0.67
Analyzing	The ability to identify the elements in a reasoned case	1	0	1	0.67
Evaluating	The ability to judge the credibility, evidence, arguments or claims	1	0	1	0.67
Synthesizing	The ability to make connection among information and arguments	1	1	1	1
Interpreting	The ability to make inferences or conclusions based on analysis	0	0	1	0.67
Total					0.74
Task 2: Outline your ideas					
Creative thinking skills					
Fluency	The ability to list as many ideas, answers, or possibilities to a given issues.	1	0	1	0.67
Flexibility	The ability to develop alternative ideas, options, or possibilities to a given issues.	1	1	1	1
Originality	The ability to invent new unique or response or possibilities that are probably not have been invented.	1	1	1	1
Total					0.89
Task 3: Compose your work					
Writing Communication skills					
Content	The piece of paragraph writing presents the relevant ideas to the task and addresses all given questions in the task. Thesis statements, topic sentences, body, and conclusions are clear.	1	0	1	0.67
Organization	The piece of paragraph writing contains well-organized sequences of	1	0	1	0.67

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
	information logically by using the proper transition words, linking words, or cohesive devices within paragraph.				
Grammatical structure	The piece of paragraph writing consists of a range of simple and some complex grammatical forms with a good degree of control. Containing few errors of agreement tense, word order, articles, punctuation, capital, or pronouns does not also impede communication.	1	1	1	1
Vocabulary	The piece of paragraph writing comprises a range of vocabulary usage, concise vocabulary word, and register good. Also, the spelling does not also impede communication.	1	1	1	1
Total					0.84

E. Student's 21st century portfolio and Teacher's observation note

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
1. Part 1: Personal Information					
1.1	Appropriate content	1	1	1	1
1.2	Appropriate language use	1	1	1	1
1.3	Appropriate students' level	1	1	1	1
1.4	Appropriate form	0	1	1	0.67
Total					0.92
2. Part 2: Your task					
2.1	Appropriate content	1	1	1	1
2.2	Appropriate language use	1	1	1	1
2.3	Appropriate students' level	1	1	1	1
2.4	Appropriate form	1	0	1	0.67
	Total				0.92
3. Part 3: Your reflection					
3.1	Appropriate content	1	1	1	1
3.2	Appropriate language use	1	0	0	0.33*
3.3	Appropriate students' level	1	1	1	1
3.4	Appropriate form	0	0	0	0
	Total				0.58*
4. Part 4: Your plan toward the next unit					
4.1	Appropriate content	0	1	1	0.67

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
4.2	Appropriate language use	1	0	1	0.67
4.3	Appropriate students' level	1	1	1	1
4.4	Appropriate form	0	1	1	0.67
	Total				0.75
5.	**Teacher's observation note**				
5.1	Appropriate content	1	1	1	1
5.2	Appropriate language use	1	0	1	0.67
5.3	Appropriate students' level	1	1	1	1
5.4	Appropriate form	0	0	0	0
	Total				0.67

F. WINVIS opinion questionnaire

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
1.	**Part 1: Personal Information**				
	1.Sex	0	1	1	0.67
	2. Age	1	1	1	1
	3. Years of studying English	1	1	1	1
	4. In your opinion, how much do you like to study English?	1	1	1	1
	5. In your opinion, how important it is for you to know writing in English class?	1	1	1	1
	6. ONET score in grade 9	1	1	1	1
	Total				0.95
2.	**Part 2: Questions about learning**				
2.1	Learning and Writing Development				
	1. How much did you understand paragraph writing after taking this course?	1	1	1	1
	2. To what extent can you explain about the components of paragraph writing?	1	1	1	1
	3. To what extent do you understand an opinion paragraph?	1	1	1	1
	4. To what extent can you write an opinion paragraph?	1	1	1	1
2.2	Instructional Method, Materials and Instructor				
	5. To what extent is the teaching method suitable for learning this course?	1	1	1	1
	6. To what extent has the teaching method helped you with learning this course?	1	1	1	1
	7. To what extent is the handout suitable for learning this course?	1	1	1	1

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
	8. To what extent are the learning materials suitable for learning this course?	1	1	1	1
	9. To what extent does the instructor understand paragraph writing?	1	1	1	1
	10. To what extent can the instructor explain clearly and systematically?	1	1	1	1
	11. To what extent does the instructor allow you to practice as well as providing useful suggestions?	1	1	1	1
2.3	Learning Satisfaction and Overall Opinions				
	12. To what extent are you satisfied with your learning in this course?	1	1	1	1
	13. To what extent are you satisfied with the instructional method?	1	1	1	1
	14. To what extent are you satisfied with the instructor?	1	-1	1	0.33*
	15. To what extent are you satisfied with the classroom atmosphere?	1	1	0	0.67
	16. To what extent are you satisfied with the learning and teaching materials?	1	1	1	1
	17. To what extent are you confident in your paragraph writing?	1	1	1	1
	18. To what extent have you developed your paragraph writing?	1	1	1	1
	19. To what extent is this course useful for you?	1	0	1	0.67
	Total				0.93
3. Part 3: Additional Comments					
3.1	1. Evaluate your satisfaction with WINVIS course	1	0	1	0.67
3.2	2. Comments on instruction method	1	1	1	1
3.3	3. Comments on the handout and the teaching materials	1	1	1	1
3.4	4. Other comments	1	1	1	1
	Total				0.92

G. Semi-structure interview questions

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
1. Part 1: Interview Schedule					
1.1	Appropriate content	1	1	1	1
1.2	Appropriate language use	1	1	1	1

No.	Items	Expert's opinion			Total
		No.1	No.2	No.3	
1.3	Appropriate students' level	1	-1	1	0.33
1.4	Appropriate form	1	1	1	1
Total					0.83
2. Part 2: Questions					
2.1	What have you learnt from the course? Describe your learning development if possible.	1	1	1	1
2.2	What do you think about the course? How is this course important for your development of paragraph writing?	1	1	1	1
2.3	How do you think about the teaching method? What do you think about the instructor? and How are they important for your learning and writing development?	1	1	1	1
2.4	What do you think about the handout or the other learning materials?	1	1	1	1
2.5	Have you found the course successful? Does it help you develop the writing skills as you expected?	1	1	1	1
2.6	What are the advantages of the course? What are the disadvantages of the course?	1	1	1	1
2.7	What are your suggestions for the course, the teaching method and materials, and the instructor?	1	1	1	1
	Total				1

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