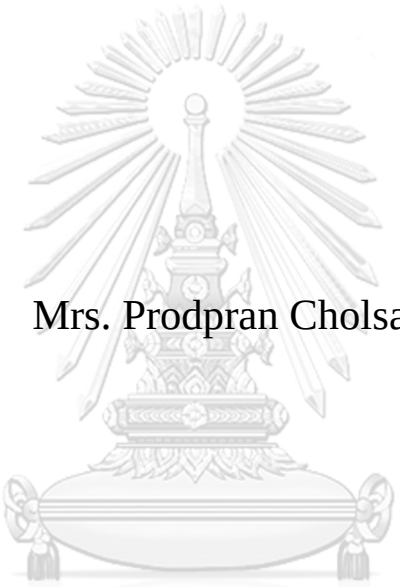
The Effects of Differentiated Reading Instruction on Reading Comprehension and Self-Efficacy of Undergraduate Students

Mrs. Prodpran Cholsakorn



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ผลการสอนอ่านตามความสามารถของผู้เรียนที่มีต่อความเข้าใจในการอ่านภาษาอังกฤษและการรับรู้สมรรถนะแห่งตนของผู้เรียนในระดับปริญญาบัณฑิต

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งานวิจัยนี้จัดทำขึ้นโดยมีวัตถุประสงค์เพื่อศึกษาผลของการสอนอ่านตามความสามารถของผู้เรียนที่มีต่อความเข้าใจในการอ่านภาษาอังกฤษและการรับรู้สมรรถนะแห่งตนของผู้เรียนภาษาอังกฤษในระดับปริญญาบัณฑิต งานวิจัยนี้แสดงให้เห็นถึงการพัฒนาทั้งด้านการอ่านภาษาอังกฤษและการรับรู้สมรรถนะแห่งตนของผู้เรียนหลังการทดลอง กลุ่มตัวอย่างคือนักศึกษาที่ลงเรียนวิชาภาษาอังกฤษสำหรับนักวิทยาศาสตร์จำนวนสามสิบสามคน มีการวัดผลด้านความสามารถในการอ่านภาษาอังกฤษและการรับรู้สมรรถนะแห่งตนของผู้เรียนก่อนการทดลอง คะแนนจากการวัดผลก่อนเรียนด้านความสามารถในการอ่านถูกนำมาใช้ในการแบ่งกลุ่มนักศึกษาเป็นสองกลุ่มคือ กลุ่มความสามารถระดับอ่อนและกลุ่มความสามารถระดับกลาง การวัดผลหลังการทดลองทั้งด้านความสามารถในการอ่านภาษาอังกฤษและการรับรู้สมรรถนะแห่งตนทำขึ้นเพื่อวัดการพัฒนาทั้งสองด้านของกลุ่มตัวอย่าง เนื้อหาของบทเรียน ขั้นตอนการเรียนการสอนและการวัดผลงานของนักศึกษาถูกแบ่งเป็นสองระดับสำหรับนักศึกษาสองกลุ่ม ในการปรับเนื้อหาบทเรียนและขั้นตอนการเรียนการสอนให้เหมาะแก่ตามความสามารถของผู้เรียนนั้น ผู้เรียนกลุ่มที่มีความสามารถระดับอ่อนได้เนื้อหาเรื่องที่อ่านและกิจกรรมที่ถูกทำให้ง่ายขึ้น ในขณะที่ผู้เรียนกลุ่มที่มีความสามารถระดับกลางได้รับเนื้อหาที่และกิจกรรมที่เป็นไปตามระดับปกติของผู้เรียนในระดับปริญญาบัณฑิต การช่วยเหลือจากผู้สอนที่มีให้กับทั้งสองกลุ่มผู้เรียนแตกต่างกันไปตามระดับของผู้เรียน เกณฑ์ในการวัดผลงานของนักศึกษาทั้งสองกลุ่มถูกปรับให้เป็นไปตามความเหมาะสมของแต่ละระดับความสามารถของผู้เรียน ผลจากการวิเคราะห์ข้อมูลเชิงปริมาณพบว่าคะแนนการทดสอบความสามารถหลังเรียนทั้งทางด้านการอ่านและการรับรู้สมรรถนะแห่งตนเพิ่มขึ้นอย่างมีนัยสำคัญโดยเฉพาะในกลุ่มนักศึกษาที่มีความสามารถระดับอ่อน ค่าสัมประสิทธิ์สหสัมพันธ์บ่งชี้ให้เห็นว่าความสามารถในการอ่านภาษาอังกฤษของผู้เรียนไม่มีความสัมพันธ์กันกับการรับรู้สมรรถนะแห่งตนของผู้เรียน อย่างไรก็ตามผลการวิเคราะห์ข้อมูลเชิงคุณภาพพบว่าผู้เรียนมีเจตคติในทางบวกต่อการเรียน จากผลการศึกษาดังกล่าวสามารถสรุปได้ว่าการสอนอ่านตามความสามารถของผู้เรียน สามารถนำไปใช้พัฒนาความเข้าใจในการอ่านภาษาอังกฤษและการรับรู้สมรรถนะแห่งตนของผู้เรียนภาษาอังกฤษในระดับปริญญาบัณฑิตได้อย่างมีประสิทธิผล

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Prodpran Cholsakorn : The Effects of Differentiated Reading Instruction on Reading Comprehension and Self-Efficacy of Undergraduate Students . Advisor: Asst. Prof. CHATRAPORN PIAMSAI, Ph.D

This study examined the effects of differentiated reading instruction (DRI) on the reading comprehension and self-efficacy of undergraduate students. The study indicated their improvement in both areas after the intervention. Thirty-three students attending the course of English for Scientists were chosen for the study. The pre-test in reading comprehension and the self-efficacy questionnaire were administered before the intervention. The scores of the pre-test of reading comprehension were used to divide the students into two groups according to their level of reading proficiency: lower-proficiency level students and higher-proficiency level students. The post-test of reading comprehension and that of self-efficacy was administered after the course to measure the students' improvement. The content, process and product were tiered to accommodate students' learning in each group. To differentiate the content and process, the materials were tiered according to each group's reading ability level. Intermediate-level students received the on-level texts while beginner-level students received the simplified texts. Scaffolding was also provided to the students to help their reading according to their proficiency. To differentiate the product or students' performance, the criteria for assessing students' presentation were also adjusted to suit the level of the students. The findings showed a significant improvement in both reading comprehension and self-efficacy, with more significant improvement in the lower-level proficiency group. The correlation coefficient suggested that there was no relationship between students' reading comprehension and self-efficacy. However, the positive attitudes of students toward DRI were evidenced. Based on the study findings, it could be concluded that DRI could be effectively implemented to promote students' reading comprehension and self-efficacy.

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CHAPTER I
INTRODUCTION

1.1 Background of the study

Language is a social tool which speakers use to make meaning in terms of spoken form or in written form (Berns, 1990). English is an international language of the world and has become the lingua franca for all people. The number of people using English as their native language is about 400-500 million, while the number of people using English as a second language around the world is about 500-1000 million (Crystal, 2012). With the increased growth of English, being able to understand English is beneficial for people in connecting to the world internationally. That is why English Language Teaching (ELT) has become important as it can equip people with a tool for communicating with others who use different native languages (McKay, 2002).

In ELT, the four language skills that are listening, speaking, reading and writing are all important because they are the key elements of learners' overall proficiency of English. People from different countries learn English to serve their purposes. Some would like to be able to access information or knowledge online. Many people would like to broaden their opportunities in their jobs. There are many more reasons to study English and to improve all skills of listening, speaking, reading and writing. However, the importance of the English reading skill is dominant in many contexts as it serves as a medium used to acquire new information in a second or foreign language. Reading skill is also seen as a meaning-maker process, which is an important component to the success of English language learners these days. It is one of the most important skills language learners need for their academic success. Many second language learners require good reading skills in English and reading has always been a core part of English language teaching curriculum (Richards, 2015).

In terms of general communication, reading is a tool that connects writers and readers through various kinds of texts. Literal and hidden meanings from the writers can be conveyed to the readers through written texts. For academic achievement and professional development, reading is a very important part of language proficiency

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influencing the learners' success. In higher education levels, where the texts are usually more complex, reading is considered quite difficult in the literacy situation, especially for those less able readers. The skill of reading is not only important in itself, but it contributes to the other three skills. Reading can help develop language proficiency and enhance views of the world. Noor (2006) stated that reading is a foundation skill that facilitates other learning. It is the most prominent academic skill for university students. Anderson (1999) also mentioned that reading is an essential skill for ESL and EFL students to focus on so that they can have better progress and development in all academic levels. Many institutions require their undergraduate level students to read texts that have not been translated into the mother tongue. It is important for university students to be efficient readers in order that they can receive the content they are required to achieve. This makes reading the most important academic skill for university students.

In Thailand, there are small chances for the majority of students in Thailand to become acquainted with professional English except to join in English classes. Therefore, it is important that English courses provide benefits for students as much as possible. Having good reading skills is important for students especially for tertiary education because English courses tend to use reading-based tests. Reading skills are usually included in all of the high-stakes examinations, for example, the national entrance examination, placement examination and summative examinations in most English courses. Many students face problems in reading, especially in academic settings and tend to gain scores below the satisfying level (O'Donnell, 2011). The students tend not to be able to make sense of the texts being processed, especially when it is in an academic reading text. One of the goals to produce efficient readers is to enhance reading comprehension in order that the skill can support other learning.

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Most universities usually put students in one large classroom according to their major or division. Unfortunately, with this class management, the students are put into an academic environment regardless of their appropriate proficiency level because of administrative and resource limitations. This leads to the fact that the range of students' level in one class might be too big, causing the tasks and activities unfit or inappropriate for all of the students. According to Tomlinson (2001) and McBride (2004), the one-size fits-all curriculum can never meet the needs of learners because

not everyone learns in the same way. Consequently, the class that provides individualized scaffolding and support would be beneficial for all students. Differentiated instruction is seen as the way to support students who have to study in the class in which students have various abilities. Tomlinson (2000) proposed that a differentiated class is designed to meet individual needs with the use of a flexible grouping approach. Differentiation is one of the instructional approaches that help achieve the goals of individual differences. In this kind of class, teachers accept that students differ from each other in several perspectives; therefore, they prepare and design a course according to students' interests, abilities, and learning styles using various ways to present lessons that help improve students' ability. According to Green (1999), being able to identify a student's learning profile can accommodate and assist students to achieve academically and improve their attitudes toward learning.

According to (Chapman & King, 2008), to create classrooms that provide more opportunities for students in terms of their needs and ability, maintaining a comfortable, accepting, and relaxed atmosphere is necessary. Without being pushed too much, all the students are motivated unconsciously. Students who are motivated intrinsically are believed to enjoy learning and eventually improve their reading (Sheldon et al., 2001). In differentiated instruction, apart from trying to serve students' needs and readiness, the class enhances motivation that can create self-efficacy in students in learning. Reading tasks usually consist of boring activities for students to complete, therefore, keeping them motivated is one of the keys to enhance successful readers. Self-efficacy is an internal motivation that can enhance a learner who used to believe in their inability to become a more competent learner (Chapman & King, 2009).

To design differentiated instruction classes, it is important to acknowledge various students' backgrounds, readiness levels, interests and learning styles (Hall, 2002). Identifying student's aspects enables teachers to highlight students' strengths and weaknesses. Moreover, students with past failure tend to possess negative attitudes toward learning. Consequently, one of the concepts that have been explored as the way to enhance academic success in students is self-efficacy. A person with a low sense of self-efficacy tends to possess negative thoughts and think of difficult tasks as threatening (Suraya & Ali, 2009). In Thailand, where English is used as a

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foreign language, the opportunity for students to expose themselves to the practical English language is limited. Therefore, with insufficient chances to practice English language, Thai language learners tend to feel insecure when they have to perform in English. It is important to build self-confidence for learners in order that they can become successful language learners. According to (Bandura, 1984), self-efficacy has a crucial influence in the learning process by helping students to progress academically and cognitively. People with a strong sense of self-efficacy tend to overcome obstacles they might be facing because they would find difficulties challenging. On the other hand, those who have a low sense of self-efficacy usually find difficult tasks threatening. The self-efficacy theory focuses on the judgment of a person's capabilities to do specific tasks to attain a desired goal. Higher levels of self-efficacy will lead to students' persistence on tasks to overcome obstacles. Therefore, self-efficacy enhancement is one of the ways to improve students' progress in learning.

To enhance students' proficiency, giving them knowledge alone cannot ensure students' effective practice. They should be guided by a belief in their ability to use knowledge effectively (Bandura, 1997). Self-efficacy motivates learners to adapt and change, which then influences performance (Bandura, 1997; Schwarzer, 1992). Efficacy can be built without learners being stressed, depressed and unmotivated. Therefore, it is important for teachers to choose the instruction that is motivated and can help build self-efficacy. One of the instructions that would not cause anxiety to learners is differentiated instruction. As this teaching method is designed to fit with various levels of students in a classroom, the students whose levels do not conform with the majority of the class will not be left out. With differentiated instruction, where the course is flexible, students have more opportunities to perform at their best.

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Differentiated instruction has impacted teaching all over the world leading to a lot of changes in teaching. Many researchers and educators have found positive results conducting research on differentiated instruction. Some findings showed that the learners would perform tasks with more readily participation, hard work and higher levels of achievement. Many studies revealed that implementing differentiated instruction was an effective way to improve education and fulfill students' needs

(Bantis, 2008; Hawkins, 2007). Some studies also reported that differentiated instruction promotes positive results when implementing the speaking class (Pinweha, 2010) and in learning vocabulary (McCullough, 2011). Several researchers have conducted differentiated instruction that enhances reading comprehension of elementary school (Aliakbari & Haghighi, 2014; Little et al., 2014; McCullough, 2011; Valiandes, 2015) and the results showed that implementing differentiated instruction was beneficial in promoting students' achievement in reading.

Most of the research on differentiated instruction is on school students and conducted with general English communication skills or written skills. However, one area of differentiated instruction study that lacks substantial research evidence is the course of English for Specific Purposes for undergraduate learners focusing on their reading skills. The present study, therefore, aims to investigate the effect of differentiated instruction on reading comprehension and self-efficacy of undergraduate learners by indicating their improvement with reading comprehension. Moreover, the research explores the increase of self-efficacy in reading skill that affects the level of reading comprehension. Also, the study attempts to find the attitude of learners towards differentiated instruction after the course.

1.2 Research questions

1. What are the effects of Differentiated Reading Instruction on reading comprehension of undergraduate students?
2. What are the effects of Differentiated Reading Instruction on self-efficacy of undergraduate students?
3. Is there a relationship between undergraduate students' self-efficacy level and their reading proficiency level?
4. What are undergraduate students' attitudes toward Differentiated Reading Instruction?

1.3 Objectives of the study

1. To investigate the effects of Differentiated Reading Instruction on reading comprehension of undergraduate students.

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2. To investigate the effects of Differentiated Reading Instruction on self-efficacy of undergraduate students.
3. To investigate the relationship between undergraduate students' self-efficacy level and their reading proficiency level.
4. To investigate the undergraduate students' attitudes toward using Differentiated Reading Instruction.

1.4 Statement of hypothesis

Based on the reviews of literature, it can be concluded that teaching reading using differentiated instruction is able to improve undergraduate students' reading comprehension and self-efficacy. Thus, the hypotheses of this study are as follows:

14.1 The post-test reading comprehension scores of undergraduate students who are taught by the Differentiated Reading Instruction is significantly higher than the pre-test reading comprehension scores.

14.2 The self-efficacy level of undergraduate students after taking the lessons taught by Differentiated Reading Instruction are significantly higher than their self-efficacy level before taking the Differentiated Reading Instruction.

14.3 There is a positive relationship between undergraduate students' self-efficacy level and their reading proficiency level.

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1.5 Scope of the study

This study was one-group pre-test and post-test quasi-experimental research design. It aimed to investigate whether the Differentiated Reading Instruction had an effect on students' reading comprehension and self-efficacy. The participants in the study were 33 second-year undergraduate students from King Mongkut's University of Technology North Bangkok who were enrolled in the English for Scientists in the academic year 2019. They passed two foundation courses of English I and English II. The study investigated how the Differentiated Reading Instruction affected students' reading performance and their self-efficacy. The variables in this study comprised the independent variable, which was the Differentiated Reading Instruction, and the dependent variable, which were the students' reading comprehension proficiency, the students' self-efficacy, and their attitudes. Data from the main study were gathered

from the pre-test and post-test scores, the results from the self-efficacy questionnaire, and those from the attitude questionnaire. Descriptive statistics as well as t-test, were used to analyze quantitative data, while content analysis were used to analyze qualitative data from students' journals and semi-structured interviews.

1.6 Definitions of terms

Differentiated Reading Instruction

Differentiated Reading Instruction refers to the class that teacher accommodates learners with mixed ability in reading comprehension by identifying their strengths, interests, and learning profile and adjusting content, process, product, and learning environment accordingly (Tomlinson, 2005). In this study, Tomlinson's framework of differentiated reading instruction was adopted. The students were grouped into different levels according to their ability in reading comprehension. The students were pre-assessed before the course to indicate both their reading comprehension ability. The lessons were tiered in terms of content, process, and product. Regarding content, the materials were tiered by providing the text with different level of readability for different levels of students (Flesch-Kincaid Readability). In terms of process, the students were scaffolded differently according to the group they were in. Scaffolding was used to support students in each group with different degree of assistance. The beginner group received more assistance, scaffolding, and time in doing reading tasks than the intermediate group. In terms of product, the student presentation was in accordance with their preference and there were two different criteria provided for the two groups (ACTFL-three modes of communication). In response to differentiated reading instruction concepts, the intervention was divided into three steps, pre-reading, while-reading, and post-reading (Crandall, 1995; Paris et al., 1991). After the course, the students would become more capable of reading comprehension.

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Reading Comprehension

Reading comprehension refers to the ability that students need when they process the meaning that the writer of the text is trying to convey (Klinger et al.,

2007). The students who can comprehend texts should be proficient readers and be able to use some reading strategies to comprehend texts. The focus of the study is on the process of reading instruction involving pre-reading strategies, while-reading strategies, and post-reading strategies according to the Text-processing strategies concept Paris et al. (1991) and Crandall (1995). To indicate students' readiness, their reading comprehension ability was obtained from taking the reading comprehension pre-test. The reading comprehension ability of the students was in response to the reading theory adopted from Barrett's Taxonomy (1968), Davis's eight reading comprehension skills (1968) and Brown's reading comprehension strategies (2004). In this study, the focus was on literal comprehension, inferential comprehension and evaluation comprehension. In literal comprehension, the focus was on skimming the text for the gist, scanning the text for specific information and reorganizing ideas from various parts of the text. In inferential comprehension, the focus was on drawing inferences about the meaning of a word from context, drawing inferences from the content, and predicting outcomes. In evaluation, the focus was on giving comprehensive judgement about some aspects of the text and recognizing a writer's purpose, attitudes, tone and mood.

EFL undergraduate students

EFL is an abbreviation for English as a Foreign Language. It refers to the learners of the English language, which is not their primary language. Also, they are from the community that do not use English as their first language. In this study, EFL undergraduate students were from the faculty of Applied Science, KMUTNB, who were enrolled in the course called "English for Scientists" in the academic year 2019. They were second year students, consisting of both males and females from the major of Food Technology. Their level of English proficiency on average was pre-intermediate. In this course, the learners were taught in differentiated reading instruction to improve their reading comprehension in the field of science and technology. The content of the course was designed to fit with the needs and wants of learners.

Self-efficacy

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Self-efficacy refers to learners' belief of their capabilities in doing specific tasks that can lead to desired goals. Students with low self-efficacy tend to be threatened when facing obstacles, while efficacious students find difficulties challenging (Bandura, 1974). The study focused on enhancing students' self-efficacy through four elements: mastery experience, vicarious experience, verbal persuasion, and emotional states. The first two sources were the main focus in the study because they could be effectively enhanced through differentiation of content, process, and product. When the students received more chances to experience success and observe success of others, they tended to be motivated and gain more self-efficacy beliefs. The third source of efficacy, verbal persuasion, was enhanced by the positive and supporting feedback received from more capable peers. The last source of efficacy, emotional states, was enhanced by the relaxed and friendly atmosphere of the class to create positive environment and to reduce anxiety.

1.7 Significance of the study

This study aimed to explore if differentiated reading instruction could serve as an effective teaching approach for teaching reading skills to students with different levels of proficiency. The study contributed to the ELT, especially in the Thai context. In terms of theoretical significance, the positive findings confirmed that differentiated reading instruction could enhance students' reading comprehension and self-efficacy. This study also provides a guideline for researchers who would like to broaden the scope of research in other language skills, or in other ELT contexts. Concerning pedagogical significance, the study provided detailed steps and information of how to design, implement and manage differentiated reading instruction in class. Therefore, the study can be a guideline for researchers, course developers, and educators who seek an instruction approach that can enhance students' language ability and self-efficacy, which is an important trait contributing to students' confidence in language learning.

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1.8 An overview of the study

This study aimed to investigate the effect of Differentiated Instruction on reading comprehension and self-efficacy of Thai undergraduate students. This chapter

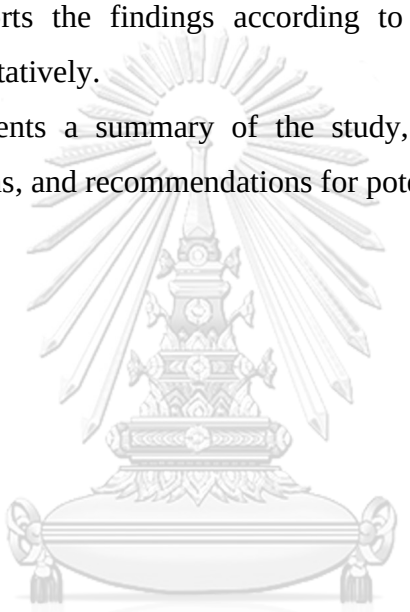
presents research background, statement of problems, research questions and objectives of the research. Also, the scope, variables, definition of terms, limitations, and significance of the study are explained.

Chapter 2 elaborates on the literature related to differentiated instruction, reading comprehension, Self-efficacy and English for Specific Purposes.

Chapter 3 presents the research methodology which involves explanation of the research design, population and sample, research instrument, instructional instruments, instrument validation, data collection, and analyses.

Chapter 4 reports the findings according to the research questions both quantitatively and qualitatively.

Chapter 5 presents a summary of the study, discussions of the findings, pedagogical implications, and recommendations for potential research in the future.



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CHAPTER II
LITERATURE REVIEW

This study investigated the effects of differentiated reading instruction on students' reading comprehension and self-efficacy. In order to develop the instruction effectively, related literature and research were reviewed to obtain theoretical and conceptual information for the study. This chapter includes four main topics, which are differentiated instruction, reading comprehension, self-efficacy, and related research regarding the concepts.

2.1 Differentiated instruction

Differentiated instruction is an approach to teaching in which teachers strategically plan for students' diverse traits in order that those students with mixed ability can gain the most benefit from learning by varying readiness levels, learning preferences, and interests (Tomlinson, 2001). Instead of expecting students to adapt themselves to the curriculum, the instructional approaches, and teaching activities are adjusted to fit with students needs and readiness.

2.1.1 Differentiated instruction meaning from experts and educators

Various researchers and educators define differentiated instruction as a form of adaptive teaching, which aims to provide different components of education and teaching to meet with students' needs. Teachers proactively modify curricular, teaching methods, resources, learning activities, and student products to maximize the learning opportunity for every student in a classroom (Bearne, 1996; Hall, 2002; Tomlinson et al., 2003; Woolfolk, 2010).

Tomlinson (2000) suggests that differentiation consists of the efforts the teachers put in response to various students in the classroom by varying teaching to reach an individual or small group. A teacher systematically modifies content, process, product and learning environment based on students' readiness, interests, and learning profiles. An instruction is differentiated in order to provide different ways for students in acquiring content, processing ideas and developing final products in

consideration that all students can learn effectively. Teacher is the professional in the classroom who has been trained to mentor using appropriate techniques and assist each learner to reach his or her potential learning ability.

Gregory and Chapman (2007) also suggests that differentiation is a philosophy, and it is used in instruction to make sure all students are learning appropriately. It helps educators learn how important it is to reach the diversity of students in a classroom. Moreover, the instruction gives several choices that enhance students to reach their goal and offers challenging, appropriate ways for them to achieve success.

McLeskey and Waldron (2011), stated that differentiated instruction means the way teachers create classrooms with different levels of task completion in a lesson. This way of instruction can benefit all learners from becoming successful in a class because of its variety of methods and supports.

Pham (2012) suggests three general principles that guide differentiated classrooms. First, teachers should provide appropriate challenging tasks. According to Vygotsky's ZPD, it is believed that students can learn best when tasks are challenging. What students can do with assistance today will be done independently tomorrow. Second, flexible groupings and classroom arrangements should be implemented. Working individually, in pairs or in groups can give different experiences to each student. Classroom arrangement helps teachers to work with students according to their needs. Finally, ongoing assessments and appropriate scaffolding should be applied in class. In order to access the ZPD of each student, assessment and scaffolding are needed. Knowing the actual level for development allows the teacher to modify tasks to fit with students' level of ability.

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Gregory and Chapman (2007) proposes a planning model to help teachers make decisions about differentiated instruction and assessment called The Six-Step Planning Model for differentiated instruction. The first step is "Standards", which refers to the detailed curriculum that students should know and be able to achieve after the course. The second step is "Content" or concept, which refers to facts and skills that need to be taught. The third step is called "Activate". It refers to the activities used in class that can activate students' prior knowledge and engage them. The fourth step is "Acquire", which refers to the planning of how the

information is best taught to the class and the most suitable materials. The fifth step is "Grouping decisions", which refers to the opportunity to practice and engage actively with the learning. The teacher should choose the best way to learn in a group and how to group the students according to their ability, interests, and learning style. The final step is "Assess", which refers to assessment after learning in order to develop a new plan.

According to educators and scholars, differentiated instruction allows teachers to organize the lessons in response to students' levels, interests, and learning styles. Specific learning opportunities should be provided to the students according to their categorization. That way, all the students in a mixed-ability class can make progress in their learning (Chapman & King, 2008; Tomlinson, 2001).

2.1.2 Differentiated by readiness, interest, and learning profile

2.1.2.1 Differentiation by readiness

Differentiation by readiness refers to developing instruction in response to each student's actual level. Students' readiness can be defined as a student's current proximity to specific knowledge, background knowledge, cognitive proficiency, life experience, skills and attitudes. To determine students' readiness, teachers should pre-assess students' levels. In one classroom, it can be composed of students with varied reading levels or lexical knowledge. Some students are at their grade level and others may be below the level of their peers. According to Tomlinson (2001), teachers should be able to accommodate students with tasks that are not too easy or too difficult. At a moderate challenge for students' actual level, the learning occurs (Wolfe, 2001). In the present study, the reading comprehension test was used to pre-assess students' readiness level.

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2.1.2.2 Differentiation by interests

Differentiation by interests allows students to choose what attracts them the most. A key feature of teaching is to be able to engage students on the topic at hand. Like readiness, students also vary in interests. Allowing students to do something they have interest in can help them develop positive learning attitudes. Teachers should

find ways to engage students by finding out what attracts students' interests. According to Carbonaro and Gamoran (2002), when students are encouraged to select reading material of interest to them, they are more likely to show substantial engagement and improvement in reading. In this study, the teacher provided various topics concerning science as the choices for the students to choose when they have to do activities so that they can practice reading effectively.

2.1.2.3 Differentiation by learning

Differentiation by learning profile helps identify the way students can *learn* best. While some students like to learn by doing the tasks on their own, others prefer to study in groups or pairs. Some can do best when they move around, while others need to sit still. Students' preferred mode of learning is affected by a number of factors such as learning style, intelligence preferences, gender and culture (Tomlinson, 2001). Sullivan (1993) reported that focusing on a student's learning style through flexible teaching results in positive achievement. In this study, the researcher provided choices for the class to work based on their preferences in terms of group work, types of presentation, or reading at their own pace. That way, they would be able to work on tasks comfortably with less stress.

2.1.3 Differentiating Content, Process, Product, and Learning Environment

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2.1.3.1. Differentiating content

Differentiating content refers to concepts, principles, and skills that students need to learn in order to receive all of the information to accomplish in a course. According to (Gregory & Chapman, 2007), differentiation in content includes using different genres, material in different levels, variety of instructional materials, and selective abandonment. In terms of student readiness, the level of complexity varies according to several levels of students. The texts used are from simple to advanced. In terms of interest, curriculum ideas and materials should be built on student interests or aims to extend their interest. The materials can be from print to electronic form or from commercial to academic. Learning profile differentiation of content focuses on ensuring that students will have chances to match their preferred way of learning in

the course. For teachers, it's important to adapt what to teach and modify how to give students what they need to learn. For example, the students can read at different reading levels according to their specific needs and interests.

2.1.3.2 Differentiating process

Differentiating process refers to the activities that meet the needs of *students* to help them make sense of the ideas and skills that they have learned. Students have to make sense of analyzing, solving problems or using material because they need those senses to accomplish in learning. According to Tomlinson (2001), the process provides opportunity for students to process their ideas and stay focused with the learning. To make good activities in differentiated instructions, the teachers offer more than one way for students to make sense of what's important. There can be more than one learning activity based on students' interest or learning styles. In terms of student readiness, matching the complexity of a task to a students' level of understanding is needed. Differentiating processes according to student interest means the teacher can give choices to students to help them link personal interest. In terms of differentiating processes according to the student learning profile, the students need to be encouraged to learn in a preferred way. In this study, differentiation of process focused on teachers' scaffolding and tasks provided according to the students' levels and learning styles. With appropriate levels of scaffolding and challenging tasks suitable for each student, the learning occurs.

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2.1.3.3 Differentiating product

Differentiating product refers to how students demonstrate or perform *what* they have learned. It reflects learning outcomes and achievements of the students. They can also have choices in how to present according to their interests and learning styles. Product assignments help students rethink, use, and extend what they have learned over time. As product assignment progresses, the teacher needs to assist students to reach a new level of possibility. According to Pinweha (2010), the product also demonstrated what students have learned from a course. In differentiating products, the tasks should be challenging but not overwhelming. Also, it should not be used only as an assessment of the class (Blaz, 2016). In this study, the product is

considered the end result of learning that shows the progress of each student. However, the results from their performance were not use for grading, instead, they were used for providing supportive feedback. That way, the students know how they should improve their learning and performance.

2.1.3.4 Differentiating the learning environment

Differentiating the learning environment refers to the way the classroom *feels* and how students link thought and feeling in the classroom. It is concerning the appearance and structure of a classroom that can be inviting for students. Also, an emotional climate can support students during their learning. Teachers need to consider students' environmental preferences. The teacher should make sure that the classroom is provided with a learning environment that fit mixed ability students. In this study, the instruction offered that class with a joyful and motivating atmosphere, in which the students would be engaged and relaxed while participating in tasks.

2.1.4 Differentiated instruction and instructional process

Tomlinson (1999) proposes strategies for teachers to apply in class in order to accommodate students' learning by focusing on students' needs, interests and learning profile. There are two interesting tools to accommodate differentiation which are centers and tiered activities. For the center, it should be flexible to facilitate learning needs and can motivate students' interest. For tiered activities, when the teachers want to support the mixed-ability students with the same concept ideas and key skills, tiered activities are applied. Tiered activities and centers are mostly used to serve students' interest and readiness level. In this study, the use of tiered assignment was with the reading texts, activities, tasks, and teacher's scaffolding. To use the center in this study, the stations were set up with various topics of interest for students to choose from.

The essential factors of differentiated instruction and suggested activities to be implemented in a classroom are concluded as follows.

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Table 1 Differentiated instruction and suggested activities

Differentiation by… **In terms of…**	**Readiness**	**Interest**	**Learning Profile**
	Learners learn better if tasks are close match for their skills	*Tasks ignite curiosity or passion in a student to extend interest*	*Tasks encourage students to work in a preferred manner*
Content ***What teacher wants students to learn***	- Activation of students' background knowledge (schema) with pre-reading activities - Graded reading provided to fit with mixed ability students	- Student choices in selecting text and topic of interest - Adjustment of standard-based curriculum to become more content-based	- Learning style according to environmental or personal factors, i.e., listening with scripts
Process ***The way a student interprets, adapts, and finds ownership***	- Pre-assessment students to identify their level of ability - Assignment designed according to level of ability of students - Assignment that is challenging for all level of students	- Choice of activities in response to students' interest - Grouping students according to their interest on topic or prior knowledge	- Activities in a classroom chosen to fit students learning styles - Provided several versions of the problem to practice
Product ***The student's personal interpretation and what he knows***	- Rubrics provided for indicating students' achievement in performance for each level of proficiency	- Allowing students to express what they have learned according to their interest - Allowing students to present their work according to their favorite topic and style	- More than one kind of end-of-unit-assessment, i.e., quiz, portfolio, report, journal, presentation
Learning Environment	- Allowing several paces in learning. - Clear guidelines in working preferences	- Learning in a way that increase motivation and trigger their interest	- Positive environment provided according to student's preference. - Variety use of rooms i.e., classroom, lab, library

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2.1.5 DI and ZPD

Regarding differentiating students in response to their readiness level, Vygotsky's notion of ZPD is concerned. ZPD or "Zone of Proximal Development" refers to the distance between the area which a person can do by himself and the area he might achieve with assistance. This "Zone" is the area of exploration for which the student is cognitively prepared by requiring help and social interaction to fully develop. A more experienced peer can provide scaffolding to support students in understanding knowledge or skills. In other words, ZPD is the concept of what a child can do today with help, he will be able to do independently tomorrow. Vygotsky's concept of ZPD is a relationship between learning and development. The notion of the ZPD plays an important role in the sociocultural theory of development, learning and instruction.

To elaborate Vygotsky's ZPD, development of a behavior occurs on two levels that form the ZPD. The lower level is the "Independent Performance" where the child can do alone without help and the higher level is the "Assisted Performance" where the child can do it with help. The level of assisted performance is the behaviors the child performs with the help or interaction with an adult or a peer. The behaviors or skills in the ZPD are dynamic and always changing and that means the child's knowledge or skill develops or improves. However, the construct of the ZPD specifies that development cannot occur if too much assistance is provided or if a task is too easy. The assistance needs to be withdrawn in order for development to occur. As the learner becomes more competent with a higher level of skills, the ZPD changes. When the learner deals with the next level of task, the new level of assistant occurs. Vygotsky's approach focuses on "the future child" rather than the "present child".

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Related elements of ZPD and differentiated instruction are the acknowledgement of students' readiness levels. Both DI and ZPD are concerned with the assistance of more capable peers that can lead the students to reach their potential within the learning context. Also, both concepts highly suggest teaching slightly higher than the actual level of the learners. To support the use of differentiated instruction in this study, the concept of ZPD was highly concerned.

2.1.6 DI & Scaffolding

Scaffolding helps students to reach beyond where they could go on their own. It is one of the main tools that help develop a learner in learning. Scaffolding identifies the state of providing students with enough support in the initial stage of learning a new subject. The support will be removed when the students are ready to learn on their own. Wood et al. (1976) proposed that the expert provide scaffolding within the ZPD to enable the novice to perform at a higher level. According to Greenfield (1999), scaffolding is used widely in building construction. It consists of five characteristics; 1) providing support; 2) functioning as a tool; 3) extending the range of the worker in doing their job; 4) allowing a worker to finish tasks or complete as much as possible; 5) assisting the worker where needed. To conclude, an instructional scaffold refers to the support that an adult or expert provides to the learner until the learner is capable of performing independently after the support is removed.

Brunner's Theory of scaffolding emerged as a part of social constructivism and was influenced by the work of Vygotsky (1980). Brunner shared the belief with Vygotsky that a child's social environment and social interactions are key elements of the learning process. A child needs help from teachers and other adults when learning new things. The interaction between the child and the adults is an imitation of the scaffolding that supports the construction of a building. It will be removed as the work is completed. Teachers need to be aware of the developmental state of each of the children in their care. When the child gains confidence and competence in a particular area, teachers might extend their learning further. In order to incorporate scaffolding throughout the lesson, Ellis and Larkin (1998) proposed the framework as follows; 1) the teacher does it: by models how to perform new task; 2) the class does it: by both teacher and students perform do task together; 3) the group does it: students work with partner or group to complete task; and 4) the individual does it: independent practice where individual students demonstrate their task mastery.

To conclude, scaffolding is the idea of helping and supporting the learners until they are ready to complete a task on their own. The teacher or expert is responsible for monitoring the students' progress and removing assistance once the learners are ready so that they can grow and become independent. Similar to

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differentiated instruction, scaffolding focuses on supporting learners during instruction. In differentiated instruction, the process can start with the whole-class instruction followed by group work and ending the process with individualized work. According to Tomlinson (2001), differentiated instruction is a blend of whole-class, group work and individual instruction. To support the use of differentiated instruction in this study, Ellis and Larkin framework was followed. The teacher taught by showing the example to the whole class and then the class did the tasks as a group. At the end, all the students should be able to perform the tasks on their own.

2.1.7 Differentiated Reading Instruction

Primary intention of differentiated reading instruction is to maximize students' capacity in reading by planning curriculum and instruction for academically diverse learners. Since every reader requires different treatment in a class, not all students possess the same strategies and understanding while reading. Some texts and tasks can be challenging to some learners and frustrating to other learners. According to Aebersold and Field (1997), in order to enhance students to understand enough of the reading, the text needs to be within their proficiency range. This matter can be supported with differentiated instructions in which the content, process, product, and environment are tiered in response to students' diverse needs.

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In order to provide differentiated reading Instruction in this study, several theories are collaborated as follows.

Table 2 Theories supporting differentiated reading instruction

	Theories
Readiness (learners learn better if tasks are close match)	Tiered assignment: students are put into the groups depending on their levels. (Tomlinson, 1999)
Interest (Tasks ignite curiosity or passion in a student)	Centers: A learning center in a classroom provided with a collection of activities or materials designed to support students' interests and needs.

Learning Styles (Tasks encourage students to work in a preferred manner)	Self-efficacy (Bandura, 1986) consists of three factors-personal determinants, behavioral determinants, and environmental determinants-that regulate human behavior.
Content (What teacher wants students to learn)	The reading text difficulty levels according to the readability of Flesch-Kincaid Index.
Process (The way a student interprets, adapts and fines ownership)	Paris et al. (1991) and Crandall (1995) proposed strategies to promote comprehension 1) Pre-reading process 2) While-reading process 3) Post-reading process
Product (The student's personal interpretation and what he knows)	Summative Performance Assessment 1) Interpretive mode 2) Interpersonal mode 3) Presentational mode
Learning Environment (Positive classroom atmosphere)	Self-efficacy (Bandura, 1984) Sources of self-efficacy 1) Mastery Experiences 2) Vicarious Experience 3) Verbal Persuasion 4) Emotional States

2.1.8 Previous studies on Differentiated Instruction

There are many studies concerning Differentiated Instruction in several subjects and with several levels of education. Some investigated the effects on students and some were on teachers. Most of the results revealed positive effects of Differentiated Instruction toward various variables. In terms of language learning, the focus in this study is on the effects of Differentiated Instruction on language skills.

The example of Differentiated Instruction that affects teachers is the study of Dixon et al. (2014). The research investigated teacher willingness to use differentiated instruction to the class and teacher's efficacy. The study revealed a positive association of DI and teacher's efficacy. The study found that efficacy is an important factor for implementing DI.

Another interesting example of DI which has an effect on teachers is the study of Chien (2015). The study investigated 13 school teachers in Taiwan in the course of Teaching English Listening and Speaking. After implementing DI classes, the teachers gave reflection on the DI. The results suggested that the teachers still needed skills in designing activities suitable to use in DI.

Valiandes (2015) investigated the effects of differentiated instruction on mixed-ability classes on their overall learning. The subjects were 476 students in elementary school in Cyprus. The results revealed that the students who received the treatment made better progress. Even with the teachers' opinions on difficulties of implementing differentiated instruction, they suggested that the instruction provide benefits for all students.

Ramli and Yusoff (2020) conducted an interesting previous study on DI and its effects on teachers' self-efficacy. The participants were 428 secondary school teachers in Malaysia. It was found that this study proved a significant positive relationship between teachers' self-efficacy and teachers' practice of differentiated instruction. Self-efficacy has a major influence and can predict teachers' differentiated instruction.

There are several studies investigating the effects of DI on learners. Most of the studies are on school students. The example of the study focusing on the effects on the students is the study of Aliakbari and Haghighi (2014). The research is on DI and its enhancement of reading comprehension in Iran with 47 elementary students. The focus was also on gender differences in language performance. It was found that the students who received treatment performed better, and females performed better than males.

Another study investigating the effects of DI on students' reading fluency and reading comprehension is the study of Forster et al. (2018). The subjects were German elementary school students. It investigated short-term and long-term effects of combining learning progress assessment to monitor students' progress of reading comprehension. The results revealed that the students in the treatment group showed higher improvement in reading fluency.

However, one study found negative results is the work of Little et al. (2014). The study is on differentiated reading instructions that affect learning achievement. The focus is on interest-based reading. The samples were 2,150 students in sixth to eight grade. They found that both experimental and control groups had similar scores for comprehension. The negative result is caused by not providing enough time for independent reading.

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The study investigating the effect on students is the study of Shaunessy-Dedrick et al. (2015). It investigated DI effects on reading comprehension of thirty-three fourth-grade teachers and 786 students from eight elementary schools. The results revealed the positive effects of Differentiated Instruction in students' attitude in the group of gifted students but not in the regular students. Implementation of DI can positively affect student learning.

There is a study that implements differentiated instruction in English language learning to students with dyslexia in Greece by Nikolaou et al. (2017). The focus is on ten-year-old students who have difficulties that affect learning in one or more skills of reading, spelling and writing. The results showed effective use of differentiated teaching in teaching foreign language to students with dyslexia.

Siddi and Alghamdi (2017) conducted an action research on differentiated instruction in EFL classes in Saudi Arabia. The subjects were 17 low-achievers first-year university students. After ten weeks of intervention, the results showed a positive impact of implementing differentiated instruction on learning.

An interesting study in Thailand was with the use of tiered instruction on reading comprehension (Vibulphol, 2020). There were 29 ninth grade students who were tiered into three groups of different levels. The results reported positive effects of the instruction on students' reading comprehension.

These studies were concerned with the present study in the aspects of their beneficial results which would provide positive effects for university students in terms of reading comprehension. It could be implied from the previous studies that, with DI implemented, students are equipped with reading comprehension skills. Students would be more aware of the elements needed in learning reading comprehension.

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The following section is the explanation of the concept of reading comprehension, reading comprehension instruction and related research.

2.2 Reading

2.2.1 What is reading?

According to Aebersold and Field (1997), reading refers to the process in which the reader looks at a text and then assigns meaning to the written symbol in that

text. In other words, the text and the reader are interacting with each other. The meaning that two different readers get from the same text may not be the same because each reader possesses different prior knowledge and level of comprehension ability. Reading has been defined as an interactive meaning-making process in which readers utilize a large number of strategies to achieve the goal of reading comprehension (Alderson, 2000; Anderson, 1999; Carrell, 1988).

Reading is seen as an interaction process (Alderson, 2000; Anderson, 1999; Grabe, 1991). Therefore, to understand the reading process, the attention should be paid to the model of the reading process to understand the way the reader reads the text and comprehends it. Interaction in reading can be 1) between purpose and manner of reading (reading for a purpose); 2) through reading strategies (reading using strategies to derive common meaning); and 3) through schema (knowledge that reader brings to a text) (Aebersold & Field, 1997).

Anderson (2003) defined reading as the meaning-making process from print with four main components collaborating into the process of meaning-making from the print: the reader, the text, reading strategies, and fluency. When humans read, they use information from the text and their prior knowledge to comprehend meaning. Being able to read effectively requires strategies in reading that can enhance fluent readers. To be fluent readers, it is important to be able to read at an appropriate rate with adequate comprehension without too many difficulties. It is an essential component of efficient reading comprehension abilities. It is what good readers do with most reading texts they have to encounter (Grabe, 2010). To be strategic readers, it is important to be able to use a wide variety of reading strategies to achieve purposeful reading. In reading, readers use different strategies depending on the text genre, readers' familiarity with the topic, the difficulty level of the text, and readers' purpose in reading (Richards, 2015). Therefore, to enhance strategic reading, teachers should make sure that learners understand their purpose for reading.

Many researchers suggest how reading is processed. The most two paradigmatic approaches are bottom-up approaches and top-down approaches. In the bottom-up process of reading, it is seen as an active process for understanding the message by decoding meaning from the text starting with the smallest units to the bigger ones (i.e. letters to words to phrases to sentences). The process of constructing

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the text from those small units then becomes automatic and the reader is not aware of how it processes. Bottom-up process is also known as a text-driven approach to reading because it is based initially and mainly on written symbols. Top-down processing in reading involves background knowledge, expectations, assumptions, and questions to the text. This approach focuses on meaning first and reading is a process of constructing meaning. Top-down theorists suggested that readers fit the text into knowledge they might already have. In top-down processing, readers control comprehension actively according to their goals, expectations, and strategic processing. (Richards, 2015).

Interactive processing in reading according to Grabe (1991) refers to two perspectives of the interactive approach. The first one relates to the interaction that occurs between the reader and the text. The meaning of the text occurs when the reader interacts with the textual information and his or her background knowledge to comprehend the information of the text. The second perspective relates to the interaction between bottom-up and top-down processes in comprehending the text, which can occur alternately or at the same time. The move between processing of top-down and bottom-up depends on the reader's background knowledge, language proficiency level, motivation, strategy use, and cultural beliefs.

An awareness of top-down (reader-driven), bottom-up (text-driven), and interactive processing strategies can be a useful process for teachers. They encourage the use of a combination of strategies in reading instruction.

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2.2.2 L1 & L2 Reading

Second language (L2) acquisition is in contrast to the first language (L1) acquisition. While L1 is acquired as a mother tongue, L2 is an additional language. Both L1 and L2 reading are the fact that people look at a text and assign meaning to the written symbols. Meaning that each reader gets from the same text might be different as each reader can be influenced by family, community, culture, motivation, aptitudes, and characteristics. L1 and L2 reading abilities share similarities only in terms of underlying cognitive and linguistic components. However, in second language reading, it involves two languages in processing. L2 reading combines L2 and L1 reading resources in processing meaning.

There are many factors researchers believe L1 is strongly influencing L2. Transfer is believed to help in L2 reading; however, in L2 reading transfer can happen if the first and second language share similar properties at any linguistic level. Koda (2007) defined transfer as the ability to learn new skills by drawing on the previous one. L1 may facilitate the developmental process of learning L2 when the L1 is similar to the L2. Krashen (1981) also suggested that learners can use the L1 to initiate sounds when they do not know the word in L2. L1 can be a resource to support a speaker when he has to speak the word beyond their knowledge.

However, according to Grabe (1991), some people with little experience in L1 reading or lack of academic reading may not transfer abilities from their L1 to L2. Reading in a second language is an integration of dual language abilities and processing. L2 reading is crosslinguistic and more complex than L1 reading. According to Grabe (2010), there are three sets of differences between L1 and L2 reading; 1) linguistic and processing differences; 2) developmental and educational differences; 3) sociocultural and institutional differences. L1 lexical, grammatical and discourse knowledge of a person is different from L2. Transfer can facilitate only with the similar point that two languages may share. Also, L1 transfer can interfere with L2 reading.

For developmental and educational differences in L1 and L2 reading, it is harder to predict the distinctions between the two language learning. It depends on the experience of L1 readers. If they are at an academic level and experienced a lot of L1 academic reading, they tend to bring all the skills from reading L1 to their L2 reading processes. Also, in terms of purposes and goals, reading in L1 is different from L2. Social and cultural contexts can affect L1-L2 reading as the two languages are mostly from widely different cultures and society. L2 readers need to recognize the differences and find ways to accommodate them; otherwise, they can be limited in L2 settings.

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2.2.3 Reading Comprehension and reading skills

Reading comprehension in the second language is one of the most important complex language abilities needed by language learners. In comprehension skills, the readers need to be able to use context and linguistic knowledge to decode meaning

from text. Especially in the L2 setting, learners tend to need reading for their academic goals because they need content in texts for their field of study. One of the most important factors in reading comprehension abilities is how reading processes vary depending on the reading purposes. It is important for teachers to teach reading to help students understand different tasks and activities involved in different levels of demand on comprehension. To enhance learners to process the reading text effectively, the focus is on reading skills. Skill, defined by Harris and Hodges (1981), means "an acquired ability to perform well". It can be stated that skill is improved through practice, repetition or training but not innate. Skill is goal-directed, well organized behavior which can be shaped through practices and performed effortlessly.

In order to process in comprehension, Gordon (1982) suggested three sets of competencies concerning reading skill development and reading comprehension: namely, 1) lower-level skills (decoding), 2) higher-level (comprehension), 3) strategies (metacognition). It is the hierarchy of skills which helps identify reading skills and strategies. For lower-level or decoding skills, it includes word recognition, syntactic parsing, and meaning encoding (Koda, 2005; Stanovich, 2000). Higher-level skill or comprehension includes building a text model of reading comprehension and interpretation of readers. That is to say, readers communicate with the text and activate more ideas with inferences.

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In terms of hierarchy order of comprehension, Barrett (1968) developed a taxonomy of five comprehension skill levels; 1) literal comprehension (information is stated explicitly); 2) reorganization (analyze, synthesize and organize information that is stated explicitly); 3) inferential comprehension (use information explicitly stated and personal experience for conjecture); 4) evaluation (judgment and decisions concerning value and worth); 5) appreciation (aesthetic impact of text on readers). Barrett's taxonomy was influenced by Bloom's taxonomy (1956) in order to define levels of cognitive and affective processing that represent different levels of educational objectives.

As for the effort to understand the reader's ability to understand text at a certain level, researchers have been trying to distinguish levels of comprehension. Davis (1968) was one of the scholars who proposed reading

comprehension skills in hierarchical order to identify processes or skills involved in reading comprehension. The eight reading comprehension skills was addresses as follows; 1) recalling word meanings; 2) drawing inferences about the meaning of a word from context; 3) finding answers to questions answered explicitly or in paraphrase; 4) weaving together ideas in the content; 5) drawing inferences from the content; 6) recognizing a writer's purpose, attitude, tone and mood; 7) identifying a writer's technique; 8) following the structure of a passage. He noted that reading comprehension skills for mature readers does not include only one mental skill, but it requires at least five or six mental skills.

Brown (2001) proposed that reading comprehension is about readers developing appropriate and efficient comprehension strategies. For second language learners, they usually are already literate. They tend to be able to develop strategies related to bottom-up processes to enhance top-down processes. Therefore, he proposed 9 strategies for reading comprehension as follows; 1) identify the purpose in reading; 2) use rules and patterns to help bottom-up decoding; 3) use guessing meaning technique; 4) skim the test for main ideas; 5) scan the text for specific information; 6) use note, outlines and charts for understanding; 7) capitalize on discourse markers to process relationships; 8) analyze vocabulary; 9) distinguish between literal and implied meaning.

In this study, the conceptual framework of reading comprehension focuses on the eight reading comprehension skills by Barrett taxonomy (1968), Davis's cognitive and affective dimensions of reading comprehension (1968), and Brown's reading comprehension strategies (2004). The details of the three concepts of reading comprehension are as follows.

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Table 3 Reading comprehension frameworks in reading comprehension

Barrett (1968)	**Davis (1968)**	**Brown (2001)**	**Framework for this study**
1. Literal comprehension; recognition and recall of **- details** **- main ideas** **- sequence**	recalling word meaning	identifying your purpose in reading a text	1. Literal Comprehension - Skimming the text for the gist - Scanning the text for specific information - Reorganizing ideas
	finding answers to questions answer explicitly or in paraphrases	applying spelling rules and conventions for bottom-up decoding	

- comparison **- cause and effect** **- character traits**		guessing meaning of words, idioms, etc.	from various parts of the text
		skimming the text for the gist and main ideas	
		scanning the text for specific information	
2. Reorganization; **- classifying** **- outlining** **- summarizing** **- synthesizing**	weaving together ideas in the content	using marginal notes, outlines, charts for understanding	
3. Inferential comprehension; **inferring of** **- supporting details** **- main ideas** **- sequence** **- comparisons** **- cause and effect** **- character traits** **- figurative language** **- predicting outcomes**	drawing inferences about the meaning of a word from context	capitalizing on the discourse markers to process relationships	2. Inferential Comprehension - Drawing inferences about the meaning of a word from context - Drawing inferences from the content - Predicting outcomes
	drawing inferences from the content		
4. Evaluation; judgment of **- reality or fantasy** **- fact or opinion** **- adequacy and validity** **- appropriateness** **- worth, desirability and acceptability**	recognizing a writer's purpose, attitudes, tone and mood	using lexical analysis	3. Evaluation - Giving comprehensive judgement about some aspect of the text - Recognizing a writer's purpose, attitudes, tone and mood
	identifying a writer's technique	distinguishing between literal and implied meanings	
	following the structure of passage		
5. Appreciation; **- emotional response to the content** **- identification with characters or incidents** **- reactions to the author's use of language** **- imagery**			

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The three conceptual frameworks of reading comprehension mentioned from Barrett, Davis, and Brown are falling on similar and overlapping traits of reading comprehension. Each one contains beneficial aspects and detailed strategies for teaching reading. Therefore, in this study, the focus of reading comprehension skills is based on the three frameworks mentioned.

2.2.4 Reading Strategies

According to Griffiths (2008), strategies mean activities that are chosen subconsciously by learners in order to regulate their learning. Learning strategies refers to specific actions and behaviors learners use to improve their skill in learning. According to Richards (2015), in order to enhance strategic readers, teachers should concern the following: 1) the purpose of reading; 2) the kind of text; 3) the writer's purpose; 4) the kind of information to be found in a text; 5) the organization of the text; 6) the kind of information from the text that needs to be focused on; 7) The linguistic knowledge and lexical knowledge that the readers need to have in order to comprehend the text; and 8) the opinion about the content of the text.

Barnett (1989) and Clarke (1980) list what successful readers do consciously and unconsciously; recognize words quickly; use text features (subheadings, transitions, etc.); use title(s) to infer what information might follow; use world knowledge; analyze unfamiliar words; identify the grammatical functions of words; read for meaning, concentrate on construction meaning; guess about the meaning of the text; evaluate guess and try new guesses if necessary; monitor comprehension; keep the purpose for reading the text in mind; adjust strategies to the purpose for reading; identify or infer main ideas; understand the relationships between the parts of a text; distinguish main ideas from minor ideas; tolerate ambiguity in a text (at least temporarily); paraphrase; use context to build meaning and aid comprehension; and continue reading even when unsuccessful, at least for a while.

Readers should experience a large amount of experience in L2 input to enhance their fluency. In order to develop reading fluency, there are three components, namely, automaticity, accuracy and rate (Kuhn & Stahl, 2003). Automaticity is processing operations that are rapid, resource-free, not subject to interference, unconscious, and hard to suppress. For accuracy, it is an essential

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component that is associated with word recognition. Rate of reading for comprehension is one of the requirements in becoming fluent readers who will always maintain ease of comprehension at an appropriate rate.

According to Ashby and Rayner (2006), it is important for educators who are interested in reading to understand what skilled readers do when they read. In order to understand more what fluent readers do when they encounter texts and to build general notion of reading.

To focus on struggling readers, Chapman and King (2009) suggested that it is important to identify struggles that readers may have in order to cope with them. There are four areas that can be barriers for struggling readers; 1) vocabulary of readers is limited and the chance of exposure is small; 2) decoding skill is low as insufficient ability to identify letter to word; 3) comprehension skill is weak in terms of strategies and skills limitation; and 4) motivation or desire to read is low.

Reading strategies can enhance skilled and fluent readers. In this study, by promoting students to gain strategies and skills on reading comprehension would lead to their improvement in reading fluency.

2.2.5 Teaching and Assessing Reading

According to Ashby and Rayner (2006), the main goal of reading instruction is to help children to become strategic and fluent readers, or to be precise, to learn how to read effortlessly so that they don't struggle with the reading processes and be able to focus on the content. According to Grabe and Strolller (2002), the goal in teaching reading is to put component skills and knowledge together to form a reading curriculum in a principled and consistent way.

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Metacognitive strategies concern awareness about the reading experience and the ability to manage strategies in different situations (Williams & Burden, 1997). Cohen (1998) described metacognitive strategies as pre-assessment and pre-planning, on-line planning and evaluation, and post-evaluation of learning activities and of language use. Useful metacognitive strategies are described by Pearson and Fielding (1991) as pre-reading, while-reading and post-reading strategies.

Cognitive strategies are mental processes that enable us to read starting from the meaning of words in context through skimming a whole text to extract the gist.

One useful area to improve students cognitively is word recognition. Visual processing of orthography and word units forming into language is considered comprehension in word recognition models. Another area is automaticity, which focuses on how readers process language into the form of text without thinking consciously. Being able to master this strategy will improve speed and accuracy in reading.

In terms of the reading process concerning the construct of the meaning to increase comprehension, reading strategies have to be used by readers. Reading strategies can help readers to comprehend text more actively especially when the students have to deal with the comprehension questions in their reading tasks or examinations. The categories of reading comprehension question can be based on Bloom's Taxonomy of Educational Objectives, with the six hierarchical levels of skills and abilities namely, knowledge, comprehension, application, analysis, synthesis, and evaluation. Bloom suggested each level for students to answer reading comprehension questions.

To connect Bloom's categories with how the students can answer to different types of comprehension questions, teachers need to provide the students the information of different levels of questions which can be consisted of (1) literal comprehension question, (2) inferential comprehension question, and (3) evaluation question.

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In literal comprehension questions, the information needed is provided in the text. Readers can skim the text to quickly get the information they are looking for. In order to find specific information, the readers can scan by looking through the text. Scanning is useful in the pre-reading stage to build knowledge. For reorganization, readers use information from various parts of the text and combine them for additional understanding.

In inferential comprehension, which is a higher level of reading comprehension ability, the information needed is not clearly stated in the text. It requires both literal comprehension and background knowledge of the readers to comprehend. The readers can draw inferred meaning that can be found from a whole text or from words. Moreover, readers can predict related matters from their understanding of the text.

Evaluation occurs with the readers' comprehension after the whole text has been read. It requires readers to understand literal meanings and sometimes inferential meanings. They consciously compare and contrast the content of the text with their knowledge. Sometimes, readers need to give judgement about some aspects of the text. Sometimes, they need to identify the writer's purpose, attitudes and mood.

In order to organize the lesson in terms of differentiated reading instruction, the focus of this study is on the concept of Paris et al. (1991) presenting **text-processing strategies.** This strategy aims to promote comprehension that is applied before, during, and after reading. In **pre-reading** strategies, the planning of how to manage a text is implemented and decisions are made about possible information and content. It provides activities that activate schemas or background knowledge and help direct purposes for reading. Common pre-reading activities include key vocabulary from a text, discussion questions to predict the idea of the content, and brainstorming activity to gather related information to the text. For **while-reading** strategies, the readers put priority to decoding meaning throughout the actual reading activity. This stage encourages readers to react to what they read while reading. Readers may need to revise understanding and adjust their reading based on difficulties while reading a text. Readers may also have to reread for clarification or skip ahead to find the information they expect. Moreover, readers may have to check if the content fits with prior knowledge. Variety of processes occurs at this stage. In **post-reading**, the readers may focus on the text itself, i.e. its vocabulary, grammar or discourse organization. Another focus may be on evaluation of the information in accordance with the tasks. The new information collected from the text will be applied in the task.

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Another scholar who proposed three stages of the reading process is Crandall (1995). The reading lessons consist of pre-reading, while-reading, and post-reading. **Pre-read**ing provides background knowledge, activates schema, and provides purpose in reading. The activities in pre-reading are key vocabulary preparation, brainstorming, question discussion, and so on. Another stage is **while-reading**, which will be about understanding text and monitoring the reading process. The activities involve checking comprehension during reading, identifying main ideas, making inferences, monitoring vocabulary, and so on. Last stage is **post-reading**, which

focuses on the reaction of readers to the text. The activities are reviewing the text and the markings, reflecting the text, completing the tasks and so on.

In this study, the focus of the framework to the differentiated instruction in reading is based on the three stages of pre-reading, while-reading, and post-reading shown in the figure 1. To enhance the fluent and independent reader, it is important to enable learners to monitor their progress and identify their goals to improve their reading.

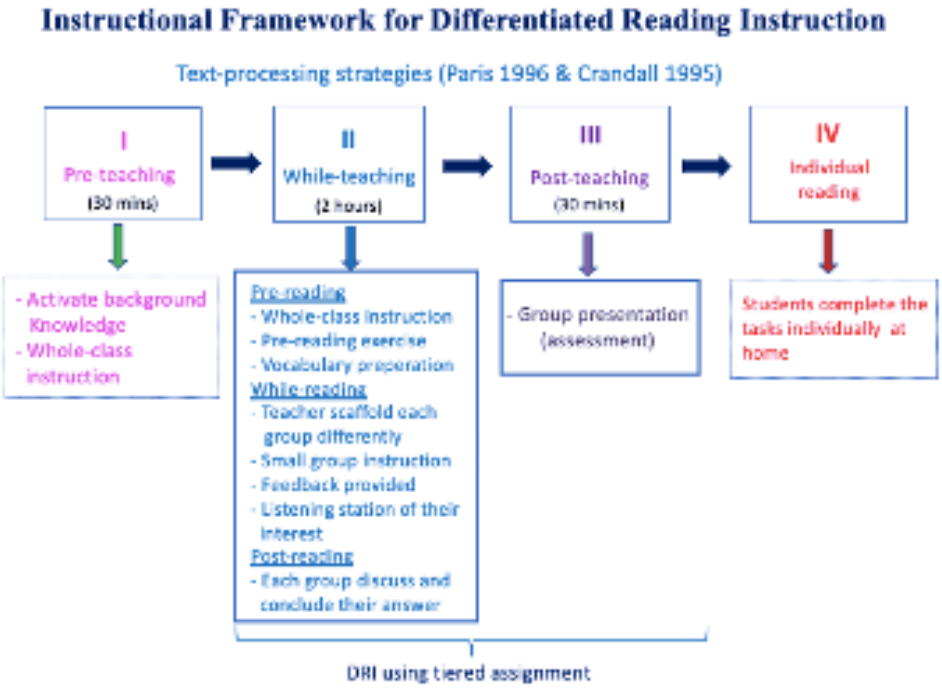

Figure 1 Instructional framework for differentiated reading instruction

Assessment is one of the most important instructional processes in academic settings. It is a key tool to tell how well a learner can be done in tests after the end of the course. There are many kinds of tests and assessments and any performance in the classroom can be assessed by the teacher. For reading, according to Brown (2004), assessment of reading ability involves measurement of comprehension and strategy. Also, the process of reading and its product cannot be observed; therefore, the assessment of reading is done by inference.

Brown (2004) proposed three kinds of reading genres; 1) academic reading, i.e. general articles in newspaper, professional articles, textbooks, and test directions; 2) job-related reading, i.e. project reports, announcements, manuals, and directions; 3) personal reading, i.e. letters, maps, menus and novels. Knowing genres of written text will help readers to know how to process the meaning from the text and be able to apply a certain schema with certain text.

In order to develop reading strategies to achieve comprehension of a written text, it is important to learn a brief taxonomy of strategies for reading comprehension (Brown, 2004). Some principal strategies are as follows; 1) identify your purposes in reading a text; 2) apply spelling rules and conventions for bottom-up decoding; 3) use lexical analysis (prefixes, roots, suffixes, etc.); 4) guess at meaning (of words, idioms, etc.) when you are not certain; 5) skim the text for the gist and for main ideas; 6) scan the text for specific information (names, dates, key words); 7) use silent reading techniques for rapid processing; 8) use marginal notes, outlines, charts, or semantic maps for understanding and retaining information; 9) distinguish between literal and implied meanings; 10) capitalize on discourse markers to process relationships.

Knowing how to teach and assess reading would help the teacher and learner in considering the way and process to handle the text, the course content, the activities, and the course assessment in order to reach a goal in language learning.

2.2.6 Standards for Reading Comprehension

In designing a curriculum or an instruction, determining the standard or the learning outcomes of the course should be created. The standards can be frameworks available for course designers, educators, and teachers to use as references. Most language programs in Thailand have been carefully developed to include different courses that support institutions and ministry of education requirements. A successful language course should provide a positive outcome for learners. Therefore, curriculum and syllabus are concerned with what students will learn and the plan for how they will learn. (Graves, 2014). In this study, the standards that are concerned in the instructional design are ACTFL and CEFR.

2.2.6.1 ACTFL

ACTFL stands for American Council on the Teaching of Foreign Languages designed to describe language performance resulting from instruction. ACTFL is the standard for foreign language learning originated in 1996 as guidelines of what students need to know and should be able to do as they learn English as a foreign language.

The descriptors identify appropriate learning targets for language learners at any age and grade levels. The descriptors can be a guideline for teaching and learning and help teachers create performance tasks targeted to the appropriate performance range. For learners, it is challenging to learn and reach the next levels. The standards should provide learners with language ability that they need in both instructional setting and real world situations appropriate to native speakers of the language.

ACTFL describes how language learners use language across three ranges of performance (novice, intermediate, and advanced) in three modes of communication (interpersonal, interpretive, and presentational) according to certain language features. The organized principle is designed to describe language performance across four language skills (listening, speaking, reading and writing).

According to ACTFL proficiency guidelines for reading, reading comprehension is based mainly on the amount of information readers can retrieve from a text including inferences and connections in a text that readers can come up with. The guidelines do not describe how reading skills are developed or how people learn to read. The guidelines are intended to describe what readers are able to get from what they read.

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The ACTFL (2012) Proficiency Guidelines in Reading describes five major levels of proficiency which are distinguished, superior, advanced, intermediate, and novice. The major levels of advanced, intermediate and novice are divided into high, mid, and low sublevels. For this study, as the participants are EFL language learners, the present study focuses only on the two levels of intermediate and novice.

At intermediate level, readers can understand simple, basic and predictable information. Contextual clues are an important factor for the readers to comprehend. Familiar format of text is important for them to understand without troubles. At this

level, readers can get meaning from simple and straightforward texts in familiar forms.

At novice level, readers can understand key words and phrases that are highly contextualized. They can get a limited amount of information from predictable texts in a very familiar format. They rely heavily on their own background knowledge.

2.2.6.2 CEFR

Common European Framework of References for Languages is the descriptor to be used as the framework for the English proficiency standards of academics and professionals for many countries including Thailand. The framework can be used as a reference to the English standards recommended for the qualifications necessary for academic reference and job recruitment. With an integration of ASEAN Economic Community (AEC) in 2015, the learning standards and goals to enable the children to acquire knowledge and skills are crucial factors. Therefore, the Minister of Education announced the use of CEFR as the standards adopted to all levels of education. Therefore, based on CEFR, the Framework of Reference for English Language Education in Thailand (FRELE-TH) was developed by the team members from the Chulalongkorn University Language Institute and the Language Institute of Thammasat University. FRELE-TH is a ten-level reference framework adapted from CEFR to fit with the certain academic qualifications of Thai learners. The Table 4 describes the equivalency of the CEFR and the FRELE-TH.

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Table 4 FRELE-TH Equivalency

FRELE-TH	CEFR Proficiency Level (with plus levels)	CEFR Proficiency Level	Standard Level
A1	A1	A1	Basic user
A1+	A1+		
A2	A2	A2	
A2+	A2+		
B1	B1	B1	Independent user
B1+	B1+		

B2	B2	B2	
B2+	B2+		
C1	C1	C1	Proficient user
C2	C2	C2	

The team of FRELE-TH conducted research and developed suggested standards of English levels for the academic group as shown in Table 5. In this study, the focus is on bachelor's degree students with the current ability level of A2+ - B1+. They are expected to improve their ability to B1+ as non-English major students.

Table 5 Suggested standards of English levels for the academic groups

Academic group	Current ability level	Expected ability level in 3 years
Prathom 1-3	A1 – A1+	A1+
Prathom 4-6	A1+ - A2	A
Lower secondary	A1+ - A2+	A2+
Upper secondary	A1+ - A2+	B1
Vocational certificate	A2+ - B1	A2+
Vocational diploma	A2 – A2+ - B1	B1
Tertiary: Bachelor's graduates	A2+ - B1+	B1+ (non-English major) B2 (English major)
Tertiary: Master's graduates	A2+ - B1+	B1+
Tertiary: Doctoral graduates	A2+ - B1+	B1+

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In order to find the right reading level for students so that teachers can find suitable textbooks, the readability level of English reading text needs to be defined. In this study, the focus is on the Flesch-Kincaid Readability Formula because it is the most tested and reliable (Dubay, 2004). The measurement of Flesch-Kincaid and CEFR can be compared as shown in Table 6.

Table 6 Reading score difficulty Flesch-Kincaid and CEFR levels

Flesch-Kincaid	Levels	CEFR	FRELE-TH
0-29	Very difficult	C2	C2 – C2+
30-49	Difficult college	C2	C2 – C2+
50-59	Fairly difficult	C1	C1 – C1+
60-69	Standard	B2	B2 – B2+
70-79	Fairly easy	B1	B1 – B1+
80-89	Easy	A2	A2 – A2+
90-100	Very easy	A1	A1 – A1+

Based on the FRELE-TH level, the university students should start with level A2+ and reach the desired level at B2. This can be in the readability level between 80 to 69.

2.2.7 Previous studies concerning reading comprehension

There are some interesting previous studies on reading comprehension that might reflect present study. Most of the research focuses on how reading strategies can maximize reading comprehension.

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Bereiter and Bird (1985) conducted research on the explicit instruction of reading strategies and the effects on reading comprehension. It was found that the students significantly gained in reading comprehension. With a similar study in 2009, Spörer et al. (2009) investigated the effects of three different forms of strategy instruction on 210 elementary school students It was found that students who received the training of reading comprehension strategies got higher scores on reading comprehension than the control group. Also, the students who practiced in small groups outperformed students in instructor-guided and traditional instruction groups.

Another study on reading strategies that has effects on reading comprehension is in Malaysia. Nordin et al. (2013) investigated the effects of reading strategies on

reading comprehension. The focus is on the use of pre, while and post-reading strategies between the high and low achievers' undergraduate students. The findings revealed that ESL high achievers use post-reading strategies more frequently than low achievers. The findings suggested that the use of appropriate reading strategies should be enhanced to help students improve reading comprehension.

The study on differences and similarities of native and non-native speakers of English in reading strategies is by Mokhtari and Reichard (2004). They studied 350 university students (141 US and 209 Moroccan) to measure their metacognitive awareness of reading strategies. They stated that Moroccan students used strategies more often than American students.

Chen (2015) conducted research on online reading strategies (global, problem-solving and support strategies) and its effects on reading comprehension to 94 Taiwanese students. It was found that the online readers used more global strategies such as contextual clues and observing tables, figures and pictures. High level students used more global and problem-solving strategies than low learners. The study suggested the raise of awareness to use strategy in reading comprehension.

Many studies with Thai students are also widely conducted. One interesting example is from Akkakoson and Setobol (2009) study. The study investigated how Thai utilized reading strategies in reading tasks. Among 207 tertiary level students, it was found that the lower-proficiency level students used a similar style of strategies while the higher-proficiency level students used a more variety of strategies. The research suggested that Thai EFL readers were affected positively by strategies-based instruction.

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Kasemsap and Lee (2015) conducted similar research on the types of strategies used by Thai lower and higher achievers. The results showed no significant difference in the overall use of reading strategies between the two groups of students. However, the higher-level students used almost all strategies more frequently than the lower level students.

O'Donnell (2011) investigated reading strategies by those low- and high-achievers in Thai university. The findings showed that reading strategies were often

used by both high and low students. There were significant differences regarding strategy use between the two groups of students.

Chavangklang and Suppasetseree (2018) investigated a flipped cooperative classroom that enhances Thai university students' reading comprehension. The study found that providing a suitable environment for learning and practicing affects learning positively. The instruction promoted students to learn online before classroom. The results showed significant improvement in reading comprehension and positive opinions about learning experiences.

In terms of reading for making inference, there are some studies investigating how students make inferences in reading (Attaprechakul, 2013; Warnidah & Suwarno, 2016). In Attaprechakul study, after twenty-four students have read journal articles, they relied heavily on their bottom-up processing. They were less able to infer the tone and attitudes of the authors. In Warnidah & Suwarno study, the students reported moderate difficulty in making inference.

It can be implied from the previous studies that the awareness of reading strategies helps students improve their learning in reading comprehension. Next section is discussing self-efficacy, which is one of the crucial factors in designing the instructions that enhance students' motivation, positive attitudes and self-confidence in learning.

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2.3 Self-Efficacy

Self-efficacy is a central mechanism of personal agency and self-regulation. It refers to people's beliefs that they can perform behaviors successfully and fulfill their desired goal (Bandura, 1977). It is also seen as past accomplishments that serve as indicators of ability from actual experience, vicarious experience, physical and emotional states. Self-efficacy is incorporated with the social learning theory which is merged out of the behavior and learning condition. It emphasizes that a person is an originator of experience. Humans are viewed as agents that have the ability to act and make things happen with their cognitive, vicarious, self-regulative, and self-reflective capacities. Most behaviors can be learned without being rewarded or punished.

Extrinsic reinforcement is not an outcome of natural behavior as it can be a key role of behavioral change only in early development. Without positive encouragement after unsuccessful performance, humans can be eventually discouraged. Human agency influences humans to behave purposefully. People can change their undesired behaviors with social learning theories.

Perceived self-efficacy is seen as people's beliefs about their capabilities to produce desired levels of performance that influence their lives. It is important to enhance students to become more efficacious. According to Pajares (1996), self-efficacy affects people's behavior in three ways; 1) it influences people's behavior; 2) it helps estimate the effort and duration people are spending on the task; and 3) it affects people's thoughts and emotions. According to Zimmerman (2000), self-efficacy is a key ingredient in the processes of self-regulation. Self-efficacy is subcategorized into 1) self-efficacy for self-regulation and 2) self-efficacy for academic achievement. Self-efficacy is task-specific and involves individuals' prior experiences in the task. Learners who perceive themselves capable of a given task tend to engage more than when they do not feel themselves competent.

In terms of education, self-regulation is one of the important processes learners use to lead to desired goals, to self-evaluate, and to have higher self-efficacy. According to Bandura (1997) and Zimmerman (1990), effective self-regulation depends on the sense of self-efficacy. When learners have high self-efficacy, they tend to increase self-regulating behaviors. Schunk and Zimmerman (1997) formulated a social cognitive model of the development of self-regulation which consists of four phases namely, (1) observation means observational level the learners observe from higher ability peers; (2) emulation refers to the performance learner observe and follow based on the higher ability peers; (3) self-control refers to the stage that skills are internalized in learners; and (4) self-regulated is the stage that adaptation occurs. With these stages, self-regulation arises and along with self-efficacy, the students tend to improve in their learning. According to Bandura and Schunk (1981), people with high self-efficacy tend to perform successfully in their tasks while those with low efficacy tend to feel that difficult tasks are threatening.

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2.3.1 Self-efficacy and academic achievement

In academic context, students' efficacy influences their goals and learning achievement. The beliefs about academics of the students help determine what they can perform with the knowledge and skills they own (Pajares & Valiante, 1997). In language learning, self-efficacy is the beliefs that students develop about their academic capabilities, and it helps determine what they do with the knowledge and skills they have. Higher levels of self-efficacy will lead to students' persistence on tasks to overcome difficulties (Pajares, 1996). When students perform their task academically and perceive their progress, their motivation in learning increases. Therefore, in order to enhance students in successful learning, learners' beliefs of self-efficacy and motivation need to be supported.

Positive experience in the classroom can increase the positive performance of the students along with their self-efficacy. According to Bandura (1997), students who believe in their abilities in the classroom are able to rely on their own learning abilities when being challenged academically. They can participate actively, work harder, persist longer and produce less emotional reactions when facing difficulties. As a teacher, it is crucial to promote learners' positive and engaging experience, encourage them in a supportive way, be a good model to learners, and support them emotionally in order to prepare them to learn effectively and become efficacious.

In sum, there is a strong relationship between students' self-efficacy and their learning performances. Self-efficacy was used as a predictor of many skills of language performance such as reading, writing, speaking, and listening. Hence, in this study, the focus is on self-efficacy and reading comprehension skills.

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2.3.2 Self-efficacy and DRI

In implementing DRI, the focus is on enhancing the students to maximize their ability in reading comprehension. To provide students with effective differentiated instruction, self-efficacy should be focused because it is considered an internal motivator for learners (Chapman & King, 2009). If learners believe they can do the reading tasks, they tend to be able to achieve their goal. In order to help learners to build self-efficacy, the four main sources are focused in order to influence self-efficacy belief development in learners' minds. They are mastery experiences,

vicarious experiences, social persuasion and emotional states. Therefore, in order to build self-efficacy on someone, the four techniques are provided as follows.

Mastery experience or performance accomplishment refers to first-hand experience of mastery or success. It is the most effective way to create self-efficacy. A person's success can help promote another's success in the future. On the other hand, failures can decrease self-efficacy. A sense of efficacy requires experience in overcoming obstacles through effort. It needs cognitive, behavioral, and self-regulatory tools to build efficacy. In other words, successes tend to increase efficacy perceptions which in turn promote further success.

Vicarious experience refers to observing the actions of others. It is the second most influential way to build efficacy. This kind of experience can be promoted through seeing people become successful by putting effort. When the learners see that others can succeed, then they raise the beliefs that they can also master the same thing. It is important for the learners to observe competent models so that the influences are positive.

Verbal or social persuasion is a third way of strengthening people's beliefs that they have what it takes to succeed. People who can persuade learners verbally or socially should be those who are influential in their lives such as parents or teachers. It can be done through persuasive boosts such as encouragement to try tasks and assurance that self-improvement is better than competing with others.

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Stress and tension can be a sign that lower self-efficacy and a lot of learners tend to perform poorly when they are stressed. Mood also affects judgement of learners. To enhance perceived self-efficacy, learners' stress and negative emotion should be reduced.

In order to provide self-efficacy in DRI implementation, the elements of self-efficacy can be incorporated with DRI as an instructional framework in figure 2.

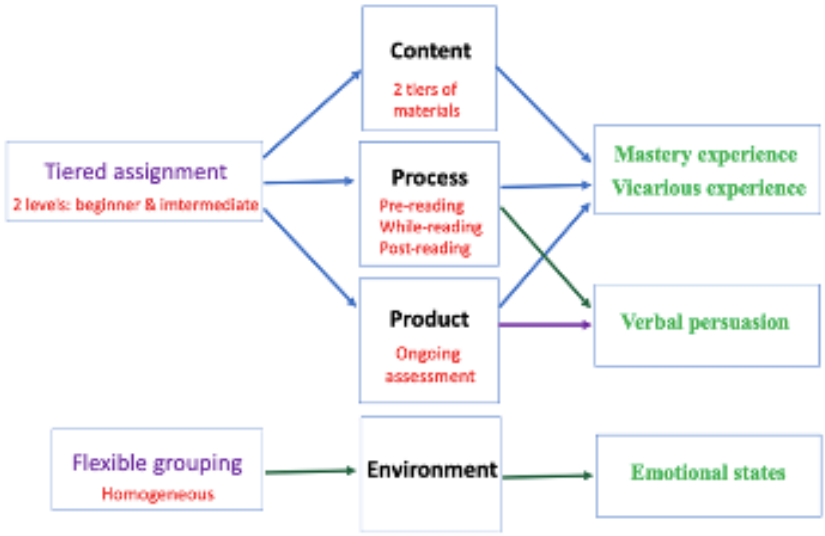

Figure 2 Instructional framework for differentiated reading instruction and self-efficacy

2.3.3 Previous studies on self-efficacy

More studies on the concept of self-efficacy has been reviewed in order to gain more understanding of the relationship between self-efficacy and reading comprehension. There are several studies based on self-efficacy as a predictor of learning performance and other variables.

Tilfarlioglu and Cinkara (2009) investigated the self-efficacy of 175 EFL undergraduate students. The students were put into three levels of proficiency. The self-efficacy survey revealed that self-efficacy can be an influential aspect in students' success in learning language. The researchers suggested self-efficacy as an important tool for EFL classrooms.

Yusuf (2011) investigated the impact of self-efficacy, achievement motivation and learning strategies on undergraduate students. It was found that self-efficacy beliefs positively enhanced learning attainment of the students. Raoofi et al. (2012) tried to investigate whether self-efficacy can predict language learning achievement or not by selecting research articles on self-efficacy and factors affecting self-efficacy. The findings were from collecting results from those studies and the results showed that there were several factors enhancing the students' self-efficacy. Also, it was found that self-efficacy was a strong predictor of performance in language learning.

One interesting study is on Chinese language acquisition in the virtual world that enhances self-efficacy belief (Henderson et al., 2009). The focus was on using Chinese in the virtual world which engaged students in collaborative activities. The results showed significant improvement or self-efficacy from mastery experiences.

Another study of Kitikanan and Sasimonton (2017) was on thirty-two Thai university students. It aimed to investigate self-efficacy and learning performance in four language skills of English major students. It was found that self-efficacy of all four skills had a significant positive relationship to the English learning achievement.

However, there are some studies that received negative results. For example, Ersanlı (2015) investigated the relationship between academic self-efficacy and language learning motivation. The participants were 257 secondary students of eight grade from three schools. The results revealed that there was a low level negative correlation between English language learning motivation and self-efficacy.

Another study with negative results is the study of Anyadubalu (2010), which focused on self-efficacy, anxiety, and language performance. The participants were 318 Thai middle school students. The results revealed self-efficacy had no significant relationship with learning performance. However, it was found that self-efficacy and language anxiety had positive relations and can be considered predictors of language performance.

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Nwosu and Okoye (2014) studied the self-efficacy of 133 second year undergraduate students in psychology courses. The results showed that self-efficacy did not predict students' achievement. The researchers concluded that large self-efficacy is not enough to measure knowledge and competence.

In sum, positive experience in the classroom can increase positive performance of the students along with their self-efficacy. According to Bandura (1997), students who believe in their abilities in the classroom are able to rely on their own learning abilities when being challenged academically. As a teacher, it is crucial to promote learners' positive and engaging experience, encourage them in a supportive way, be a good model to learners, and support them emotionally in order to prepare them to learn effectively and become efficacious.

The next section discusses the related theories concerning the effects of implementation of DRI to enhance students' reading comprehension and self-efficacy; namely, second language acquisition and learning plateau.

2.4 Related research

2.4.1 Second Language Acquisition

Second language (L2) acquisition is in contrast to the first language (L1) acquisition. While L1 is acquired as a mother tongue, L2 is an additional language. There are many factors researchers believe L1 is strongly influencing L2. The clear fact is foreign accents in L2 speech of speakers. Another interesting effect is on vocabulary and grammar. These aspects of L1 transfer are believed to be negative because the learner could produce language errors if L1 is way different from L2. However, Corder (1978) suggested that L1 may facilitate the developmental process of learning L2 when the L1 is similar to the L2. Grabe (1991) also proposed that L1 readers who are not exposed to academic reading text may not be able to transfer their abilities from L1 to their L2. Krashen (1981) also suggested that learners can use the L1 to initiate sounds when they do not know the word in L2. L1 can be a resource to support a speaker when he has to speak the word beyond their knowledge.

Stephen Krashen is a linguist specialized in theories of language acquisition. His research studies in learning and acquisition were wildly well known. One of the most renowned theories in second language acquisition is five main hypotheses namely, the acquisition-learning hypothesis, the monitor hypothesis, the natural order hypothesis, the input hypothesis, and the affective filter hypothesis.

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1. The acquisition-learning

Krashen proposed two independent systems of second language performance called the acquired system and the learned system. Acquisition or the acquired system is the product of a subconscious process similar to when a child learns a first language. Learning or learned systems are produced by formal instruction. Krashen stated that learning is less important than acquisition

2. The monitor

This concept explains the relationship between acquisition and learning. The

monitor occurs when the learning system takes control. The monitor acts in editing and correcting when the language user focuses on forms or knows the grammar rules. Conscious learning is not a good way for communication. Krashen suggested that language users should use the monitor appropriately so that communication can be made smoothly.

3. The natural order

This hypothesis is based on how a child learn first language in Krashen's findings in 1988. The acquisition of grammatical structures in L1 should be applied in L2 learning. Communication is the main focus on this approach, not the structural rules of language.

4. The input hypothesis

This concept explains how the learner acquires a second language. It is best for learner to understand the input that is slightly beyond their current level of competence (i +1). Krashen suggested that the natural communicative input is the key to design language courses in a way that each learner will receive 'i+1' input that is appropriate for the existing level.

5. The affective filter hypothesis

Krashen stated that affective variables such as motivation, self-confidence, and anxiety plays a crucial role in second language acquisition. He claimed that learners with high motivation, high self-confidence and low level of anxiety are better equipped for success in second language acquisition. The filter refers to emotional states which can be adjusted to be lower or raised based on learners' emotion and attitudes. To acquire language, the learners need motivation, self-confidence and low anxiety.

There are both low and high achievers in a classroom, so teachers should educate students in accordance with their characteristics and their actual levels. People learn in their own ways, therefore, in order to equip the students with appropriate scaffolding, the suitable approach should be applied in the curriculum.

2.4.2 Learning plateau

In second language acquisition, apart from trying to develop in language learning, it is important to consider the decrease of the development in learning.

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Learning plateaus happen constantly to many language learners by causing them to stop their progress of learning no matter how hard they try. According to Collins et al. (1973), learning plateaus occurs in the process of learning a new skill and the learners cannot make any more progress even though they put in a lot of effort and practice. According to Richards (2008), plateau effect is a temporary phenomenon when EFL learners move from intermediate to advanced levels. It prevents L2 learners from further learning development. When learners reach an intermediate level of language learning, the progress has reached a plateau and making further development seem slow. However, Richards asserted that the plateau is a natural effect of the learning process.

Lewis (1993) reported that students at the intermediate level, who usually are able to handle most difficult situations, tend to avoid challenging tasks when they reach their upper intermediate levels. Yi (2007) also experienced a major decrease in the learners who were moving from intermediate level to upper intermediate and advanced levels. The following are the factors that cause the learners to encounter the plateau effect.

1. There is a gap between receptive and productive competence. All language Learners have greater receptive competence than productive one. Learners may be able to make a lot more progress in listening skills but are still weak in speaking skills.
2. There are persistent, fossilized language errors. Error that usually occur with lower-level learners reappear even though the learners put the efforts on the task. Errors in both grammar and pronunciation have become permanent.
3. Fluency may have progressed at the expense of complexity. Learners may be able to use language to express their meanings but the grammar and vocabulary may not be complex.
4. The learners have a limited vocabulary range. Vocabulary development has not progressed enough. Learners tend to overuse lower-level vocabulary and fail to acquire more advanced vocabulary and usage.
5. Language production may be adequate but often lacks natural speech. English of the learners may be fluent, communicative, and grammatical but sounds too formal.

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In this study, the main focus is on differentiated instruction, reading comprehension, and self-efficacy. The students in one class are usually mixed-ability and the courses are usually designed for one particular level. Those who are on-level would be the only group to receive the best support, while those lower or higher level students would be affected either positively or negatively. Differentiated reading instruction is a teaching approach that accommodates students' needs, readiness, interest, and learning styles. In terms of reading comprehension, the students would be provided with reading text that is on topic of their interests and customized according to their levels. With a stress-free class and relaxing encouragement from the teacher, the students would gain motivation to learn and that can lead to higher self-efficacy.

2.5 Chapter summary

This study aimed to investigate the effects of differentiated reading instruction on reading comprehension and self-efficacy on undergraduate students. To understand how the intervention was used to develop students' reading ability and self-efficacy, three main theories were focused. The underlying assumptions of the theoretical framework of the differentiated instruction based on Tomlinson (2001) have been discussed. Another theory mentioned was the differentiated reading instruction based on Barrett (1968), Davis (1968) and Brown (2001). Also, the theory on self-efficacy based on Bandura (1997) has been discussed. Moreover, some related studies have been outlined. The conceptual framework of the study is illustrated in Figure 3.

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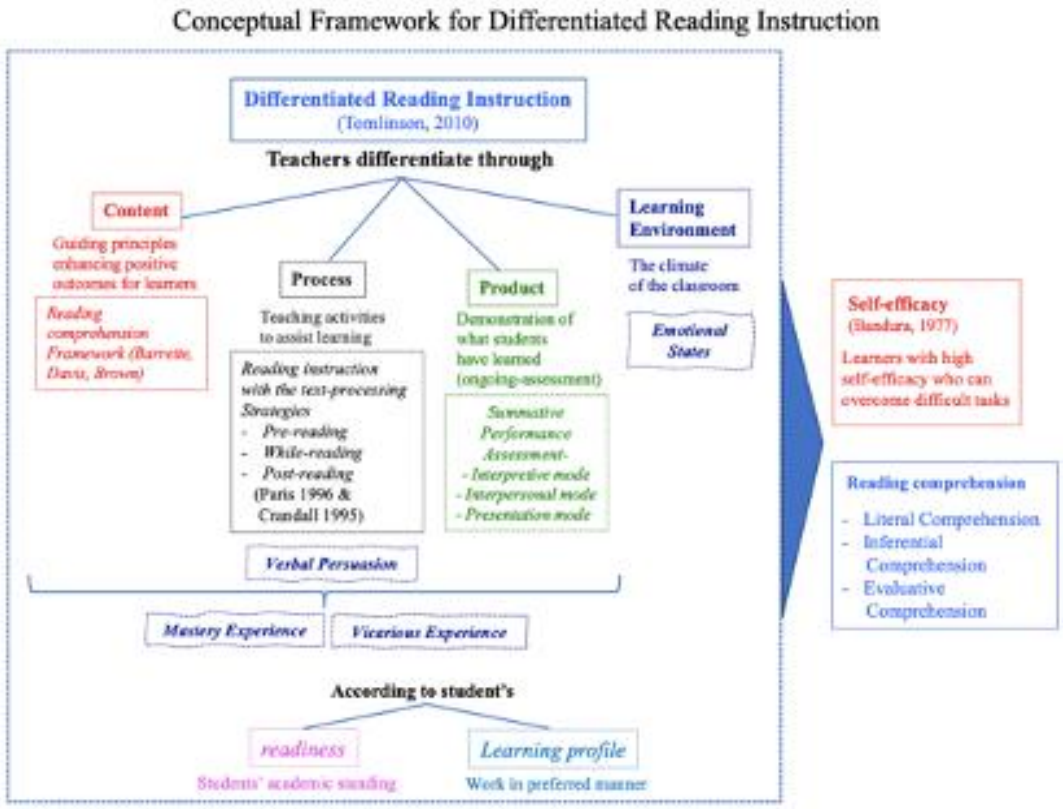

Figure 3 Conceptual framework of the differentiated reading instruction

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CHAPTER III
RESEARCH METHODOLOGY

This chapter describes the research methodology used in the study. The description covers research design, research procedure, population and samples, and instruments for each stage of the research together with data collection and data analysis methods. In this chapter, the population and samples are described. The data were collected by mixed methods: quantitative and qualitative methods. The stages of research instruments construction are described, and validation as well as revision details are reported.

3.1 Research design

The research used a mixed method of research by integrating both the qualitative and quantitative data. Also, it was a one-group pretest-posttest design aiming to investigate the effects of differentiated reading instruction to enhance reading comprehension and self-efficacy of undergraduate learners. Students were assessed with the pre-test of reading comprehension and pre-test of self-efficacy questionnaire at the beginning of the course to determine their level of reading comprehension competency and self-efficacy before the intervention. Then, the treatment, which was the differentiated reading comprehension, was implemented. At the end of the course, the post-test of reading comprehension, post-test of self-efficacy questionnaire, attitude questionnaire, and semi-structured interview were given to the students to explore if there were any changes in the students' reading comprehension ability and self-efficacy because of the differentiated reading instruction.

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3.1.1 Participants

The population in this study was second year undergraduate students at King Mongkut's University of Technology North Bangkok (KMUTNB). They are from eight departments in this faculty namely, Department of Agro-Industrial, Food and Environment Technology, Department of Applied Statistics, Department of Computer and Information Science, Department of Industrial Chemistry, Department of Industrial Physics and Medical Instrumentation, Department of Mathematics, and

Department of Biotechnology. Students' age ranges are from 19-20. They took the courses of English I and English II when they were the first-year students. The course of English for Scientists, which is an elective course, is offered every semester. The class meets once a week for three hours.

In this study, the sample was assigned to the research as an intact group of 33 students who were second year students from the faculty of Applied Science, KMUTNB. There were five males and twenty-eight females participating in the study. They were students from one of the eight departments mentioned above and their native language was Thai. These second-year students have passed the compulsory courses of English I and English II. The subjects in this study were the class that KMUTNB assigned the researcher to teach in that semester, which was from the Department of Food and Environment Technology. The main study was in the academic year 2019, starting from November 2019 until February 2020. The students were made aware that their information would be kept confidential and that their participation was voluntary and would not affect their grades in any classes. The pre-test score of reading comprehension and students' previous English grades (English II) were used to divide the students into two groups of intermediate level (group A) and beginner level (group B). The students who were put in group A obtained grade C+ or above from the English course in the last semester and the pre-test scores of more than 22 or above the mean score of the pre-test.

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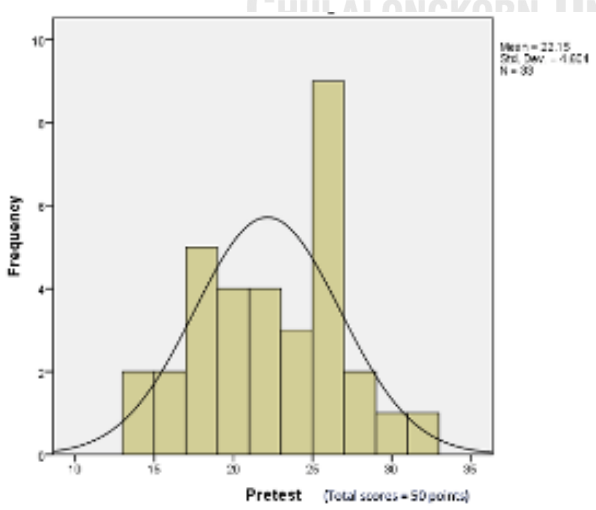

Figure 4 Students' pre-test scores of reading comprehension

From the group division criteria, there were thirteen students in group A and twenty students in group B. Among group A, there were three groups and among group B, there were four groups. Group A were requested to name their group starting with the letter “A” and group B with the letter “B”.

3.1.2 Research instruments

There were five instruments for the assessment and two instruments for the instruction. Before all the instruments in this study were used, each instrument was validated by three experts in the field of language teaching and assessment. The Index of Item Objective Congruence (IOC) was sent to the three experts to indicate their agreement with the items, uncertainty with the items, or disagreement. The experts then provided the comments or ideas with the instruments. The IOC results were then calculated to summarize the experts’ opinion. The calculation of IOC is shown in the following formula.

$$IOC = \frac{\sum R}{N}$$

IOC = Index of item congruence
$\sum R$ = Total score from responding to the test items of three experts
N = Number of experts

The IOC mean score with equal or higher than 0.5 for the instruments was considered valid.

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3.1.2.1 Assessment instruments

The students were given the pre-test of reading comprehension and the self-efficacy questionnaire at the beginning of the course. The pre-test of reading comprehension was designed to evaluate the students’ reading comprehension ability in their literal comprehension, inferential comprehension, and evaluation comprehension. The pre-test of self-efficacy questionnaire was also given to the students to identify the students’ self-efficacy before the intervention.

After the course, the post-test of reading comprehension and post-test of self-efficacy questionnaire were provided to the students. The pre-test and post-test of both reading comprehension and self-efficacy were the same as those of pre-tests. The

pre-tests and post-tests were three months or twelve weeks apart. The pre-test of reading comprehension and self-efficacy were administered in November 2019 and the post-tests were administered in February 2020. The time intervals between two tests were long enough to prevent memorization. According to Brown et al. (2008), it is common to repeat the same test in six weeks without students remembering the previous test. Moreover, the reason for using the same test for pre-and post-test was that the tests were used to determine whether changes had taken place after the intervention.

At the end of the course, the attitude questionnaire was used as a quantitative instrument to investigate students' opinion toward the differentiated reading instruction at the end of the course. The semi-structured interview was employed as a qualitative instrument after the course to investigate the students' attitudes toward the course in which the differentiated reading instructional modules were implemented.

During the course, the students were assigned to write two journals after completing two lessons. The data from the journals was used to analyze qualitatively. The teacher also used checklist to assess students' two performances in order to provide positive feedback.

3.1.2.1.1 Pre-test and post-test of reading comprehension (Appendix A)

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The pre- and post-test of reading comprehension was designed to evaluate the students' reading comprehension ability before the intervention and to see whether the students had improvement in reading comprehension ability after the course. The pre-test and post-test were designed in response to the goals and objectives of the course. The content of the test covered the reading dimension adapted from Barrett's Taxonomy (1968), the reading comprehension strategies adapted from Brown (2004) and the eight reading comprehension skills by Davis (1968) as follows.

Table 7 Reading comprehension frameworks for constructing pre-test and post-reading comprehension test

Barrett (1968)	Davis (1968)	Brown (2004)	Framework for this study

1. Literal comprehension; recognition and recall of **- details** **- main ideas** **- sequence** **- comparison** **- cause and effect** **- character traits**	recalling word meaning	identifying your purpose in reading a text	1. Literal Comprehension - Skimming the text for the gist - Scanning the text for specific information - Reorganizing ideas from various parts of the text
	finding answers to questions answer explicitly or in paraphrases	applying spelling rules and conventions for bottom-up decoding	
		guessing the meaning of word, idioms, etc.	
		skimming the text for the gist and main ideas	
		scanning the text for specific information	
2. Reorganization; **- classifying** **- outlining** **- summarizing** **- synthesizing**	weaving together ideas in the content	using marginal notes, outlines, charts for understanding	
3. Inferential comprehension; inferring of **- supporting details** **- main ideas** **- sequence** **- comparisons** **- cause and effect** **- character traits** **- figurative language** **- predicting outcomes**	drawing inferences about the meaning of a word from context	capitalizing on the discourse markers to process relationships	2. Inferential Comprehension - Drawing inferences about the meaning of a word from context - Drawing inferences from the content - Predicting outcomes
	drawing inferences from the content		
4. Evaluation; judgment of **- reality or fantasy** **- fact or opinion** **- adequacy and validity** **- appropriateness** **- worth, desirability and acceptability**	recognizing a writer's purpose, attitudes, tone and mood	using lexical analysis	3. Evaluation - Giving comprehensive judgement about some aspect of the text - Recognizing a writer's purpose, attitudes, tone and mood
	identifying a writer's technique	distinguishing between literal and implied meanings	
	following the structure of passage		

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5. Appreciation; **- emotional response to the content** **- identification with characters or incidents** **- reactions to the author's use of language** **- imagery**

Validation

The pre-test and post-test were validated by three experts. The experts were asked to decide whether the items in the test are appropriate or not. Data received was analyzed using the mean and standard deviation. The IOC result was higher than 0.50, which implied that the pre-test and post-test were suitable. The Item-Objective Congruence Index (IOC) results were 0.91. The researcher revised the pre-test and post-test according to the experts' suggestions. The test specification of the pre- and post- reading comprehension test and the reading comprehend pre-test and post-test are in **Appendix A**.

The test constructs literal comprehension, inferential comprehension, and evaluation. The example of questions according to the test construct is in Table 8 showing the question construct and the question items in the reading comprehension test.

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Table 8 Test Construct and Question

	Construct	Objectives	Test Items
1	**Literal Comprehension**: Skimming the text for the main idea and for the gist	To check if the students have understood the basic or surface meaning of the text that is directly stated	Item 7: ____ Einstein had to move to America in 1933 because his parents wanted him to get a better education. (T/F) Item 11: According to the passage, what can occur to people with synesthesia? Item 17: ____ If you have synesthesia, you would be able to see a certain color when hearing a certain song. (T/F) Item 25: Which elements can lead to dehydration if humans do not have enough? Item 45: Which of the following will happen if people do nothing about global warming?

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2	**Literal Comprehension**: Scanning the text for specific information	To check if the students can find the specific piece of information that is directly stated	Item 4: Which of the following is the name of the theory explaining how energy is related to mass? Item 8: ____ His most famous invention was the development of the nuclear bomb. (T/F) Item 9: ___According to the passage, the particles of light are photons. (T/F) Item 18: ___According to the study, 10% of the population will have synesthesia and it can pass on in the family. (T/F) Item 21: Which of the following elements make up most of the human body? Item 24: About how many different elements are part of the human body? Item 26: Which elements that humans need in order to get strong bones? Item 31: What can't you do if you have glossophobia? Item 33: According to the passage, what are victims of Nomophobia really addicted to? Item 36: What can be the effect of the phone addiction? Item 41: According to the passage, when did the rise in the temperature of the Earth's surface start? Item 42: What are the effects of climate change and global warming that have been more evident recently?

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3	**Literal Comprehension:** Reorganizing ideas from various parts of the text	To check if the students can combine the information for additional understanding	Item 2: Which of the following is closest in meaning in the sentence, "He had speech problems as a child"? Item 3: Which of the following is NOT TRUE about Albert Einstein? Item 14: The following are true about synesthesia, EXCEPT: Item 19: ____Synesthesia tends to occur with creative people. (T/F) Item 22: Which of the following is NOT TRUE? Item 32: What is NOT TRUE about phobia? Item 35: Which statement below is true? Item 37: According to the passage, which of the following constitutes criterion for phone addiction? Item 43: What or who is the cause of global warming? Item 46: Which is the correct order of the effects of global warming? Item 49: The following are ways to "live a greener lifestyle" EXCEPT:
4	**Inferential:**Drawing inferences about the meaning of a word from context	To check if the students can use the find the information or meaning that is not directly stated in the text based on logical hints of the words	Item 1: Which of the following can best replace the word "contribution" in line 1? Item 12: What is the best meaning of "prevalent"? Item 15: Which of the following is closest in meaning in the phrase, "to perceive together"? Item 23: Which of the following can best replace the word "common" in paragraph 2? Item 34: What is the best meaning of "withdraw"? Item 44: What is the meaning of "carbon footprint"? Item 48: What is the best meaning of "minimize"?

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5	**Inferential:** Drawing inferences from the content	To check if the students can find the information that is not directly stated in the text based on the specific paragraph or the entire text	Item 5: Which of the following is TRUE about Albert Einstein and the atomic bomb? Item 10: ___Einstein was 76 years old when he died. (T/F) Item 13: According to the passage, people in many professions tend to have synesthesia, EXCEPT? Item 27: Which of the following can be the best title of the passage? Item 38: The word "The signs" in the last paragraph refers to_____?
6	**Inferential:** predicting outcomes	To check if the students can predict related matters from their understanding of the text	Item 20: The paragraph following this passage should be about how to cure synesthesia. Item 30: What should the paragraph following this passage be about? Item 50: What should the paragraph following this passage be about?
7	**Evaluation:** Giving comprehensive judgement about some aspect of the text	To check if the students can identify and evaluate their feelings for the text and the content.	Item 6: How will the information be useful to the reader? Item 29: How will the information in this passage be useful to the readers? Item 40: How will the information be useful to the reader?
8	**Evaluation:** Recognizing a writer's purpose, attitudes, tone and mood	To check if the students can identify tone and purpose of a specific part of a text or of the entire text	Item 16: The primary purpose of the passage is to___. Item 28: According to the passage, it can be implied that____. Item 39: What is the purpose of the text? Item 47: What does the author mean by "you should learn how you personally impact global warming"?

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Table 8 illustrates the experts' validation of the construct of the test of reading comprehension. The test construct includes 1) literal comprehension, 2) inferential comprehension, and 3) evaluation. To be more precise, the test focuses on the strategies used in reading process from Brown (2004), Davis (1968), and Barrett (1968), namely, 1) skimming, 2) scanning, 3) reorganizing, 4) inferencing about the meaning of a word, 5) inferencing from the content, 6) predicting, 7) Giving

judgement, and 8) recognizing purpose, attitudes, and tone of writing. Some adjustments according to the experts' suggestions were made before the pilot study.

Table 9 Experts' validation of reading comprehension pre-test and post-test

	Construct	Mean	Result
1	**Literal Comprehension**: *Skimming* the text for the main idea and for the gist	0.66	Accepted
2	**Literal Comprehension**: *Scanning* the text for specific information	1	Accepted
3	**Literal Comprehension:** *Reorganizing* ideas from various parts of the text	1	Accepted
4	**Inferential:** Drawing inferences about the *meaning of a word* from context	1	Accepted
5	**Inferential:** Drawing inferences from the *content*	0.66	Accepted
6	**Inferential:** predicting outcomes	1	Accepted
7	**Evaluation:** Giving comprehensive *judgement* about some aspect of the text	1	Accepted
8	**Evaluation:** Recognizing a *writer's purpose*, attitudes, tone and mood	1	Accepted

3.1.2.1.2 Pre-test and post-test of self-efficacy (Appendix B)

In order to investigate students' self-efficacy, a questionnaire of self-efficacy scale was developed. The students were asked to complete the self-efficacy questionnaire so that their improvement of self-efficacy would be measured after the implementation of the differentiated reading instruction. The questionnaire of self-efficacy scale was designed in response to the goals and objectives of the course. The survey questions, which consist of nineteen questions, were adapted from the questionnaire of English Self-Efficacy (QESE) by Wang (2004) and Generalized Self-Efficacy Scale by Schwarzer (1992). The method of Coefficient Alpha of Cronbach was used to measure the scale reliability. The reliability coefficient value was 0.87, which indicated good consistency.

Validation

The questionnaire of the self-efficacy scale was validated by three experts. The Item-Objective Congruence Index (IOC) results were 0.87. The questionnaire of self-

efficacy was revised before carrying out the pilot study. The self-efficacy questionnaire scale is in Appendix B.

Table 10 shows the experts' validation of the questionnaire of self-efficacy. The questionnaire contained nineteen items and was divided into three parts, self-efficacy on reading comprehension, self-efficacy in studying in a language course and self-efficacy based on sources of efficacy. Some adjustments according to the experts' suggestions were made before the pilot study. For example, item 9, which was not accepted, was changed into "Do you think you can understand the content and materials after being taught from the class?".

Table 10 Experts' validation of self-efficacy pre-test and post-test

	Item	Mean	Result
1	Do you think you can understand the basic meaning of the text that is directly stated? (skimming)	0.66	Accepted
2	Do you think you can find information you want in the text? (Scanning)	1	Accepted
3	Do you think you can draw conclusions from pieces of information in the text? (Reorganizing)	1	Accepted
4	Do you think you can find the meaning that is not directly stated in the text based on hints of the words? (Inferencing from a word)	0.66	Accepted
5	Do you think you can find the information that is not stated directly in the text based on the specific paragraph or the entire text? (Inferencing from the content)	1	Accepted
6	Do you think you can predict related matters from the text? (Predicting outcomes)	1	Accepted
7	Do you think you can identify and evaluate your feelings for the text? (Giving judgement)	1	Accepted
8	Do you think you can identify the tone and purpose of a specific part of a text or of the entire text? (Recognizing purposes, attitudes and tone of writing)	1	Accepted
9	Do you think you can understand the content and materials on science and technology after being taught from the class? (Observation)	0.33	Revised
10	Do you think you can retell the story that you read from the text to your friends after being taught from the class? (Emulation)	0.66	Accepted

11	Do you think you can do the assignments with friends after being taught in the class? (Self-control)	1	Accepted
12	Do you think you can do the assignments on your own after being taught in the class? (Self-control)	1	Accepted
13	Do you think you can do as well as, or better than most of your friends in class? (Self-regulation)	1	Accepted
14	Do you think you can understand the text you read outside class? (Self-regulation)	0.66	Accepted
15	Do you think you can do the task in English classes you may join in the future? (Self-regulation)	1	Accepted
16	Do you think you can become a successful language learner by experiencing and overcoming obstacles? (Mastery experience)	1	Accepted
17	Do you think you can become a successful language learner by observing others' successful experiences? (Vicarious experience)	1	Accepted
18	Do you think you can become a successful language learner by being encouraged with nice words and encouraging words from teachers and friends? (Verbal persuasion)	1	Accepted
19	Do you think you can become a successful language learner by being in a decent environment? (Emotional states)	0.66	Accepted

Five-point likert scales were used for rating their self-efficacy ability as follows.

1 means I am totally unable to do this
2 means I am possibly unable to do this
3 means I am possibly able to do this
4 means I am able to do this
5 means I am able to do this well

3.1.2.1.3 Attitude questionnaire (Appendix C)

The attitude questionnaire was developed in order to investigate the students' overall satisfaction with the differentiated reading instructional modules. The questionnaire was adapted from Yin (2005) in a language learning questionnaire. The questionnaire, which consisted of nineteen questions, would elicit students' attitudes after attending the classes in which the teacher uses differentiated reading instruction. At the end of the questionnaire there was an open-ended question for the students to provide suggestions for the course.

Validation

The attitude questionnaire was validated by three experts. The Item-Objective Congruence Index (IOC) was employed to elicit the experts' opinion. The IOC result was 0.92. The method of Coefficient Alpha of Cronbach was used to measure the scale reliability. The reliability coefficient value was 0.92, which indicated excellent consistency. The sample of the attitude questionnaire is in Appendix C.

Table 11 shows the experts' validation of the questionnaire of attitude. There were nineteen questions, and it was divided into three parts: attitude toward reading comprehension, attitude toward differentiated instruction and other suggestions.

Table 11 Experts' validation of attitude questionnaire

	Item	Mean	Result
1	After studying the course, I can identify the main idea of the passage.	0.66	Accepted
2	After studying the course, I can skim the text for the gist and main idea	1	Accepted
3	After studying the course, I can scan the text for specific information	1	Accepted
4	After studying the course, I can guess at meaning of words and phrases	1	Accepted
5	After studying the course, I can distinguish between literal and implied meanings	0.66	Accepted
6	After studying the course, I can draw inferences about the meaning from context	0.66	Accepted
7	After studying the course, I can identify the purpose of text	1	Accepted
8	After studying the course, I can read and understand the text more quickly	1	Accepted
9	After studying the course, I know more useful vocabulary	1	Accepted
10	After studying the course, I remember more useful vocabulary	1	Accepted
11	After studying the course, I think learning English through DRI, helps me to learn with ease	1	Accepted
12	After studying the course, I think learning English through DRI, is enjoyable most of the time	1	Accepted
13	After studying the course, I think learning English through DRI, gives me stress-free learning environment	1	Accepted

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14	After studying the course, I think learning English through DRI, motivates me to learn English in the future	1	Accepted
15	After studying the course, I think learning English through DRI, is effective instruction	1	Accepted
16	When I was studying with differentiated instruction, I liked most of the activities	1	Accepted
17	After studying the course I am confident that I can do better in reading comprehension in the course and examination	1	Accepted
18	After studying the course I am confident that I can do better in English in the future	0.66	Accepted
19	After studying the course I am confident that I can be proficient in English for my future career	1	Accepted

Five-point likert scales were used for rating students' attitudes toward the instruction as follows.

1 means strongly disagree
2 means disagree
3 means neutral
4 means agree
5 means strongly agree

3.1.2.1.4 Semi-structured interview (Appendix D)

The interview questions were composed in order to collect qualitative information related to the students' attitudes toward the differentiated reading instruction. The interview was based on Kvale (1996) on qualitative interviewing. The interview, which consisted of four questions, was conducted at the end of the instruction. Questions number and two concerned the students' opinions on differentiated reading instruction and its activities. Question number three examined their opinions on working as a corporate group. Question four was about their self-efficacy when learning with DRI. The participants were interviewed one by one by the researcher. The interview was conducted in English, but students could answer in Thai if they prefer. The reason why the students were allowed to speak Thai for the interview was to make sure they shared their true ideas and opinions.

Six students were randomly chosen to be interviewed, three from the beginner group and three from the intermediate group. They were interviewed individually. The interviews were administered in the last class.

Validation

The interview questions were validated by three experts. The Item-Objective Congruence Index (IOC) was 0.74. The IOC results showed that the mean score of the content validity of the interview was acceptable. Additionally, the experts' further comments were used to revise the questions. The sample of the semi-structured interview is in Appendix D.

Table 12 Experts' validation of attitude questionnaire

	Item	Mean	Result
1	What is your opinion toward DRI? Do you think it is useful for reading comprehension and can improve your reading ability? Why?	0.66	Accepted
2	What is your opinion about reading ability in class? What activities do you think influenced the most in reading? Do you think it is useful for reading comprehension? Why?	0.66	Accepted
3	Do you think working in a group assist your learning? Which do you prefer, working in a group or alone? Why?	1	Accepted
4	Do you think differentiated reading instruction enhances your self-efficacy? Do you believe that you can do better in reading English in the future after this class? Do you think English can help you with your future career? Explain.	0.66	Accepted

3.1.2.1.5 Students' journal and teacher's checklist (Appendix E)

During the course, the students were assigned to write journals. The first one was after the second lesson of the intervention and the second was after the course. The data from the journals was qualitatively analyzed. The checklist to assess students' performances were also used in order to provide feedback for students instead of to score them.

3.1.2.2 Instructional materials

The differentiated reading instructional modules were used to enhance the students' reading comprehension and self-efficacy. It was developed according to the theoretical frameworks of differentiated instruction, reading instruction and self-efficacy in language learning.

The course components, which included the course objectives, course descriptions, materials, activities, and assessment plans, were validated by a panel of three experts. As the lessons' contents are mainly scientific based, the experts who

validated the instruction have experience teaching English for Specific Purposes so that specificity and authenticity of the instruction was verified. The Item-Objective Congruence Index (IOC) was employed to summarize the experts' opinion.

The IOC result was 0.81 which implied that the lesson plan was accurate. The researcher revised the lesson plans according to the experts' suggestions, and then conducted the pilot study.

Table 13 Experts' validation of differentiated reading instruction lessons

Items	Mean	Results
1. The objectives of the lesson are clearly written.	0.66	Accepted
2. The time duration of the lesson is appropriate.	1	Accepted
3. The lesson promotes a communication between student – student and teacher – student.	1	Accepted
4. Active and collaborative learning is encouraged in the lesson.	1	Accepted
5. Teaching methods and content could lead to the accomplishment of the lesson objectives.	0.66	Accepted
6. Teaching methods and content could lead to improvement of reading comprehension of students with mixed ability in a class.	0.66	Accepted
7. Teaching methods and content for both levels of students are appropriate for each level.	0.66	Accepted
8. Teaching methods and content create a positive, productive and relaxing atmosphere.	0.66	Accepted
9. Teaching methods and content create a positive, productive and relaxed atmosphere.	0.66	Accepted
10. The teaching / learning content in each unit is appropriate to the allocated time.	1	Accepted
11. Materials and resources are various and useful.	0.66	Accepted
12. The assessment in terms of providing feedback is useful.	1	Accepted
13. The assessment / evaluation techniques are appropriate.	1	Accepted

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3.1.2.2.1 Reading Lessons (Appendix F)

There were four lessons in the instructional modules. In each lesson, there was an explanation of lesson objectives, instruction and activities, materials and assessment criteria. The class organization was adopted from Text-processing strategies of Paris et al. (1991) and Crandall (1995), which includes pre-reading, while-reading and post-reading. In pre-reading, the students' background knowledge was activated, and vocabulary knowledge was prepared for students before reading. In while-reading, the students connect with the text by decoding the meaning from the

text. They were required to understand texts and complete the tasks as a group. For the post-reading stage, it involves the students' review and evaluation of collected information from the text.

The first reading lesson was about science in general. There was information concerning reading comprehension skills and strategies included in this lesson. The second lesson focused on lab safety rules which most scientists should know. The content for the third lesson covered famous inventors. And the last lesson was about interesting inventions that were created in the world. The first three lessons were taught before the midterm examination and the fourth lesson was taught after the midterm because of the time allotment of the semester. The syllabus and lesson plan are shown in **Appendix F**.

The materials provided for the differentiated class comprises four lessons with the materials that were tiered for two groups of students. It started with reading comprehension skills and strategies that the students needed (Literal, Inferential and Evaluation). The useful techniques would enable them to improve their reading comprehension. The reading materials used in the lesson were science-related and mostly academic so that the students could apply the knowledge learned with their future career or study.

In terms of tiering the reading text, the reading difficulty levels were aligned with the reading competence described in CEFR. According to the Ministry of Education, bachelor graduate students are expected to achieve between A2 to B2 (basic to independent user) proficiency. The readability level can be between 80 – 69 (easy to standard).

The reading text in lesson one for group A students (higher-proficiency level students) consisted of 395 words, with the Flesch Kincaid reading ease score of 59.4 (C1). Meanwhile, the reading text for group B students consisted of 370 words, with the Flesch Kincaid reading ease score of 65.3 (B2). According to Vygotsky, the assistance from the teacher needs to be slightly higher than the students' actual level so the learning occurs. The reading text for group B was provided with more pictures, highlighted words for hints, and helps in vocabulary (see figure 5 and 6). The exercises for group A were more complicated whereas the ones for group B were simplified. The lesson plans are presented in **Appendix G**.

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A

Science in your life

Have you ever wondered why you have to study science?

Science, which means "knowledge" in Latin, is the study of the nature and behavior of natural things and the knowledge obtained about them. Sciences are categorized in many ways. Some sciences such as physics and chemistry are considered "hard sciences" and psychology and anthropology are considered "soft science". The division of science is also drawn differently, such as life sciences and physical sciences. Life sciences include anything that is living, while physical sciences include things that are not living, such as astronomy and geology. The best known fields of sciences are biology, chemistry, and physics. These three kinds of science may sound intimidating to some people, but they directly affect human life and are related to our life.

Biology is the science that tends to investigate every form of life – how it survives and where it originated. Biology is derived from the ancient Greek words "bios" which means life and "logos" which means study. Biology is everywhere starting from our body to the environment around us. Biology helps doctors learn how to cure disease. Marine biologists study life in the oceans. They may help to inform us about how to save the ocean from being polluted.

Chemistry is the study of characteristics and structure of substances both natural and artificial. Also, it involves the study of their properties, how and why they combine or separate to form other substances. Chemistry in everyday life can be illustrated by the sunscreen we use. The reflective particles in sunscreen usually consists of zinc oxide or titanium oxide. These chemicals filter the light from the sun so that less of it reaches the deeper layers of your skin.

Physics refers to "nature" in ancient Greek and is the foundation of most scientific knowledge. Physics is the study of matter and energy and how they relate to one another. Physics governs our daily life; for example, in a ball point pen. The concept of gravity is involved when you use your pen. As you move your pen across the paper, the ball rolls and the gravity forces the ink down onto the top of the ball where it is transferred onto the paper.

The world of science may appear difficult to understand to most people or people who are not familiar with science. However, it is closely related to our everyday life and is a way of uncovering new knowledge.

Readability
- 395 words
- Flesch = 59.4 (C1)
- grade level = 8.8

Figure 5 Reading text for students in group A

B

Science in your life

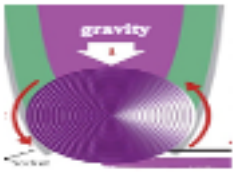
Have you ever wondered why you have to study science?

Science means "knowledge" in Latin. It is the study of the nature and behavior of natural things. Sciences are categorized in many ways. Physics and chemistry are "hard sciences" and psychology and anthropology are called "soft sciences". The division of science is different, such as life sciences and physical sciences. Life sciences include living things, which are people, animals and plants. However, physical sciences include things that are not living, such as astronomy and geology. The best known science are biology, chemistry, and physics. These three kinds of science may sound hard for some people, but they directly affect human life and are related to our life.

Biology is the science about every form of life – how it survives and where it is started. Biology comes from ancient Greek words "bios" which means life and "logos" which means study. Biology starts from our body to the environment around us. Biology helps doctors learn how to cure disease. Marine biologists study life in the oceans. They may help us to save the ocean from being polluted.

Chemistry is the study of the characteristics and structure of substances both natural and artificial. Also, it involves the study of their qualities, how and why **they** combine or separate to form other substances. Chemistry in everyday life can be in the sunscreen we use. The reflective particles in sunscreen is zinc oxide or titanium oxide. These chemicals filter the light from the sun so that less of it reaches the deeper layers of your skin.

Physics means "nature" in ancient Greek and is the foundation of most scientific knowledge. Physics is the study of matter and energy and how they relate to one another. Physics controls our everyday life. One example of physics in our life is in a ball point pen. The concept of gravity is involved when you use your pen. As you move your pen across the paper, the ball rolls and the gravity pushes the ink down onto the top of the ball. Then the ink is transferred onto the paper.



The world of science may be difficult to most people or people. However, it is closely connected to our everyday life and is a way to learn new knowledge.

Readability
- 370 words
- Flesch = 65.3 (B2)
- grade level = 7.3

Need help? ➔ Scan for vocabulary bank

Figure 6 Reading text for students in group B

After they finished the reading text and the exercises, there were three listening stations for each group to choose from. They were able to choose any topic they were interested in. Each station provided scaffolds for groups A and B differently. After they listen to the topic, they have to do the exercise which was tiered according to the group level of proficiency. Figure 7 showed the three stations with three topics on Biology, Chemistry and Physics.

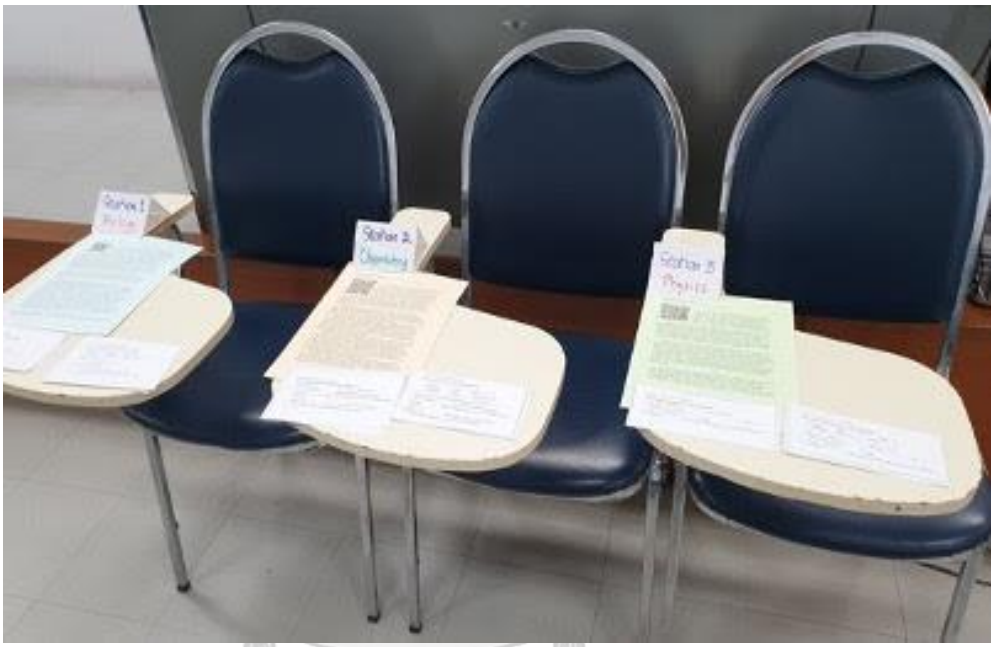


Figure 7 Listening station

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For example, in the station of Biology (Figure 8), after the students had chosen their topic of interest, there were assignment sheets separated for students in group A and group B to complete. For group A students, the assignments were more complex and for group B students, the assignments were simplified.

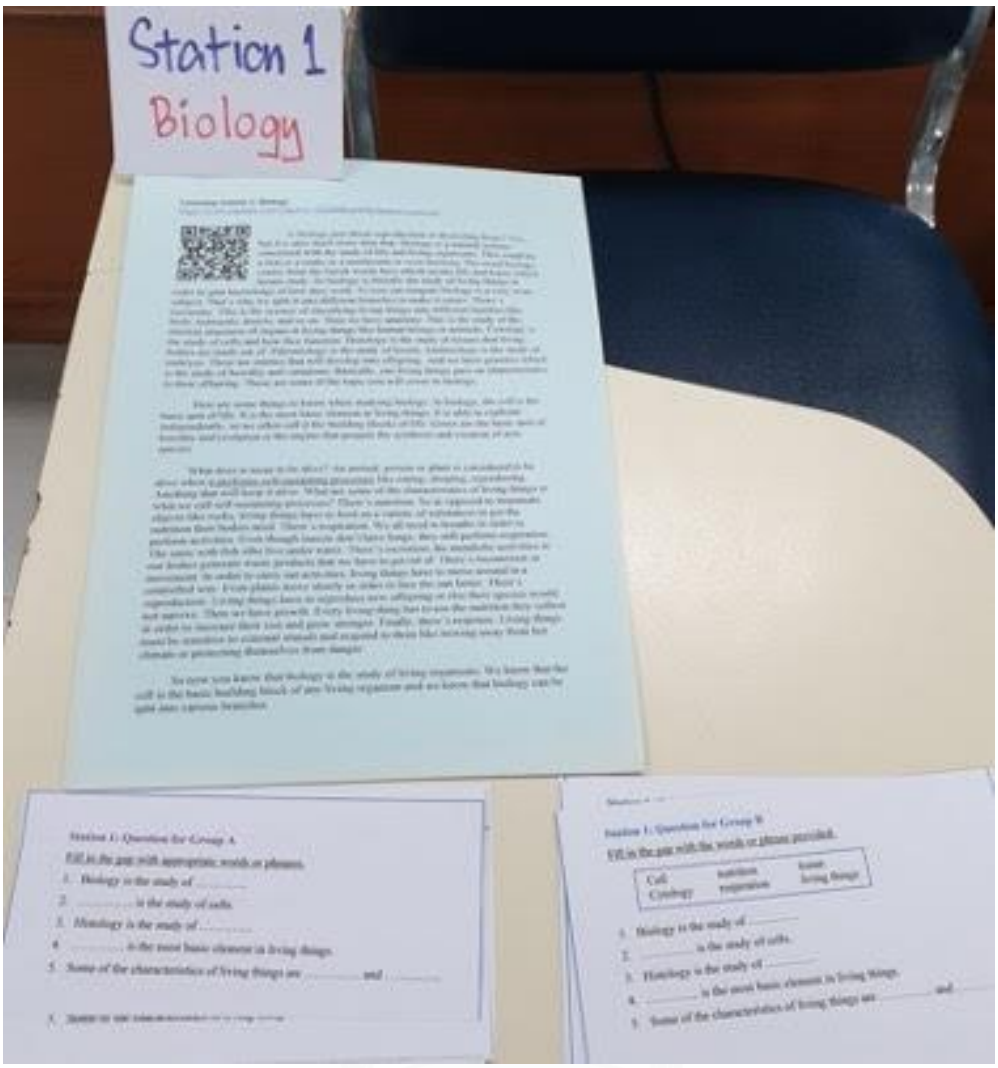

Figure 8 Listening Station One Biology

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After the listening station, the group presented their work to the class. Each group was evaluated according to the tiered product assessment sheet (teacher observation). The evaluation was administered after the second and the fourth presentation. The criteria for group A and B were different. The one for group A required more conditions and skills. The students were not graded according to this criterion, instead, the criteria were used for providing positive feedback. The criteria were based on Integrated Performance Assessment (IPA) of ACTFL (2012). The three modes of communication; interpersonal, interpretive, and presentational, helped teachers provide feedback and remind students about their goals. Interpersonal communication refers to students' performance in negotiating meaning among peers. Interpretive communication refers to the students' performance in interpreting what

the text says. Presentational communication means the students' performance in terms of explaining and persuading the audience. The criteria for both groups of students are presented in Table 14. At the end of the class, homework, which was not differentiated, was provided for the students to do individually.

Table 14 Tiered product assessment sheet for group A and B students (Appendix G)

Level Performance Assessment for group B			
Skill	Description	Yes	No
Interpersonal skill	There is connection within group		
	Discuss on familiar topic		
	Use variety of words, phrases, and simple sentences		
Interpretive skill	Identify main idea		
	Comprehend text by recognizing keywords or phrases		
Presentational Skill	Write simple sentences		
	Follow a practiced format		
	Ask and answer highly practiced questions		

Level Performance Assessment for Group A			
Skill	Description	Yes	No
Interpersonal skill	Connect well within group		
	Discuss on topic and extend idea further		
	Understand, ask and answer a variety of questions		
Interpretive skill	Comprehend main idea and some key details		
	Predict meaning from context		
Presentational skill	Write complex sentences		
	Provide more description		
	Maintain conversation on familiar topics		

3.2 Research procedures

3.2.1 Phases of the study

The research procedures were divided into two main phases. **The first phase** was the development of differentiated reading instruction and research instruments. **The second phase** was an experimental phase using one-group, pre-test and post-test design to investigate the students' reading comprehension and self-efficacy after implementing the differentiated reading lesson. Also, the attitudes of the students

toward the differentiated reading instruction were assessed on its completion. The phases are described as follows.

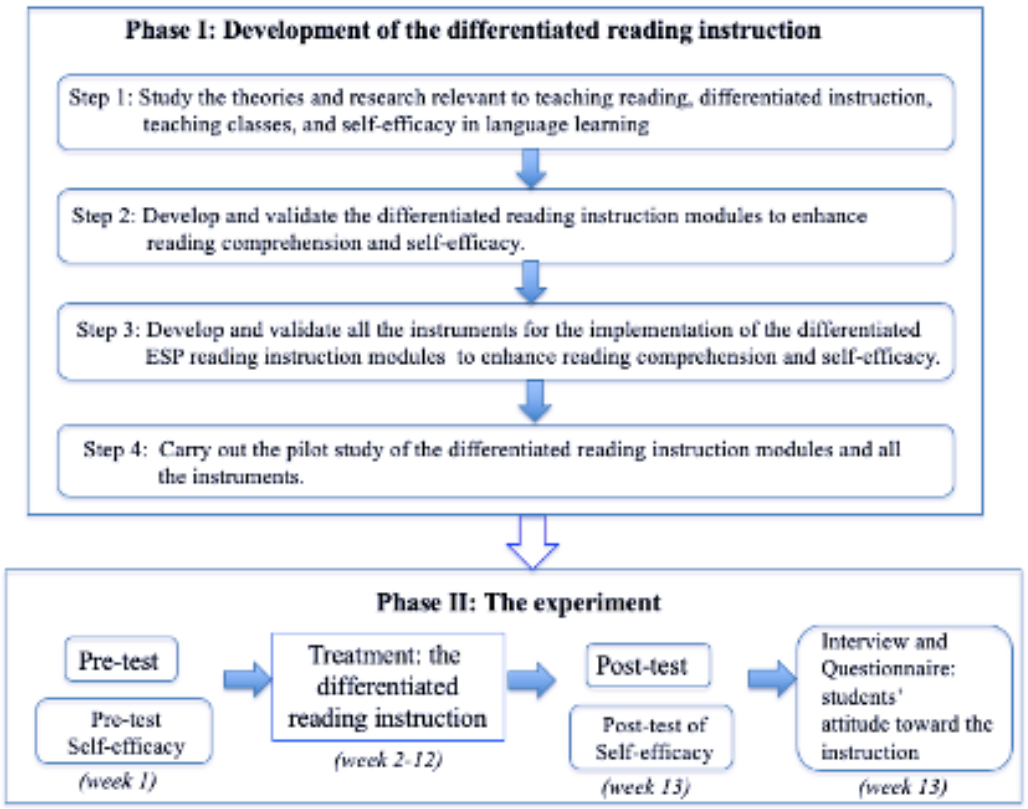

Figure 9 Research developmental phases

3.2.2 Pilot teaching

After revising the instruments, the pilot study of the instruction and research instruments was carried out in this stage. The pilot study was applied in order to confirm the effectiveness of the instruments used to analyze the differentiated reading instruction. Twenty-one second-year students from the Department of Biotechnology, faculty of Applied Science at King Mongkut's University of Technology North Bangkok was an intact group for the study. The students were a comparable group of students who possessed similar ability and characteristics to the sample.

The lesson plan was conducted and validated to test the appropriateness of the lesson plan. The reading comprehension pre-test and post-test was conducted and validated to test the appropriateness of the test in terms of the test tasks and the time allocation. Also, the attitude and self-efficacy questionnaires were piloted to the

students to investigate the reliability of the questionnaire and the ambiguity of the statements. The students were asked to report any unclear items on the questionnaire to the researcher.

The DRI was pilot tested in semester 1/2019 from June to October, 2019 with twenty-one students who were from the department of Biotechnology. They were from different departments of the participants of the main study, which were from the department of Food and Environment Technology. The pre-test of reading comprehension and self-efficacy scale was administered at the first week. The scores of the reading comprehension were used as criteria to put the students into the two groups of beginner or intermediate. Thirteen students were put into group A (intermediate) and eight students were put into group B (beginner). In the pilot study, the two reading lessons were taught in class.

The mean scores of the post-test of reading comprehension was higher than the mean scores of the pre-test. The mean scores of pre-test was 24.90 whereas the mean scores of the post-test was 28.67. The treatment could help improve reading comprehension skills.

The mean scores of the post-test of self-efficacy were higher than the mean scores of the post-test. The mean scores of the pre-test was 3.06 whereas the mean scores of the post-test was 3.37. The treatment could help improve self-efficacy level.

However, from the attitude questionnaire, it revealed that the students felt neutral about the effectiveness of the DRI.

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3.3 Data collection

Data collection was conducted in 12 weeks. The pre-test and post-test of reading comprehension was administered at the beginning and at the end of the course. The pre-test was carried out in the first week of the study and the post-test was carried out at the end of the course. The test lasted one hour and thirty minutes. The students were requested to complete fifty test items. The post-test was administered in the twelfth week, which was the last week of the main study.

Additionally, the pre-test of self-efficacy survey (Questionnaire of Self-Efficacy scale) was given to the students to assess their self-efficacy at the beginning

of the course. And the post-test of self-efficacy survey (Questionnaire of Self-Efficacy scale) was carried out in the fifteenth week to assess students' self-efficacy at the end of the course. The time available for the test completion was 30 minutes.

Also, the semi-structured interview was carried out at the end of the main study by choosing students from each group randomly. The attitude questionnaire was given to the whole class in order to investigate the students' attitudes toward the instruction after the end of the course. Then, the semi-structured interview was implemented for three students from group A and three students from group B. The data collection process is shown in Table 15.

Table 15 Data collection

Before the implementation of the study	- The research instruments of the differentiated reading instruction, namely, the differentiated reading instructional modules, pre- and post- reading comprehension test, questionnaire of self-efficacy scale, attitude questionnaire, and semi-structured interview were distributed to the experts. This is to assess and trial if the instruments are appropriate, useful and effective. - The researcher adjusted the instruments according to the experts' suggestions. -The pilot study was carried out and the instruments were adjusted again.
Week 1	- The reading comprehension pre-test was administered to the students - The questionnaire of self-efficacy scale was administered to the students. - The orientation of the differentiated reading instruction was introduced to the class
Week 2 – 11	- Students study one unit in one week and a half - Students learn through three stages: pre-reading, while-reading, and post-reading - In each unit plan, students were put into an order of four kinds of instruction; whole-class instruction small-group instruction whole-class instruction individualized activity - The teacher observation was carried out and students' journal was requested
Week 12	- The post-test was administered to the students - The questionnaire of self-efficacy scale was administered to the students. - The attitude questionnaire was completed by the students. - The semi-structured interview was administered to the students.

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3.4 Data analysis

To investigate the effectiveness of the differentiated reading instruction on students' reading comprehension and self-efficacy, the instructional materials and assessment instruments were used. The study employed a mixed method of both qualitative and quantitative data. The quantitative data consisted of students' scores from pre-test and post-test, questionnaire of self-efficacy scale, and attitude questionnaire. The qualitative data was analyzed from the semi-structured interview, teacher's observation, and students' journal. Data analysis according to each research question was discussed as follows:

1. Research question 1: What are the effects of Differentiated Reading Instruction on reading comprehension of undergraduate students?

The answer to research question 1 was obtained from the students' score assessments from the pre- and post- reading comprehension test. The test scores were calculated by using paired T-test. The effect size was also explored by using Cohen's *d* to identify the magnitude of the difference between reading comprehension scores of pre- and post- reading comprehension tests.

2. Research question 2: What are the effects of Differentiated Reading Instruction on self-efficacy of undergraduate students? The answer to research question 2 was obtained from the questionnaire of self-efficacy scale. The test scores were calculated by paired T-test. The effect size was also explored by using Cohen's *d* to identify the magnitude of the difference between pre- intervention self-efficacy scores and post-intervention self-efficacy scores.

3. Research question 3: Is there a relationship between undergraduate students' self-efficacy level and their reading proficiency level? To answer research question 3, the students' scores on pre-test and post-test and the scores from the questionnaire of self-efficacy scale were calculated to analyze the relationship. Pearson correlation coefficient was used to analyze the two sets of scores.

4. Research question 4: What are undergraduate students' attitudes toward Differentiated Reading Instruction? Quantitative data was drawn from the questionnaire scores. Descriptive statistics was used to analyze the data. Qualitative data was drawn from the semi-structured interview, reports from students' journals, and the comments from the comment section part of the attitude questionnaire.

The interview and students' journals findings were analyzed by means of content analysis. The counting frequency of occurrence such as their opinions on classroom satisfaction, reading comprehension, peer assistance, and self-confidence, was counted as collected data for this study. The questions of the interview and the guided questions for students' journals were divided into three parts; differentiated instruction, reading comprehension, and self-efficacy. The interviews of six students and data from students' journals were transcribed and the transcription was used to find the theme of the interview. Then, the data were analyzed and presented in accordance with the three themes in the questions.

This chapter has discussed the research procedures, instructional materials, and assessment instruments. The chapter explains the overview of the methodology. The details of research procedures are elaborated with the differentiated reading instruction, its implementation and its effects on the students' reading comprehension and self-efficacy. This study adopted the one-group pretest – posttest quasi-experimental design. Instructional instruments and research instruments were developed and validated by experts.

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Pilot study was carried out to verify the practicality of the instructional treatments and the validity of research instruments. During the twelve-week implementation of the main study, students performed weekly tasks. Data on students' reading comprehension performance via DRI were collected during the treatment period. After the treatments, the pre- and post-test scores of reading comprehension were compared to study the improvement of students' reading comprehension.

The semi-structured interview was administered at the end of the course to elicit students' opinion about DRI. The next chapter reports the results of this study according to four research questions. A summary of the research instruments and data collection are presented in Table 16 below.

Table 16 A Summary of the research instruments and data collection

Research questions	Research objectives	Instruments	Methods of analysis
1. What are the effects of Differentiated Reading Instruction on reading comprehension of undergraduate students?	To investigate the effects of Differentiated Reading Instruction on reading comprehension of undergraduate students.	Pre-test and post-test of reading comprehension	- paired t-test - Cohen's *d* *(effect size)*
2. What are the effects of Differentiated Reading Instruction on self-efficacy of undergraduate students?	To investigate the effects of Differentiated Reading Instruction on self-efficacy of undergraduate students.	Questionnaire of Self-Efficacy Scale	- paired t-test - Cohen's *d* *(effect size)*
3. Is there a relationship between undergraduate students' self-efficacy level and their reading proficiency level?	To investigate the relationship between undergraduate students' self-efficacy level and their reading proficiency level.	- Pre-test and post-test of reading comprehension - Questionnaire of Self-Efficacy Scale (pre- and post-test)	Pearson Correlation coefficient
4. What are undergraduate students' attitudes toward Differentiated Reading Instruction?	To investigate the undergraduate students' attitudes toward using Differentiated Reading Instruction	- Students' attitude questionnaire - Semi-structured interview	- Mean score - Coding and qualitative analysis

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CHAPTER IV
RESULTS

This chapter presents the findings of data collected from the reading comprehension test, self-efficacy test, checklist from the differentiated reading class, students' journal, attitude questionnaire and the semi-structured interviews. The findings are examined in accordance with the four research questions:

1. What are the effects of Differentiated Reading Instruction on reading comprehension of undergraduate students?
2. What are the effects of Differentiated Reading Instruction on self-efficacy of undergraduate students?
3. Is there a relationship between undergraduate students' self-efficacy level and their reading proficiency level?
4. What are undergraduate students' attitudes toward Differentiated Reading Instruction?

The following null hypotheses were tested in this study:

Hypothesis 1: The post-test of reading comprehension scores of undergraduate students who are taught by the Differentiated Reading Instruction is significantly higher than the pre-test reading comprehension scores.

Hypothesis 2: The self-efficacy level of undergraduate students after taking the lessons taught by Differentiated Reading Instruction is significantly higher than their self-efficacy level before taking the Differentiated Reading Instruction.

Hypothesis 3: There is a positive relationship between undergraduate students' self-efficacy level and their reading proficiency level.

Hypothesis 4: Undergraduate students have positive attitudes towards Differentiated Reading Instruction.

Research Question 1 focused on the improvement of English reading comprehension test scores after the intervention, and the mean scores of pre-test and post-test of reading comprehension were compared. Research question 2 explored the students' self-efficacy improvement from participating in the DRI. The mean scores of the pre-test and post-test of self-efficacy were compared. Research question 3 aimed at

finding the relationship between self-efficacy levels and the English proficiency level. The relationship between students' reading comprehension scores and their self-efficacy scores before and after the intervention were then examined. Research question 4 aimed at examining students' opinions about the intervention and students' responses from the semi-structured interviews were analyzed.

4.1 Results of Research Question 1

Research question 1: What are the effects of Differentiated Reading Instruction on reading comprehension of undergraduate students?

This study was conducted in the second semester of the academic year 2019 (from November 2019 until February 2020) with the students from the Food and Environment Technology Department, Faculty of Applied Science. The sample size included 33 students: five male students (15.2%) and 28 female students (84.8%). The students were divided into two groups (A and B) according to their pre-test score of reading comprehension and their previous grade of English course (English II).

There were thirteen students in group A (39.4%) with two males and eleven females. There were twenty students in group B (60.6%) with three males and seventeen females. The students in class were asked to set up groups of four or five members according to their levels A or B. There were three groups in A and four groups in B. The Demographic data were reported in Table 17

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Table 17 Demographic data of the students participating in DRI

Number of students participated in DRI	**33 students**	
	5 males	28 females
Number of students in group A	**13 students**	
	2 males	11 females
Number of students in group B	**20 students**	
	3 males	17 females

This research question explored the effects of DRI on reading comprehension by comparing the pre-test and post-test scores of reading comprehension. The pre-test was conducted at the first teaching session, while the post-test was conducted at the

twelfth week. As the study employed a one group pretest and posttest design, the comparison between the pre-test and post-test score was undertaken by using paired t-test. The results of the comparison between the mean score of pre-test and post-test of reading comprehension are presented in Table 18.

Table 18 Findings of reading comprehension pre-test and post-test scores of students participating in DRI

	n	Mean	SD	Mode	t	Sig.	*d*
Pre-test	33	22.15	4.604	26	4.132	.00*	-0.9534
Post-test	33	26.52	4.549	25			

P*<.05

The findings in Table 18 indicate that the students participating in DRI had a significant improvement (t= 4.132, p <.05) in their reading comprehension scores after twelve weeks of DRI. The effect size calculated by Cohen's d (*d*=-0.9534) indicated that the magnitude of the effect was large. Therefore, it could be concluded that the first research hypothesis was supported.

Table 19 Comparison of the scores of pre-test and post-test of reading comprehension between the students in group A and group B

	Group A (n=13)					Group B (n=20)				
	Mean	SD	t	Sig.	d	Mean	SD	t	Sig.	*d*
Pre-test	26.85	1.676	-0.443	0.666	-0.168	19.00	3.112	-5.825	0.00*	-1.98
Post-test	27.54	5.577				25.95	3.776			

P*<.05

The findings in Table 19 showed that the students in group B (beginner level) had significant improvement, while the students in group A (Intermediate level) had the score improvement but not significant. Also, the effect size suggested that students

in group B was large, while it was small in group A. In summary, the improvement occurred significantly on students in group B.

Table 20 Students' pre-test and post-test scores of reading comprehension according to criteria of reading comprehension

Criteria	Pre-test score (%)	Post-test Score (%)	Scores Difference (%)
(1) Literal comprehension: Skimming	55.75	69.69	13.94
(2) Literal comprehension: Scanning	52.02	64.14	12.12
(3) Literal comprehension: Reorganizing	41.32	56.74	15.42
(4) Inferential: meaning of a word from context	29.43	38.96	9.53
(5) Inferential: meaning from the content	47.87	61.81	13.94
(6) Inferential: predicting outcomes	38.38	33.33	-5.05
(7) Evaluation: Give judgement	54.54	60.60	6.06
(8) Evaluation: Recognizing writer's purpose	35.60	21.97	-13.63

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Table 20 presents reading comprehension scores of pre-test and post-test that the students could answer correctly in the eight criteria according to Barrett's Taxonomy (Barrett, 1968), Reading comprehension strategies Brown (2004), and the eight reading comprehension skills by Davis (1968). They are (1) Literal Comprehension: Skimming the text for the gist, (2) Literal Comprehension: Scanning the text for specific information, (3) Literal Comprehension: Reorganizing ideas from various parts of the text, (4) Inferential Comprehension: Drawing inferences about the meaning of a word from context, (5) Inferential Comprehension: Drawing inferences from the content, (6) Inferential Comprehension: Predicting outcomes, (7) Evaluation: Giving comprehensive judgement about some aspect of the text, and (8) Evaluation: Recognizing a writer's purpose, attitudes, tone and mood. The findings indicated that after the intervention, the students had improvement in six criteria out of eight. Two of the criteria in which the score of post-test decreased were (6) Inferential

Comprehension: Predicting outcomes and (8) Evaluation: Recognizing a writer's purpose, attitudes, tone and mood. Students' scores on criteria number (3) Literal Comprehension: Reorganizing ideas from various parts of the text, had the highest score difference (15.42%), while their scores on the criteria number (7) Evaluation: Giving comprehensive judgement about some aspect of the text, had the least improvement (6.06).

Table 21 Comparison between the reading comprehension pre-test and post-test scores of group A students and group B students according to reading comprehension criteria

Criteria	**Group A**			**Group B**		
	Pre-test (%)	Post-test (%)	Score Difference (%)	Pre-test (%)	Post-test (%)	Score Difference (%)
(1) Literal comprehension: Skimming						
	67.69	73.84	**6.15**	48	67	**19**
(2) Literal comprehension: Scanning						
	64.1	67.94	**3.84**	42.08	65	**21.67**
(3) Literal comprehension: Reorganizing						
	49.65	55.24	**5.59**	37.27	54.54	**17.27**
(4) Inferential: meaning of a word from context						
	37.36	37.36	**0**	25.71	38.57	**12.86**
(5) Inferential: meaning from the content						
	64.61	56.92	**-7.69**	42	60	**18**
(6) Inferential: predicting outcomes						
	46.15	51.28	**5.13**	28.33	26.66	**-1.67**
(7) Evaluation: Give judgement						
	69.23	69.23	**0**	40	60	**20**
(8) Evaluation: Recognizing writer's purpose						
	36.53	53.84	**17.31**	21.25	15	**-6.25**

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The findings in table 21 indicated that after the intervention, the students in group B had more improvement in items 1, 2, 3, 4, 5 and 7 than the students in group

A. However, in item 8, which is the more advanced skill in reading comprehension, the students in group A had more improvement. In item 5, the students in group B improved their scores in the post-test, while the students in A got lower scores in their post-test. On the contrary, in item 6, the students in A group got higher scores in their post-test, while the students in B got lower scores in their post-test. Overall, the students in group A had more improvement in the pos-test scores in most items than the students in group B. However, the pre-test and post-test score of the students in group A were higher than the scores of group B in all items.

Table 22 Score difference of RC pre-test and post-test by eight criteria of students in groups A and B

	Mean	SD	t	Sig.
Group A score difference	3.7913	7.1105		
Group B score difference	14.1725	8.0462	-2.290	.056

The findings in Table 22 showed that the score difference of reading comprehension of the students were improved, but the improvement was not significant.

4.2 Results of Research Question 2

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Research question 2: What are the effects of Differentiated Reading Instruction on self-efficacy of undergraduate students?

In order to answer this question, it was necessary to determine how much the students gained their self-efficacy from DRI. Therefore, a comparison between the pre-test and post-test score of self-efficacy was required. The pre-test was carried out in the first teaching session, while the post-test was conducted in the twelfth week. The result of the comparison between the mean score of pre-test and post-test is presented in Table 23.

Table 23 Comparison between the pre-test and post-test of self-efficacy using t-test and their effect size

	n	Mean	SD	t	Sig.	d
Pre-test	33	3.49	0.414	-5.063	.00*	-0.9319
Post-test	33	3.95	0.562			

P*<.05

The findings in Table 23 showed that the mean score of the post-test was higher than that of the pre-test score in self-efficacy. As for the Effect size, it was found that the magnitude of the effect size was considered large. Therefore, it can be concluded that DRI can help improve students' self-efficacy and the second research hypothesis was confirmed.

Table 24 Comparison of the scores of pre-test and post-test of self-efficacy using t-test and their effect size

	Group A (n=13)					**Group B (n=20)**				
	Mean	SD	t	Sig.	d	Mean	SD	t	Sig.	d
Pre-test	**3.73**	0.509	-2.272	0.042*	-0.434	**3.42**	0.387	-4.472	0.00*	-1.101
Post-test	**4.00**	0.610				**3.92**	0.543			

P*<.05

The results shown in Table 24 indicated that the students in both groups had significant improvement in their self-efficacy after the intervention. As for the effect size, the magnitude of the effect in group B was much larger than in group A.

Table 25 Findings from self-efficacy questionnaire according to reading comprehension, self-regulation, and sources of efficacy

		Mean	**SD**	**t**	**Sig.**	**d**
SE on RC (items1 to 8)	Pre-test	3.405	0.4098	-3.896	0.000*	-0.7741
	Post-test	3.7841	0.5583			
SE on SR (Items 9 – 15)	Pre-test	3.51	0.5010	-5.193	0.000*	-0.96080

	Post-test	4.06	0.6359			
SE on Sources of Efficacy (Items 16 – 19)	Pre-test	3.583	0.6424			
	Post-test	4.037	0.6222	-3.730	0.001*	-0.7179

P*<.05

Table 25 presents the mean scores of self-efficacy according to the three aspects namely (1) Self-efficacy on Reading Comprehension (SE on RC, items 1-8), (2) Self-efficacy on Self-Regulation (SE on SR, items 9-15), and (3) Self-efficacy on Sources of Efficacy (items 16-19). The first aspect was for checking whether or not the students understood and were able to accomplish the reading comprehension ability. The second aspect was for checking whether the students have acquired self-regulation, which is the learning process of humans in order for them to achieve their desired goal (Zimmerman, 1990). Both self-regulation and self-efficacy can lead to learning improvement. The third aspect was for checking the sources of efficacy that they had. This refers to the belief of their capabilities in doing tasks that can lead to the desired goal (Bandura, 1974). The findings showed that the students had significant improvement in their self-efficacy in all three aspects. The one that had the most improvement was the second one, self-efficacy on self-regulation, with the largest effect size. The one with the least improvement was the first one, self-efficacy on reading comprehension, with the medium magnitude of effect size.

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In sum, it could be assumed that the students' improvement in self-regulation, including observation, emulation, self-control, and self-regulation, was considered at a high level. Considering the total mean score of the students' self-efficacy after the intervention, they tended to have confidence that they could achieve in learning a language course.

After each lesson of the instruction, there were two ongoing assessments during the activities. This is to check students' performance after the lessons were taught with differentiated instruction. The assessments were used as evidence of students' learning and improvement in their reading comprehension and self-efficacy.

The rubric used was adopted from IPA's ACTFL (2012) which refer to Integrated Performance Assessment. IPA's ACTFL consists of the following:

1. Interpersonal communication refers to the students' performance in negotiation of meaning among peers. It involves students' connection within the group.

2. Interpretive communication refers to the students' performance in interpretation of what the text says directly and indirectly. It involves the connection of readers and texts.

3. Presentational communication refers to the students' performance in creating a message to inform, explain or persuade the audience.

In this course, the organization of each lesson was adopted from Text-processing strategies (pre-reading, while-reading, and post-reading) from Paris et al. (1991) and Crandall (1995). The teacher checked students' performance at the third stage (post-reading), in which the students presented their work as a group. During the instruction, students from both groups were evaluated by the teacher according to the criteria checklist for each group as shown in Table 26. The checklist was used for two times of students' presentations.

Table 26 Tiered product assessment sheet

Level Performance Assessment for group A			
Skills	Description	Yes	No
Interpersonal skill	Connect well within group (SE1)		
	Discuss the topic and extend the idea further (SE2)		
	Understand, ask and answer a variety of questions (RC1)		
Interpersonal skill	Comprehend the main idea and some key details (RC2)		
	Predict meaning from context (RC3)		
Presentation skill	Write complex sentences (SE3)		
	Provide more description (SE4)		

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	Maintain conversation on familiar topics (SE5)		
Level Performance Assessment for group B			
Skills	Description	Yes	No
Interpersonal skill	There is connection within group (SE1)		
	Discuss a familiar topic (SE2)		
	Use a variety of words, phrases, and simple sentences (RC1)		
Interpersonal skill	Identify main idea (RC2)		
	Comprehend text by recognizing keywords or phrases (RC3)		
Presentation skill	Write simple sentences (SE3)		
	Follow a practiced format (SE4)		
	Ask and answer highly practiced questions (SE5)		

There were three groups in A and four groups in B (seven groups altogether). The students were evaluated according to the criteria customized to fit with their group. The criteria for group A required more skills than those of group B. The findings were shown in tables 26 and 27

Table 27 Checklist of students' level performance assessment of group A

Level Performance Assessment for Group A						
Criteria	Group A1		Group A2		Group A3	
	1st attempt	2nd attempt	1st attempt	2nd attempt	1st attempt	2nd attempt
SE1: Interpersonal Skill (Connect well within group)	/	/	/	/	/	/
SE2: Interpersonal Skill (Discuss topics and extend ideas further)	/	/	/	/	/	/
SE3: Presentational Skill (Write complex	/	/	/	/	/	/

sentences)						
SE4: Presentational Skill (Provide more description)	/	X	X	/	X	/
SE5: Presentational Skill (Maintain conversation on familiar topics)	/	/	/	/	X	/
RC1: Interpersonal Skill (Understand, ask and answer a variety of questions)	/	/	X	/	/	/
RC2: Interpretive Skill (Comprehend main idea and some key details)	/	/	/	/	/	/
RC3: Interpretive Skill (Predict meaning from context)	/	/	/	/	/	/

Table 28 Checklist of students' level performance assessment of group B

Level Performance Assessment for Group B

Criteria	Group B1		Group B2		Group B3		Group B4	
	1st attempt	2nd attempt	1st attempt	2nd attempt	1st attempt	2nd attempt	1st attempt	2nd attempt
SE1: Interpersonal Skill (There is connection within group)	/	/	/	/	/	/	/	/
SE2: Interpersonal Skill (Discuss a familiar topic)	X	/	/	/	/	/	/	/
SE3: Presentational Skill (Write simple sentences)	/	/	/	/	/	/	/	/
SE4: Presentational Skill (Follow a practiced format)	/	/	X	/	/	/	/	/
SE5: Presentational Skill (Ask and answer highly practiced questions)	/	/	X	X	/	/	X	/

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RC1: Interpersonal Skill (Use variety of words, phrases, and simple sentences)	/	/	X	/	/	/	/	/
RC2: Interpretive Skill (Identify main idea)	/	/	/	/	/	/	/	/
RC3: Interpretive Skill (Comprehend text by recognizing keywords or phrases)	X	/	/	/	/	/	/	/

The findings from the level performance assessment revealed that in terms of presentation skills, students in group A usually missed to provide enough description when they presented their work (SE4). Also, one group could not maintain conversation during the preparation. For interpersonal skills, one group did not ask and answer a variety of questions. However, the students in group A could do the rest of the skills. For group B students, they tended to fail mostly on presentational skill (SE5). They missed to ask questions and could not provide answers. That is, two groups missed to ask and answer highly practiced questions. Also, one group failed to follow a practiced format by missing some points in presentation. In terms of interpersonal skill (SE2), one group did not discuss enough while preparing the presentation. In terms of interpretive skill (RC3), one group failed to be able to comprehend text by recognizing keywords or phrases. Other than that, group B passed the rest of the criteria.

With the customized criteria appropriate for each group and the teacher feedback given after the presentation, most of the students tended to be able to improve their performance in their second attempt. The students in group A seemed to fail in fewer criteria than group B even though more skills were required from them in presentation.

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4.3 Results of Research Question 3

Research question 3: Is there a relationship between undergraduate students' self-efficacy levels and their reading proficiency level?

To answer this question, the students' scores on pre-test and post-test of Reading Comprehension and the pre-test and post-test scores from the questionnaire of self-efficacy were explored. Pearson correlation coefficient was used to analyze the relationship between the two sets of scores. Table 29 reported the results of the relationship between the two variables.

Table 29 The relationship between pre- and post-test of reading comprehension (RC) and pre- and post-test of self-efficacy (SE) of students

		Pre-test SE	**Pre-test RC**
Pre-test SE	Pearson Correlation	1	.318
	Sig. (2-tailed)		.065
	N	33	33
Pre-test RC	Pearson Correlation	.318	1
	Sig. (2-tailed)	.065	
	N	33	33
		Post-test SE	**Post-test RC**
Post-test SE	Pearson Correlation	1	.161
	Sig. (2-tailed)		.371
	N	33	33
Post-test RC	Pearson Correlation	.161	
	Sig. (2-tailed)	.371	
	N	33	33

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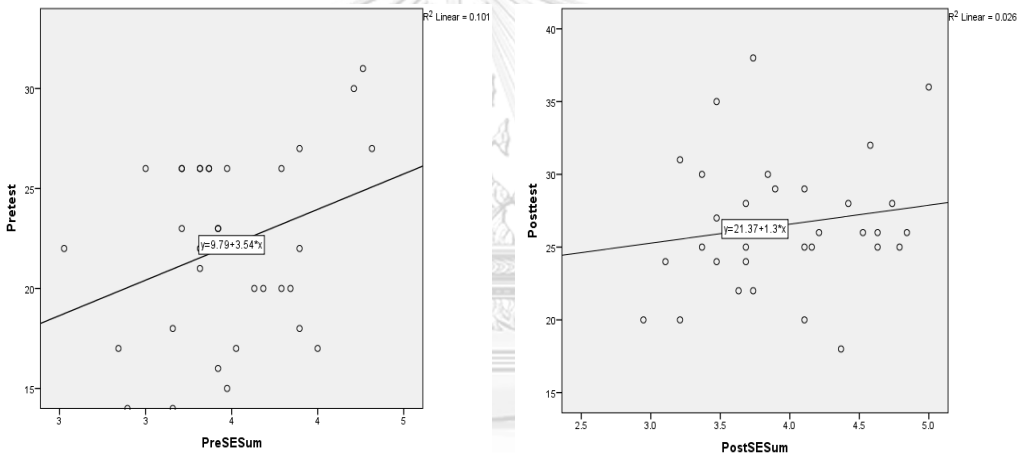
The findings in table indicated that the correlation between pre-test of reading comprehension and pre-test of self-efficacy variables was fairly weak (r= .318, R^2= 0.101, weak effect size), and the correlation between post-test of reading comprehension and post-test of self-efficacy variables was weak (r= .161, R^2 = 0.026,

very weak effect size). The effect size of the variables is shown as scatterplots in figure 9. According to the P-value of more than 0.05, there was no significant relationship between pre-test of reading comprehension and pre-test of self-efficacy, and post-test of reading comprehension and post-test of self-efficacy. This meant that there was no linear relationship between reading comprehension and self-efficacy. As the score of pre-test of reading comprehension increased, the score of pre-test of self-efficacy did not have to increase. Therefore, the third research hypothesis was not supported.

Figure 10 Scatterplot of pre- and post-test of reading comprehension and pre- and post-test of self-efficacy of students



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4.4 Results of Research Question 4

Research question 4: What are undergraduate students' attitudes toward Differentiated Reading Instruction?

In order to answer this question, the data gained from the attitude questionnaire and interviews were investigated in order to explore the students' overall satisfaction after the intervention. The questionnaire was completed by the students in the twelfth week of the course. Quantitative findings from the attitude questionnaire and qualitative findings from interviews are discussed as follows:

4.4.1. Quantitative findings

The nineteen-item questionnaire was used to calculate the mean score. The overall mean score of 3.70 with the S.D. of 0.88 shows that the students agreed that the intervention was effective and could help with their reading comprehension and self-efficacy. The questionnaire was divided into two parts. The first part consisted of nineteen questions asking about the students' reading comprehension ability, differentiated instruction and self-efficacy. The second part was for additional suggestions and comments on the course. The results of the finding from the first part are reported in Table 30

Table 30 The attitude of the students toward the course of Differentiated Reading Instruction

	Mean	**SD**	**Interpretation**	
After studying the course, I can….				Mean = 3.58
1. identify the main idea of the passage.	3.70	0.847	agree	
2. skim the text for the gist and main idea	3.88	0.857	agree	
3. scan the text for specific information	3.64	0.895	agree	
4. guess at meaning of words and phrases	3.36	1.084	neutral	
5. distinguish between literal and implied meanings	3.21	0.992	neutral	
6. draw inferences about the meaning from context	2.91	0.91	neutral	
7. identify the purpose of text	3.52	0.834	agree	
8. read and understand the text more quickly	3.21	0.927	neutral	
9. know more useful vocabulary	4.18	0.808	agree	
10. remember more useful vocabulary	3.91	0.879	agree	

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After studying the course, I think I will learn English through differentiated instruction…				Mean = 4.00
11. helps me to learn with ease	3.79	0.740	agree	
12. is enjoyable most of the time	4.12	0.960	agree	
13. gives me a stress-free learning environment	4.42	0.663	agree	
14. motivates me to learn English in the future	4.00	0.968	agree	
15. is effective instruction	4.00	0.935	agree	
16. I liked most of the activities in class	3.70	1.104	agree	
After studying the course,…				Mean = 3.59
17. I am confident that I can do better in reading comprehension in the course and examination	3.55	0.869	agree	
18. I am confident that I can do better in English in the future	3.64	0.742	agree	
19. I am confident that I can be proficient in English for my future career	3.58	0.708	agree	
Total	3.70	0.880	agree	

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The data from the five-likert scale was calculated for the mean score. The mean presented the students' attitudes toward learning through DRI. The criteria for interpreting the data was from a range divided by numbers of levels. The calculation was (5-1)/5=0.80, which showed that the mean was added up with -.80 for each level. Therefore the scale was interpreted as follows.

1.00 - 1.80 means agree

1.81 – 2.60 means disagree

2.61 – 3.40 means neutral

3.41 - 4.20 means agree

4.21 – 5.00 means strongly agree

In the questionnaire, items 1 – 10 were constructed in order to explore the attitude of the students according to reading comprehension. They were asked to identify the degree of skills in reading comprehension they can do after the course. The mean score of 3.58 showed that the students agreed that after the intervention, they could do several skills in reading comprehension. Also, it could be seen that the students agreed that they could accomplish six items out of ten. They believe they could identify main idea of the passage (Item 1), skim the text for the gist (Item 2), scan the text for specific information (Item 3), identify the purpose of the text (Item 7), know more vocabulary (Item 9), and remember more useful vocabulary (Item 10). As for the other four items, they tended to feel neutral that they can be capable of the skills in reading comprehension in items 4 (mean = 3.36), item 5 (mean = 3.21), item 6 (mean = 2.91), and item 8 (mean = 3.21). In other words, they tended to feel neutral with the skills of inferential comprehension and the speed of their reading. Additionally, the students felt that after DRI they learned more useful vocabulary (Item 9, mean = 4.18). The item with the least mean score was the one asking about their ability to draw inference about the meaning from context (Item 6, mean = 2.91).

The second part of the questionnaire (items 11 – 16) were constructed to explore how much they think Differentiated Instruction helped them in learning. The mean score of the six items is 4.0 which means the students agreed that the stress-free instruction was effective, helped them to learn with ease, and they were satisfied with it. The item that asked if the intervention was stress-free had the highest mean score, 4.42 (Item 13). The item with the least mean score asked if the students liked most activities in class and its mean score was 3.70 (Item 16).

Items 17 – 19 were constructed to explore students' confidence or efficacy of their ability in learning English after the course and the mean score was 3.59. Item 18 asking about students' confidence to become better in English in the future had the highest mean score of 3.64. The least mean score was 3.55 in item 17 asking about students' confidence in reading comprehension. In sum, the students believed that they would be able to be better learners in English language learning in the future.

It can be concluded that the students agreed the intervention was appropriate for reading comprehension and could help them in learning English in the future.

4.4.2 Qualitative findings

4.4.2.1 Students' attitude toward the course

There were twenty-three students, nine students from group A and fourteen students from group B providing comments in the attitude questionnaire (additional comment section). Some related comments showed that the students were satisfied with the course. It was found that 7% of the students from group A (n=1) and 5% of the students from group B (n=1) felt that the class was fun. Moreover, 7% of the students from group A (n=1) reported that the class and activities were interesting. It was also found that 7% of the students from group A (n=1) and 20% of the students from group B (n=4) reported that they liked to work as a group because it helped with learning. Some students' reports concerning their opinions are presented below.

The teacher made me feel stress-free during the class. (Student # 1 from group A)

I like working as a group because it was so stress-free. It made the class fun. The activities were enjoyable and made me want to participate. (Student # 4 from group B)

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The teacher made the class so fun. It made me like to learn in this class. (Student #9 from group A)

There were various kinds of activities in class. Working as a group made the class interesting, relaxed and enjoyable. (Student # 3 from group B)

Working as a group made the class fun. (Student # 21 from group A)

Working as a group was my favorite thing in this class. My friends and the teachers were so kind. The class was interesting. (Student # 16 from group B)

4.4.2.2 Students' journal

The findings from the students' journals were also used to analyze students' opinions towards the course. The data was taken after the second and fourth class of the intervention. It revealed that the students had positive attitudes for the intervention in terms of reading comprehension, self-efficacy, and differentiated reading instruction.

According to the results from the students' journals, in terms of reading comprehension, almost half of the students from group A (40%, n=5) and 5% of the students from group B (n=1) agreed that they gained more new knowledge from the reading texts. There were 30% of the students from group B (n=6) and 15% of students from group A (n=2) who admitted that they understood more about skills in reading comprehension. Moreover, 15% of the students from group A (n=2) found that reading was more enjoyable than before the intervention. Lastly, 15% of the students from group A (n=2) and 30% of the students from group B (n=6) reported that they gained more vocabulary from the reading texts. Some students' reports are presented below.

I gained knowledge from the reading tasks. It was fun to read when I understand more. (Student #21 from group A)

I learned something new that I have never known before from some reading texts. It felt good to gain new knowledge. (Student #26 from group B)

I learned how to read and skills for comprehending texts. It became easier to read when I knew the technique in reading. (Student #13 from group A)

Even though reading gave me a headache, I felt I learned some reading skills. But when I worked with friends and paid attention, I gained a lot of knowledge. (Student #14 from group B)

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The reading texts were related to my field of study, so I had focus and found reading more fun. (Student #8 from group A)

There were so many scientific words to learn, and they made me understand the texts more. (Student #1 from group A)

The class was good. I learned new vocabulary and something from the reading texts. (Student #31 from group B)

As for collaborative learning with friends, after the intervention, most of the students agreed that they liked sharing ideas while working with friends as a group. Some of them stated that they found working in this class useful and enjoyed collaborative work with friends in groups. There were 30% of the students from group A (n=4) and more than half of the students from group B (55%, n=11) who reported their preferences in working as a group because they could share ideas with friends. As for team working, 15% of the students from group A (n=2) and 25% of the students from group B (n=5) agreed that they liked to work as a group. The students' reports are presented below.

I gained more knowledge. The tasks were not too difficult, and I could complete them by myself. However, group work was very good. I got to share my ideas and learned from my friends' ideas too. (Student #30 from group A)

We got to practice reading a lot and learn new vocabulary. Exchanging opinions with friends was great. I didn't feel shy or nervous with friends. (Student #6 from group B)

We gained a lot of knowledge from the reading texts. It was good for everyday use It was fun working with friends and we could share our ideas. (Student #32 from group A)

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This class gave me new experience. It was fun. I learned a lot of new words. I also felt great to share ideas with friends. Many thoughts and opinions helped us with learning like I have never experienced before. (Student #16 from group B)

In terms of stress-free classroom, the students from group A (30%, n=4) stated that the class was fun. Below is the comment of the students from group A.

The teacher made the class easy to understand. The reading texts were related to my interest and fun. The class was also enjoyable and stress-free. (Student #8 from group A)

In the aspect of self-efficacy, only the students from group B (25%, n=5) agreed that the help provided by the teacher gave them more confidence. Also, there were 25% of the students from group B (n=5) who agreed that the help provided by the teacher made task completion easier. There were 15% of the students from group A (n=2) reporting that they believed that not receiving too much scaffolding made the lessons more challenging for them. They admitted that the challenging tasks encouraged them to put more effort in the work. However, more than 20% of the students from group A (n=3) reported that more help from the teacher should be provided. The students' reports are presented below.

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The class was strange for me at first. I have never had chances to work as a group like this in English class before. Collaboration between group members worked well. I didn't get bored at all. The tasks were difficult for me, but it was fun working with friends. (Student #4 from group B)

It was interesting to study in this class. Some reading texts and some reading techniques were new to me. I liked when we work as a group because we helped each other doing the tasks. It made all the tasks easier. (Student #7 from group B)

I think the teacher's help was fine, but I was ok doing the tasks with friends. I had no problem with less help. Working together made me know my friends better. (Student #17 from group A)

I gained knowledge from the texts and gained more vocabulary. Help from the teacher was enough, but I think a little more help would be good. (Student #21 from group A)

4.4.2.3 Students' attitude from semi-structured interview

The semi-structured interview was conducted randomly with three students from group A (S17, S27, and S32) and three students from group B (S4, S11, S15). The findings from the interview of six students revealed that the students had positive attitudes toward DRI. Students' opinion and comments from the interview concerning (1) reading comprehension, (2) vocabulary builder (3) self-efficacy, and (4) collaborative work with peers are reported as follows:

1. Reading Comprehension (RC)

The students' comments and opinions from the interview supported that the intervention could help them improve their reading comprehension. Student number17 from group A admitted that practicing reading in class frequently helped improve reading comprehension. Student number 11 from group B also stated that reading in class with friends helped improve the reading speed. The students' opinions toward reading comprehension are presented below:

The class helped with the reading concept. I like the idea of starting with learning vocabulary and moving on to reading text. (Student #17 from group A)

I think reading with friends in a group helped us read faster. (Student #11 from group B)

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2. Vocabulary Building

The students from both groups found the intervention helped them learn more about vocabulary. Two of the students from group B (S4 and S15) stated that they gained more vocabulary knowledge during reading in class. Student number 4 from group B mentioned that many scientific terms in the reading text were interesting. Two of the students from group A also stated that they gained new vocabulary they had never known before (S17, S32). Student number 27 from group A also admitted that she learned a lot of new vocabulary from reading activities in this class. The students' opinions and suggestions toward vocabulary building are presented below:

You (the teacher) provided vocabulary I'd never known before and that was very useful when doing reading tasks in class. (Student #15 from group B)

Many scientific terms in the reading texts were interesting. It is related to us already, so I wanted to know more vocabulary. (Student #4 from group B)

There were several unknown words that we learned in this class. We gained more new vocabulary. (Student #32 from group A)

From many activities, there were so many new words to learn. I have never learned so many words like this before. (Student #27 from group A)

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3. Self-efficacy (SE)

It was also found that the interviewees felt that DRI could help them improve their self-efficacy. Two of the students in group A (S27, S32) and one student in group B (S4) stated that by practicing more in reading and doing exercises, they can gain more confidence in learning English. One student from group A (S32) and another one from group B (S11) believed that if they had known more vocabulary, they would gain more confidence in learning English. In group B, two students (S4, S15) stated that activities in the group were stress-free and made them feel more confident in learning English. The students' attitude toward self-efficacy are presented as follows:

I think I'm more confident with reading in English. I believe I can practice by myself outside class. I can learn from watching movies. Reading is still not my favorite. (Student #27 from group A)

I *think I feel confident when I know more vocabulary and I think it's important to know that the meaning I wanted was the correct one.* (Student #11 from group B)

Learning new vocabulary and theories in reading comprehension can be difficult. But when I practiced with activities and exercises regularly, it made me feel confident to do the task. (Student #4 from group B)

When I didn't have to complete the task by myself, it made me confident. I was afraid to make a mistake. (Student #15 from group B)

4. Collaborative work with peers

According to the results from the interview, it was also found that all the students from group B (S4, S11, and S15) agreed that working in a group was effective and helpful. They could share the vocabulary they already knew with the group. They could also gain knowledge from the group. However, all the students in group A (S17, S27, and S32) stated that they liked group work, but two of them (S17 and S27) reported that working in pairs might be better for them. One student (S27) stated that she might not try hard enough in doing the tasks because there were too many people in a group. Some opinions towards collaborative work with peers are presented as follows:

I like working in groups because with a lot of people, many ideas are shared and that can help me learn more. (Student #32 from group A)

I think working with friends is really helpful. Working alone can really nervous. I can be so shy when I have to speak. (Student #15 from group B)

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I prefer group work with big projects, but with reading tasks in class, I think pair work would be more appropriate and easier to work with. (Student #17 from group A)

4.5 Chapter Summary

This chapter discusses the findings from data analyses to answer the four research questions regarding the effects of DRI on undergraduate students' reading comprehension and self-efficacy, as well as their opinions about the instruction. After the instruction of DRI, the students' reading comprehension and self-efficacy improved significantly. However, the students in group B had more significant improvement in both reading comprehension and self-efficacy than those in group A. In terms of reading comprehension skills, which are literal, inferential and evaluation, both groups increased their scores in literal comprehension skills increased; however, for such harder reading comprehension skills as inferential and evaluation, their scores decreased. For the relationship between students' self-efficacy and reading comprehension ability, the findings revealed that there was no relationship between the two variables. Even though the scores of the pre-test of reading comprehension increased, the scores of the pre-test of self-efficacy did not increase. For investigation of students' attitude, the findings from the questionnaire and the semi-structured interview revealed that the students had positive attitudes toward the intervention and agreed that the instruction was effective. Also, they stated that the class was stress-free and enjoyable. They also believed that they gained more confidence in reading and learning English. Additional findings were provided to support the claim that the instruction had significant improvement on reading comprehension and self-efficacy. In terms of reading comprehension and self-efficacy, the students were mostly able to perform effectively when they were scaffolded and evaluated according to their proficiency levels. Discussion of the results, pedagogical implications and recommendations for the future studies are discussed in the next chapter.

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CHAPTER V
DISCUSSION AND CONCLUSION

This chapter concludes the study with discussion of the results, pedagogical implications, limitations of the study and recommendations for the future studies. It aims at providing its discussion in brief and elaborates on how the findings can contribute to the improvements of the differentiated reading instruction for EFL undergraduate learners in particular and on issues that need further investigation.

5.1 Summary of the study

This study investigated the effects of the differentiated reading instruction in Thai undergraduate students' reading comprehension ability and self-efficacy. The attitudes of students toward the differentiated reading instruction were also examined.

This study employed the one-group pre-test post-test design. In this study, the differentiated reading instruction was integrated into the English for Scientists course. The students were pre-assessed with the reading comprehension pre-test and self-efficacy scale at the beginning of the course. Then, the intervention, the differentiated reading instruction, was implemented. During the intervention, the reading comprehension skills and strategies were also taught. After the course, the post-test of reading comprehension and post-test of self-efficacy were administered to explore if any changes had taken place because of the implementation of the differentiated reading instruction. Additionally, the questionnaire and the semi-structured interview were used to assess students' attitudes toward the intervention.

The data from the findings revealed that the students' reading comprehension and self-efficacy score increased significantly. It is also worth noting that the students in the beginner group had more improvement in reading comprehension and self-efficacy than the students in the intermediate group. Finally, based on the data gathered from the attitude questionnaire, the students showed positive attitudes toward the intervention, and they found the course enjoyable and helpful for their learning. Moreover, most of the students found that the course gave them more confidence to perform in English.

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In sum, the evidence from the quantitative and qualitative findings showed that the instruction was effective because the students' reading comprehension and self-efficacy were significantly improved with the large effect size and with positive attitudes toward the course.

5.2 Discussion of key research findings

The discussion of this study is organized in three parts: DRI in improving students' reading comprehension; DRI in improving students' self-efficacy; and DRI and students' attitudes.

5.2.1. DRI in improving reading comprehension

In differentiated instruction for reading comprehension, the students were put into two different groups according to their proficiency level. With the differentiation in content, process, product and environment, the students were mediated in response to their level in reading comprehension. As a result, the students showed their improvement of reading comprehension in their post-test score. The comparison of means scores from the pre-test and post-test of reading comprehension indicated that students' reading comprehension significantly improved with large effect size. During the intervention, the students were prompted with scaffolding and materials suitable for each level of competency. The low-achievers did not have to read the text at the level suitable for high-achievers. That way, they found the reading tasks not too challenging to complete. According to the report from students' comments and interviews, it was found that they were satisfied with working as a group because it enabled them to gain more knowledge in science and vocabulary. Moreover, twenty-five percent of students in group B reported in journals that teacher assistance gave them more confidence in doing the tasks. These findings support Tomlinson (2004) who claimed that DI class offers students opportunities to perform with their high performance. With appropriate and sufficient help from more capable peers, the students can reach the level that they can eventually do independently.

The study also supported Vygotsky's notion of ZPD (Vygotsky, 1978), which proposed that with mediation given to a child at an appropriate level by a more capable peer, learning can be enhanced. In other words, when the learners are assisted by teachers or friends, it enables them to perform the task above their level. In this

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study, the customized materials, activities, and assessment were in response to mixed-ability students' needs and levels. These conditions formed a positive environment or zone that helped facilitate students' learning and acquisition of the reading comprehension of the students' skills

The positive effects of DI on students' reading comprehension found in this study were in some ways similar to the positive results of previous findings (Aliakbari & Haghighi, 2014; McCullough, 2011; Vibulphol, 2020). The improvement of secondary school students' language proficiency, specifically in reading comprehension, was reported in these studies. The study conducted by McCullough and Vibulpohl found that DI promoted vocabulary and reading comprehension in elementary school students. Meanwhile, Haghighi's study revealed positive effects of DI on university students' overall language performance. However, this study was conducted on the university students in the field of science with the tier of four elements: content, process, product and environment. The positive results of DI in students' reading comprehension were also revealed.

In terms of reading comprehension ability between two groups, although the students in group A (intermediate level) still performed better than those in group B (beginner level), the students in group B showed a higher degree of improvement than those in group A. The students in two groups were given different versions of reading texts, different kinds of scaffolding and different levels of task difficulties. The students in group B received materials, tasks, and scaffoldings in simplified versions while students in group A received on-level materials, tasks, and scaffoldings. The fact that the low-proficiency level students could possess a higher degree of improvement than the high-proficiency level students can be concluded with the ZPD concepts. Learners take different pace and time in learning and need different help until reaching the zone that they can develop independently. In terms of ZPD, it would be unfair to compare the size of the zone of development between the higher achievers or lower achievers without considering other factors. According to Vygotsky, for two learners with the same IQ, only one of them might be able to achieve more complex tasks with guidance. A high achiever with a high IQ might have a small ZPD. They might be exposed to books or entertainment they enjoy at

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home that are in English. This means those learners are likely to have already passed a large portion of their ZPD (Van de Veer & Valsiner, 1991). In other words, the higher achievers might already reach the level where they might not be able to progress further more easily.

This can also be supported by Richards (2008) who stated that language learning does not always progress smoothly, especially when learners are moving to advanced levels in their proficiency. It is difficult to break through the intermediate plateau. Lewis (1993) and Yi (2007) reported the amount of attainment of language competence dropped as learners reached upper intermediate and advanced levels. According to Towell and Hawkins (1994), L2 learners who did not acquire L2 like native speakers tend to become fossilized in language learning. Moreover, it is also possible that some students in intermediate level (group A) still need the same amount of scaffolding the same way the beginner level students receive. According to some of the reports in the students' journals. Twenty-three percent of students in group A reported that they think more help from teachers should be provided to them as well. On the other hand, fifteen percent of students in the same group reported that they do not need too much help from the teacher because they prefer working with challenges on their own. That is to say, it is possible that learners with a similar proficiency level may possess different zones of potential development.

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In terms of differentiating products, the students' performance was measured with two different rubrics. The one for group A required more skills and conditions than that of group B. As shown in table 4.10, the criteria provided for each group were appropriate for them to follow. That would be consistent with Affective Filter Hypothesis (Krashen, 1985). The students would perform according to their level of proficiency when they have a lower filter or anxiety. If the students in group B had to conform to the criteria of group A students, it would be too hard for them to accomplish the task. Also, students in group A would lack opportunities to do challenging tasks if they had to use the criteria of group B. With the appropriate criteria for students' level, even though the students in both groups tended to miss some requirement on their first attempt of presentation, they could improve on their second attempt.

To discuss the score of reading comprehension questions in the reading comprehension pre- and post-test, the three constructs were focused, namely, literal comprehension, inferential comprehension and evaluation. Even though most of the students were able to improve their post-test score, there was a decrease in post-test scores in some constructs (see Tables 20 and 21). The construct that all the students improved was literal comprehension. For the constructs of which the students' scores decreased were inferential comprehension and evaluation. Students in group A had lower post-test scores only in one construct which was inferential comprehension, whereas the students in group B obtained lower post-test scores in two areas that were inferential comprehension and evaluation. The results are in line with the study related to reading skills. Making inferences are the skills that require more advanced language proficiency and are found to be difficult for learners to master (Warnidah & Suwarno, 2016). According to Attaprechakul (2013), the students were less able to infer the tone of the text.

Additionally, the students with higher proficiency were able to do better, especially in skills that require more advanced proficiency such as inferential comprehension and evaluation. This is because they know how and when to use strategies appropriately (Grabe, 2010). Based on the previous studies that investigated the use of strategies between higher proficiency level students and lower proficiency level students, the differences were found in the number and the frequency of the strategies that the two groups used. The former group used more strategies and used them more frequently than the latter (Akkakoson & Setobol, 2009; Chen, 2015; Kasemsap & Lee, 2015; O'Donnell, 2011).

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5.2.2. DRI in improving self-efficacy.

In terms of self-efficacy improvement, the students were supported during the intervention with four sources of self-efficacy: mastery experience, vicarious experience, verbal persuasion, and emotional states. With DRI, the students have chances to observe performance from peers, choose the topic of their interest, work in a friendly environment, and be scaffolded to lesson confusion in task completion. This study showed significant improvement in the self-efficacy level of the students. The

comparison of means scores from the students' pre-test and post-test of self-efficacy indicated that they significantly improved with large effect size. Moreover, the students reported in the attitude questionnaire that they found the class fun and stress-free. The finding supports Krashen's Affective Filter Hypothesis (Krashen, 1985). Low affective filter learners (low anxiety and high self-confidence) tended to be more successful in language learning. That is to say, when the students have chances to observe other's success, perform successfully, get productive feedback, and study in a friendly environment, their self-efficacy level increases.

Additionally, in DI class, the chance to accomplish the tasks for all students is high because of the customized texts and exercises in response to students' levels. According to Tomlinson (2000), with the content and the level of difficulties suitable for students, the students are enabled to master their learning effectively. This can also be the benefit of self-efficacy improvement in terms of mastery experience. With more opportunities to become successful in tasks, the students gain positive self-efficacy belief. The students in this study were prompted with reading comprehension skill and strategies, and vocabulary building skill. They reported in the interview that they found the knowledge learned from the course useful for them to overcome the task obstacle in reading comprehension. That way, they gained more confidence and motivation to study reading comprehension. According to Aebersold and Field (1997), if the texts are in students' proficiency range, they can understand most of the text. Therefore, the degree of comprehension is enough to motivate reading and the chance to comprehend text is high. That is to say, when comprehension is high, mastery experience of students in performing the task is also high. This can lead to a higher self-efficacy level of students.

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Moreover, with the intervention focusing on students' interest could be one of the reasons the students improved their self-efficacy. Using DI in class, the learners are served with the topic of their interest which can influence motivation to learn. In this study, the reading texts were science-oriented, and some activities provided several topics of interest for them to choose. According to the study of Eisenberger and Shanock (2003), the content which is interesting for the students would lead to students' high engagement and intrinsic motivation. When the students are drawn to the context, it leads to student engagement, productivity, and higher level of

motivation. Providing the learners topics that attract their interest might be another reason why the mean scores of the post-test of self-efficacy were higher than the pre-test.

From the findings in this study, the students tended to have the highest score on self-regulation (see Table 25). This can be concurred with Zimmerman's self-regulation behavior. Self-regulation includes self-generated thoughts, feelings, and behaviors needed to acquire goals (Zimmerman, 2000). Self-regulation is generated from observing the models who are more capable. The observed behaviors cause the observers to compare their behaviors with the models. That leads to self-regulatory behavior. When learners have high self-efficacy, their self-regulation tends to increase. Those students with self-regulation are able to observe what other people have done in class and follow the instruction and peers correctly. Then they should be able to do the task on their own and become better at learning. Working as a group in this class, the students scaffolded each other and with the mediation from the teacher, they could work individually at the end of the course. This can be concluded that students gained more self-efficacy and self-regulation after the intervention.

In terms of self-efficacy between two groups of participants, the students in group B, which was at the beginner level, tended to have more improvement of self-efficacy than those in group A (Intermediate level). This might be concluded with Bandura's source of efficacy, namely vicarious experience. In vicarious experience, the students observe others who are more capable. Then, they compare their capabilities to themselves and make judgement about their performance. Students in group B had more chances for vicarious experience, while those in group A did not have enough of vicarious experience. Therefore, this might be the reason why students in group A did not rate themselves as much improvement in self-efficacy as students in group B did.

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The findings in this study also showed that there was a weak positive correlation between reading comprehension and self-efficacy. Even though self-efficacy is normally seen as a predictor of students' performance or achievement, not all studies yielded the same results. In terms of measurement, self-efficacy focuses on performance capabilities to achieve desired goals rather than on personal qualities.

Perceptions of efficacy depend on a mastery criterion of performance rather than on norm criterion (Zimmerman, 2000). In this study, students reported that they felt more confident when they gained more knowledge on vocabulary and reading comprehension skills. When they were more self-efficacious, they were more motivated to learn. It can be concluded that self-efficacy may not be a sole factor that enhances students to perform better in reading comprehension.

There are some studies that found a negative relationship between self-efficacy and learning language performance (Anyadubalu, 2010; Ersanlı, 2015; Nwosu & Okoye, 2014). The example is the study of Anyadubalu (2010), which found that self-efficacy alone cannot predict performance. However, the study reported that when self-efficacy increased, learning anxiety decreased and when the two factors decreased, learning performance also decreased. In other words, when learners were relaxed, they became more efficacious and eventually performed well in learning. According to Bandura (1997), self-efficacy is not a sole predictor of actual academic ability. The types of expected outcome from people depend largely on their own judgements of how well they are performing in a particular task (Bandura, 1986). Additionally, Anyadubalu reported that Thai students are influenced by collectivism, the culture that has an impact on how people behave and create self-concept. It might be possible that collective society, or in this case working in groups and helping each other, can affect students' self-rating on their self-efficacy.

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In sum, DRI, which provides appropriate support in response to students' ability and facilitates a stress-free atmosphere, can enhance students' self-efficacy. Also, DI creates a comfort zone for learners and that leads to a low anxiety state which can lead to higher performance. However, self-efficacy does not function as a strong indicator or as an only predictor of learning performance.

5.2.3. DRI and students' attitudes.

Based on the results of the questionnaire, it was found that the mean scores of the overall picture of the questionnaire was 3.70 (see Table 30). This means that the students agreed that the intervention was effective and could help with their reading comprehension and self-efficacy. According to Tomlinson (2004), classrooms that

give students' satisfaction can positively impact students' motivation to learn. According to the attitude questionnaire, the mean scores of the items asking about class activities and satisfaction, were high. The students seemed to feel that the class was enjoyable, stress-free and motivative. Providing students opportunities to increase motivation and self-efficacy can encourage them to perform well in learning (Ryan & Deci, 2000). With the class using DRI that provides flexible instruction to facilitate learning of students in each level, it can be concluded that the source of efficacy arose and brought about states of low anxiety.

For qualitative findings from the interviews and students' journals, it was found that the students had positive opinions in 1) reading comprehension, 2) vocabulary building, 3) self-efficacy, 4) collaborative work with peers, and 5) stress-free environment. In terms of lexical knowledge, the mean scores of questions 9 and 10 in the attitude questionnaire, which asked about vocabulary building, were the highest. It can be said that the students believed they gained so much knowledge in vocabulary. Also, based on the results from the interview and journals, it was discovered that they tended to believe in vocabulary learning from DRI. They reported that they could understand text better and felt more confident when they were scaffolded with vocabulary knowledge and with help from peers about vocabulary. According to (Laufer & Sim, 1985), to acquire a new language, a learner needs to be provided with sufficient vocabulary knowledge. That is to say, when the students have enough lexical knowledge, they tend to feel more confident and comfortable in learning.

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Some interesting results of the students' journals were the statements from some higher-proficiency students in group A, which was the more proficient group, about the limited assistance provided by the teacher. There were various views reported by the students. Fifteen percent of the students in group A believed that they did not receive enough scaffolding from the teacher, whereas others were satisfied with the provided assistance and preferred to work on their own. They reported that being able to work on their own without too much help from the teacher enhanced them to become more hard-working and promoted more learner autonomy. Moreover, they preferred working on more challenging tasks. This could lead to the notion of

ZPD in the aspect that the mediators are needed temporarily and will no longer be used after the learner has reached their desired level. That is to say, one mediator does not work effectively for all students. However, when the appropriate mediator is provided and it can enhance the students' proficiency to the desired level, the scaffolding, then, has to be moved to the next level.

5.3 Recommendations for future research

Based on the findings of this study, teachers, researchers, curriculum developers and syllabus designers, who are dedicated to students with diverse needs, should take consideration of the study.

5.3.1 Recommendations on implementing DI

Differentiated instruction is an approach to accommodate the diverse learning needs of all students. According to Imbeau and Tomlinson (2014), it is crucial for educators to take responsibility to facilitate teaching for all students. Instead of expecting students to adapt themselves to the curriculum, teachers should be able to support different students in response to their needs, interests, and pace. Although students learn differently, they all should have chances to be supported in order to reach their true potential. Moreover, DI implementation can be subjective when the teachers have to be responsible for using at least two tiers of scaffolding, material, task and assessment in one class. Teachers may pay more attention in scaffolding to students with lower proficiency than to higher proficiency level students. The teachers should be supported with professional training to develop their skills on implementation of DI. In Chien (2015) study on the effect of DI on teacher, the teachers reported that they needed more skills in preparing lessons and activities in DI class.

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5.3.2 Recommendations on research methods

Due to a small sample size with thirty-three students in the study, the findings of this study may not be able to generalize to the whole population. Also, the sample of the study was an intact group, therefore, the random sampling technique could not

be applied. In future studies, DRI may need to be conducted in different settings and with a larger number of participants.

In addition, this study employed a one-group, pre-test and post-test design because there was only one section of English for Scientists in the semester that the main study took place. With the control group, the study would provide clearer evidence of the effects of DRI on students' reading comprehension as opposed to other methods of instructions. Thus, an experimental study with the control and the experimental group with random sampling should be conducted to investigate further the effectiveness of DRI.

As the present study was conducted in twelve weeks, the amount of time the students had been exposed to the intervention was fairly limited. Also, the students were exposed to the integrated skills offered during the remaining hours of the course. Therefore, the development of the students' reading comprehension proficiency and self-efficacy may not have been solely resulted from the DRI.

Apart from the samples and the research design, it is suggested that vocabulary size measurement be explored in the future research as it is what the students reported as one of the benefits of the DRI. According to the students' interviews and journals, some of them stated that they felt that after the intervention, they knew more vocabulary. By expanding lexical knowledge, they tended to be able to comprehend reading more easily and felt more confident with reading. Further investigation in lexical improvement will help contribute to the area of vocabulary teaching.

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5.4 Implications of the study and conclusion

The findings of this study have pedagogical implications in three areas: positive environment, scaffolding from teacher and peers, and DI promoting language learning and self-efficacy.

5.4.1 Positive environment

The learning environment plays a crucial role in developing students' reading comprehension ability in higher education. With a friendly and stress-free environment, students were confident and willing to actively and effectively

participate in class. In this study, after the students were put into two groups according to their level of proficiency, they were allowed to set up their own group. That way, they would feel comfortable to work with the people they were familiar with. The assessment for their performance was also provided according to their level of proficiency to enhance positive feedback. The impact of a positive learning environment should not be overlooked by educators. Classroom management needed to be considered in order for students' achievement to occur. It can help improve students in academic aspects and lower anxiety in higher education settings. Without learning anxiety, the students tend to gain more intrinsic motivation and self-efficacy (Anyadubalu, 2010).

5.4.2 Scaffolding from teacher and peers

Through the concept of scaffolding from teacher and peers, learners acquire more knowledge, vocabulary and reading comprehension skills. The teacher's support and the collaborative work with friends helped the students to read more fluently. The students showed confidence in tasks and were willing to participate in class activities. From the beginning of the class, the students in lower proficiency groups gradually started to volunteer and participated in class activities. Scaffolding is provided until the learner is capable of performing tasks independently (Greenfield, 1999). Scaffolding is one of the main tools in the ZPD concept in a way to help learners to reach the desired level in which they cannot do on their own. With scaffolding from more capable peers, the learners can become more competent with a higher level of skills. According to Ankrum et al. (2014), the intentional scaffolding has positive implications in literacy instruction. Therefore, it is important to include enough scaffolding in a class in order to assist students to reach the desired level.

5.4.3 DI promoting language learning and self-efficacy

It is worth noting that the students in most classes might be mixed-ability. With that awareness, the language teacher should provide options for different levels of students so that they can make sense of concepts taught without limitation in developing language proficiency. Based on DI, the curriculum and the course designer should provide choices for students who have different interests, backgrounds, and learning

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styles. This way, students' different needs can be fulfilled and they can eventually become more efficacious. In this study, the increase of students' post-test scores of reading comprehension and self-efficacy showed significant improvement. It can be concluded that after the course, their self-efficacy in reading and reading comprehension proficiency were constructed. When the students became more knowledgeable and confident of their reading skills, their self-efficacy beliefs arose. Many studies reported positive effects of differentiated instruction in various skills, subjects, and levels of students (Aliakbari & Haghighi, 2014; Shaunessy-Dedrick et al., 2015; Vibulphol, 2020). Some studies also revealed that there was a positive relationship between English language learning and self-efficacy (Kitikanan & Sasimonton, 2017; Raoofi et al., 2012; Yusuf, 2011). Therefore, it can be concluded that DI can be an effective approach for students in all levels to enhance their language learning and self-efficacy.

5.5 Chapter summary

This study investigates the effects of differentiated reading instruction on reading comprehension and self-efficacy of undergraduate students. The findings support previous studies on the benefits of differentiated instruction, reading comprehension, and self-efficacy. In terms of supporting reading comprehension, DI helped the mixed-ability students to access the texts suitable for their readiness. This way, the students tended to feel comfortable with reading and that leaded to the desire to read and learn (Chapman & King, 2009). In response to students' readiness, DI allowed teachers to monitor students' learning and provide appropriate guidance and feedback in accordance with students' needs and interests (Tomlinson, 2000). To support students' self-efficacy, DI lowered the affective filter, which led to the lower level of anxiety in a class. And that could lead to more chances of successful learning. The higher chance of students to have mastery experience, the higher chance of the students to become more efficacious. That is to say, the intervention engaged the students in tasks suitable for them and enhanced reading comprehension and self-efficacy.

The present study highlights the contributions of scaffolding of teachers, collaborative work with peers, suitable levels of activities for mixed-ability classes

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that enhance reading comprehension and self-efficacy with the tiered instruction and friendly environment.

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Appendix

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Appendix A

Pre- and Post-test of Reading Comprehension

Passage 1

Albert Einstein was a German scientist with many discoveries and theories. His most important **contribution** to the world of science is the Theory of Relativity. The formula he developed explains how energy (E) is related to mass (m). This theory changed the world of science.

Albert Einstein was born in Ulm, Germany in March, 1879, but lived most of his childhood in the city of Munich. **He had speech problems as a child**, and his parents didn't think he was very intelligent. He didn't talk until he was four years old. He didn't read until he was nine. He said he didn't like school but loved reading and learning on his own.

His father owned an electronics shop so Albert learned all about science and electronics from him. He first became interested in science when his father gave him a compass. Because he really loved math, he wanted to study that in school. He finished his education in Switzerland. Later he moved back to Bern, Germany and started his first job as a clerk in the patent office.

Albert moved to the United States in 1933 to avoid the Nazis in Germany. Albert was Jewish and the Nazis were killing Jewish people. He became a United States citizen in 1940. His Theory of Relativity changed how scientists observed the world and led to many modern inventions, including nuclear energy and the nuclear bomb.

Albert Einstein laid much of the foundation for modern physics. In 1905 Einstein came up with the concept that light is made up of particles called photons. Most scientists then didn't agree, but later experiments in 1919 proved him right. He was awarded the Nobel Prize for Physics in 1921 for his discovery of the law of the photoelectric effect.

Albert Einstein did not work directly on inventing the atomic bomb, but his name is closely associated with the bomb. This is because his scientific work and discoveries were important in the bomb's development.

He received a love of music from his mother and said that if he were not a physicist, he would be a musician. He played the violin and piano and said that he got the most joy out of life in doing that. He saw his life in terms of music and lived his daydreams in music.

Einstein's brain has been preserved by scientists so they can find out why he was such a genius by examining it. It is said to be different from the brains of most other people.

Albert Einstein died in the United States in 1955.

Choose the best answer

1. Which of the following can best replace the word “contribution” in line 1?
   a. continue b. support c. grant d. development

2. Which of the following is closest in meaning in the sentence, “He had speech problems as a child” ?
   a. He had a bad memory when he was a child.
   b. He was a very shy kid.
   c. He couldn’t hear when he was young.
   d. He couldn’t speak when he was young.

3. Which of the following is NOT TRUE about Albert Einstein?
   a. His brain was preserved after his death.
   b. He loved music and could play many instruments.
   c. He was originally from Switzerland.
   d. His first job was in a parent office.

4. Which of the following is the name of the theory explaining how energy is related to mass?
   a. Theory of Advanced Physics
   b. Theory of Matter
   c. Theory of Energy
   d. Theory of Relativity

5. Which of the following is TRUE about Albert Einstein and atomic bomb?
   a. His theory led to the invention of the nuclear bomb.
   b. He won the Nobel Prize for inventing the atomic bomb.
   c. He helped with development of the first nuclear bomb.
   d. He wanted to fight with the Nazis with the atomic bomb.

6. How will the information useful to the reader?
   a. It can help readers to win the Nobel Prize.
   b. It might inspire readers to pursue science.
   c. It might encourage readers to work harder.
   d. It might inspire reader to change the world.

Put T for the statements that are true and F for the statements that are false.

7. _____ Einstein had to move to America in 1933 because his parents wanted him to get better education.

8. _____ His most famous invention was the development of the nuclear bomb.

9. _____ According to the passage, the particles of light is photons.

10. _____ Einstein was 76 years old when he died.

Passage 2

Synesthesia is a neurological condition that causes the brain to process data in the form of several senses at once. For example, a person with synesthesia may hear sounds while also seeing them as colorful swirls. They may see one particular color when they are in pain. The condition seems unbelievable to most people and isn't fully understood by researchers, but it is thought to be genetic and affects more women than men.

Synesthesia can occur in only about 1 in 2,000 people, according to the American Psychological Association (APA). The condition is more **prevalent** in artists, writers and musicians whose creative capacity is prominent. There are 20 to 25 percent of people of these professions with the condition. Examples of famous artists with synesthesia include musician Billy Joel, violinist Kaitlyn Hova, painter Wassily Kandinsky and Writer Vladimir Nabokov.

Nobokov described his condition that he could see letters g, j and h in brown. Letter m is in pink and letter b is in red. In term of musical world, Joel found that songs create worlds of color. When he hears slower and softer melodies, blue or green are the colors he sees.

The word "synesthesia" comes from the Greek phrase for "**to perceive together**". There are more than 60 types of synesthesia. Most people with the condition experience at least two types of synesthesia. The most common type is grapheme-color synesthesia, which is when letters or numbers seem to be colored on the written page or visualized as colored in the mind. Some other types of synesthesia include smelling certain scents when hearing certain sounds or seeing a certain color when feeling pain.

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David Eagleman, a neuroscientist explains that in synesthesia people's brain, the connections between each sensory are not normal to most people. They can match what they smell to the sound or the taste to the color. Simon Baron-Cohen from University of Cambridge has suggested that synesthesia results from too much neural connections. In the brains of people with synesthesia, the walls are broken down and communication can cross over its true function.

Even though synesthesia can be uncomfortable to live with, there are some benefits. It is easier to memorize information when colors, texture and sound are concerned. Also, some evidence shows that synesthesia may enhance creativity. In some cases, people with synesthesia are required to help in designing products.

Choose the best answer

11. According to the passage, what can occur to people with synesthesia?
    a. They see colorful rings when they close their eyes.
    b. They see a certain color on a certain letter.
    c. They smell pain from other people.
    d. They feel pain when they see a certain color.

12. What is the best meaning of "prevalent"?
    a. widespread b. famous c. common d. previous

13. According to the passage, people in many professions tend to have synesthesia, EXCEPT?
    a. Composer b. Painter c. Researcher d. Singer

14. The following are true about synesthesia, EXCEPT:
    a. There are more than 60 types of synesthesia.
    b. Synesthesia is found mostly in women.
    c. Among 2,000 people, one of them will have synesthesia.
    d. Synesthesia was originally found in Greece.

15. Which of the following is closest in meaning in the phrase, "to perceive together"?
    a. To continue lifelong learning
    b. To process data continuously
    c. To link two sensory pathways
    d. To control senses all at once

16. The primary purpose of the passage is to _____
    a. provide information of an unbelievably strange phenomenon in human brain.
    b. give the information of how horrible the symptoms of synesthesia are.
    c. explain the causes and effects of synesthesia and how to cure it.
    d. introduce the famous people who have to live with the phenomenon.

Put T for the statements that are true and F for the statements that are false.

17. _____ Some people with synesthesia are able to see a certain color when hearing a certain song.

18. _____According to the study, 10% of population will have synesthesia and it can pass on in family.

19. _____ Synesthesia tends to occur with creative or artistic people.

20. _____ The paragraph following this passage should be about how to cure synesthesia.

Passage 3

Everything is made up of chemicals, including the human body. They are combined to form molecules such as proteins, carbohydrates, lipid and nucleic acids. There are 92 elements listed in the Periodic Table, and about 60 of them make up the human body. However, about 96% of the body is made up of just four elements: oxygen, carbon, hydrogen, and nitrogen. Nearly all the chemicals in the body serve a purpose, either as a single element or joined with other chemicals to form compounds.

Most of the chemicals of the human body are quite **common**. For example, hydrogen and oxygen, make up about 60% of your body. Therefore, the body must remain hydrated, meaning it needs water throughout the day. Without water, a person could not survive.

The top four chemicals that make up a person's body weight include oxygen, carbon, hydrogen, and nitrogen. Oxygen makes up 65% of the body and is mostly bound to hydrogen to make water. The large amounts of oxygen are found in the lungs and bloodstream. It can be found in proteins and carbohydrates, and more.

About 18% of the body is carbon. It is the basis of organic chemistry. Every molecule in the body contains carbon, which assists with the metabolism in the body. Carbon is released from the body when you breathe.

Hydrogen makes up10% of the body and is bound with oxygen to form water. It can be found in every molecule to assist with the chemical reactions in the body.

Nitrogen makes up 3% of the body and is found in the lungs. It is breathed in with the air and absorbed in the body through foods that are eaten. It is a component of amino acids and is parts of DNA and other molecules.

Calcium (1.4%) is found in bones and teeth. It helps with muscle contraction and protein regulation. At 1% of the body chemical is phosphorous. Like calcium, it is found in bones and teeth. It can also be found in nucleic acids and energy molecules.

The remaining chemicals, all under 1% of the body include potassium (0.25%) which helps regulates the heartbeat and electrical impulses. All the cells in the body requiring potassium to work properly. Sulfur (0.25%) is found in amino acids and is used to build proteins in the body. Like potassium, sodium (0.15%) is important for nerve transmission and muscle function. Chlorine (0.15%) helps with the transport of enzymes and supplies energy for biochemical reactions. It is found in the stomach and helps with digestion. Magnesium (0.005%) is used to help build healthy teeth and bones and helps with enzymes.

Understanding body chemistry can help determining which chemicals are needed for the body to function properly. We would be able to choose the sorts of foods that are best for maintaining health.

Choose the best answer.

21. Which of the following elements make up most of the human body?
    a. Hydrogen b. Oxygen c. Carbon d. Nitrogen

22. Which of the following is NOT TRUE?
    a. Human body is filled mostly with water.
    b. Phosphorous and calcium are found in bones and teeth.
    c. Calcium helps with nerve and enzymes to work properly.
    d. Some chemicals join together to create new compounds.

23. Which of the following can best replace the word “common” in paragraph 2?
    a. different b. similar c. effective d. amount

24. About how many different elements are part of the human body?
    a. 92 b. 65 c. 96 d. 60

25. Which elements can lead to dehydration if human does not have enough?
    a. Hydrogen and Oxygen
    b. Nitrogen and Oxygen
    c. Magnesium and Hydrogen
    d. Carbon and Sodium

26. Which elements that human needs in order to get strong bones?
    a. Calcium and Nitrogen
    b. Magnesium and Sodium
    c. Sodium and Calcium
    d. Phosphorous and Calcium

27. Which of the following can be the best title of the passage?
    a. What Makes Human Live
    b. The Human Body Chemistry
    c. Inside Human Body
    d. How Human Survives

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28. According to the passage, it can be implied that_____
    a. to remain good health, we need to eat properly.
    b. to stay fit, we need enough minerals and vitamins.
    c. All the chemicals in human body function in the same way.
    d. we won’t survive if we lack chemicals mentioned in the passage.

29. How will the information in this passage be useful to the readers?
    a. The readers can purchase the right vitamins and minerals to consume.
    b. The readers will have information about how to consume to stay fit.
    c. The readers will understand each chemicals’ purposes for body.
    d. The readers can find the right chemicals to cure their illness.

30. What should the paragraph following this passage be about?
    a. Nutrition that human body needs the most.
    b. Where to find necessary chemicals in food.
    c. Harmful chemicals that can cause illness
    d. Chemicals that can produced by human.

Passage 4

Everyone is afraid of something. Some of us are afraid of spiders (Arachnophobia), snakes (Ophidiophobia) and even holes (Teypophobia). This kind of fear is called Phobia. A phobia is a very strong irrational fear or hatred of something. Some phobias are very interesting. Ailurophobia is the fear of cats and Cynophobia is the fear of dogs. If you have Glossophobia, you will not be able to give presentation in front of the class because it's a fear of public speaking.

The biggest phobia in the world nowadays is nomophobia. It's the fear of being without your mobile phone. The fears include losing connection, running out of battery and losing sight of your phone. The studies found that people who use their phones to store, share, and access personal memories suffer most. Smartphone users tend to perceive phones as their extended selves and get attached to the devices. Being without your phone gives you separation anxiety. People accepted that they experience feelings of anxiety and unpleasantness when separated from their phones. Overall, women were more likely to suffer from nomophobia than men.

In the UK, the survey study of 1,000 people reported young adult between 16-24 tend to be the most addicted to their mobile phones. Also, 77 percent of people at age between 25-38 are unable to stay apart from their phones. Phone addiction can increase stress levels because the constant sounds and vibrations prevent you from concentration. Excessive usage of mobile phone can cause sleep disturbance, increase stress levels and depression. Sometimes your phone usage leads to a negative impact on your conversations and relationships.

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To **withdraw** from phone addiction, you should accept that you have the symptoms. **The signs** are inability to turn off your phone, checking your phone obsessively and constantly topping up the battery life. One of the easiest ways to heal the phone addiction is switching off your phone. Switch off your phone for short period of time during the day and get on with your life. Try at night when you go to bed by switching off and leaving the phone somewhere far away from your bed. Practice the habit until you find that being away from your phone become easier.

Choose the best answer.

31. What can't you do if you have glossophobia?
    a. You can't have dogs.
    b. You can't talk in public.
    c. You can't touch cats.
    d. You can't talk on the phone.

32. What is NOT TRUE about phobia?
    a. It's a strong fear
    b. It's involuntary
    c. It's irritating
    d. It's enjoyable

33. According to the passage, what are victims of Nomophobia really addicted to?
    a. Relationship b. Games c. Technology d. The device

34. What is the best meaning of "withdraw"?
    a. cut down b. break up c. switch off d. turn off

35. Which statement below is true?
    a. Victims from nomophobia tend to get frustrated when they have their phone.
    b. People with nomophobia feels relief when they don't touch their phones.
    c. Phone separation anxiety affects women more than men.
    d. Phone addicted people put their personal life into the phone.

36. What can be the effect of the phone addiction?
    a. divorce b. depression c. cynophobia d. death

37. According to the passage, which of the followings constitutes criterion for phone addiction?
    a. Believing that phone is the most important thing in life.
    b. Using application to de-stress or get excited.
    c. Trying to find the ways to withdraw from addiction
    d. Playing interactive online games non-stop.

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38. The word "The signs" in the last paragraph refers to_____?
    a. The phones
    b. The symptoms
    c. The addicted people
    d. The phobia

39. What is the purpose of the text?
    a. To describe the ways to use smartphones smartly
    b. To help parents diagnose their kids' addition
    c. To describe the people addiction to smartphones
    d. To raise awareness about using social media

40. How will the information be useful to the reader?
    a. The readers would know if they have any kinds of phobia.
    b. The readers would learn how to cure many kinds of phobia.
    c. The readers would learn the pros and cons of phone usage.
    d. The readers would know how to cope with phone addiction.

Passage 5

Climate change and global warming are the names given by scientists for the gradual increase in the temperature of the Earth's surface, which has increased since the industrial revolution. Over the past twenty years the effects have become more marked. Sea temperatures and global surface temperatures have risen, fresh water ice in the Arctic has melted, and glaciers are retreating. Considerable evidence shows that most of this warming has been caused by human activities. That is to say human beings have altered the chemical composition of the atmosphere through a buildup of greenhouse gases.

Our "carbon footprint," the amount of carbon being emitted by an activity we do, has increased and we are destroying the Earth. If we do nothing, the rising global temperatures will cause the sea level to rise and alter local climate conditions, affecting forests, crop yields, and water supplies. It may also affect human health, animals, and many types of ecosystems. Deserts may expand and some of our countryside may be permanently altered. Sea-level rise will lead to increased coastal flooding through direct inundation and an increase in the base for storm surges, allowing flooding of larger areas and higher elevations. Fortunately, there are many ways you can help, and the first step is you should learn how you personally impact global warming.

Remember that your carbon footprint does not come only from the amount of electricity you use at home or from how many plastic bags you take from supermarkets. It also comes from your choice of transportation and the kinds of food you buy, which in turn affect the kinds of transportation for delivery and the use of paper or plastic for packaging. Knowing your carbon footprint will help you learn how to **minimize** your impact and live a "greener" lifestyle.

Choose the best answer.

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41. According to the passage, when did the rise in the temperature of the Earth's surface start?
a. Before the industrial revolution
b. After the industrial revolution
c. Less than twenty years ago
d. Twenty years ago

42. What are the effects of climate change and global warming that have been more evident recently?
a. Ice melting and people using more plastic
b. Sea temperature increasing and ice melting
c. Glaciers retreating and animals losing their homes
d. Earth surface temperature rising and water being colder

43. What or who is the cause of global warming?
a. Human activities cause all of it.
b. Human activities cause most of it.
c. Human activities cause some of it.
d. Human activities do not cause it.

44. What is the meaning of “carbon footprint”?
a. The kinds of food people buy when shopping at a supermarket
b. The temperature of the Earth’s surface when climate changes
c. The size of a person’s footprint when walking at the beach
d. The amount of carbon created when doing an activity

45. Which of the following will happen if people do nothing about global warming?
a. We will have no more water supplies. b. The whole world will be under water.
c. The weather in each area will change. d. All areas on Earth will become deserts.

46. Which is the correct order of the effects of global warming?
a. A higher sea level --> higher global temperatures --> increase in coastal flooding
b. Increase in coastal flooding --> higher global temperatures --> a higher sea level
c. A higher sea level --> increase in coastal flooding --> higher global temperature
d. Higher global temperatures --> a higher sea level --> increase in coastal flooding

47. What does the author mean by “you should learn how you personally impact global warming”?
a. It is important to know the real causes of global warming.
b. It is important to know the negative effects of global warming.
c. It is important to know how you yourself cause global warming.
d. It is important to know how you can stop and reverse global warming.

48. What is the best meaning of “minimize”?
a. Reduce b. Increase c. Undo d. Worsen

49. The following are ways to “live a greener lifestyle” EXCEPT:
a. Using cloth shopping bags
b. Delivering food by yourself
c. Buying food with less packaging
d. Turning off electricity when not in use

50. What should the paragraph following this passage be about?
a. Earth temperature that is decreasing
b. How to buy good organic products
c. “Green” supermarkets in your area
d. How to measure your carbon footprint

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The test specification of the pre-test and post-test of reading comprehension

In this study on the course of English for Scientists, the test measure is on reading comprehension. The test is developed based on Brown's principal strategies for reading comprehension (2004) and Barrett's taxonomy (1968) and the test specifications framework of Alderson, Clapham, and Wall (1995).

Test specification information

1. **The purpose of the test**

It is important that test tasks will support the performance that correspond as closely as possible to the target language use. This test aims at examining the ability in reading in English (literal comprehension, inferential comprehension, evaluation) in academic and scientific genres of the undergraduate students from the faculty of Applied Science, KMUTNB. The test is an achievement and a summative test with the aim of evaluating students' levels at the beginning of the course and students' accomplishment at the end of the course. The stakeholders of the test are the students, and the instructors of the course. The test is the instrument for measuring the students' ability in reading academic and science specific texts.

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2. **Characteristics of the test takers**

In order to develop the test task with quality, it is important to know nature of the test takers. The test is designed to measure performance of university student level (bachelor's degree). The test takers are second year students who have passed the foundation courses of English I and English II. Thirty-three of them are both male and female and all of them are Thai.

3. **Test level**

Knowing test takers' characteristics can maximize the test level appropriateness. The students taking this test are in the scientific field, so they have a similar background. They also passed foundation courses of English with various

levels of proficiency, so they have mixed ability. This test is, therefore, a low stake for summative course. It aims for university level with a pre-intermediate to an intermediate language use.

4. Definition of construct

As mentioned earlier, the test aims to measure reading comprehension skill, so the construct of the test includes 1) literal comprehension, 2) inferential comprehension and 3) evaluation. However, to be precise, the test will focus on the strategies used in reading process from Brown (2004) and Barrett (1968) and Barrett (1968), namely;

1) skimming the text for the main idea and for the gist (literal comprehension)
2) scanning the text for specific information (literal comprehension)
3) reorganizing ideas from various parts of the text (literal comprehension)
4) drawing inferences about the meaning of a word from context (inferential comprehension)
5) drawing inferences from the content (inferential comprehension)
6) predicting outcomes (inferential comprehension)
7) giving comprehensive judgement about some aspect of the text (evaluation)
8) recognizing a writer's purpose, attitudes, tone and mood (evaluation)

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5. Content of the test

- In terms of organization of task

  There are 5 tasks (50 items) 50 points. Each task consists of 10 items, in two passages, first six task items are in multiple-choice and the other four items are in True or False questions.

- In terns of time allotment

  The test comprises of five passages and 50 questions. The whole test takes 1 hour and 30 minutes.

6. Test task details

This test comprises of scientific content that most scientists should be able to understand, therefore; background knowledge is important in this test task.

Two out of five passages, the reading test is developed with six multiple-choice items. The reading test in three passages are developed in ten multiple choice items. Such selected-response items are chosen because it is practical with a large number of test takers and easy to score.

The second task is the True or False questions which focuses more on literal understanding of the students. This task is in two passages.

7. Grading criteria

In multiple-choice items and the true or false question, the correct answers are fixed. One correct item is awarded one mark.

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Appendix B

Questionnaire of Self-efficacy Scale (Post-test)

Directions: These questions reflect opinions about self-efficacy in reading English and studying the language course. Please indicate how much confidence you have in doing the specific behavior in this class. There are no right or wrong answers. Your honest opinions are the most important.

Part I: Self-efficacy on reading comprehension
Part II: Self-efficacy on studying in a language course
Part III: Self-efficacy based on sources of efficacy

*1 = I am totally **unable** to do this*
*2 = I am possibly **unable** to do this*
*3 = I am possibly **able** to do this*
*4 = I am **able** to this*
*5 = I am **able** to do this well*

Statements	Level of efficacy				
	1	2	3	4	5
Part I: Self-efficacy on reading comprehension					
1. Do you think you can understand basic meaning of the text that is directly stated? (Skimming)					
2. Do you think you can find information you want in the text? (Scanning)					
3. Do you think you can draw conclusion from pieces of information in the text? (Reorganizing)					
4. Do you think you can find the meaning that is not directly stated in the text based on hints of the words? (Drawing inferences from a word)					
5. Do you think you can find the information that is not stated directly in the text based on the specific paragraph or the entire text? (Drawing inferences from the content)					
6. Do you think you can predict related matters from the text? (predicting outcomes)					
7. Do you think you can identify and evaluate your feelings for the text? (Giving judgement about text)					
8. Do you think you can identify tone and purpose of a specific part of a text or of the entire text? (recognizing a writer's purpose, attitudes, tone and mood)					
Part II: Self-efficacy on studying in a language course					
9. Do you think you can understand the content and materials on science and technology after being taught from the class? (Observation)					

Statements	Level of efficacy				
	1	2	3	4	5
10. Do you think you can retell the story that you read from the text to your friends after being taught from the class? (Emulation)					
11. Do you think you can do the assignments with friends after being taught in the class? (Self-control)					
12. Do you think you can do the assignments on your own after being taught in the class? (Self-control)					
13. Do you think you can do as well as, or better than most of your friends in class? (Self-regulation)					
14. Do you think you can understand the English text you read outside class? (Self-regulation)					
15. Do you think you can do the task in English classes you may join in the future? (Self-regulation)					
Part III: Self-efficacy based on sources of efficacy					
16. Do you think you can become a successful language learner by experiencing and overcoming obstacles? (Mastery experience)					
17. Do you think you can become a successful language learner by observing others' successful experiences? (Vicarious experience)					
18. Do you think you can become a successful language learner by being encouraged with nice words and encouraging words from teachers and friends? (verbal persuasion)					
19. Do you think you can become a successful language learner by being in decent environment? (emotional states)					

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*1 = I am totally **unable** to do this*
*2 = I am possibly **unable** to do this*
*3 = I am possibly **able** to do this*
*4 = I am **able** to this*
*5 = I am **able** to do this well*

Appendix C

Attitude Questionnaire

Name…….. Department……

These questions reflect opinions and attitudes about reading comprehension in English and studying the language course. Please indicate your opinion. There are no right or wrong answers. Your honest opinions are the most important.

This questionnaire consists of two parts which are:
Part I: Attitude toward reading comprehension
Part II: Attitude toward differentiated instruction
Part III: Attitude and suggestions about the study

Statements	Level of attitude				
	1	2	3	4	5
Part I: Attitude toward reading comprehension					
After studying the course, I can….					
1. identify main idea of the passage.					
2. skim the text for the gist and main idea					
3. scan the text for specific information					
4. guess at meaning of words and phrases					
5. distinguish between literal and implied meanings					
6. draw inferences about the meaning from context					
7. identify the purpose of text					
8. read and understand the text more quickly					
9. know more useful vocabulary					
10. remember more useful vocabulary					
Part II: Attitude toward differentiated instruction					
After studying the course, I think learning English through differentiated instruction…					
11. helps me to learn with ease					
12. is enjoyable most of the time					
13. gives me stress-free learning environment					
14. motivates me to learn English in the future					
15. is effective instruction					
When I was studying with differentiated instruction, ….					
16. I liked most of the activities					
After studying the course,…					
17. I am confident that I can do better in reading comprehension in the course and examination					
18. I am confident that I can do better in English in the future					

Statements	Level of attitude				
	1	2	3	4	5
19. I am confident that I can be proficient in English for my future career					

Part III: Attitudes and suggestions

Write your attitudes and suggestions about the instruction

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Appendix D

Semi-structured Interview

Interviewee: _____ Time: _____

Date: _____ Place: _____

Actual duration: _____

Topic: The student's attitude toward differentiated reading instruction

Questions:

1. What is your opinion toward differentiated reading instruction? Do you think it is useful for reading comprehension? Do you think you can improve your reading ability from this class? Why?
2. What is your opinion about reading activities in class? What activities do you think influenced you the most in reading? Do you think it is useful for reading comprehension? Why?
3. Do you think working in groups assist your learning? Which do you prefer, working in group or alone? Why?
4. Do you think differentiated reading instruction enhance your self-efficacy? Do you believe that you can do better in reading English in the future after this class? Do you think English can help you with your future career? Why?

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Appendix E

Teacher's Checklist

Rubric for assessing students' performance after each reading task

Assessment informs teachers on the decisions and the actions in language education. It helps teachers with student's guidance on their road to learning. Rubric is used by teacher to provide feedback and helps remind students about their goals. ACTFL suggests a sequenced approach called Integrated Performance Assessment (IPA), which consists of the following;

1. **Interpersonal communication** refers to the students' performance in negotiation of meaning among peers.
2. **Interpretive communication** refers to the student's performance in interpretation of what the text says directly and indirectly.
3. **Presentational communication** refers to the student's performance in creation of messages to inform, explain or persuade the audience.

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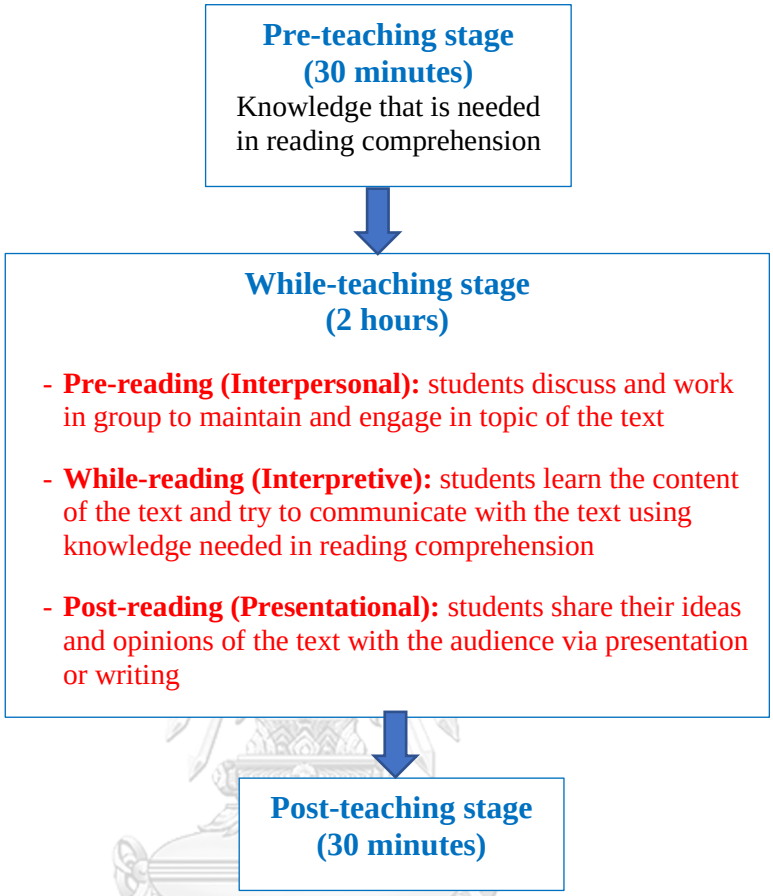
In this course the organization of each lesson is as follows;



Unit Level Performance Assessment

During each process, a student can….

	Interpersonal	Interpretive	Presentational
Beginner	- There is connection within group - Discuss on familiar topic - Use variety of words, phrases, and simple sentences	- Identify main idea - Comprehend text by recognizing keywords or phrases	- Write simple sentences - Follow a practiced format - Ask and answer practiced questions
Intermediate	- Connect will within group - Discuss on topic and extend idea further - Understand, ask and answer a variety of questions	- Comprehend main idea and some key details - Predict meaning from context	- Write complex sentences - Provide more description - Maintain conversation on familiar topic

Tiered Product Assessment Sheet (TT Observation)

Group B (Beginner)

Level Performance Assessment			
Skill	Description	Yes	No
Interpersonal skill	There is connection within group (SE)		
	Discuss on familiar topic (SE)		
	Use variety of words, phrases, and simple sentences (Read)		
Interpretive skill	Identify main idea (Read)		
	Comprehend text by recognizing keywords or phrases (Read)		
Presentational Skill	Write simple sentences (SE)		
	Follow a practiced format (SE)		
	Ask and answer highly practiced questions (SE)		

Group A (Intermediate)

Level Performance Assessment			
Skill	Description	Yes	No
Interpersonal skill	Connect well within group (SE)		
	Discuss on topic and extend idea further (SE)		
	Understand, ask and answer a variety of questions (Read)		
Interpretive skill	Comprehend main idea and some key details (Read)		
	Predict meaning from context (Read)		
Presentational skill	Write complex sentences (SE)		
	Provide more description (SE)		
	Maintain conversation on familiar topics (SE)		

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Appendix F

Course Syllabus

English for Scientists Course Syllabus
Differentiated Reading Instruction

Instruction information

The Differentiated Reading Instruction (DRI) accommodates learners with mixed ability by identifying their particular strengths, interests, and learning profile in order to enhance students' reading comprehension. It is organized to answer research questions as follows:

Research question 1: What are the effects of Differentiated Reading Instruction on reading comprehension of undergraduate students?

Research question 2: What are the effects of Differentiated Reading Instruction on self-efficacy of undergraduate students?

Research question 4: What are undergraduate students' attitudes toward Differentiated Reading Instruction?

As a result, the course contents, materials, instructions, and assessment are designed and selected based on the learners' readiness, interests, and learning profile to improve students' reading comprehension proficiency.

Pedagogical Implications and Application

Based on the findings concerning Differentiated Reading Instruction, two pedagogical implications are drawn as follows:

1. To enable different levels of students to improve reading comprehension in one class, language teacher should provide options for different levels of students so that they can make sense of concepts taught without limitation in language proficiency.
2. A classroom should be flexible in terms of pace, activities, environment in order to create productive and relax atmosphere. That way, students can become more efficacious.

These implications are applied in Differentiated Reading Instruction (DRI) in the aspects of a course contents, teaching methods, and teaching materials as follows:

1. In the reading tasks, the passages are provided in two versions that fit with students' reading proficiency, intermediate and beginner. The students are scaffolded according to their levels.
2. Reading comprehension skills and strategies are taught so that students know useful techniques that can enable them to improve their reading skills.
3. Vocabulary building is taught so that students know useful techniques that can enable them to improve and expand their vocabulary knowledge.

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4. The reading materials used in the classroom are science-related and mostly academic so that students can apply with their future career or study. Each reading text is provided in two versions, intermediate and beginner.

Participants

The participants in this instruction are 33 second year students studying English for Scientists course at King Mongkut's University of Technology North Bangkok in the second semester of the academic year 2019 from November 2019 to February 2020. All of them are from the faculty of Applied Science, Department of Food and Environment technology. They have to pass two foundation courses of English I and English II.

Objectives of the course

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

1. Use reading comprehension skills and strategies in scientific reading texts
2. Develop and expand vocabulary knowledge by identifying word parts
3. Read fluently in scientific articles, discoveries, research reports and innovation
4. Summarize an article related to general science and their areas of interest in science
5. Handle questions related to scientific and technological themes
6. Read and discuss within groups concerning scientific matters
7. Plan and describe their project in the areas of science
8. Give presentation on a theme related to students' fields and interests

Time Duration: 15 hours in total

There are 4 lessons in this differentiated instruction. Lesson one and three last four and a half hours. Lesson two and four last three hours.

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Teaching methods: Lecture, Group discussion, Pair work, Oral presentation, Written Presentation, Teacher-students conference

Materials

1. Textbook "Career Paths: Science"
2. PowerPoint Presentations
3. Document
   - Reading texts for two levels of students
   - Reading tasks as individualized practice
   - A handout on reading comprehension skills and strategies
   - A handout on building vocabulary
   - Reading comprehension exercises for two levels of students
   - Listening stations for students to choose according to their interest
   - Assignment in reading comprehension worksheets for two levels of students
   - Scripts and vocabulary sheet for listening stations

Assessment

1. Pre-test and post-test
2. Self-efficacy questionnaire
3. Reading comprehension tasks
4. Students' journal
5. Teacher's observation
6. Student's interview

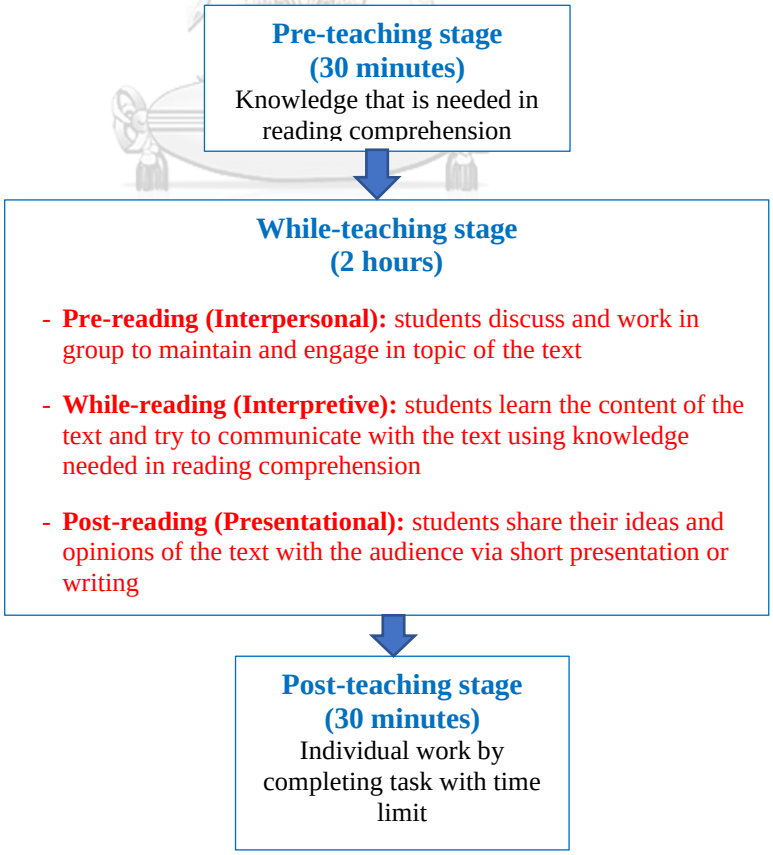
Rubric for assessing students' performance after each reading lesson

Assessment informs teachers on the decisions and the actions in language education. It helps teachers with student's guidance on their road to learning. Rubric is used by teacher to provide feedback and helps remind students about their goals.

ACTFL suggests a sequenced approach called Integrated Performance Assessment (IPA), which consists of the following.

4. **Interpersonal communication** refers to the students' performance in negotiation of meaning among peers.
5. **Interpretive communication** refers to the student's performance in interpretation of what the text says directly and indirectly.
6. **Presentational communication** refers to the student's performance in creation of messages to inform, explain or persuade the audience.

The organization of each reading lesson is as follows.



Performance Assessment Criteria

During each process, a student can….

	Interpersonal	Interpretive	Presentational
Beginner	- There is connection within group - Discuss on familiar topic - Use variety of words, phrases, and simple sentences	- Identify main idea - Comprehend text by recognizing keywords or phrases	- Write simple sentences - Follow a practiced format Ask and answer practiced questions
Intermediate	- Connect well within group - Discuss on topic and extend idea further - Understand, ask and answer a variety of questions	- Comprehend main idea and some key details - Predict meaning from context	- Write complex sentences - Provide more description - Maintain conversation on familiar topic

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Lesson Plan (Class 1, 3, 4, 6, 8, 9, 11, and 12 contains Reading Lessons which is the main study of this research)

Class / Duration	Unit / Topic	Objectives	Content	Materials	Assessment
1 (3 hours) 11-15 Nov	**Course Introduction**		- **Overview of the course** - **Pre-test (1 hour 30 mins)** - **Self-efficacy questionnaire (30 mins)** - **Learning preference questionnaire (15 mins)**		- Reading comprehension Pre-test - Self-Efficacy Pre-test - Teacher's observation - Reading Comprehension tasks
2 (3 hours) 18-22 Nov	**Kinds of Science**	Students will be able to - Show agreement, express a concern, talk about future events, and describe opposites	- Read the magazine article and discuss with partner - Discuss with partner about science topic - Discuss about types of science	- PowerPoint Presentation - Textbook: **Book 1**: Unit 1 and **Book 3**: Unit 1, 2, and 3	- Pair work discussion - Workbook exercises
3 (3 hours) 25-29 Nov	**Reading Lesson 1** **Science in your life** **(DRI)**	Students will be able to - Comprehend text that is directly stated - Find the information that is needed in questions - Combine the information for additional understanding - Find the information or meaning that is not directly stated in the text based on logical hints of the words - Find the information or meaning that is not directly stated in the text based on the specific paragraph or the entire text - Predict the related matters from their understanding of the text	- Introduction and orientation on differentiated instruction and reading comprehension strategies - Lecture and practice on literal, inferential, and evaluation comprehension skills for reading - Reading exercises	- PowerPoint Presentations - A handout on differentiated instruction - A handout on reading comprehension reading skills and strategies (**literal skill**-skim/ scan/ reorganize **& inferential skill** – infer from meaning of words/ infer from content/ predict outcomes **& evaluation**-judgement/ recognize writer's purpose) - Reading passage on Science in your life	- Teacher's observation - Reading Comprehension tasks - Student's journal

Class / Duration	Unit / Topic	Objectives	Content	Materials	Assessment
4 (3 hours) 2-6 Dec	**Reading Lesson 1 (Continue)** **Science in your life** **(DRI)**	Students will be able to - Comprehend text that is directly stated - Find the information that is needed in questions - Combine the information for additional understanding - Find the information or meaning that is not directly stated in the text based on logical hints of the words - Find the information or meaning that is not directly stated in the text based on the specific paragraph or the entire text - Predict the related matters from their understanding of the text	- Reading exercises - Listening practices	- PowerPoint Presentations - A handout on differentiated instruction - Reading passage on Science in your life - Listening stations	- Teacher's observation - Reading comprehension tasks - Student's journal
5 (3 hours) 9-13 Dec	**Lab Equipment and Lab Equipment**	Students will be able to - Correct someone and describe necessity	- Review of the previous class - Read the memo and discussion with partner	- PowerPoint Presentation - Textbook: **Book 1**: Unit 2, 3, 4, and 7	- Pair work discussion - Workbook exercises

Class / Duration	Unit / Topic	Objectives	Content	Materials	Assessment
6 (3 hours) 16-20 Dec	**Reading Lesson 2** **Safety first** **(DRI)**	Students will be able to - Comprehend text that is directly stated - Find the information that is needed in questions - Combine the information for additional understanding - Find the information or meaning that is not directly stated in the text based on logical hints of the words - Find the information or meaning that is not directly stated in the text based on the specific paragraph or the entire text - Predict the related matters from their understanding of the text	- Review homework from reading lesson 1 - Lecture and practice on literal, inferential, and evaluation comprehension skills for reading - Reading exercises	- PowerPoint Presentations - A handout on reading comprehension (**literal skill**-skim/ scan/ reorganize **& inferential skill** – infer from meaning of words/ infer from content/ predict outcomes **& evaluation**-judgement/ recognize writer's purpose) - Reading passages on safety at work	- Teacher's observation - Reading comprehension tasks - Students' journal
7 (3 hours) 23-27 Dec	**Measurement and Analyzing Quantities**	Students will be able to - Work with numbers and make suggestion	- Review of the previous class - Read basic math and quantities - Read and describe graphs and charts	- PowerPoint Presentations - Textbook: **Book 1**: Unit 10, 12, 13	- Pair work discussion - Workbook exercises
8 (3 hours) 30 Dec-3 Jan	**Reading Lesson 3** **Great Inventors** **(DRI)**	Students will be able to - Comprehend text using three level of comprehension: literal, inferential and evaluation. - Decipher meaning of a word by identifying word parts in order to develop and expand vocabulary knowledge	- Review homework from reading lesson 2 - Lecture and practice on vocabulary building and reading comprehension - Reading exercises	- PowerPoint Presentations - A handout on vocabulary building - Reading passage on Elon Musk	- Teacher's observation - Reading comprehension tasks - Students' journal

Class / Duration	Unit / Topic	Objectives	Content	Materials	Assessment
9 (3 hours) 6-10 Jan	**Reading Lesson 3 (Continue)** **Great Inventors** **(DRI)**	Students will be able to - Comprehend text using three level of comprehension: literal, inferential and evaluation. - Decipher meaning of a word by identifying word parts in order to develop and expand vocabulary knowledge	- Reading exercises - Listening practices	- PowerPoint Presentations - A handout on vocabulary building - Reading passage on Elon Musk - Listening stations	
10 (3 hours) 13-17 Jan	**Various Kinds of Science (Anatomy, Astronomy, and Genetics)**	Students will be able to - Ask information, introduce news, and make recommendations	- Review of the previous class - Read about the information of anatomy, astronomy and genetics	- PowerPoint Presentations - Textbook: **Book 1** Unit 5 and **Book 3** Unit 13 and 14	- Pair work discussion - Workbook exercises
Midterm Exam (22 January, 2020)					
11 (3 hours) 27-31 Jan	**Reading Lesson 4** **Inventions** **(DRI)**	Students will be able to - Comprehend text using three level of comprehension: literal, inferential and evaluation. - Decipher meaning of a word by identifying word parts in order to develop and expand vocabulary knowledge	- Review homework from reading lesson 3 - review on building vocabulary and reading comprehension - Reading exercises	- PowerPoint Presentations - Reading passage on useful inventions	- Teacher's observation - Reading comprehension tasks - Students' journal
Class 12 : 3-7 Feb	**End of the main study**		- **Post-test (1 hr 30 mins)** - **Self-efficacy questionnaire (30 mins)** - **Students' attitude interview (1 hour)**	- **Pre-test** - **Questionnaire** - **Interview questions**	- **Post-test** - **Questionnaire** - **Interview**
13 (3 hours) 10-14 Feb	**Scientific Methods**	Students will be able to - React to news, interrupt, and describe process and difficulty		- PowerPoint Presentations Textbook: **Book 2**: Unit 7, 8 and 12	- Pair work discussion - Workbook exercises

Class / Duration	Unit / Topic	Objectives	Content	Materials	Assessment
14 (3 hours) 17-21 Feb	**Student Formative Test**	- Revision - Quiz - Listening Test		- PowerPoint Presentations - Quiz - Listening test	
15 (3 hours) 24-28 Feb	**Student Project Presentation**	Group Presentation			
Final Exam (5 March)					

Appendix G

Lesson 1 - 4

Reading Lesson 1

Lesson Objectives:

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

1. Comprehend text that is directly stated; find the information that is needed in questions; combine the information for additional understanding
2. Find the information or meaning that is not directly stated in the text based on logical hints of the words; find the information or meaning that is not directly stated in the text based on the specific paragraph or the entire text; combine information for additional understanding; and predict related matters from their understanding of the text.
3. Identify and evaluate their feelings for the text and the content; and identify tone and purpose of a specific part of a text or of the entire text.

Time duration: 4 hours and 30 minutes

Class contents

- Reading comprehension skills and strategies; literal, inferential and evaluation.
- Reading passage and exercise

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Instruction and Activities

Lesson 1 (4 hours and 30 minutes)

Pre-teaching stage *(45 minutes)*

Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
Pre-lesson preparation: activate students' background knowledge	1. The students in the class are asked questions about comprehension in reading. The questions are about the skills the readers should have and the strategies they have used in the past when they have to do reading exam. Then the teacher writes the answer on the board. 2. The teacher uses the students' answer to explain about reading comprehension strategies. The handout (Document 1) about reading comprehension skills and strategies	Questions are raised to check students' understanding and background knowledge of the content they are going to learn next.

	are distributed. 3. The teacher explains about reading comprehension skills and strategies and check if the whole class understand with some questions about reading comprehension skills and strategies. 4. The whole class answer some questions about reading comprehension in the handout 1. Questions are allowed.	Differentiation is **not** applied at this stage.

While-teaching stage *(2 hours)*

Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
Pre-reading (45 minutes)		
Pre-reading: - group students in the right level - learn necessary vocabulary and activate background knowledge - group discussion	1. The students are put into groups (intermediate and beginner) that has been managed according to the results of pre-test and preference questionnaire. The groups of *intermediate* (A) levels and *beginner* (B) levels will be seated on the opposite side of the classroom. 2. In pre-reading activities, the two groups are provided with different handouts on reading comprehension passage on the topic **"Science in your life"** and exercise on the topic of science (Document A and B). The lead-in activity (pre-reading) starts with vocabulary building. The students match the vocabulary with the right definition. 3. Then the pre-reading questions are asked in order to activate students' background knowledge. Within the group, the students help each other answering the questions before reading. 4. The teacher checks with students if they can answer the questions correctly.	- The students are grouped according to their **readiness** (reading proficiency) from pre-test score. - In the handout, there are two different sets of questions and passages (Document A and B) based on students' **readiness** - During the lead-in activity, the content for both groups of students are the same. Assessment criteria: Interpersonal communication
While-reading (50 minutes)		
While-reading: - reading text and doing tasks - group discussion - task completion with teacher monitoring and	1. The passage is provided to each group in Document A and B. A is for intermediate level and B is for beginner level. 2. In document for group B, the content is simplified in terms of lexical and syntactic knowledge so that the basic level students can comprehend. Also the levels of readability of the two group are different according to the readability by Flesch-Kincaid. 3. Dictionary can be used but only the ones	- The content between A and B are different as to differentiate the **content** according to students' **readiness**. - The content and tasks in A are fit with the course level, but the content and tasks in B have been simplified so that basic level students

Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
scaffolding	provided in class. Mobile phone dictionary is allowed. 4. Both groups can use Document 1 to help with reading text. Teacher emphasizes the use of strategies in reading comprehension to the whole class. 5. Assistance from teacher can be given for each group differently. Teacher assists beginner level groups (B) by: - Highlighting the paragraph or the line where the answer would be. (If they require) - Pointing out the important clues. (If they require) - Provides definition of some words. Teachers assists intermediate level groups (A) by: - respond to the kind of questions that can clarify their understanding but not for the clues and important points. 6. Teacher reviews the whole class with reading comprehension strategies again and ask the students to recheck their answer. 7. Teacher monitors the whole class answer and provides the correct answers to each group for correction. 8. The teacher asks the students to check the answer and discuss their mistake within the group.	can understand. - The teacher's scaffolding to assist task completion are differentiated according to students' **readiness** and **preference**. Assessment criteria: Interpretive communication
Post-reading (25 minutes)		
Post-reading: check students' understanding on reading comprehension	1. Teacher asks the class to prepare brief summary of the content they have read in the passage. They may add their opinions about the passage. 2. The group prepare to present to the class about their summary. Teacher monitors the class as they are preparing. Time given for the presentation is 5 minutes for each group.	Students write summary and opinions about the text the read Assessment criteria: Presentational communication

Post-teaching stage *(45 minutes)*

Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
Lesson summary: conclusion	1. The teacher concludes the reading comprehension skills and strategies. 2. The teacher explains students about listening	Differentiation is **not** applied at this stage.

and home assignment	stations. There are three stations containing three video from YouTube for each group to choose from. 3. They can choose whatever clip they like from the topic. The B group will get a script to use when they are watching the video. Each group will get different tasks to complete after watching the clip. 4. After finishing the clip, each group will explain the clip they are choosing to the class. 5. Before ending the class, teacher explains assignment at home. Each student has to do reading assignment as homework individually. They are asked to do homework on their own like they are doing exam.	Homework: reading passage for students is the same level. Topic on importance of science.

Teaching Methods

Lecture, reading comprehension skills and strategies and reading practices, group work and discussion.

Materials and Media

1. Course syllabus
2. PowerPoint Presentations
3. Document: 1) A handout on reading comprehension
   2) Reading comprehension passages and exercises I for literal, inferential and evaluation *(A and B for two levels of students)*

Assessment

1. Teacher's observation
2. Reading comprehension tasks
3. Lesson performance assessment criteria

During each process, a student can….

	Interpersonal	Interpretive	Presentational
Beginner	- There is connection within group - Discuss on familiar topic - Use variety of words, phrases, and simple sentences	- Identify main idea - Comprehend text by recognizing keywords or phrases	- Write simple sentences - Follow a practiced format Ask and answer practiced questions

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Intermediate	- Connect well within group - Discuss on topic and extend idea further - Understand, ask and answer a variety of questions	- Comprehend main idea and some key details - Predict meaning from context	- Write complex sentences - Provide more description - Maintain conversation on familiar topic

Material for Reading Lesson 1

Document 1 (reading comprehension) for both A and B

Reading comprehension skills and strategies

Lead-in: Read the following statement and answer the questions.

"Unfortunately, China is one of the largest carbon dioxide emitters in 2018."

1. Which country have emitted carbon dioxide the most?

   _____

2. Is China the only carbon dioxide emitter in the world?

   _____

3. What can we do to reduce carbon dioxide emission?

   _____

Reading is a complex process of decoding symbols in order to construct or derive meaning. It is important for readers to be able to make sense of what they read in a text. Reading without comprehension then is just a word calling. Comprehension can be improved when the readers are provided with explicit instruction in comprehension. It is important for readers to engage with different texts and apply strategies to real life situation. In reading comprehension, three levels of comprehension are usually mentioned as the most needed skills for readers to acquire; ***literal, inferential,*** *and* ***evaluation***.

Literal comprehension

Literal comprehension refers to an understanding of the straightforward meaning of the text, such as facts, vocabulary, dates, times, and locations. Questions

of literal comprehension can be answered directly and explicitly from the text. The questions are often asked to check readers' understanding of basic or surface meaning of the text.

The strategies used to answer literal question is to **skim** for main ideas, to **scan** for specific details, and to **reorganize** ideas from various parts of text. Some sample questions are as follows;

1) Skimming = Which of the following best describe the main idea of the passage?
2) Scanning = What can be the effect of …… ?
3) Reorganizing = Which of the following is Not true?

Inferential comprehension

Making inferences involves more than a literal understanding because the meaning is implied. The text doesn't say exactly what it means. Questions require responses that are not directly stated or based on the fact that is not in the text. Readers are often required to use their prior knowledge with the information they have gained from reading the text.

The strategies used to answer inferential comprehension question is to draw meaning of word from context or surrounding words, to draw meaning from the content, and to predict from the text. Some questions for inferential comprehension are as follows;

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1) Which of the following is closest in meaning to the phrase, …… ?
2) Which of the following can best replace the word "……"?
3) What should the paragraph following this passage be about?
4) What topic does the passage most likely discuss next?

Evaluation

Evaluative comprehension requires the readers to give opinion and comprehensive judgement about some aspect of the text. The responses can be based on readers' opinion and insights. In order to answer this kind of question, the reader should use both literal understanding of the text and their knowledge of the text's topic and related issues.

The strategies used to answer evaluation question is to give judgement about text and to identify tone and purpose of text or writer. The questions for evaluation are as follows;

1) How will the information be useful to the reader?
2) What is the purpose of the text?
3) What is the primary purpose of this passage?

Exercise:

What **kinds of comprehension** do you think the questions for the statement "**Unfortunately, China is one of the largest carbon dioxide emitters in 2018**" are?

Question 1: _____ comprehension

Question 2: _____ comprehension

Question 3: _____ comprehension

To answer the first question, **"Which country have emitted carbon dioxide the most?"**, is to check literal comprehension. It asks for the information that is directly stated.

The possible answer to this question is **"China"**.

Question 2, **"Is China the only carbon dioxide emitter in the world?"**, is asked about information that is not stated in the statement. However, there are some clues that the readers can use to get the idea. The possible answer to this question is "No". The answer is not stated but the clue in the statement is "one of ….. emitters". It shows that there are many more countries that also emit carbon dioxide but not as much as China.

Question 3, **"What can we do to reduce carbon dioxide emission?"**, is asked about opinions and it is important for readers to use their prior knowledge. The possible to this question is varied. **It depends on the readers' background knowledge.** It can be about suggestion for recycling, stop using plastic and spreading knowledge about the danger of carbon dioxide emission.

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Reading Handout (Reading Task for group A)

Pre-reading

Building vocabulary: How much do you know about Science?

Fill in the gaps with a word from the list below.

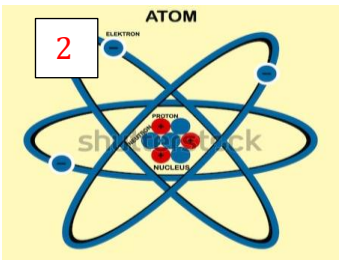
anthropology	astronomy	geology	psychology

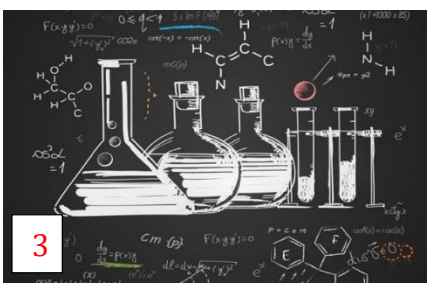
1. While _____ is the study of the earth, _____ is the study of everything outside the atmosphere of Earth.
2. In _____, the focus is on the mind and behavior of human.
3. The science of humans and their culture and societies is called _____.

Activating background knowledge

Answer the following questions.

1. What do you think each picture is about?
2. Look at the three pictures below. What do you think the passage is about?
3. Read the title of the article in the next page. What do you think the passage is about?





A

Science in your life

Have you ever wondered why you have to study science?

Science, which means “knowledge” in Latin, is the study of the nature and behavior of natural things and the knowledge obtained about them. Sciences are categorized in many ways. Some sciences such as physics and chemistry are considered “hard sciences” and psychology and anthropology are considered “soft science”. The division of science is also drawn differently, such as life sciences and physical sciences. Life sciences include anything that is living, while physical sciences include things that are not living, such as astronomy and geology. The best known fields of sciences are biology, chemistry, and physics. These three kinds of science may sound intimidating to some people, but they directly affect human life and are related to our life.

Biology is the science that tends to investigate every form of life – how it survives and where it originated. Biology is derived from the ancient Greek words “bios” which means life and “logos” which means study. Biology is everywhere starting from our body to the environment around us. Biology helps doctors learn how to cure disease. Marine biologists study life in the oceans. They may help to inform us about how to save the ocean from being polluted.

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Chemistry is the study of characteristics and structure of substances both natural and artificial. Also, it involves the study of their properties, how and why they combine or separate to form other substances. Chemistry in everyday life can be illustrated by the sunscreen we use. The reflective particles in sunscreen usually consists of zinc oxide or titanium oxide. These chemicals filter the light from the sun so that less of it reaches the deeper layers of your skin.

Physics refers to “nature” in ancient Greek and is the foundation of most scientific knowledge. Physics is the study of matter and energy and how they relate to one another.

Physics governs our daily life; for example, in a ball point pen. The concept of gravity is involved when you use your pen. As you move your pen across the paper, the ball

rolls and the gravity forces the ink down onto the top of the ball where it is transferred onto the paper.

The world of science may appear difficult to understand to most people or people who are not familiar with science. However, it is closely related to our everyday life and is a way of uncovering new knowledge.

Readability
- 395 words
- Flesch = 59.4 (C1)
- grade level = 8.8

Developing reading skill

Exercise I: Getting the main ideas

Use information from the passage to answer each question by choosing the choices provided below.

a. Science is divided into three fields.
b. Science is closely related to our life.
c. Physics involves the concept of gravity.
d. Physics is the foundation of science.

1. Which sentence best describe the main idea of the passage? _____
2. What is the main idea of the first paragraph? _____
3. What is the main idea of the paragraph about physics? _____

Exercise II: Understanding key details

Use the information from the passage to write short answers to these questions or statement.

1. Provide two studies of "hard sciences", and two studies of "soft science"

   _____

2. What is life sciences?

   _____

3. According to the passage, what job can you do if you study mostly biology?

   _____

4. What makes a pen transfer the ink onto the paper?

   _____

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Exercise III: Identifying references

Answer the following questions.

1. What does the word “they” in paragraph 3 refer to?

   _____

2. In your opinion, what science(s) are the most important? Why?

   _____

   _____

3. If you want to become an engineer, what science(s) would you focus on the most?

   _____

4. Why are some sciences called soft science?

   _____

Exercise IV: Writing

Answer the following questions.

1. What science(s) is/are the most important in human life? Why?

   _____

   _____

   _____

2. What do you think is/ are the science(s) that can help save the earth? Why?

   _____

   _____

   _____

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B

Reading Handout (Reading Task for group B)

Pre-reading

Building vocabulary: How much do you know about Science?

Fill in the gaps with a word from the list below.

anthropology	astronomy	geology	psychology

1. While _____ is the study of the earth, _____ is the study of everything outside the atmosphere of Earth
2. In _____, the focus is on the mind and behavior of human.
3. The science of humans and their culture and societies is called _____.

Activating background knowledge

Answer the following questions.

1. What do you think each picture is about?
2. Look at the three pictures below. What do you think the passage is about?
3. Read the title of the article in the next page. What do you think the passage is about?

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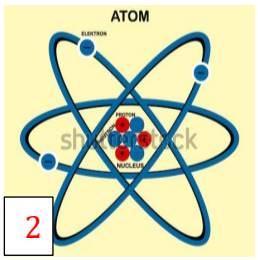

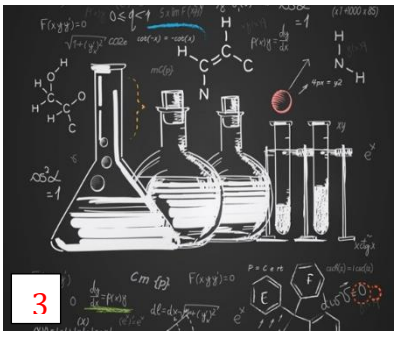

Science in your life

Have you ever wondered why you have to study science?

Science means “knowledge” in Latin. It is the study of the nature and behavior of natural things. Sciences are categorized in many ways. Physics and chemistry are “hard sciences” and psychology and anthropology are called “soft sciences”. The division of science is different, such as life sciences and physical sciences. Life sciences include living things, which are people, animals and plants. However, physical sciences include things that are not living, such as astronomy and geology. The best known science are biology, chemistry, and physics. These three kinds of science may sound hard for some people, but they directly affect human life and are related to our life.

Biology is the science about every form of life – how it survives and where it is started. Biology comes from ancient Greek words “bios” which means life and “logos” which means study. Biology starts from our body to the environment around us. Biology helps doctors learn how to cure disease. Marine biologists study life in the oceans. They may help us to save the ocean from being polluted.

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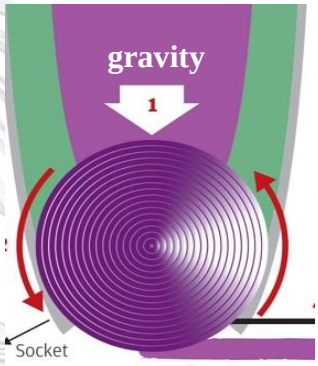
Chemistry is the study of the characteristics and structure of substances both natural and artificial. Also, it involves the study of their qualities, how and why **they** combine or separate to form other substances. Chemistry in everyday life can be in the sunscreen we use. The reflective particles in sunscreen is zinc oxide or titanium oxide. These chemicals filter the light from the sun so that less of it reaches the deeper layers of your skin.

Physics means “nature” in ancient Greek and is the foundation of most scientific knowledge. Physics is the study of matter and energy and how they relate to one another.

Physics controls our everyday life. One example of physics in our life is in a ball point pen. The concept of gravity is involved when you use your pen. As you move your pen across the

paper, the ball rolls and the gravity pushes the ink down onto the top of the ball. Then the ink is transferred onto the paper.



The world of science may be difficult to most people or people. However, it is closely connected to our everyday life and is a way to learn new knowledge.

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Readability
- 370 words
- Flesch = 65.3 (B2)
- grade level = 7.3

Need help? ➔ Scan for vocabulary bank

Developing reading skill

B

Exercise I: Getting the main ideas

Use information from the passage to answer each question by choosing the choices provided below.

a. Science is divided into three fields.
b. Science is closely related to our life.
c. Physics is the foundation of science.

1. Which sentence best describe the main idea of the passage? _____
2. What is the main idea of the first paragraph? _____
3. What is the main idea of the paragraph about physics? _____

Exercise II: Understanding key details

Use the information from the passage to choose the best answers.

1. Which of the following are considered soft sciences?
   a. physics
   b. psychology
   c. chemistry

2. What is life sciences?
   a. The study concerning science categorization.
   b. The study only about humans and animals.
   c. The study about all the living things.

3. According to the passage, what job can you do if you study biology?
   a. geologist
   b. engineer
   c. doctor

4. What makes a pen transfer the ink onto the paper?
   a. division
   b. gravity
   c. chemistry

Exercise III: Identifying references

Match phrases 1-4 with the words a-d to complete sentences that are true to the passage.

1. The word “they” in paragraph 3 refer to _____	a. physics
2. According to the passage, _____ provide the most useful knowledge in science.	b. easier
3. If you want to be a doctor, you focus more on _____	c. substances
4. Soft sciences are _____ than hard sciences.	d. biology

Exercise IV: Writing

Answer the following questions.

1. What science(s) is/are the most important in your opinion?

   _____

   _____

2. What do you think is the science that can help save the earth?

   _____

   _____

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Listening Station

Each group choose ONE listening station for their topic of interest.

Station 1:

Biology

https://www.youtube.com/watch?v=Q2iH8Bon8PI&feature=youtu.be

Station 1: Question for Group A

Fill in the gap with appropriate words or phrases.

1. Biology is the study of …….
2. …….. is the study of cells.
3. Histology is the study of …….
4. ……. is the most basic element in living things.
5. Some of the characteristics of living things are …….. and ……..

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Station 1: Question for Group B

Fill in the gap with the words or phrase provided.

Cell	nutrition	tissue
Cytology	respiration	living things

1. Biology is the study of …….
2. …….. is the study of cells.
3. Histology is the study of …….
4. ……. is the most basic element in living things.
5. Some of the characteristics of living things are …….. and ……..

Station 2:

Chemistry

https://www.youtube.com/watch?v=L2Q2q20KaEk&feature=youtu.be

Station 2: Question for Group A

Fill in the gap with appropriate words or phrases.

1. It is possible that …… occurs when we bake a cake.
2. Many discoveries in …….. lead to production of cheap medicine.
3. We are all ……. Because by cleaning and cooking, we do them based on chemistry.
4. When we use …… to grow plants, chemical reaction occurs.
5. In medical terms, chemistry can help discover new cures for ……..

Station 2: Question for Group B

Fill in the gap with the words or phrase provided.

chemistry	disease	chemists
ingredients	fertilizer	chemical reaction

1. When we bake a cake, the chemical reaction is created by the …….
2. Many discoveries in …….. lead to production of cheap medicine.
3. We are all ……. because by cleaning and cooking, we do them based on chemistry.
4. When we use …… to grow plants, chemical reaction occurs.
5. In medical terms, chemistry can help discover new cures for ……..

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Station 3:

Physics

https://www.youtube.com/watch?v=2vYI2NcVsXY

Station 3: Question for Group A

Fill in the gap with appropriate words or phrases.

1. Physics is the study of …… and how it works.
2. In physics, you will study …….. , ……. , …… and ……..
3. Cars are moved with …… energy.
4. In terms of …… , X-rays and ultrasounds were created based on physics.

Station 3: Question for Group B

Fill in the gap with the words or phrase provided.

energy	nature	force	light
movement	medical care	kinetic	

1. Physics is the study of …… and how it works.
2. In physics, you will study …….. , ……. , …… and ……..
3. Cars are moved with …… energy.
4. In terms of …… , X-rays and ultrasounds were created based on physics.

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Homework

Name _____ Group _____

Why is studying science important?

Science is an essential part of human life. Science is the most **productive** discipline developed by people to gather reliable information about how the world works. Everything we do in our daily life involves science aspects underneath. Its innovations have made it simpler to spend our life more comfortably. Without science, we may live like in stone ages and we can no longer live sophisticated life.

If you think science doesn't matter much, think again. It affects us all, every day of the year, from the moment we wake up, all day long, and through the night. Your digital alarm clock, the weather report, the bus you ride in, your cell phone, the antibiotics that treat your sore throat, the clean water that comes from your faucet, and the light that you turn off at the end of the day have all been brought to you because of science. The modern world would not be modern at all without the understandings and technology enabled by science.

There would be no electricity if Ben Franklin did not conduct his experiment with lightning and Alessandro Volta's first battery was not invented. The discovery of the relationship between electricity and magnetism light up our modern world. Science has built up our understanding of electricity, which today brings entertainment to our televisions and keeps the lights on.

Without science, there would be no modern agriculture. Science has prevented us from starvation. In the 1940s, biologists began developing high-yield varieties of corn, wheat, and rice. Development of fertilizers and pesticides also helps increase the amount of food that could be harvested from a single field. These science-based technologies have triggered changes in agriculture and the amount of food available to feed the world.

There would be no modern medicine if Edward Jenner did not show that vaccination actually worked. In the 1800s, scientists and doctors established the theory that many diseases are caused by germs. And in the 1920s, a biologist discovered the first antibiotic. Successful treatments for once deadly infections prove that modern medicine on global health has been powerful. In fact, without science, many people alive today would have instead died of diseases that are now easily treated.

Scientific knowledge can improve the quality of life at many different levels — from the routine workings of our everyday lives to global issues. Science informs public policy and personal decisions on energy, conservation, agriculture, health, transportation, communication, defense, economics, leisure, and exploration. **It's almost impossible to overstate how many aspects of modern life are impacted by scientific knowledge**.

Choose the best answer.

1. Which sentence best describe the main idea of the passage?
   a. The human quality of life is improved because of scientific knowledge.
   b. We would be living like in stones ages if we lack scientific knowledge.
   c. Science is important because it is influential for people to live comfortably.
2. What is the best meaning of “Productive” in line 1?
   a. Effective b. Scientific c. Possible
3. According to the passage, which of the following is NOT TRUE about agriculture?
   a. The use of fertilizers can help producing massive amount of food
   b. The increase of many agriculture product is caused by science
   c. Modern agriculture can be one of the causes of starvation
4. Which of the following is the closest in meaning in the last sentence, “It's almost impossible to overstate how many aspects of modern life are impacted by scientific knowledge”?
   a. It is impossible for people to live without scientific knowledge.

b. It can be said that science influences our life in many ways.

c. Nowadays, it is important that everyone learn about science.

Answer the following questions.

5. What was Alessandro Volta's invention?

   _____

6. What does antibiotic do?

   _____

7. According to the passage, without modern technology in agriculture, we would _____

8. Do you think science is important? Why?

_____

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Reading Lesson 2

Lesson Objectives:

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

4. Comprehend text that is directly stated; find the information that is needed in questions; combine the information for additional understanding
5. Find the information or meaning that is not directly stated in the text based on logical hints of the words; find the information or meaning that is not directly stated in the text based on the specific paragraph or the entire text; and predict related matters from their understanding of the text.
6. Identify and evaluate their feelings for the text and the content; and identify tone and purpose of a specific part of a text or of the entire text.

Time duration: 3 hours

Class contents

Reading comprehension skills and strategies; literal, inferential and evaluation

Instruction and Activities

Lesson 2 (3 hours)

Pre-teaching stage *(30 minutes)*

Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
Pre-lesson preparation: activate students' background knowledge	5. Homework (Why studying science is important) is reviewed and corrected. The students have done homework which are in one level. They will have chances to practice reading that are similar to the mainstream. 6. The whole class are asked about the knowledge of reading comprehension strategies they have learned previously. Short exercise is presented on the slide to check students' memory about the knowledge. Teacher write down their answers on the board. 7. The teacher reviews the content again (Document A) about reading comprehension and check if the whole class remember.	Questions are raised to check students' understanding of previous lesson. Differentiation is **not** applied at this stage.

While-teaching stage *(2 hours)*

Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
Pre-reading (45 minutes)		
Pre-reading: - learn necessary vocabulary and activate background knowledge - group discussion	5. Within the same group (intermediate and beginner), the students do pre-reading activity together. 6. The handout on reading comprehension passage and exercise on the topic on **"Safety First"** is provided (Document A and B). 7. The lead-in activity starts with watching the YouTube video on how to be safe in a lab. After the video, the teacher asks questions concerning the content. This is to activate their background knowledge about the situation in the lab in their own experience. 8. Then the teacher building vocabulary with another pre-reading task by giving the students time to discuss within their group about the exercise. 9. Then the pre-reading questions are asked in order to activate students' background knowledge. Within the group, the students help each other answering the questions before reading. 10. The teacher checks with students if they can answer the questions correctly.	- The students are already grouped according to their **readiness** (reading proficiency) from pre-test score. - In the handout, there are two different sets of questions and passages (Document A and B) based on students' **readiness** - During the lead-in activity, the content for both groups of students are the same. Assessment criteria: Interpersonal communication
While-reading (50 minutes)		
While-reading: - reading text and doing tasks - group discussion - task completion with teacher monitoring and scaffolding	9. The passage is provided to each group in Document A and B. A is for intermediate level and B is for beginner level. 10. In B document, the content is simplified in terms of lexical and syntactic knowledge so that the basic level students can comprehend. Also the levels of readability of the two group are different according to the readability by Flesch-Kincaid. 11. Dictionary can be used but only the ones provided in class. Mobile phone dictionary is not allowed. 12. Both groups can use	- The content between A and B are different as to differentiate the **content** according to students' **readiness**. - The content and tasks in A are fit with the course level, but the content and tasks in B have been simplified so that basic level students can understand. - The teacher's scaffolding to assist task completion are differentiated according to students' **readiness** and **preference**.

Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
	Document 1 about reading comprehension to help with reading text. Teacher emphasizes the use of strategies in reading comprehension to the whole class. 13. Assistance from teacher can be given for each group differently. Teacher assists beginner level groups (B) by: - Highlighting the paragraph or the line where the answer would be (If they require) - Pointing out the important clues (If they require) - Provides definition of some words if they ask. Teachers assists intermediate level groups (A) by: - allowing them to ask the kind of questions that can clarify their understanding but not for the clues and important points. 14. Teacher reviews the whole class with reading comprehension strategies again and ask the students to recheck their answer. 15. Teacher monitors the whole class answer and provides the correct answers to each group for correction. 16. The teacher asks the students to check the answer and discuss their mistake within the group.	Assessment criteria: Interpretive communication
Post-reading (25 minutes)		
Post-reading: check students' understanding on reading comprehension	3. Teacher asks the class to prepare brief summary of the content they have read in the passage **(Safety First)**. They may add their opinions about the passage. 4. The group prepare to present to the class about their summary. Teacher monitors the class as they are preparing. Time given for the presentation is 5 minutes for each group.	Students write summary and prepare their presentation according to their **preference** Assessment criteria: Presentational communication

Post-teaching stage *(45 minutes)*

Steps in	Learning and activities	Elements / strategies of

the lesson		Differentiated instruction
Lesson summary: conclusion and home assignment	6. The teacher concludes the reading comprehension skills and strategies. 7. The teacher explains students about listening stations. There are two stations containing two video from YouTube for each group to choose from. 8. They can choose whatever clip they like from the topic. The B group will get a script and vocabulary to use when they are watching the video. Each group will get different tasks to complete after watching the clip. 9. After finishing the clip, each group will explain the clip they are choosing to the class. 10. Before dismissing the class, teacher explains assignment at home. Each student has to do reading assignment as homework individually.	Differentiation is **not** applied at this stage. Homework: reading passage for everyone is the same level. Topic on workplace safety

Teaching Methods

Lecture, reading comprehension skills and strategies and reading practices, group work and discussion.

Materials and Media

4. Course syllabus
5. PowerPoint Presentations
6. Document: 1) A handout on reading comprehension (Same one with lesson 1)
   2) Reading comprehension passages and exercises *(A and B for two levels of students)*

Assessment

4. Teacher's checklist
5. Reading comprehension tasks
6. Students' journal
7. Lesson performance assessment criteria

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During each process, a student can….

	Interpersonal	**Interpretive**	**Presentational**
Beginner	- There is connection within group - Discuss on familiar topic - Use variety of words, phrases, and simple sentences	- Identify main idea - Comprehend text by recognizing keywords or phrases	- Write simple sentences - Follow a practiced format Ask and answer practiced questions
Intermediate	- Connect well within group - Discuss on topic and extend idea further - Understand, ask and answer a variety of questions	- Comprehend main idea and some key details - Predict meaning from context	- Write complex sentences - Provide more description - Maintain conversation on familiar topic

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Material for Reading Lesson 2

A

Reading comprehension passage and exercises for literal, inferential, and evaluating comprehension

(A for Intermediate and B for Beginner)

Task 1: Watch the video and discuss the following questions with your friends. (https://www.youtube.com/watch?v=3ELbwzqyuhs&feature=youtu.be)

1. What do you think the video is about?
2. Which of the situation in the video has happened to you before?
3. Have you experienced any other accident in a lab?

Task 2

Pre-reading

Building vocabulary

Fill in the gaps with a word from the list below.

disposed	inhale	hazardous	risky	dress codes

1. It's really _____ trying to conduct experiment using toxic chemicals.
2. So much waste is _____ of in the North Sea.
3. I want to quit this job. They put me into _____ condition. I have to work with toxic chemicals without protection.
4. You should follow the _____ for working in a plant. It will protect you from any accident.
5. It is so dangerous to _____ in a big city lately. You should wear mask when you are outside of the building.

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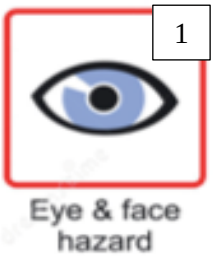
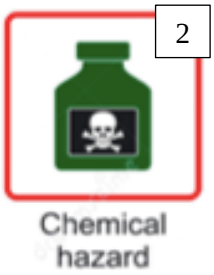
Activating background knowledge

A

Answer the following questions.

1. Look at the three pictures below. What do you think the passage is about?
2. What do you think each picture is about?
3. Read the title and the first paragraph. What is the passage is mainly about?





Safety First

Science experiments are vital for science students and those who are into science. They are beneficial for understanding the theories and concepts of science that cannot be comprehended alone by science text books. Even though science laboratories are risky by the very nature of chemicals, they are essential parts of science because it is where the answers to the experiments might be found. It is important for every scientist to know how to avoid the accidents or injuries in a lab. These are some major, general safety rules that apply for many types of labs.

In terms of dress codes, it's important that you wear something that helps to prevent accidents. Close-toed shoes should be worn in a lab in order to cover your whole feet. Additionally, you should always wear gloves because you might have to work with chemicals or specimens that can irritate your skin. You may need to wear a lab coat or an apron to protect your clothes from chemicals spill. Long hair needs to be tied back in order to avoid unexpected accidents such as knocking stuff over. You need to wash your hands after spending time in the lab. In some labs, there might be a safety shower which will dump a very large amount of water on you if you are exposed to hazardous chemicals.

To avoid any health risk, eye protection can be managed by wearing goggles. If you feel as though something has gotten in your eyes, or feel a tingle or pain, use the eyewash station and flush the affected area for at least 10 minutes. In some labs, you may find a special ventilation system known as a fume hood. It is used when dealing with volatile substances. Some of the fumes from some experiments may be harmful to inhale. Remember that you must not taste or sniff chemicals and never consume food or drink in a lab.

When you are finished with chemicals, make sure you properly dispose of them. Many chemicals cannot just be put down the drain. Instead, put them into an appropriate waste container. Different solvents and reagents have to be disposed of differently. They may need to be disposed of as hazardous waste. Also, the unused chemicals should never be put back into the original container. You need to throw them away properly according to the labels.

Some labs provide lasers for the experiment and it can be really dangerous to deal with; therefore, it is vital to follow key rules to prevent injuries. Always wear appropriate goggles where lasers are present because most common laser injuries are caused by scattered laser light reflecting either off the shiny surface of optical tables, the sides of mirrors, or off of mountings. Keep your head above the level of the laser beam as it is safer when **it** is below chest level.

MSDS (Material safety data sheet) is available for every substance you use in the lab. It provides all kinds of safety information on a substance, including how to safely handle it, what to do if there is an accident with it, and how to safely dispose of it.

There are many items in the lab that are specific to the lab that you will be using.

You should spend time studying the rules in order to be safe in a lab. Do not be intimidated by the lab rules. If you respect the rules and guidelines, doing experiments can be really smooth and successful.

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Readability
- 581 words
- Flesch = 65 (B2)
- grade level = 8.1

Developing reading skill

A

Exercise I: Getting the main ideas and key details

Choose the best answer.

1. Which question does the passage mainly discuss?
   a. What should you do to stay safe in a laboratory?
   b. How can we handle all equipment in a laboratory?
   c. Why do we need to follow rules in a laboratory?

2. Which of the following is true according to dress codes in a lab?
   a. Cut your hair short if you have to spend a very long time in a lab.
   b. Gloves should be worn only when dealing with chemicals substances.
   c. You should not wear open-toed shoes so that your feet are protected.

3. Fill in the problems and solutions

Problem	Solution
(1.) _____	- use wash station
(2.) Get hazardous chemical on you	_____
(3.) Unused chemical substances	_____
(4.) _____	- Find MSDS

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Exercise II: Identifying referent and evaluation

Answer the following questions.

1. What does “it” in paragraph 5 refer to?

   _____

2. If you do not know how to work with a chemical substance, you need to…

   _____

3. What is the main purpose of the passage?

   _____

4. What else do you think is needed to put in as lab rules?

   _____

Material for Reading Lesson 2

B

Task 1: Watch the video and discuss the following questions with your friends. (https://www.youtube.com/watch?v=3ELbwzqyuhs&feature=youtu.be)

1. What do you think the video is mostly about?
2. Which of the situation in the video has happened to you before?
3. Have you experienced any other accident in a lab?

Task 2:

Pre-reading

Building Vocabulary

Fill in the gaps with a word from the list below.

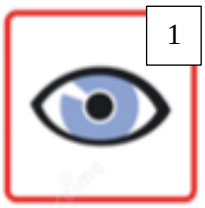
disposed	inhale	hazardous	risky	dress codes

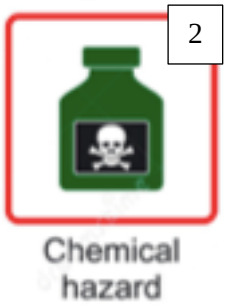
1. It's really _____ trying to conduct experiment using toxic chemicals.
2. So much waste is _____ of in the North Sea.
3. I want to quit this job. They put me into _____ condition. I have to work with toxic chemicals without protection.
4. You should follow the _____ for working in a plant. It will protect you from any accident.
5. It is so dangerous to _____ in a big city lately. You should wear mask when you are outside of the building.

Activating background knowledge **B**

Answer the following questions.

1. Look at the three pictures below. What do you think the passage is about?
2. What do you think each picture is about?
3. Read the title and the first paragraph. What is the passage is mainly about?





Safety First

Science experiments are important for science students and people who like science. They are useful in understanding the concepts of science that science text books alone cannot help. Science laboratories are risky by the chemicals; however, they are important parts of science. It is important for scientist to know how to avoid the accidents in a lab. These are some major, general safety rules that are used for many types of labs.

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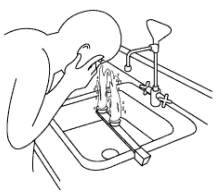
For dress codes, always wear something that helps to prevent accidents. You should wear close-toed shoes in a lab to cover your feet completely. Also, you should always wear gloves because you might have to work with chemicals that can harm your skin. You may need to wear a lab coat to protect your clothes from chemicals spills. Long hair needs to be tied back to avoid accidents. You need to wash your hands after being in the lab. In some labs, there might be a **safety shower** which will dump a lot of water on you if you touch hazardous chemicals.



To avoid any health risk, always use eye protection by wearing goggles. If something has gotten in your eyes and you feel a tingle or pain, use the **eyewash station** and flush the eye

for 10 minutes. In some labs, you may find a ventilation system called a **fume hood**. It is used when dealing with volatile substances. Some of the fume from some experiments may be harmful to inhale. Remember that you must not taste or sniff chemicals and never eat or drink in a lab.

When you are finished with chemicals, make sure you get rid of them properly. You need to put them into a suitable container. Different chemicals have to be disposed of differently. They may need to be disposed of as hazardous waste. Also, you should not put unused chemicals back into the original container. You need to throw them away properly according to the labels.

Some labs provide lasers for an experiment; therefore, it is important to follow rules to prevent injuries. Always wear appropriate goggles when using lasers because most laser injuries are from laser light reflecting the shiny things in the lab. Keep your head above the level of the laser beam. **It** should be below chest level.

MSDS (Material safety data sheet) is available for every substance you use in the lab. It has all safety information of how to safely handle it, what to do when an accident happens, and how to dispose of it.

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There are many things in the lab that are specific to the lab that you use. You should study the rules for your safety. Do not be afraid of the lab rules. If you respect the rules, doing experiments can be really smooth and successful.

Need more help? Scan ➔

Readability
- 464 words
- Flesch = 70.3 (B1)
- grade level = 6.6

Developing reading skill

B

Exercise I: Getting the main ideas and key details

Choose the best answer.

1. Which question does the passage mainly discuss?
   a. What should you do to stay safe in a laboratory?
   b. Why do we need to follow rules in a laboratory?

2. Which of the following is true according to dress codes in a lab?
   a. Gloves should be worn only when dealing with chemicals substances.
   b. You should not wear open-toed shoes so that your feet are protected.

3. Match the right problems and solutions.

Problem		Solution
(1.) Eye tingles or hurts.	_____	a. throw away
(2.) Get hazardous chemicals on you.	_____	b. find MSDS
(3.) Unused chemical substances	_____	c. use eyewash station
(4.) Not sure how to use chemical substances	_____	d. use safety shower

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Exercise II: Identifying referent and evaluation

Answer the following questions.

1. What does “It” in paragraph 5 refer to?
   a. goggles b. your head c. laser beam
2. According to the passage, if you do not know how to work with a chemical substance, you need to…
   a. call the company from the label on the bottle of substance for information.
   b. find MSDS sheet for information of the substance that you want to use.
   c. ask your instructor or your supervisor for the information of the substance.
3. What is the main purpose of the passage?
   a. To inform scientists about new rules in a lab
   b. To discuss the lab rules that need to be changed
   c. To inform lab users how to work in a lab properly

4. What else do you think is needed to put in as lab rules?

_____

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Listening Station

Each group choose ONE listening station for their topic of interest.

Station 1: Lab equipment (Lab safety, Fire, Fume hood)

https://www.youtube.com/watch?v=IiHEYtnKfF0&list=PL4qaj9envIYnBaQSPpcOMUqWiQUAgPoMq&index=2
(3.49 mins)

Question for Group A

Fill in the gap with appropriate words or phrases.

1. When working in a lab for the first time, _____ the location of the safety equipment
2. Class A fires consist of ordinary things such as _____ , _____, and_____.
3. Class B and C fires must be distinguished by _____ foam _____.
4. Never wrap a person with a fire blanket when they _____. This will force flames upward toward the head.
5. The chemical _____ is used when dealing with chemicals that have toxic vapors.

Question for Group B

Fill in the gap with the words or phrase provided.

paper	chemical	stand	fume hood
identify	extinguisher		

1. When working in a lab for the first time, _____ the location of the safety equipment
2. Class A fires consist of ordinary things such as wood , clothe, and _____.
3. Class B and C fires must be distinguished by _____ foam _____.
4. Never wrap a person with a fire blanket when they _____. This will force flames upward toward the head.
5. The chemical _____ is used when dealing with chemicals that have toxic vapors.

Station 2: Lab (potential chemical hazards)

https://www.youtube.com/watch?v=8queMM7VVfw&list=PL4qaj9envIYnBaQSPpcOMUqWiQUAgPoMq&index=4
(3.54 mins)

Question for Group A

Fill in the gap with appropriate words or phrases.

1. There are two main tools that a scientist use in a lab; Safety data sheet and _____
2. _____ is required to be provided in every lab as a technical document.
3. Chemical labels or Globally Harmonized Systems of Classification and _____ of _____ is what a lab user should study before working with a chemical for the first time.
4. In section two of SDS or safety data sheet, a lab scientist will fine _____ .
5. In section four of SDS, the information provide is about _____ for those who are exposed to the chemical.

Question for Group B

Fill in the gap with the words or phrase provided.

hazard identification	Labelling	Safety data sheet
chemical labels	treatment	Chemical

1. There are two main tools that a scientist use in a lab; Safety data sheet and _____
2. _____ is required to be provided in every lab as a technical document.
3. Chemical labels or Globally Harmonized Systems of Classification and _____ of _____ is what a lab user should study before working with a chemical for the first time.
4. In section two of SDS or safety data sheet, a lab scientist will find _____ .
5. In section four of SDS, the information provide is about _____ for those who are exposed to the chemical.

Homework

Workplace safety

Why workplace safety is important? Workplace safety is important for each and every employee in the industry because all the workers desire to work in a safe and protected atmosphere. Health and safety is the key factor for all the industries in order to promote the wellness of both employees and employers. It is a duty and moral responsibility of the company to look after the employee's protection. There are some important points for both employers and employees to keep in mind concerning workplace safety.

Workplace health and safety procedures are important for the well-being of both employees and employers. Keeping working space clean and tidy is the key to working efficiently. One of the ways to reduce accidents or stress in the workplace is training. Familiarity with the work and the workplace can increase employee performance in jobs. Obeying the signs, rules and guidelines in performing tasks are always good suggestions for employees.

Fire prevention procedures are important for employees. Regular and adequate fire training of staff should be provided. There should be safe and adequate means of fire escape as well as installation of fire safety equipment. If the fire alarm goes off, do not assume that it is a false alarm. Leave the building and contact emergency services. If it is safe to fight the fire, make sure you select the correct fire extinguisher. Red one is water, black one is CO2, blue one is dry powder, and cream is foam.

The control of substances hazardous to health (COSHH) is one of the important issues for human long-term health. Hazardous substances come in many different forms such as liquids, solids, gasses, powders, dusts, bacteria, viruses, vapor and fumes. As an employee, you must follow the safe working practice. As an employer, you need to provide training for your employees who need to operate with the hazardous substances. If your job is a risk to your health, you must make sure that these risks are monitored by competent staff. Make sure that suitable personal protective equipment (PPE) is provided by employers.

As an employee, you need to consider four categories of manual handling; lifting, carrying, pushing, pulling. When lifting something, you need to bend the knees and keep your back straight. Take a grip on the load and start to lift in a smooth upward movement. When carrying, keep the load close to your body and always maintain control. For pushing and pulling, there are many mechanical aids to help you move loads. You need to check if the route you are going is clear. Push off the load with the power in your legs. Pulling is the least acceptable method of moving a load except when it is unavoidable. Make sure to keep your
back straight and use the power from your legs to start the moving in a controlled manner. These practices will help you stay safe and keep your health in good condition.

Safety is one of the biggest issues and it is completely the responsibility of the managers and the business owners to make sure that their employees are working in safe environment or not. The management should make sure that they keep on motivating and boosting the employees to make them active in the working process.

Adapted from: https://medium.com/@BastionSafe/top-10-reasons-why-workplace-safety-is-important-8797c978e1f9 and https://youtu.be/v2FNbuPR01Y

Readability
- 503 words
- Flesch = 59.4 (C1)
- grade level = 8.6

Choose the best answer.

1. Which of the following is NOT TRUE, according to the passage?
   a. Health and safety is a key factor in working environment
   b. Training is needed for employees in working and safety
   c. Use correct type of fire extinguishers to put out fire
   d. It's important to train employee to fight the fire

2. According to the passage, as an employer, you need to ……
   a. provide staff necessary training about their jobs.
   b. seek for training in order to avoid accident.
   c. set the rules and punishment for employees.
   d. let employees choose their own break time.

3. According to the passage, as an employee, you need to …..
   a. put a lot of warning signs around the office and plant to inform others.
   b. know how to deal with loads when you lift, carry, push, and pull loads.
   c. make sure to keep back straight and use power from legs when pushing loads.
   d. fight the fire if you have been trained about fire extinguishers and firefighting.

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4. Which of the following is the closest in meaning in the sentence "*Familiarity with the work and the workplace can increase employees' performance in jobs*"?
   a. It's important for employees and their family if the company provide training
   b. To increase your employees' working condition, you should provide them training
   c. It's good for the company if employees know best about their jobs and workplace
   d. To boost your employees' working process, provide them safe working space

5. How will the information from the passage be useful to the reader?
   a. The reader will choose the right way to work safely.
   b. The reader will know about safety rules at workplace.
   c. The reader will know how to solve the problems at work.
   d. The reader will understand why they should be trained at work.

6. What is the purpose of the article?
   a. To inform
   b. To warn
   c. To motivate
   d. To describe

Answer the questions

7. In dealing with hazardous substances, as an employee, you need to….

   _____

8. What other kinds of safety do you think needed in working environment?

   _____

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Reading Lesson 3

Lesson Objectives:

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

1. Comprehend text that is directly stated; find the information that is needed in questions; combine the information for additional understanding
2. Find the information or meaning that is not directly stated in the text based on logical hints of the words; find the information or meaning that is not directly stated in the text based on the specific paragraph or the entire text; and predict related matters from their understanding of the text.
3. Identify and evaluate their feelings for the text and the content; and identify tone and purpose of a specific part of a text or of the entire text.
4. Decipher meaning of a word by identifying word parts in order to develop and expand vocabulary knowledge.

Time duration: 4 hours 30 minutes

Class contents

Reading comprehension skills and strategies; literal, inferential and evaluation

Instruction and Activities

Lesson 3 (3 hours)

Pre-teaching stage *(45 minutes)*

Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
Pre-lesson preparation: activate students' background knowledge	1. Homework (safety at work) is reviewed and corrected. The students have done homework which are in one level. They will have chances to practice reading that are similar to the mainstream. 2. The whole class are asked about how to find the main idea of the text. Teacher brainstorms the types of comprehension and write the answers on the board. 3. The whole class are asked about how to guess the unknown vocabulary. Teacher brainstorms the ideas and write on the board. 4. The teacher uses the students' answers to explain about how to guess the meaning of unknown words. The content in handout (Document 1) about building vocabulary is	Questions are raised to check students' understanding of previous lesson. Differentiation is **not** applied at this stage.

	distributed. 5. The lead-in activity starts with the word building. The students match the meaning of words with the right vocabulary. 6. The teacher explains about the word parts and check if the whole class understand. The students do exercise as a group they were in previously.	

While-teaching stage *(2 hours)*

Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
	Pre-reading (30 minutes)	
Pre-reading: - learn necessary vocabulary and activate background knowledge - group discussion	1. Within the same group (intermediate and beginner), the students do pre-reading activity together. 2. The handout on reading comprehension passage and exercise on the topic on **"Inventors"** is provided (Document A and B). 3. The lead-in activity starts with vocabulary building. The students match the vocabulary with the right definition. 4. Then the pre-reading questions are asked in order to activate students' background knowledge. Within the group, the students help each other answering the questions before reading. 5. The teacher checks with students if they can answer the questions correctly.	- The students are already grouped according to their **readiness** (reading proficiency) from pre-test score. - In the handout, there are two different sets of questions and passages (Document A and B) based on students' **readiness** - During the lead-in activity, the content for both groups of students are the same. Assessment criteria: Interpersonal communication
	While-reading (50 minutes)	
While-reading: - reading text and doing tasks - group discussion - task completion with teacher monitoring and	1. The passage is provided to each group in Document A and B. A is for intermediate level and B is for beginner level. 2. In B document, the content is simplified in terms of lexical and syntactic knowledge so that the basic level students can comprehend. 3. Dictionary can be used but only the ones provided in class. Mobile phone dictionary is not allowed. 4. Both groups can use the two versions Document 1 (on reading comprehension strategies and Vocabulary building) to help with reading text. Teacher emphasizes the use of strategies in reading comprehension to the whole class. 5. Assistance from teacher can be given for	- The content between A and B are different as to differentiate the **content** according to students' **readiness**. - The content and tasks in A are fit with the course level, but the content and tasks in B have been simplified so that basic level students can understand. - The teacher's scaffolding to assist task completion are differentiated according to students' **readiness** and

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Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
scaffolding	each group differently. Teacher assists beginner level groups (B) by: - Highlighting the paragraph or the line where the answer would be. - Pointing out the important clues - Provides definition of some words if they ask. Teachers assists intermediate level groups (A) by: - allowing them to ask the kind of questions that can clarify their understanding but not for the clues and important points. 6. Teacher reviews the whole class with reading comprehension strategies again and ask the students to recheck their answer. 7. Teacher monitors the whole class answers and provides the correct answers to each group for correction. 8. The teacher asks the students to check the answer and discuss their mistake within the group.	**preference**. Assessment criteria: Interpretive communication
Post-reading (25 minutes)		
Post-reading: check students' understanding on reading comprehension	1. Teacher asks the class to prepare brief summary of the content they have read in the passage **(A great scientist)**. They may add their opinions about the passage. 2. The group prepare to present to the class about their summary. Teacher monitors the class as they are preparing. Time given for the presentation is 5 minutes for each group.	Students write summary and prepare their presentation according to their **preference** Assessment criteria: Presentational communication

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Post-teaching stage *(30 minutes)*

Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
Lesson summary: conclusion and home assignment	1. The teacher concludes the reading comprehension and vocabulary building. 2. The teacher explains students about listening stations. There are three stations containing three video from YouTube for each group to choose from. 3. They can choose whatever clip they like from the topic. The B group will get a script and vocabulary list to use when they are watching the video. Each group will get different tasks to complete after watching the clip.	Differentiation is **not** applied at this stage. Homework: reading passage for everyone is the same level. Topic is on Wave Energy

	4. After finishing the clip, each group will explain the clip they are choosing to the class.	

Teaching Methods

Lecture, reading comprehension skills and strategies and reading practices, group work and discussion.

Materials and Media

1. Course syllabus
2. PowerPoint Presentations
3. Document: A) A handout on vocabulary building
   B) Reading comprehension passages and exercises I *(A and B for two levels of students)*

Assessment

1. Teacher's observation
2. Reading comprehension tasks
3. Lesson performance assessment criteria

During each process, a student can….

	Interpersonal	**Interpretive**	**Presentational**
Beginner	- There is connection within group - Discuss on familiar topic - Use variety of words, phrases, and simple sentences	- Identify main idea - Comprehend text by recognizing keywords or phrases	- Write simple sentences - Follow a practiced format Ask and answer practiced questions
Intermediate	- Connect well within group - Discuss on topic and extend idea further - Understand, ask and answer a variety of questions	- Comprehend main idea and some key details - Predict meaning from context	- Write complex sentences - Provide more description - Maintain conversation on familiar topic

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Material for Reading Lesson 3

Document 1 (reading comprehension) for both A and B

Building Vocabulary

Lead-in: Identify the meaning of words below by matching the two columns.

1) inappropriate	a. removing or doing away with something
2) transport	b. to vanish
3) geology	c. not right for a certain situation; not suitable
4) disappear	d. to carry or move something from one place to another
5) modernize	e. to bring something up-to-date; to make it current
6) elimination	f. can be used again
7) reusable.	g. the study of the earth

Apart from comprehension strategies, vocabulary building or word-learning strategies is one of important factors that enhances reading comprehension. As people get older, they are expected to know more words and understand more difficult texts. Even though learning vocabulary can indirectly be developed through reading and personal experiences, it is important for readers to know enough words to comprehend text and not interfere reading process. It has clear evidence that those readers with better vocabulary knowledge tend to show advanced reading comprehension than those who have limited vocabulary knowledge. Therefore, it is important to know strategies to decode unknown words.

Instead of using contexts to help decode word meaning, it is possible that word parts can help identify particular words. The meaning of the part can give clue to the meaning of the whole word. In order to identify the meaning of words, readers should know the three word-parts; ***prefixes, suffixes, and roots.***

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Prefixes

Prefixes is a letter or a group of letters that will be added to the beginning of a word. Prefixes change the meanings of a word. It is important to be able to know the meaning of some prefixes in order to help identify the closet meaning of a word. For example, adding “il” to the root word “logical” can make illogical means “not logical”. The prefix “un” can mean “not”, “remove”, or “opposite”. Adding un- to the word “happy” gives you the word “unhappy”, which means not happy. There are some common prefixes that are necessary in reading.

Common Prefixes		
Prefix	**Definition**	**Examples**
dis-	not; opposite of	discover
en- , em-	cause to	enact, empower
in-, im-	in	income, impulse
in-, im-, il-, ir-	not	indirect, immoral, illegal
inter-	between; among	interrupt
mis-	wrongly	misspell
over-	over; too much	overeat
pre-	before	preview
re-	again	rewrite
trans-	across	transmit

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Suffixes

A suffix is a letter or group of letters added to the end of a word. Suffixes are added to the word and change the part of speech. For example, “beauty”, which is a noun can be changed into an adjective by adding “ful”. Adding “ion” to the verb “act” gives the word “action”, which is the noun form of the word. Suffixes also identify the verb tense of words or whether the words are plural or singular. Moreover, knowing the patterns that make common suffixes can help readers to identify root. That way, the smaller size of the word allows readers to focus on relevant information within the word.

Common Suffixes		
Suffix	**Definition**	**Examples**
-able, -ible	is; can be	affordable, sensible
-er, -or	one who; person connected with	teacher, professor
-er	more	taller
-ion, -tion, -ation, -ition	act; process	submission, motion, edition
-ive, -ative, -itive	adjective form of noun	active, sensitive
-ize	to make; cause to become	memorize, modernize
-ly	how something is	lovely
-ous, -eous, -ious	having qualities of	dangerous, courageous,
-logy	the study of	biology

Roots

Roots refer to the base parts of words. Many English words are from Greek and Latin. For example, the word “gerontology” is made up of the Greek root word “geronto”, which means “old person”. It is combined with the suffix ‘-logy”, which means “the study of”. Therefore, gerontology is the study of an old person.

Common Latin Roots		
Roots	**Definition**	**Examples**
aqua	water	aquarium
aud	to hear	audition, audience
form	shape	reform, conform
mort	death	mortal
rupt	to break	disruption, bankrupt
Common Greek Roots		
Roots	**Definition**	**Examples**
auto	self	automobile
dyna	power	dynamic, dynamite
homo	same	homogenous

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micro	small	microscope
therm	heat	thermometer

Some of the ways that helps readers to comprehend text is to know how words are formed. Long and complicated words can be intimidating to some readers. Being able to break down a word would help in word guessing and make new words more memorable.

Prefix **+** ***Root*** **+** ***Suffix*** **=** ***Meaning***

unbelievable => un + believe + able = not able to believe; hard to believe

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Exercise:

Use the list of **Most Common Prefixes and Suffixes provided in the table above** to add the appropriate prefix, suffix for the root and identify its part of speech. (Item 1 is an example)

	Root	Prefix / Suffix.	Part of speech	Meaning
1)	struct (to build) ➔	_con_ struct _ion_	_Noun__	The action of building something
2)	port (to carry) ➔	port _____	_____	is able to be moved
3)	tract (to draw or drag) ➔	attract _____	Adjective	Pleasing or appealing to look
4)	rupt (to break) ➔	_____ rupt	_____	Interrupt something by causing disturbance
5)	sec (to cut) ➔	sec _____	_____	Any of distinct parts into which something is divided or formed.
6)	bio (life) ➔	bio _____	_____	A study of life
7)	counter (against) ➔	_____ counter	_____	unexpectedly be forced with something difficult

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A

Material for Reading Lesson 3

Reading comprehension passage and exercises for literal, inferential, and evaluating comprehension (A for Intermediate and B for Beginner)

Pre-reading

Building vocabulary

Fill in the gaps with a word from the list below.

reusable	affordable	alternative
founder	funder	neurotechnology

1. Do you know that_____ is the technology that influences on how we understand the brain, thought, and higher order activities in the brain?
2. The company decided to produce _____ product so that everyone, either poor or rich, can buy.
3. Jack Ma is the _____ of Alibaba.
4. To help save the earth, you can start by using zero waste product such as _____ straws.
5. There are many_____ energy sources instead of fossil fuels, such as solar power and wind power.
6. Bill Gates has long been the _____ of Gates Foundation that helped with more than 10,000 high-achieving students in America.

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A

Activating background knowledge

Answer the following questions.

1. Look at the two pictures below. What do you see?
2. What do you think the passage is about?
3. Read the title. What do you think the passage is about?

Success story of the 21st century innovator

Elon Musk is a native of South Africa, born on June 28, 1971 to parents who later divorced when Musk was ten. His father was an engineer and his mother- originally from Canada- was a nutritionist. At the age of nine, he created a video game in the style of Space-Invaders and sold it to a company.

In 1989, he decided to move to Canada to live with his mother before moving to the USA and received two bachelor's degrees from the University of Pennsylvania. One in economics and another in physics. Musk was 24 when he started his first company, Zip2 Corporation, a web software company that provided maps and business directories to online newspapers. He left the PhD program to start that company.

In his late 20s, he became a multimillionaire when he sold his start-up company, Zip2, for $307 million. Then he co-founded an online financial services company, X.com, which later became PayPal. PayPal became the online-payment system of choice with more than one million users in a few months. In 2002, eBay

bought PayPal for $1.5 billion. Musk's next move was to pursue his ultimate dreams, space engineering and alternative energy sources.

In June 2002, he founded Space Exploration Technologies (SpaceX) to make affordable rockets. In order to make the rockets cheaper, they need to be reusable. Its first rocket was falcon 1, which launched in 2006 and became the first privately-funded, liquid-fueled rocket to put a satellite into Earth's orbit. On May 22, 2012, Falcon 9 rocket was launched into space with an unmanned capsule to the International Space Station with 1,000 pounds of supplies for the astronauts stationed there. He has always believed that human has to become a multi-planet species in order to survive.

Musk had long been interested in the possibilities of electric cars. He joined and became one of the major funders of Tesla Motors in 2004. Two years later, Tesla introduced its first car, the Roadster, which could travel 245 miles (394 km.) on a single charge. More than 2,500 Tesla Roadster cars were sold in 31 countries. However, there is the problem with charging station shortage. Its next move is to build more charging stations throughout USA.

After innovating in the financial, automotive, and space worlds, Musk has turned his attention toward artificial intelligence (A.I.). In December 2015, he announced the development of OpenAI aiming to develop A.I. that could be broadly accessible. Then Nauralink, a neurotechnology startup, was founded in 2016 to integrate artificial intelligence with the human brain.

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Musk works really hard running several organizations at the same time. Musk's most influential quotes is "Failure is an option here. If things are not failing, you are not innovating enough". He fears failure like everybody, but that failure is part of being a great innovator. He once said "If something is important enough you should try. Even if the probable outcome is failure". He always reminds everyone that greatness doesn't come from not being afraid, but rather from having the courage to move past it.

Readability
- 513 words
- Flesch = 46.1 (C2)
- grade level = 10.6

A

Developing reading skill

Exercise I: Getting the main ideas and key details

Choose the best answer

1. Which question does the passage discuss?
   a. What has Elon Musk done in order to become successful?
   b. What can we do to become as successful as Elon Musk?
2. Which of the followings best describe the main idea of the passage?
   a. Elon Musk never fails if he wants something to happen.
   b. Elon Musk is a guy who never stops thinking and working.
3. Which of the following is TRUE?
   a. Musk got his Ph.D. from the University of Pennsylvania.
   b. Musk received the most money from selling Tesla Motors.
   c. One of Musk's dreams is to develop the space worlds.

Match each paragraph to its main idea.

Paragraph 2 _____	a. how he became really rich
Paragraph 3 _____	b. the story of SpaceX
Paragraph 4 _____	c. the story of A.I. company
Paragraph 5 _____	d. his childhood and education
Paragraph 6 _____	e. the story of Tesla Motors

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Exercise II: Identifying references and evaluation

Answer the following questions.

1. What does “Its” in paragraph 5 refer to?

   _____

2. What can be the best alternative title for the passage?

   _____

3. Do you think Musk will sell another company? If so, which one? Why?

   _____

Scan for your task

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B

Reading Lesson 3

Pre-reading

Building vocabulary

Fill in the gaps with a word from the list below.

reusable	affordable	alternative
founder	funder	neurotechnology

1. Do you know that_____ is the technology that influences on how we understand the brain, thought, and higher order activities in the brain?
2. The company decided to produce _____ product so that everyone, either poor or rich, can buy.
3. Jack Ma is the _____ of Alibaba.
4. To help save the earth, you can start by using zero waste product such as _____ straws.
5. There are many_____ energy sources instead of fossil fuels, such as solar power and wind power.
6. Bill Gates has long been the _____ of Gates Foundation that helped with more than 10,000 high-achieving students in America.

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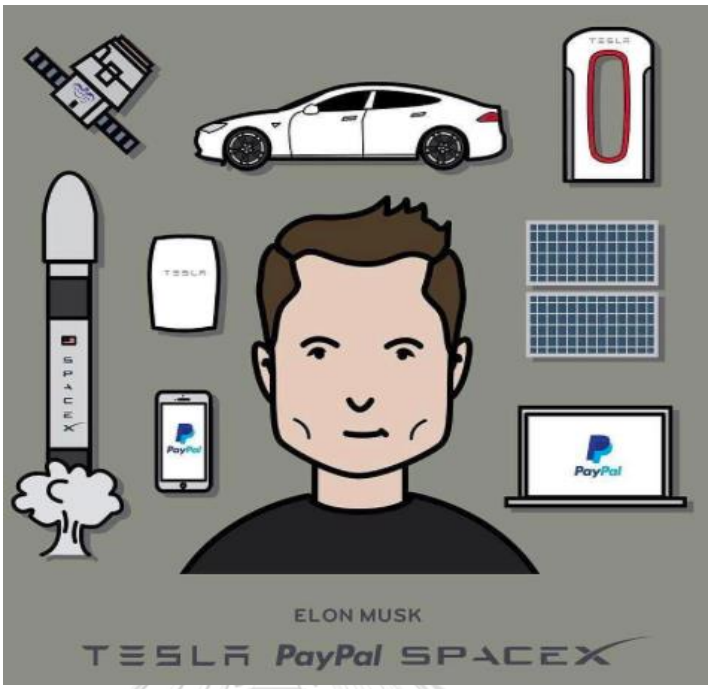
Activating background knowledge

Answer the following questions.

1. Look at the three pictures below. What do you see?
2. What do you think the passage is about?
3. Read the title. What do you think the passage is about?



B

Success story of the 21st century innovator

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In 1989, he moved to Canada to live with his mother before moving to study in the USA. He received two bachelor's degrees from the University of Pennsylvania in economics and another in physics. Musk was 24 when he started his first company, Zip2 Corporation, a web software company. He left the PhD program to start that company.

In his late 20s, he became really rich because he sold his company, Zip2, for $307 million. Then he co-founded an online financial services company, X.com, which later became PayPal. PayPal became the online-payment system of choice with more than one million users in a few months. In 2002, eBay bought PayPal for $1.5 billion. Musk's next move was to follow his dreams, space engineering and alternative energy sources.

In June 2002, he founded Space Exploration Technologies (SpaceX) to make affordable rockets. In order to make the rockets cheaper, they need to be reusable. Its first rocket was falcon 1, which launched in 2006 and became the first privately-funded, liquid-fueled rocket to put a satellite into Earth's orbit. On May 22, 2012, Falcon 9 rocket was launched to the International Space Station with 1,000 pounds of supplies for the astronauts stationed there. He has always believed that human has to be able to live in other planets to survive.

Musk had long been interested in electric cars. He joined and became one of the major funders of Tesla Motors in 2004. Two years later, Tesla introduced its first car, the Roadster, which could travel 245 miles (394 km.) on one charge. More than 2,500 Tesla Roadster cars were sold in 31 countries. However, there is the problem with charging station shortage. **Its** next move is to build more charging stations throughout USA.

After innovating in the financial, automotive, and space worlds, Musk's next step is to work on artificial intelligence (A.I.). In December 2015, he announced the development of OpenAI, which aimed to develop A.I. that could be broadly accessible. Then Nauralink, a neurotechnology startup, was founded in 2016 to connect computer with the human brain.

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Musk works really hard with his several organizations. His most influential quotes is "Failure is an option here. If things are not failing, you are not innovating enough". He fears failure like everybody, but that failure is part of being a great innovator. He once said "If something is important enough you should try. Even if the probable outcome is failure". He always reminds everyone that greatness doesn't come from not being afraid, but from having the courage to move past it.

B

Readability
- 480 words
- Flesch = 52.1 (C1)
- grade level = 9.3

Use QR code for vocabulary bank

Developing reading skill

Exercise I: Getting the main ideas and key details

Write "T" for the statement that is true and "F" for the statement that is false.

1. ____ The passage discuss mostly about what Elon Musk has done to become successful
2. ____ The main idea of the passage is that Musk never fails if he wants something to happen.
3. ____ Musk received the most money from selling Tesla Motors.

Match each paragraph to its main idea.

Paragraph 2 _____	a. how he became really rich
Paragraph 3 _____	b. the story of SpaceX
Paragraph 4 _____	c. the story of Tesla Motors
Paragraph 5 _____	d. his childhood and education

Exercise II: Identifying references and evaluation

Choose the best answers and answer the question.

1. What does "Its" in paragraph 5 refer to?
   a. Musk's interest b. charging station c. Tesla Motors
2. What can be the best alternative title for the passage?
   a. Elon Musk: A guy who always wins
   b. Elon Musk: A guy who never stops

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3. What is the main purpose of the passage?
   a. To tell story of a great and successful innovator
   b. To explain why Elon Musk is very rich.
4. Do you think Musk will sell another company? If so, which one? Why?

Scan for your task

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Listening Station

Each group choose ONE listening station for their topic of interest.

(Note: In each station, there will be a vocabulary list provided. Also some pictures from the video will be shown to help the class choose the video they really like to watch. However, the scripts are not provided.)

Station 1: Elon Musk's hyperloop could revolutionize public transport

https://www.youtube.com/watch?v=lWo6LscqSGg
(5.09 mins)

Question for Group A

Answer the following questions.

1. What will the Hyperloop be used for?
2. What limitation is the hi-speed trains these days are facing?
3. Name two of engineering challenges about hyperloop.
4. Do you think this project will become successful? Why?

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Question for Group B

Put **T** if the statements are true and **F** if the statements are false.

1. _____ The hyperloop will be used for intercity transportation.
2. _____ The hi-speed trains nowadays are facing problems about thermal and air resistance.
3. _____ Hyperloop is expected to break the speed of light which is over 1,200 km./hour.
4. _____ The project will be ready to launch in 2020.

Station 2: What you should know about the Neuralink brain implant

https://www.youtube.com/watch?v=mty_WVP8DvA (4.59 mins)

Question for Group A

Answer the following questions.

1. What does NeuraLink technology do? Explain.
2. What makes NeuraLink brain implant different or better than the old approaches?
3. Who is performing the implant in human brain?
4. Has this technology been experimented with human?

Question for Group B

Put **T** if the statements are true and **F** if the statements are false.

1. _____ NeuraLink tries to perform brain implant which track spikes.
2. _____ Utah Array is one of the approaches of NeuraLink.
3. _____ The surgeons are performing the implant for human.
4. _____ NeuraLink has never conducted experiment with human before.

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Station 3: SpaceX's plan to colonize Mars, explained

https://www.youtube.com/watch?v=OLuq3CKqky8
(7.11 mins)

Question for Group A

Answer the following questions.

1. What is the advantage of supersonic retropropulsion?
2. How to get the fuel to travel from Mars back to Earth?
3. What's Elon's plan to survive on Mars?
4. What does microgravity lead to?

Question for Group B

Put **T** if the statements are true and **F** if the statements are false.

1. _____ SuperSonic Retropropulsion is the technology for launching rocket.
2. _____ Methane can be made from mixing carbon dioxide and water.
3. _____ SpaceX provides plans for humans to survive on Mars.
4. _____ Microgravity can be useful to human body.

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Reading Lesson 4

Lesson Objectives:

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

5. Comprehend text that is directly stated; find the information that is needed in questions; combine the information for additional understanding
6. Find the information or meaning that is not directly stated in the text based on logical hints of the words; find the information or meaning that is not directly stated in the text based on the specific paragraph or the entire text; and predict related matters from their understanding of the text.
7. Identify and evaluate their feelings for the text and the content; and identify tone and purpose of a specific part of a text or of the entire text.
8. Decipher meaning of a word by identifying word parts in order to develop and expand vocabulary knowledge.

Time duration: 3 hours

Class contents

Reading comprehension skills and strategies; literal, inferential and evaluation

Instruction and Activities

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Lesson 3 (3 hours)

Pre-teaching stage *(30 minutes)*

Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
Pre-lesson preparation: activate students' background knowledge	1. The whole class are asked about vocabulary building to check if they still remember what they have learned. Teacher brainstorms the vocabulary that contain prefix and suffix and write the answers on the board. 2. The content in handout (Document 1) about vocabulary building is mentioned and review again.	Questions are raised to check students' understanding of previous lesson. Differentiation is **not** applied at this stage.

While-teaching stage *(2 hours 45)*

Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
Pre-reading (30 minutes)		
Pre-reading: - learn necessary vocabulary and activate background knowledge - group discussion	1. Within the same group (intermediate and beginner), the students do pre-reading activity together. 2. The handout on reading comprehension passage and exercise on the topic on **"Inventions"** is provided (Document A and B). 3. The lead-in activity starts with vocabulary building. The students match the vocabulary with the right definition. 4. Then the pre-reading questions are asked in order to activate students' background knowledge. Within the group, the students help each other answering the questions before reading. 5. The teacher checks with students if they can answer the questions correctly.	- The students are already grouped according to their **readiness** (reading proficiency) from pre-test score. - In the handout, there are two different sets of questions and passages (Document A and B) based on students' **readiness** - During the lead-in activity, the content for both groups of students are the same. <u>Assessment criteria</u>: Interpersonal communication
While-reading (50 minutes)		
While-reading: - reading text and doing tasks - group discussion - task completion with teacher monitoring and scaffolding	1. The passage is provided to each group in Document A and B. A is for intermediate level and B is for beginner level. 2. In B document, the content is simplified in terms of lexical and syntactic knowledge so that the basic level students can comprehend. 3. Dictionary can be used but only the ones provided in class. Mobile phone dictionary is not allowed. 4. Both groups can use the two versions Document A (on reading comprehension strategies and vocabulary building) to help with reading text. Teacher emphasizes the use of strategies in reading comprehension to the whole class. 5. Assistance from teacher can be given for each group differently. <u>Teacher assists beginner level groups by</u>: - Highlighting the paragraph or the line where the answer would be. - Pointing out the important clues - Provides definition of some words if they ask. <u>Teachers assists intermediate level groups by</u>:	- The content between B1 and B2 are different as to differentiate the **content** according to students' **readiness**. - The content and tasks in B1 are fit with the course level, but the content and tasks in B2 have been simplified so that basic level students can understand. - The teacher's scaffolding to assist task completion are differentiated according to students' **readiness** and **preference**.

Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
	- allowing them to ask the kind of questions that can clarify their understanding but not for the clues and important points. - Teacher reviews the whole class with reading comprehension strategies again and ask the students to recheck their answer. - Teacher monitors the whole class answer and provides the correct answers to each group for correction. - The teacher asks the students to check the answer and discuss their mistake within the group.	Assessment criteria: Interpretive communication
Post-reading (25 minutes)		
Post-reading: check students' understanding on reading comprehension	1. Teacher asks the class to prepare brief summary of the content they have read in the passage **(Inventions)**. They may add their opinions about the passage. 2. The group prepare to present to the class about their summary. Teacher monitors the class as they are preparing. Time given for the presentation is 3 minutes for each group.	Students write summary and prepare their presentation according to their **preference** Assessment criteria: Presentational communication

Post-teaching stage *(30 minutes)*

Steps in the lesson	Learning and activities	Elements / strategies of Differentiated instruction
Lesson summary: conclusion and home assignment	1. The teacher concludes the reading comprehension and vocabulary building. 2. The students do the listening activity. There is only one clip for the whole class. However, the exercise for the two groups are different. Also, group B is provided with script and vocabulary list. 3. After finishing the clip, each group will prepare their presentation that each group will get guidance from the teacher.	Differentiation is **not** applied at this stage.

Teaching Methods

Lecture, reading comprehension skills and strategies and reading practices, group work and discussion.

Materials and Media

1. Course syllabus
2. PowerPoint Presentations
3. Document: A) A handout on vocabulary building

B) Reading comprehension passages and exercises I *(B1 and B2 for two levels of students)*

Assessment

1. Teacher's checklist
2. Reading comprehension tasks
3. Students' journal
4. Lesson performance assessment criteria

During each process, a student can….

	Interpersonal	**Interpretive**	**Presentational**
Beginner	- There is connection within group - Discuss on familiar topic - Use variety of words, phrases, and simple sentences	- Identify main idea - Comprehend text by recognizing keywords or phrases	- Write simple sentences - Follow a practiced format Ask and answer practiced questions
Intermediate	- Connect well within group - Discuss on topic and extend idea further - Understand, ask and answer a variety of questions	- Comprehend main idea and some key details - Predict meaning from context	- Write complex sentences - Provide more description - Maintain conversation on familiar topic

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A

Material for Reading Lesson 4

Reading comprehension passage and exercise (A for Intermediate and B for Beginner)

Pre-reading

Vocabulary skill

Fill in the gap with a word from the list below.

commits	impact	invention
transportation	antibiotic	fatal

1. _____ is a medicine that fights bacterial infections.
2. Leonardo DiCaprio is one of the superstars who _____ himself to the global warming issues.
3. Positive thinking can _____ your life. It makes you become more confident and happier.
4. A _____ accident can happen in a lab if you do not know the lab safety.
5. Using public _____ is one of the best ways for everyone to help solve traffic problem.

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Before you read

Discuss the following.

1. What kind of science-related equipment or gadget or inventions do you like most?
2. What is the invention you think can be very popular in the future?
3. What is the thing you cannot live without? Why?

A

Inventions

Humans are an ingenious species. Their inventions have shaped civilizations and transformed life on earth. **Some** made living more convenient and some made the world a safer and healthier place. Most major inventions were created by more than one inventor and were built on previous inventions. Here are five inventions that have changed the world completely.

The printing press helped spread knowledge and was one of the first ways that connected parts of the world. Though Johannes Gutenberg was credited with this invention in 1430s, he actually perfected and popularized existing technology by combining the Chinese principle of movable type with European press systems already in use for winemaking. Books had previously been items for only rich people, but mass production brought the price down largely. Gutenberg created the machine that printed text on a wide scale which in turn lowered the price of books and helped spread information and knowledge.

Many medicines and vaccinations have extended and changed our lives significantly. Edward Jenner's creation of the world's first vaccine for smallpox in the 1798 was introduced. Louis Pasteur's experimented with the development of cholera vaccine in 1897. Many dangerous diseases such as polio and rubella have been contained because of the safe, effective and affordable vaccines. Discovered by accident by Alexander Fleming in 1928, penicillin was the first modern antibiotic that fought illnesses from infections. Before penicillin, a simple wound could be fatal and any form of surgery was really risky.

One of the inventions that got industry and the population moving was the engine. Instead of relying on horses as transportation, people traveled across the countryside via steam engine. It was invented in 1712 by James Watt. Later, it quickly became the backbone of society and sparked the industrial revolution. Internal combustion ultimately replaced steam in the second industrial revolution and allowed individuals to affordably travel great distances. Even though an engine generated a lot of pollution, it brought enormous economic growth worldwide.

Several inventions changed global communications forever. Samuel Morse brought us the electric telegraph in 1836. Alexander Graham Bell's telephone was the first to be awarded
a patent to transmit voices in 1876. Guglielmo Marconi and Nikola Tesla developed radio in the late 19th century. In 1925, Conrad Sousa developed the first computer in the early 40s. Tim Berners-Lee proposed the World Wide Web in the late 80s and they all made the world a little bit smaller. We went from the world where it took weeks to hear news from across the country to one where we can watch events live on the other side of the globe. These inventions had **impacts** on communication that completely shrank the world.

Sleep patterns also alter vastly with the introduction of electricity. Electricity is an energy from nature discovered by Benjamin Franklin in 1752. When he could find the connection between lightning and electricity. In 1831, Michael Faraday created the electric dynamo which solved the problem of generating electric current. Actually, there are many innovators who made important contributions to this modernization which brought light and power to the masses.

Readability
- 512 words
- Flesch = 39.7 (C2)
- grade level = 11.4

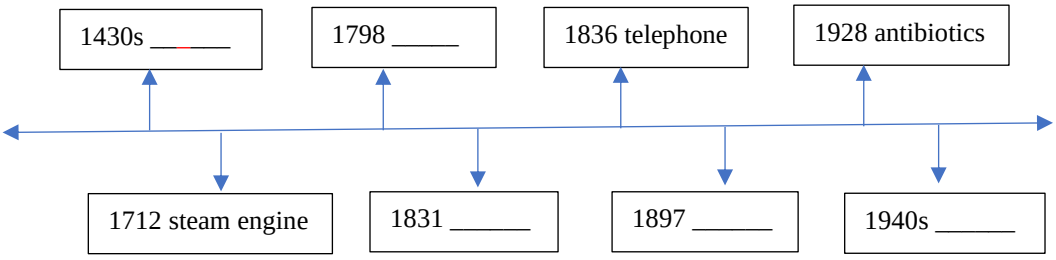
Developing reading skill

Exercise I: Getting the main ideas and key details

Choose the best answer.

1. Which question does the passage discuss?
   a. Can you really live without these inventions?
   b. What inventions have changed the world completely?
   c. What can be invented in the future to make the world better?
2. Which of the following best describe the main idea of the passage?
   a. Many inventions were created by several inventors.
   b. It took a really long time to create one great invention.
   c. The oldest invention that was created was printing press.
3. According to the passage, which of the following is NOT TRUE?
   a. Electric telegraph was the first kind of global communication
   b. Steam engine was the key factor for industrial revolution.
   c. The first nation to create the printing press was German.
4. Put the right inventions into the timeline that they are invented.

a. electricity	b. smallpox vaccines	c. telegraph
d. printing press	e. computer	f. cholera vaccine



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Exercise II: Identifying references and evaluation.

Answer the questions.

1. What is the best meaning of “impacts” in paragraph 5?

   _____

2. What does “some” in the first paragraph refer to?

   _____

3. Think about another invention that have changed the world completely?

   _____

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Reading Lesson 4

B

Pre-reading

Vocabulary skill

Fill in the gap with a word from the list below.

commits	impact	invention
transportation	antibiotic	fatal

1. _____ is a medicine that fights bacterial infections.
2. Leonardo DiCaprio is one of the superstars who _____ himself to the global warming issues.
3. Positive thinking can _____ your life. It makes you become more confident and happier.
4. A _____ accident can happen in a lab if you do not know the lab safety.
5. Using public _____ is one of the best ways for everyone to help solve traffic problem.

Before you read

Discuss the following.

1. What kind of science-related equipment or gadget or inventions do you like most?
2. What is the thing you cannot live without? Why?

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B

Inventions

Humans are an intelligent species. Their inventions have changed life. **Some** made living more convenient and some made the world a safer and healthier place. Most major inventions were created by more than one inventor. Here are five inventions that have changed the world completely.

The printing press helped spread knowledge and was one of the first ways that connected parts of the world. Johannes Gutenberg from Germany was credited with this invention in 1430s. He actually improved and popularized technology by combining the Chinese principle of movable type with European press systems used for winemaking. Books used to be only for rich people, but with big production, the price was brought down so much. The printing machine printed text on a wide scale and that lowered the price of books and helped spread information and knowledge.

Many medicines and vaccinations have changed our lives a lot. Edward Jenner created the world's first vaccine for smallpox in the 1798. Louis Pasteur developed cholera vaccine in 1897. Many dangerous diseases such as polio and rubella have been reduced because of the vaccines that are safe, effective and not too expensive. Penicillin was the first modern antibiotic discovered by Alexander Fleming in 1928. It fought illnesses from infections. Before penicillin, a simple wound could be fatal, and any form of surgery was really risky.

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One of the inventions that moved industry forward was the engine. Instead of using horses as transportation, people traveled by steam engine. It was invented in 1712 by James Watt. Later, it quickly became the key factor of society and the industrial revolution. Internal
Combustion completely replaced steam in the second industrial revolution and allowed people to travel great distances with cheap price. Even though engine caused a lot of pollution, it brought economic growth worldwide.

Several inventions changed global communications forever. Samuel Morse created the electric telegraph in 1836. Alexander Graham Bell's telephone was awarded a patent to transmit voices in 1876. Guglielmo Marconi and Nikola Tesla developed radio in the late 19th century. In 1925, Conrad Sousa developed the first computer in the early 40s. Tim Berners-Lee introduced the World Wide Web in the late 80s. The world used to take weeks to hear news from outside the country. Now, we can watch events live from anywhere. These inventions had **impacts** on communication that made the world smaller.

Last but not least, electricity is an energy from nature discovered by Benjamin Franklin in 1752. His experiment confirmed the connection between lightning and electricity. In 1831, Michael Faraday created the electric dynamo which solved the problem of generating electric current. Actually, there are many other innovators who helped make the world more modern by bringing light and power to the people.

Glossary:
- Cholera (N.) = an infectious and fatal bacteria disease causing diarrhea
- revolution (N.) = a wide-reaching change in conditions
- patent (N.) = license conferring a right
- establish (V.) = set up on a permanent basis

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← *Scan for more vocabulary*

Readability
- 454 words
- Flesch = 45.6 (C2)
- grade level = 10.1

B

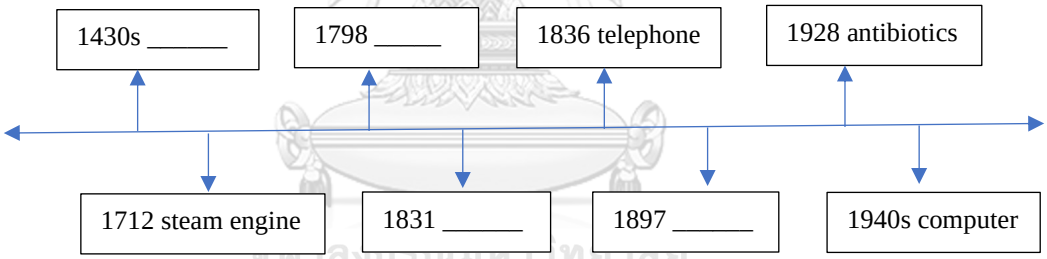
Developing reading skill

Exercise I: Getting the main ideas and key details

Put T if the statement is TRUE, and put F if the statement is FALSE.

1. _____ The main idea of the passage is that we cannot live without these inventions
2. _____The passage mostly states that many inventions were created by several inventors.
3. _____ According to the passage, the first nation to create printing press was German.
4. _____ The word “some” in the first paragraph refers to inventors.
5. Put the right inventions into the timeline that they are invented.

b. electricity	b. smallpox vaccines	c. telegraph
d. printing press	e. cholera vaccine	



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Exercise II: Identifying references and evaluation.

Answer the questions.

1. What is the best meaning of “impacts” in paragraph 5?

   _____

2. Think about another invention that have changed the world completely?

   _____

Listening Station

Each group listening to the same topic.

(Note: a script is provided for group B only.)

Sweden and their trash
https://www.youtube.com/watch?v=lpp_rDcf7F8
(3.45 mins)

Question for Group A

Answer the following questions.

1. What does Sweden do with garbage?
2. What kind of 47% trash does Sweden recycle?
3. What does this program do with the trash that cannot be recycled?
4. What does this program do with the remaining materials that do not bun?
5. What does Sweden do when they run out of garbage?

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Question for Group B

Fill in the gap with appropriate words or phrases.

1. Sweden _____ garbage into sustainable energy in a waste-to-energy program.
2. This program recycle _____, _____, _____, and _____, which are about 47% of recycle waste.
3. The remaining trash that cannot be recycled is burned in order to _____.
4. The materials that do not burn will be used for _____.
5. According to the video, Sweden imported trash from _____ and _____.

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VITA

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