USE OF ARTIFICIAL INTELLIGENCE APPLICATION TO ENHANCE LEARNING ACHIEVEMENT OF SECONDARY STUDENTS WITH INDIVIDUAL DIFFERENCE SKILLS IN ENGLISH LANGUAGE

MENG YAN LING

A THESIS SUBMITTED IN PARTIAL FULLFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF EDUCATION PROGRAM IN LEARNING TECHNOLOGY AND INNOVATION

FACULTY OF TECHNICAL EDUCATION
RAJAMANGALA UNIVERSITY OF TECHNOLOGY THANYABURI

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วิทยานิพนธ์ฉบับนี้เป็นงานวิจัยที่เกิดจากการค้นคว้าและวิจัย ขณะที่ข้าพเจ้าศึกษาอยู่ในคณะครุศาสตร์อุตสาหกรรม มหาวิทยาลัยเทคโนโลยีราชมงคลธัญบุรี ดังนั้น งานวิจัยในวิทยานิพนธ์ฉบับนี้ถือเป็นลิขสิทธิ์ของมหาวิทยาลัยเทคโนโลยีราชมงคลธัญบุรี และข้อความต่าง ๆ ในวิทยานิพนธ์ฉบับนี้ ข้าพเจ้าขอรับรองว่าไม่มีการคัดลอกหรือนำงานวิจัยของผู้อื่นมานำเสนอในชื่อของข้าพเจ้า

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Meng Yan Ling

(..Ms. Meng Yan Ling..)

Thesis Title	Use of Artificial Intelligence Application to Enhance Learning Achievement of Secondary Students with Individual Difference Skills in English Language
Name - Surname	Ms. Meng Yan Ling
Program	Learning Technology and Innovation
Program	Technology and Learning Innovation
Thesis Advisor	Assistant Professor Thidarat Kulnatarawong, Ph.D.
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หัวข้อวิทยานิพนธ์ การใช้แอปพลิเคชันปัญญาประดิษฐ์เพื่อส่งเสริมผลสัมฤทธิ์ทางการเรียนของนักเรียนชั้นมัธยมศึกษาตามความแตกต่างระหว่างบุคคลด้านทักษะภาษาอังกฤษ
ชื่อ – นามสกุล Ms. Meng Yan Ling
สาขาวิชา เทคโนโลยีและนวัตกรรมการเรียนรู้
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ปีการศึกษา 2565

บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อ 1) ศึกษาประสิทธิภาพของการใช้แอปพลิเคชันปัญญาประดิษฐ์เพื่อส่งเสริมผลสัมฤทธิ์ทางการเรียนของนักเรียนชั้นมัธยมศึกษา ตามความแตกต่างระหว่างบุคคลด้านทักษะภาษาอังกฤษ 2) เปรียบเทียบผลสัมฤทธิ์ทางการเรียนของนักเรียนด้วยคะแนนก่อนเรียนและคะแนนหลังเรียน และ 3) ศึกษาความพึงพอใจของนักเรียนที่ใช้แอปพลิเคชันปัญญาประดิษฐ์เพื่อส่งเสริมผลสัมฤทธิ์ทางการเรียนของนักเรียนชั้นมัธยมศึกษา ตามความแตกต่างระหว่างบุคคลด้านทักษะภาษาอังกฤษ

กลุ่มตัวอย่างที่ใช้ในการวิจัย ได้แก่ นักเรียนชั้นมัธยมศึกษาในประเทศสาธารณรัฐประชาชนจีน ภาคเรียนที่ 1 ปีการศึกษา 2565 จำนวน 30 คน โดยการเลือกกลุ่มตัวอย่างแบบเจาะจง เครื่องมือที่ใช้ในการวิจัย ได้แก่ 1) แอปพลิเคชันปัญญาประดิษฐ์เพื่อส่งเสริมผลสัมฤทธิ์ทางการเรียนของนักเรียนชั้นมัธยมศึกษาตามความแตกต่างระหว่างบุคคลด้านทักษะภาษาอังกฤษ 2) แบบประเมินคุณภาพด้านเนื้อหาและด้านสื่อ 3) แบบทดสอบวัดผลสัมฤทธิ์ทางการเรียน และ 4) แบบประเมินความพึงพอใจ

ผลการวิจัยพบว่า 1) ประสิทธิภาพของการใช้แอปพลิเคชันปัญญาประดิษฐ์เพื่อส่งเสริมผลสัมฤทธิ์ทางการเรียนของนักเรียนชั้นมัธยมศึกษา ตามความแตกต่างระหว่างบุคคลด้านทักษะภาษาอังกฤษมีประสิทธิภาพของบทเรียน (E1/E2) เท่ากับ 82.27/81.00 ซึ่งเป็นไปตามเกณฑ์ 80/80ที่ตั้งสมมติฐานไว้ ผลการประเมินคุณภาพด้านเนื้อหาของแอปพลิเคชันปัญญาประดิษฐ์เพื่อส่งเสริมผลสัมฤทธิ์ทางการเรียนของนักเรียนชั้นมัธยมศึกษาตามความแตกต่างระหว่างบุคคลด้านทักษะภาษาอังกฤษโดยผู้เชี่ยวชาญ มีคุณภาพด้านเนื้อหาโดยรวมอยู่ในระดับดีเยี่ยม ($\bar{X}$=4.87, *SD*=0.23) และผลการประเมินคุณภาพด้านสื่อโดยผู้เชี่ยวชาญ มีคุณภาพโดยรวมอยู่ในระดับดี ($\bar{X}$=4.40, *SD*=0.58) 2) ผลสัมฤทธิ์ทางการเรียนของนักเรียนหลังเรียนสูงกว่าก่อนเรียน อย่างมีนัยสำคัญทางสถิติที่ระดับ .05 และ 3) ความพึงพอใจของนักเรียนที่ใช้แอปพลิเคชันปัญญาประดิษฐ์เพื่อส่งเสริมผลสัมฤทธิ์ทางการเรียนของนักเรียนชั้นมัธยมศึกษา ตามความแตกต่างระหว่างบุคคลด้านทักษะภาษาอังกฤษ โดยรวมอยู่ในระดับดีเยี่ยม ($\bar{X}$=4.53, *SD*=0.50)

คำสำคัญ: แอปพลิเคชันปัญญาประดิษฐ์ ความแตกต่างระหว่างบุคคล ภาษาอังกฤษ ผลสัมฤทธิ์ทางการเรียน

Thesis Title	Use of Artificial Intelligence Application to Enhance Learning Achievement of Secondary Students with Individual Difference Skills in English Language
Name - Surname	Ms. Meng Yan Ling
Program	Learning Technology and Innovation
Thesis Advisor	Assistant Professor Thidarat Kulnatarawong, Ph.D.
Academic Year	2022

ABSTRACT

The objectives of this study were to: 1) study the efficiency of the use of artificial intelligence application to enhance secondary students' learning achievement with individual difference skills in English language, 2) compare the students' learning achievement between pre-test and post-test scores, and 3) study the students' satisfaction towards the use of artificial intelligence application to enhance learning achievement with individual difference skills in English language.

The sample group consisted of 30 students studying in a secondary school in the first semester of the academic year 2022. They were drawn by purposive sampling technique. The research instruments included an artificial intelligence application to enhance students' learning achievement with individual difference skills in English language, assessments on content quality and media quality, learning achievement tests, and a questionnaire for evaluating student satisfactions.

The research results revealed that: 1) the efficiency of the use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skills in English language (E1/E2) was 82.27/81.00 which was higher than the set criteria of 80/80. The evaluation of content for the artificial intelligence application to enhance learning achievement of secondary students with individual difference skills in English language by the experts was totally appropriate at the highest level ($\bar{X}$=4.87, *SD*=0.23), and the evaluation of media by the experts was also totally appropriate at a good level ($\bar{X}$=4.40, *SD*=0.58). 2) The post-test scores were differently higher than the pre-test scores at the .05 level of significance, and 3) the students' satisfaction towards using artificial intelligence application to enhance learning achievement of secondary students with individual difference skills in English language was at the highest level as well ($\bar{X}$=4.53, *SD*=0.50).

Keywords: artificial intelligence application, individual difference, English language, learning achievement

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I owe a huge debt of appreciation to my family particularly my parents, who have provided me with unwavering support and encouragement throughout my two years of study. Without them, this feat would not have been possible. Finally, I would like to express my gratitude to my friends in China research participants Director of Vocational Institute in China and all those who contributed to making my thesis a success all processing.

Meng Yan ling

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CHAPTER 1
INTRODUCTION

1.1 Background of Statement

Artificial intelligence (AI) is intelligence demonstrated by machines, as opposed to the natural intelligence displayed by animals and humans, enables machines to perform advanced, humanlike functions, promises breakthroughs across society in health care, transportation, education, finance, and beyond. At their best, AI tools perform tasks at a much greater speed, scale, or degree of accuracy than humans freeing up time and resources for us to solve problems that machines cannot. (Zara Abrams, 2021). Artificial intelligence (AI) has become increasingly important in recent decades. It is having a significant impact in numerous fields, such as medicine, finance, law, industry, and entertainment (Amisha et al., 2019 and Gade et al., 2020). Artificial intelligence (AI) is defined as "computing systems that are able to engage in human-like processes such as learning, adapting, synthesizing, self-correction and use of data for complex processing tasks" (Popenici & Kerr, 2017, para.3).

Artificial intelligence (AI) in education started with the introduction of computers to the education sector during the 1990s, and research has focused on developing AI-enhanced learning environments, such as intelligent tutoring systems, adaptive learning systems, intelligent agents, and intelligent collaborative learning systems, that manifest significant improvements in automated computational approaches to education. The education sector is now significantly influenced by AI research, as AI applications are being used by learners, educators, and administrators and various tools, algorithms, and applications have been developed with the capacity to transform the education field (Chen et al., 2020). Furthermore, Owoc et al. (2021) indicated that the benefits of AI in education are the following: (a) automation of repetitive and time-consuming activities such as grading or controlling student attendance, (b) use of AI facilitators to support teachers in their classroom work, (c) feedback for teachers using AI chatbots to collect students' opinions,(d) adaptive learning through customization according to each learner's needs, (e) spaced repetition and knowledge revision for students, and (f) AI-powered anti-cheating systems.

From the policy documents published by the central Chinese government, which are shown to implicate educational institutions as influential actors in national and regional strategies for AI development, with a significant role in plans to train domestic expertise. The second section outlines three prominent private education companies: New Oriental Group, Tomorrow Advancing Life (TAL), and Squirrel AI. These companies are selected to represent important aspects of China's development of educational AI applications. (Jeremy Knox, 2020) Squirrel AI is a Chinese online education technology company that specializes in intelligent adaptive education. It is one of the first companies offering large scale AI-powered adaptive education solutions in China. Squirrel uses artificial intelligence to tailor lesson plans to each individual student. Chinese researchers have access to the world's largest student databases, which are used to train AI's. Squirrel works with excellent teachers to identify the most fine-grained possible concepts ("knowledge points") for a course to precisely target learning gaps. For example, middle school mathematics is broken into over 10,000 points such as rational numbers, the properties of a triangle, and the Pythagorean theorem. Each point is linked to related items, forming a "knowledge graph". Each knowledge point is addressed by videos, examples, and practice problems. A textbook might address 3,000 points; ALEKS, another adaptive learning platform, uses 1,000. Each student begins with a diagnostic test to identify where to begin the learning. The system continues to refine its graph as more students proceed. Learning is not student-directed. The system decides the order of topics. (Wikipedia, 2022)

The individual differences affecting evidence-based learning. It has long been recognized for its impact on learner learning (Glaser, 1977). Artificial intelligence application for learning is an educational process and tools that aims to adapt teaching strategies to different difference between individual learners effectively and at the same time helping each student develop the knowledge and skills they need to learn. Tutoring programs or intelligent tutoring systems (ITS) based on artificial intelligence are equipped to handle personalized feedback and instructions for one-on-one teaching. However, they cannot replace teachers since they are not advanced enough to teach how a human can. They can help scenarios where human tutors are not available for small lessons that can be taught and evaluated online. It can be an effective tool in e-learning

platforms to teach languages, geography, circuits, medical diagnosis, computer programming, mathematics, physics, genetics, chemistry, etc. They are designed to factor in engagement, metrics for grading and comprehension.

English Language in secondary school, due to different personal psychological factors and social environment, there are differences in the use of mass media, the acceptance of communication content and the influence of mass media. We should vary from person to person and cannot generalize. People's psychological composition is very different. People's congenital conditions and acquired knowledge form differences in personal interests and hobbies. Because the social environment and experience are different, their personality characteristics are also different. The ability to digest knowledge, understand problems and analyze problems are different, so we should pay attention to students' individual differences in teaching. English is a language, including listening, speaking, reading and writing. To learn English well, these four aspects must be comprehensive, from articles to vocabulary, and even the pronunciation of each word. It therefore affects the students' current learning achievements.

Recently, there has been a research focus on the application of AI in education, where it has great potential. Therefore, a systematic review of the literature on AI in education is therefore necessary. (Salas-Pilco, 2022) Nowadays, the application of artificial intelligence for English Language in secondary school is the initial stage of exploration, which has not reached the level of familiarity. How to make better use of artificial intelligence to cultivate students' interest in English and improve their English performance has become the key topic of this paper. At present, students are not very familiar with artificial intelligence. Teachers are used to using traditional teaching mode to teach students knowledge. How to make teachers and students familiar with and proficient in artificial intelligence and apply it to senior high school English Language has become our current focus.

Thus, this study focuses on the integration of the artificial intelligence application with individual difference skill and English language to enhance learning achievement of secondary students, China. With this approach, the students could develop their learning system in terms of learning behaviors, learning achievement and motivation, based on the artificial intelligence concept which directly impacts their

knowledge and skills. Apart from the contributing to the students, designing artificial intelligence application activities in the English classroom would allow the teachers to adapt their teaching styles to the student's needs, preferences, and requirements.

1.2 Research of Objectives

1.2.1 To study the efficiency to use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

1.2.2 To compare the learning achievement of students between pre-test and post-test scores using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

1.2.3 To study the satisfaction of students who using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

1.3 Research Hypothesis

There are two research hypotheses as to the following:

1.3.1 The learning achievement of students towards artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language was significantly higher at the .05 level.

1.3.2 The student's satisfaction level with the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language was a good level.

1.4 Conceptual Framework

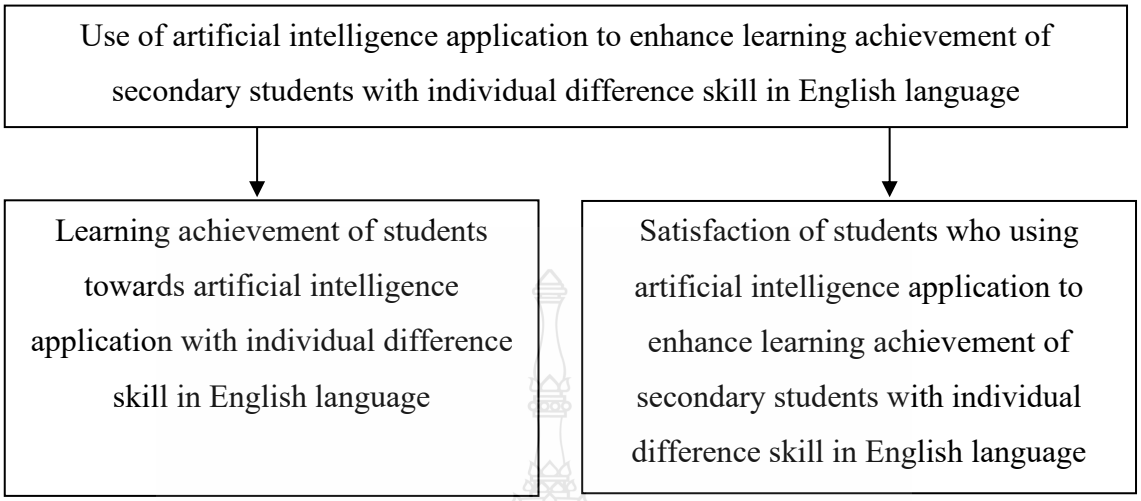

Figure 1.1 Conceptual framework for use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language

1.5 Research of Methodology

The research methods used in this paper include literature analysis, observation, interview and field research. Mainly based on article analysis and practical teaching experience, this paper explores the value and significance of the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

1.5.1 The population: The population of this study were 100 secondary students of grade 7 in the academic year 2022 of No.2 middle school, in China. The sample of this study were 30 secondary students of grade 7 with English Conversation subject at No.2 middle school, in China, during the school year 2022. They were selected by using purposive sampling as they were the students of the researcher who was responsible for teaching this course.

1.5.2 The research instruments consisted of 1) artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language 2) content and media quality questionnaire for artificial intelligence application to enhance learning achievement of secondary students with individual

difference skill in English language 3) learning achievement questionnaire of students between pretest and post-test scores using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language and 4) satisfaction questionnaires to assess the student's level for artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

1.5.3 The data were analyzed using E1/E2, Mean, Standard Deviation, and t-test.

1.5.4 Variables:

1.5.4.1 Independent Variables are artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

1.5.4.2 Dependent Variable are 1) the learning achievement of students towards artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language and 2) the student's satisfaction with the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

1.5.5 Content

In English classroom teaching, students have carefully studied grammar knowledge, vocabulary knowledge and phonetic knowledge, practiced students' listening, reading and speaking, and how to use the learned vocabulary to write an English article and practice writing. Then use artificial intelligence to accurately monitor the knowledge points that student do not master, such as the subjunctive mood in grammar, effectively and purposefully do the knowledge points that student who do not master in the system recommendation, consolidate them, and achieve the purpose of improving English performance.

1.5.6 Data amassment, the researcher experimented with an experiment was one group pretest and post-test test scores design; the population selected by purposive sampling. The measure and statistics and assessment are the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language, pretest post-test test scores, questionnaire of satisfying data were E1/E2, mean, standard definition, t-tests the dependent sample

Statistics. Amassment statistics data after the experiment and calculate (O_1) and (O_2) for mean ($\bar{X}$) and also compared, arrangement for the experimental model by artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language for students to learn.

1.5.6.1 A request for cooperation with 100 secondary students from No.2 middle school.

1.5.6.2 Plan to use artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language for secondary school.

1.5.6.3 Process learning by using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language, there are three steps goal of learning, creative thinking, construction knowledge; pretest; post-test; assess students' satisfaction; check pretest and post-test.

1.5.7 Data analysis

The statistics used to analyze data.

1.5.7.1 The efficiency to use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language according to criteria experiment by E1/E2.

1.5.7.2 Compare learning achievement of students using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language between pretest and posttest by t-test.

1.5.7.3 To assess the students' satisfaction through the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language by mean and standard deviation.

1.5.8 Research questions

Research question in this study attempt to answer the following research questions:

1.5.8.1 how to apply the artificial intelligence application of secondary students with individual difference skill in English language to enhance the students' scores?

1.5.8.2 What the differences between the pretest and posttest scores of those students who have learned English by artificial intelligence application?

1.5.8.3 What is the student's satisfaction level taught through the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language?

1.6 Definition and Scope of the Study

1.6.1 There has always been a dilemma of unsatisfactory teaching quality and effect in traditional foreign language teaching. We should make full use of the increasingly mature artificial intelligence technology to carry out a deep- seated reform and reshape the new form of times and personalization of foreign language education. After the use of neural network, deep learning, Monte Carlo number search and other technologies, artificial intelligence has gradually formed a neural network "brain" to carry out complex and accurate data processing, and initially has the "learning ability" of human advanced intelligence. The technologies needed by artificial intelligence in education mainly include 1) natural language understanding technology, which enables computers and people to communicate effectively in natural language, including machine understanding, machine translation, etc. 2) Human computer interaction technology, including speech recognition, speech synthesis, emotional interaction, etc. 3) Knowledge map technology refers to the establishment of semantic 10 network and the use of relationships in the network to analyze and solve problems and 4) Biometric recognition technology, including fingerprint recognition, speech recognition, face recognition, etc.

1.6.2 The overall efficiency of foreign language teaching in China has not been high in recent years. Although they have joined the oral test in recent years, the overall level of students' English communication is still worrying, and their application ability is far from reaching the proficiency and practical level. The development direction of secondary English is to improve the quality and enhance the effectiveness. The goal of secondary English reform is to combine humanism, effectiveness, digitization and instrumentality. As they will become the main force of campuses, they have distinctive characteristics in learning and cognitive mode and information technology application habits. Technology drawing, reading innovation and eagerness have become their logo

and are considered as "digital aborigines". They are more inclined to obtain digital learning resources in an intelligent way. However, in the face of massive and various foreign language learning resources, how to meet the personalized learning needs, improve learning efficiency and reconstruct an effective and appropriate new foreign language teaching model has become a new goal for foreign language teachers to explore scientific research.

1.7 Definition of Key Terms

1.7.1 Artificial intelligence application is AI Learning online system provides student-centered, personalized, interactive, and data-analytics-driven instruction to enrich students' learning experiences. The design is grounded in many of the same principles that inform excellent instructor-to-student instruction such as formative assessments for determine the student's ability level, targeted to the student's ability level, intelligent feedback including elaborated explanations and supports, or tutorials differentiated by ability level.

1.7.2 Individual Difference

Individual differences refer to differences in characteristics and qualities. Between 2 or more people, it may be a difference in intelligence, thinking style, learning style, pre-learning knowledge or achievement motivation.

1.7.3 English Language Proficiency

English language proficiency is the ability of students to use the English language to make and communicate meaning in spoken and written contexts while completing their program of study.

1.7.4 Learning Achievement

Learning achievements, the result of measurement to learners covering cognitive, affective, and psychomotor factors after following the learning process measured by using artificial intelligence application.

1.7.5 Student's Satisfaction

Student's satisfaction is emotional state of students' feelings towards using artificial intelligence application to enhance learning achievement with individual

difference skill in English language so motivation the inner power of the individual which is a relationship between expected goals and needs.

1.8 Significance of the Study

The research focus on the following:

1.8.1 This research provides a teaching method by artificial intelligence. At present, it is the golden development period of artificial intelligence education. How to more effectively obtain large- scale and high- quality data and how to build the best model framework. To seek theoretical support for foreign language teaching based on artificial intelligence big data analysis, we should not only use artificial intelligence big data technology, but also update and upgrade the artificial intelligence system, improve the teaching effect and overall comprehensive quality, and solve various problems encountered in foreign language teaching.

1.8.2 Through the application of artificial intelligence in English language, we can improve students' learning interest and enthusiasm, change learning methods and methods, and strengthen the cultivation of secondary vocational students' oral ability and dictation ability. Artificial intelligence, including natural language processing, machine translation and speech recognition technology, is closely related to language learning. In secondary English language, we need to take the development of artificial intelligence as an opportunity to timely deal with questions. By using the data processing ability of artificial intelligence to comprehensively analyze the overall situation of students, artificial intelligence evaluates the overall situation and individual performance of students, to provide teaching reference for teachers. Teachers can make full use of artificial intelligence, combined with the data analysis collected by intelligent computers according to big data, fully master each student's personality characteristics and learning ability, formulate targeted teaching plans, teach students according to their aptitude based on overall teaching, and combine similarities and differences to effectively fill in the links that cannot be filled in traditional teaching. Finally achieve the best English language effect.

1.8.3 At the same time, in the simulated dialogue training of artificial intelligence robots, teachers also participate in the scene dialogue between robots and people with students, which not only provides students with English learning and application, but also further improves teachers' English ability. Through the effective use of artificial intelligence, help teachers and students make full use of the achievements brought by scientific and technological development to improve the overall English language level and learning ability.

CHAPTER 2
REVIEW OF THE LITERATURE

This chapter focused on reviewing the previous studies related to the following area relevant to this research.

2.1 Artificial Intelligence

2.2 The Squirrel AI Learning System

2.3 Individual Difference

2.4 English Proficiency

2.5 Learning Achievement

2.6 Efficiency of Learning

2.7 Literature Review of the Relevant Research

2.1 Artificial Intelligence

2.1.1 Symbolic AI as the core of logical reasoning.

Also known as logicism, psychology or computer school, it believes that human cognitive primitive is symbol and cognitive process is the operation process of symbol. Both human and computer are physical symbol systems, so computer symbol operation can be used to simulate human cognition. Knowledge is the form of information and the basis of intelligence. The research method of semiotic school is to take symbol processing as the core and simulate the psychological process of human solving problems through symbol processing. The semiotic school can also be called the functional simulation school. They believe that the theoretical basis of intelligent activities is the physical symbol system, the basic element of cognition is symbols, and the cognitive process is the operation and processing process of symbol mode. Functional simulation is the earliest and most widely used research method of artificial intelligence. Functional simulation method takes symbol processing as the core to simulate the function of human brain.

According to the mental model of human brain, this method represents the problem or knowledge as a certain logical structure and uses symbolic calculus to realize the functions of representation, reasoning, and learning, to simulate the thinking

of human brain macroscopically and realize the function of artificial intelligence. Functional simulation method has achieved many important research results, such as theorem proving, automatic reasoning, expert system, automatic programming, and machine game. Functional simulation method generally uses display knowledge base and inference engine to deal with problems, so it can simulate the logical thinking of human brain and facilitate the realization of high-level cognitive function of human brain. Although functional simulation method can simulate the advanced intelligence of human brain, it also has shortcomings. When using symbols to represent the concept of knowledge, its effectiveness largely depends on the correctness and accuracy of symbol representation. When these knowledge concepts are transformed into symbols that can be processed by reasoning mechanism, some important information may be lost. In addition, it is difficult for functional simulation to process the information containing noise, uncertainty, and incompleteness. These situations show that it is impossible to solve all the problems of artificial intelligence by using the functional simulation method of symbolism alone. Represented by Minsky, Simon, and Newell, starting from people's thinking activities, the macro function simulation is carried out by computer. This school believes that the basic element of cognition is symbol, and intelligent behavior is realized through symbolic operation. It is based on the resolution method (resolution principle) proposed by American Robinson, represented by LISP and Prolog language, and focuses on the heuristic search and reasoning process in problem solving. This school has achieved success in the simulation of logical thinking, such as automatic theorem proving and expert system. In 1976, Simon and Newell put forward the hypothesis of physical symbol system and believed that the sufficient and necessary condition for the physical system to express intelligent behavior is that it is a physical symbol system. In this way, any information processing system can be regarded as a specific physical system, such as human nervous system, computer construction system and so on. The so-called symbol is a pattern. Any pattern is a symbol if it can be different from other patterns. For example, different English letters are different symbols. The operation of symbols is to compare symbols, that is, to find out which symbols are the same and which symbols are different. Starting from the research of psychology, Minsky believes that people use many knowledges obtained from previous experience and sorted out in their daily cognitive

activities. This knowledge is recorded in the human brain in a structure like the frame, so he puts forward the expression method of frame knowledge. Minsky believes that there is no unified theory of human intelligence. In 1985, he published the society of mind, which pointed out that thinking society is a complex society composed of many units with certain thinking ability.

2.1.2 Data-driven as the core of machine learning.

Connectionist school can also be called structural simulation school. They believe that the basic element of thinking is not a symbol, but a neuron, and the cognitive process is not a symbol processing process. They proposed to simulate the structure of the human brain, that is, to simulate the intelligence of the human brain according to the physiological structure and working mechanism of the human brain, which belongs to the category of non-symbolic processing. Because the physiological structure and working mechanism of the brain are far from clear, now we can only simulate or approximate the part of the human brain.

The human brain is a neural network composed of an extremely large number of nerve cells. The structure simulation method realizes the simulation of human brain intelligence through human brain neural network, the connection between neurons and the parallel processing between neurons. Different from the functional simulation method, the structural simulation method is based on the physiological model of human brain, which simulates human brain from the micro level through numerical calculation to realize artificial intelligence. This method learns from the training of neural network, obtains knowledge, and is used to solve problems. Based on network connection, the artificial intelligence school, which is based on the connection mechanism and learning algorithm built by neural network and grid, believes that human thinking unit is the main feature of neuron rather than symbolic connectionism: information processing is realized through the parallel cooperation between neurons, and the processing process is parallel, dynamic and global, which can realize the function of association, It is convenient to process noisy information. Learning and classification can be realized by adjusting the connection strength between neurons. When solving the problem, an approximate solution can be obtained quickly. Connectionism has made important breakthroughs in image processing, pattern recognition and other fields, but connectionism is not suitable

for solving logical thinking and developing a variety of knowledge. Represented by McCarthy and N.J. Nillson, they advocate using logic to study artificial intelligence, that is, using formal methods to describe the objective world. First of all, intelligent machines must have knowledge about their own environment; Secondly, general intelligent machines should be able to declaratively express most of the knowledge about their own environment; Thirdly, the language of general intelligent machine to express declarative knowledge must have the expression ability of first-order logic at least. In the research of artificial intelligence, the logic school emphasizes the representation of conceptual knowledge, the semantics of model Analects, deductive reasoning and so on.

2.1.3 Exploration and exploration as the core of reinforcement learning.

Behaviorism school can also be called behavioral simulation school. They believe that intelligence does not depend on symbols and neurons, but on perception and action, and put forward the "perception action" model of intelligent behavior. The structure simulation method believes that intelligence does not need knowledge, representation, and reasoning; Artificial intelligence may evolve like human intelligence; Intelligent behavior can only be expressed by interacting with the surrounding environment in the real world. The "perception action" mode of intelligent behavior is not a new idea. It is an effective method to simulate the automatic control process, such as self-adaptation, self-optimization, self-learning, self-organization and so on. Now, use this method to simulate intelligent behavior. The ancestor of behaviorism should be Wiener and his cybernetics, and Brooks's hexapod walking robot is just a representative work of behavior simulation (i.e., controlled evolution) to study artificial intelligence, which opens a new way for the study of artificial intelligence. Although behaviorism has attracted extensive attention, Brooks's robot insect simulates only low-level intelligent behavior, which cannot lead to advanced intelligent control behavior, nor can it make intelligent machines evolve from insect intelligence to human intelligence. However, the rise of behaviorism school shows that the ideas of cybernetics and systems engineering will further affect the research and development of artificial intelligence Represented by R.A. Brooks and others, they believe that intelligent behavior can only be shown in the real world in the process of interaction between the system and the surrounding environment. In 1991, Brooks proposed intelligence without knowledge representation

and intelligence without reasoning. He also developed a kind of robot insect based on his view. The machine uses some relatively independent functional units to realize the functions of avoidance, advance and balance respectively, and forms a layered asynchronous distributed network. The school pioneered a new method of robot research.

The main viewpoints of this school can be summarized as follows: firstly, intelligent system interacts with the environment, that is, it obtains information (perception) from the running environment and exerts influence on the environment through its own actions; Secondly, it is pointed out that intelligence depends on perception and behavior, and a "perception behavior" model of intelligent behavior is proposed. It is considered that intelligent systems can evolve step by step like human intelligence without knowledge, representation, and reasoning; Thirdly, emphasize the importance of intuition and feedback. Intelligent behavior is reflected in the interaction between system and environment. Function, structure, and intelligent behavior are inseparable. It is an intelligent model based on biological behavior. It believes that artificial intelligence can evolve gradually like human intelligence, and that intelligence depends on perception and action. Therefore, it is also called behaviorism. They believe that symbolism and connectionism are too abstract in the description of real things and intelligent behavior patterns, so they cannot truly reflect the objective things. The theoretical core of R. brooks of MIT is to replace representation with control, to eliminate concepts and models, it also emphasizes the possibility and necessity of hierarchical structure for intelligent evolution. He believes that the intelligence of a machine should be reflected in its timely response to environmental stimuli, its adaptability to the environment and its ability to survive in a complex environment and emphasizes that an agent should work in its field. Through interaction with the environment, it can express and increase its intelligence, Brooks's exploratory work represents the birth of a new research direction of artificial intelligence-situated al. Because Brooks's view of artificial intelligence is completely different from the traditional view of artificial intelligence, some people divide the current research direction of artificial intelligence into two directions: traditional artificial intelligence and field artificial intelligence. The traditional view of artificial intelligence represented by Carnegie Mellon University (CMU) holds that intelligence is manifested in deep understanding of the environment and thoughtful

reasoning and decision-making. Therefore, intelligent systems need powerful sensing and computing equipment to support complex environmental modeling and decision-making schemes to find the right answers. They adopt the so- called vertical architecture of environmental modeling - Planning - control. Field artificial intelligence emphasizes the interaction between the agent and the environment. In order to realize this interaction, the agent should obtain information from the environment on the one hand and exert influence on the environment through its own actions on the other hand.

2.1.4 The content of artificial intelligence

The basic contents of artificial intelligence research include Search technology; Knowledge representation; Planning methods; Machine learning; Cognitive science; Natural language understanding and machine translation; Expert system and knowledge engineering; Theorem proving; Data mining and knowledge discovery; and Human computer interaction technology and so on.

The purpose of knowledge representation artificial intelligence research is to establish a system that can simulate human intelligent behavior, but knowledge is the basis of all intelligent behavior, so we should first study the method of knowledge representation. Only in this way can we store it in the computer and use it to solve practical problems. Knowledge representation methods can be divided into two categories: symbolic representation (the method of combining various symbols containing specific meanings to represent knowledge in different ways and sequences) and connection mechanism representation (the representation of knowledge by neural network). Machine perception the so-called machine perception is to make the machine (computer) have the perception ability like human beings, mainly machine vision and machine hearing. Machine perception is the basic way for machines to obtain external information. Machine thinking the so-called machine thinking refers to purposeful processing through perceived external information and various working information inside the machine. Machine learning machine learning is to study how to make the computer have the learning ability like human beings, so that it can automatically obtain knowledge through learning. Machine behavior machine behavior mainly refers to the expression ability of computer, that is, the ability of "speaking", "writing", "painting" and so on. For intelligent robot, it should also have the function of human limbs, that is, it can walk, take things, operate and so on.

2.1.5 The direction of artificial intelligence

The research direction of artificial intelligence is divided into six directions: robot technology, machine vision, language understanding and communication, machine learning, cognition and reasoning, game, and morality. Robot technology involves many aspects of knowledge, mainly including control technology, action planning, dynamics, system structure, sensing technology, etc. The main contents of machine vision include image segmentation, threshold setting, image sampling, photometric stereo vision and so on. Machine learning is specialized in studying how computers simulate or realize human learning behavior, to obtain new knowledge or skills, reorganize the existing knowledge structure and continuously improve its own performance. It is not only the core of artificial intelligence, but also the fundamental way to make computers intelligent. Cognition and reasoning refer to the thinking ability of robots, mainly including the cognition and reasoning of various physical and social common sense; Game and morality mainly include multi- agent, robot and social integration, interaction, confrontation, and cooperation. The most pressing question people want to know about A.I. is, can it really be as smart as people? Many scientists believe that it is only a matter of time. A. I. Kurzweil, a software designer, believes that A.I. can be smarter as late as 2020. Horn of IBM estimates that it is conservative. He believes that it will take 40-50 years for A.I. to catch up with others. At & T's Stone said his goal is to form an A.I. football team that can only challenge Manchester United by 2050. He's not kidding.

In many ways, the A.I. brain has an advantage over humans. The process of human brain learning and absorbing new knowledge is very slow. It takes at least half a year or two or three years to speak fluent English (except for the examples in bragging advertisements). To make A.I. learn to speak French, just install a French speaking software for it, and an A.I. French expert was born in a few seconds. Another more difficult question to answer can A.I. have emotion. At present, no one is sure to answer this question. So, the most terrible question remains: can A.I. robots become smarter than humans and fight against humans? Kurzville, technologist bill joy believes this is not impossible. Horn is not very sure about this issue. Horn believes that although the rough computing ability of computer can surpass that of human beings, it cannot have all the

fine characteristics of human beings, because human beings do not understand many subtle abilities of their brain, let alone imitate the corresponding software. Kurwitz is optimistic. He believes that while developing super A.I., mankind will also improve their guidance and management, so it will always be in the front and control. From the above analysis, we can understand that artificial intelligence has been highly valued by the world from academia to application field. To make our proposition better and make our country catch up with and surpass the foreign advanced ranks in the field of artificial intelligence, we should increase research and investment and cultivate more super first-class talents.

2.1.6 The applications of artificial intelligence

Applications of artificial intelligence cover a wide range, including medicine, diagnosis, finance and trade, robot control, law, scientific discovery, and toys. Many kinds of AI applications go deep into the foundation of each industry. In the 1990s and early 21st century, artificial intelligence technology has become an element of large-scale system; But few people believe that this is an achievement in the field of artificial intelligence. The main application fields of artificial intelligence include: 1) Agriculture. 2) Communication. 3) Medical aspects. 4) Social security. 5) In the field of transportation. 6) Service industry. 7) Financial industry. 8. Big data processing. 9. Education. Many AI technologies have been used in agriculture, such as UAV spraying pesticides, weeding, real-time monitoring of crop status, material procurement, data collection, irrigation, harvest, sales, etc. Through the application of artificial intelligence equipment terminals, the output of agriculture and animal husbandry has been greatly improved, and many labor costs and time costs have been greatly reduced. Intelligent outbound call system, customer data processing (order management system), communication troubleshooting, virus interception (360, etc.), harassment information interception, etc. use the most advanced Internet of things technology to realize the interaction between patients and medical personnel. Many AI technologies have been used in agriculture, such as UAV spraying pesticides, weeding, real-time monitoring of crop status, material procurement, data collection, irrigation, harvest, sales, etc. Through the application of artificial intelligence equipment terminals, the output of agriculture and animal husbandry has been greatly improved, and many labor costs and time costs have been greatly reduced. Intelligent outbound call system, customer data processing (order management system),

communication troubleshooting, virus interception (360, etc.), harassment information interception, etc. use the most advanced Internet of things technology to realize the interaction between patients and medical personnel, medical institutions, and medical equipment, and gradually achieve informatization. institutions and medical equipment, and gradually achieve informatization.

2.2 The Squirrel AI Learning System

Squirrel AI Learning is one of the first Chinese developers to introduce an adaptive learning system in its online education platform. Squirrel AI Learning has developed instructional materials for middle school mathematics, English, physics, Chinese, and chemistry (for a fuller description of the Squirrel AI Learning system, see Li et al., 2018). The Squirrel AI Learning system, since its development in 2016, has established over 2,000 learning centers in over 700 cities serving almost 2 million registered accounts. This usage base represents a broad range of student populations with respect to socioeconomic status, urbanicity, and academic achievement. Squirrel AI Learning's rapid uptake since its start in 2016 indicates that adaptive learning addresses substantial needs in the Chinese after-school tutoring market. More research is needed to ensure that this growing trend is truly supportive of students' learning in this context. Unlike traditional Chinese teacher-centered instruction, the Squirrel AI Learning online system provides student-centered, personalized, interactive, and data-analytics-driven instruction to enrich students' learning experiences. Figure 1 demonstrates the Squirrel AI Learning system. Squirrel AI Learning's product design is grounded in many of the same principles that inform excellent instructor-to-student instruction. These include:

- Formative assessments to determine the student's ability level,
- Problems targeted to the student's ability level,
- Instant, intelligent feedback including elaborated explanations, and
- Supports (e.g., tutorials) differentiated by ability level.

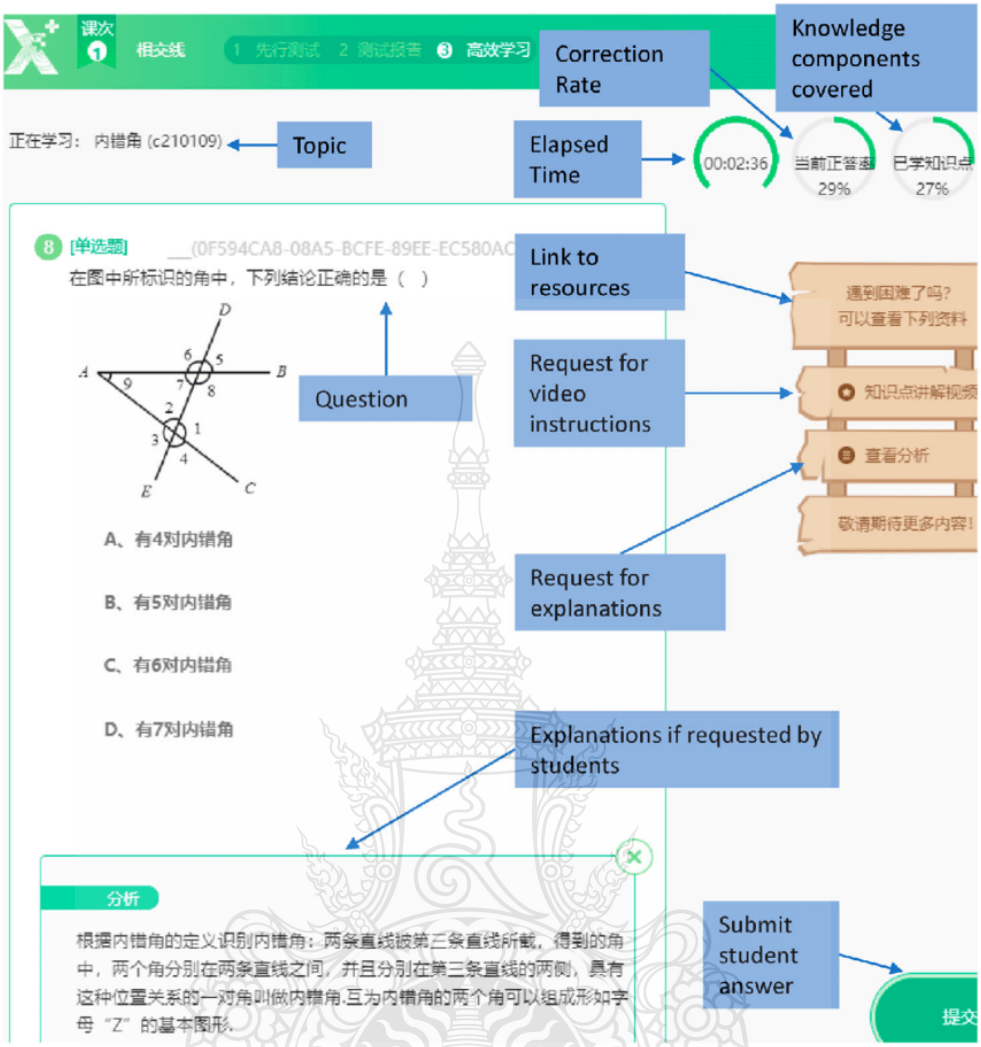

Figure 2.1 Demonstration of Squirrel AI Learning adaptive learning system.

2.3 Individual Difference

Individual differences among learners have long been recognized as affecting learners' learning. Therefore, academics have recognized the need to design teaching and learning and provide an environment to match individual differences and has studied for a long time on this issue (Glaser, 1977). But the variables selected to be used in this research study were the cognitive abilities variables.

Difference variables affect learning There are many educators who seek links between individual differences variables and learning outcomes (Cronbach and Snow, 1981). The important ones are as follows.

1) Intellectual ability (Intellectual Ability) Many types of cognitive abilities interact with teaching, such as Crystalized Intelligence or intelligence that is based on learning and experience. These intelligences are the crystals or sediments that come from the experience and learning of a person. which includes the ability to rationally evaluation, etc., and Fluid Intelligence or independent intelligence without learning and experience. This intelligence comes from heredity. It consists of many types of abilities such as reasoning, inference, visualization, relation of things, etc., and is inserted into thinking, memory, problem solving, etc.

2) Learning Style Learning style refers to different behaviors of learners. which is an indicator of how a person learns and how to adapt to their environment The learning model also guides how a person's mind works. Appropriate student characteristics will help the teaching activities to be most effective. A large amount of research on learning styles shows that learners tend to choose the style they are comfortable with when learning. and in some cases, learners can adapt their learning styles or methods according to the nature of the content to be learned (Kolb, 1984). The design of teaching activities must seriously consider the learner's style. For this reason, the learning style has received the attention of many educators.

3) Cognitive Style Thinking styles feature perceptions, memory, thinking, problem solving, and decision-making, but they do not reflect a person's abilities. It is a form or style to bring out talent. Existing capability is not a feature that indicates the level of competence available. There are many different types of thinking studies such as Field Dependence-Field Independence, Reflectivity-Impulsivity, Haptic-Visual, Leveling-Sharpening, Cognitive Complexity-Simplicity, Constricted-Flexible Control, etc.

4) Prior Knowledge pre-learning knowledge It is important because it is directly related to teaching and learning activities and many studies have shown the effect of pre-learning knowledge in predicting student achievement and teaching support needs. pre-study knowledge It needs less teaching and learning support to successfully complete the activity. In addition, pre-learning knowledge has a strong linear relationship with interest in the course. Pre-learning knowledge can be divided into 2 parts, namely, knowledge in relevant basic subjects (Entry Behavior), which is necessary for understanding and

learning in one course, and the other part is Knowledge of the content to be learned which was measured by the pre-study test

5) Stress/Anxiety Learners with high stress levels do poorly on tests. Because of the research results showed that stress levels are high. It interferes with the brain processes that control learning (Deutsch and Tobias, 1980 as cited in Park and Lee, 2004). Learning outcomes are higher than students who are stressed but do not have the option of reviewing, for example.

6) Achievement Motivation Achievement Motive is the motivation that drives a person to have the desire to accomplish things both professionally and personally. It is known that achievement motivation is a psychological determinant of academic achievement. There is evidence from studies indicating that motivation needs to be stimulated for each activity.

7) Power of one's own abilities (Self-Efficacy) This power of one's abilities influences a person's intelligence and social behavior. This included learning achievement (Bandura, 1982 as cited in Park and Lee, 2004). Therefore, learners will have different feelings about their abilities in context.

2.4 English Proficiency

2.4.1 Meaning of English proficiency

English language proficiency is described as the degree of learner's skill with which a learner can use a language, consisting of how nicely a learner, read, write, speak, or apprehend the language. In addition, it additionally refers to a learner's skill in the use of the English language for a selected purpose. English proficiency can be measured using a proficiency test consisting of TOEFL (Test of English as a foreign language) and TOEIC (Test of English for International Communication (Richard et al; Davies et al.,1999)

2.4.2 Proficiency Stage of English language learners

The proficiency stage is the standard for assessing the development of obtaining a new language. It includes the cap potential of the learners. The cap potential itself is elaborated into four skills: they're listening, speaking, reading, and writing. TOEIC tests are the international standardize proficiency test. The skills which are tested

in TOEIC proficiency test are the listening and reading comprehensions. It contains the familiar content for everyday English speaker. The TOEIC test is believed successful in assessing the student's progress in overall English language ability (Lougheed, 2006)

TOEIC divides the proficiency stage into six levels: they're novice, elementary, intermediate, simply working proficiency, advanced working proficiency, and general professional proficiency. Each level will be elaborated as follows:

2.4.2.1 General professional proficiency (905-990) is the extent of students who apprehend the conversation of native speakers of English. They can read adequately for most functional needs

2.4.2.2 Advanced working proficiency (785-900) is the extent of students who can apprehend the most work-related situation. They can function their understanding in all situations but with a greater degree of facility and accuracy. The students also read many types of documents with varying degrees of ease and little use of a dictionary

2.4.2.3 Basic working proficiency (605-780) is the extent of students who can understand explanations of work problems and discussion of current events by native speakers of English. They read with occasional use of the dictionary and also start to read many news articles and popular novels

2.4.2.4 Intermediate (405-600) is the extent of students who can apprehend explanations related to the routine work and limited social conversation, the students only understand basic technical manual for beginners with high use of a dictionary

2.4.2.5 Elementary (255-400) is the extent of students who can apprehend simple exchange in everyday professional or personal life with non-native English speakers. They only read the simple dictionary and mostly use a dictionary

2.4.2.6 Novice (10-250) is the extent of students who can apprehend immediate simple exchange survival needs and use simple questions. They simplest recognize and examine easy notes and lists. They are likely to read and translate word by word.

2.5 Learning Achievement

According to Muhibbin Shah (2008, p.91), learning achievement is the "degree of student success in learning the subject matter in schools, as indicated in the form of scores received from the results of tests on a certain subject matter." Meanwhile, Tu'u Sincere (2004, p.75) states that "learning achievement is the acquisition of knowledge or abilities created by subject matter, commonly shown by test scores or numerical value awarded by teachers." Based on this understanding, it can be concluded that learning achievement is the percentage of pupils who succeed in school and is expressed as a numerical figure.

It refers to how far a student has progressed toward their short- or long-term educational objectives. Individual disparities in academic achievement are significantly linked to personality and IQ differences. Students' levels of self-efficacy, self-control, and drive also impact their academic performance.

Achievement motivation is considered to be a significant factor of academic success since it energizes and focuses behavior toward achievement. Achievement motivation is a broad term that encompasses a number of concepts such as motivational beliefs, task values, objectives, and achievement motives. However, there are only a few studies that looked at 1) several motivational factors in relation to students' academic accomplishment in a single sample and 2) also considered students' cognitive ability and prior achievement. Because students' cognitive abilities and their prior achievement are among the best single predictors of academic success (e.g., Kuncel et al., 2004; Hailikari et al., 2007), it is necessary to include them in the analyses when evaluating the importance of motivational factors for students' achievement.

2.6 Efficiency of Learning

Instructional materials have been observed as a powerful strategy to bring about effective teaching and learning. The importance of quality and adequate instructional materials in teaching and learning can occur through their effective utilization during classroom teaching. Instructional materials here include all the tools that the teachers can use to make the learning more interesting and memorable. According to Farombi, (1998), instructional materials include books, audio-visual, software, and hardware of educational

technology. He further opines that the availability, adequacy, and relevance of instructional materials in classrooms can influence quality teaching, which can have a positive effect on students' learning and academic performance. The insight from Farombi on linking instructional resources to students' academic performance serves critical in the provision of quality education. According to Oni (1992), instructional resources are teachers' strategic factors in organizing and providing education. This is so because they help to elaborate a concept that the teacher could not, without an instructional material. This allows 2 students to learn more comfortably, therefore, influencing positively their academic performance. Writing on the role of instructional materials in teaching and learning, (Balogun, 1982) commented that science education programs cannot be taught effectively without the existence of equipment for teaching.

2.7 Literature Review of the Relevant Research

Here is numerous research which can be applied to investigate to be accomplished via way of means of researchers.

Siti Fatimah Omar (2020) research on interactive language learning activities for learners' communicative ability, examined learners' communicative in English language has been unsatisfactory due to the factors that affect their self-confidence and motivation to speak. However, the problem persisted even though ways were used to overcome the lack of communicative ability among learners in Malaysia. Therefore, this study was conducted to address learners' perceptions of interactive language learning activities in improving English-speaking ability. The study aimed to analyze the effectiveness of the interactive language learning activities in motivating learners to speak in language classroom. A set of questionnaires containing two sections with 30 questions was administered. There were 50 primary school learners selected randomly to participate in this study. The results were collected and presented in the form of tables. The finding showed that self-confidence, motivation and learning environment affect the learners' English language speaking ability and the results indicated that interactive language learning activities are able to overcome problems pertaining to communicative in language classroom. In conclusion, interactive language learning activities improved the learners' English language speaking ability.

Emine Bala. (2020). research on the impact of out-of-class language activities on English as a foreign language proficiency of private university students - (a case of Erbil), examined the most frequent activities in which English is practiced are entertaining activities like watching movies, videos, and surfing on the Internet, and that the level of the students' involvement in English language activities outside the classroom is positively associated with their language proficiency. This research could be beneficial for language teachers to show how to encourage their students to start practice outside the classroom, for students to offer some ways to augment their language proficiency with the application of English in authentic environments, and for educational administrators to give some ideas for curriculum design including out-of-class learning.

Anita Habók and Andrea Magyar. (2018). research on the effect of language learning strategies on proficiency, attitudes and school achievement, examined Hungarian students mainly engage in metacognitive strategies in both years. Differences between more and less proficient language learners' strategy use have also been found. With regard to the effect of LLS on foreign language attitude, the foreign language mark and school achievement, path analysis indicated a good fit in both years. The metacognitive, social and memory strategies primarily influenced foreign language attitudes and marks in Year 5. The metacognitive strategies had a slight impact on school achievement as well as on foreign language marks. We demonstrated the dominant effect of metacognitive strategies and the low effect of memory strategies in Year 8. In addition, metacognitive strategies also influenced foreign language marks. The effect of foreign language marks on school achievement was also remarkable. There was a strong impact on the children's attitudes through these variables.

Thidarat Kulnattarawong and Kiatisak Punlumjeak (2018) research on development of intelligent tutoring web-based system for individual difference on the learning style to enhance learning achievement of undergraduate students, examined the effectiveness of the intelligent tutoring web-based system for individual difference on the learning style to enhance learning achievement of undergraduate students (KW-CAI) were 81.39 percent which the criterion of 80 percent. This may be due to the benefits of the various communication features available in the Internet for maximum learning efficiency, and

organizing learning activities to achieve their own goals as a result, learners can learn by themselves. This is an important feature for learners to be successful in learning on the web.

Rungroj Srijunkaew (2022) research on the results of using Kahoot application on knowledge in cognitive domain the basics of trigonometric ratios of students in Grade 9, examined the achievement of additional mathematics courses 6 of the 3rd graders after the development of knowledge of the cognitive domain in basics trigonometric ratios using the Kahoot application was 70 percent higher than the threshold with a statistical significance of .05, and the level of satisfaction scores of Grade 9 Students who were given the activity to develop their knowledge of the cognitive domain in basics trigonometric ratios using the Kahoot application were at a high.

Chat Chuchuen (2019) research on the learning outcome of English subject by lesson one for kids application using augmented reality technology, examined it was found that learning by Lesson One could increase the potential in English vocabulary memorizing among the students at the statistical significance level of .05. The suggestion provided to the future research is to add more English vocabulary from other categories and to develop games to apply to this learning media.

Thus, it could be said that these empirical studies highlighted the strong connection between individual difference, artificial intelligence, English proficiency, learning achievement, social skills, collaboration, interaction, and enjoyment. These essential components could help the students to achieve their success or accomplish their learning objectives with the forms of challenges in the learning. The use of artificial intelligence application, therefore, becomes an effective tool to revolutionize the traditional learning process into an educational gimmick that has crossed over between artificial intelligence application, learning achievement of secondary students with individual difference skill in English language and educational activities, which offers students an experiential element that is more effective than traditional learning within the digital transformation trends in education.

CHAPTER 3
RESEARCH METHODOLOGY

This paper will study for the use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language and retort questions after a thorough investigation into the collection and analysis of data using quantitative methods. The researcher discusses the methodology used in this chapter. It is devoted to the method by which this study was conducted. The method is composed of the following components.

3.1 Research Design

3.2 Population and Sample

3.3 Research Instrument

3.4 Data Collection

3.5 Data and Statistical Analysis

3.1 Research Design

The research design was conducted according to the following structure in the objective of the research; it has been moving with steps as flowing:

The researcher used a quantitative approach in experimental design for conducting this study. The data was collected in a quantitative or numerical form derived from the test, and the researcher used a one-group pretest-posttest design. This design included a pretest measure followed by a treatment and a posttest for a single group. An illustration of the design is as follows:

Group: O1 x O2

O1 = Measurement of the pretest score

X = artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language

O2 = Measurement of the achievement of the posttest score

3.2 Population and Sample

3.2.1 The population of this study were 100 students of grade 7 in the academic year 2022 from NO.2 middle school, China.

3.2.2 The sample of this study were 30 students of grade 7 with English Conversation subject at NO.2 middle school, China during the school year 2022. They were selected by using purposive sampling as they were the students of the researcher who was responsible for teaching this course.

3.3 Research Instrument

3.3.1 The artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

Materials for online learning

1) Artificial intelligence application, the Squirrel AI Learning online system provides student-centered, personalized, interactive, and data-analytics-driven instruction to enrich students' learning experiences.

Squirrel AI Learning's product design is grounded in many of the same principles that inform excellent instructor-to-student instruction. These include:

- Formative assessments for determine the student's ability level.
- Problems targeted to the student's ability level.
- Instant, intelligent feedback including elaborated explanations.
- Supports or tutorials differentiated by ability level.

2) Textbook

The textbook used in this study is PW. Secondary Conversation 1 which was used as the core book for the students in the first semester of the 2022 academic year at the participant's school of NO.2 middle school, China.

3) Lesson plans for the guideline to enhance the English proficiency.

In the current study, the researcher created the lesson plans for six weeks to plan what and how to teach the students each week.

According to the course description, the students who enrolled in English Level 1 subject have to attend this course 1 time per week and 1 hour per class

(English conversation using artificial intelligence application is done only in the second half-hour of the teaching period). The details of each week are provided below:

Week 1: The researcher introduced herself as a teacher, contributed a course syllabus to students and provided them with the course description and other necessary details. After that, the teacher had the students introduce themselves one by one in front of the class in order to break the ice among them. After this, the researcher assigned the students to do a pretest containing new vocabulary they were going to learn from unit 1. Assigning the students to do the pretest provided the researcher with an opportunity to explore the students' background knowledge of the target vocabulary.

Week 2: Guide pre practice and store language materials. Teachers arrange students to carry out independent learning through the network teaching platform. Students watch the micro class, understand the topics to be discussed in the class, and complete the task of following words through the artificial intelligence app system to accumulate necessary vocabulary to prepare for teaching. Through the teaching platform, teachers can track the learning process of students, get the feedback of practice, and diagnose and analyze the learning results to determine classroom teaching strategies.

Week 3: In class: words, sentences, paragraphs, and layers. Teachers use relevant AI application in class to carry out online and offline cooperative learning. Learning and independent learning. Review and stabilize new words through classroom games or quizzes to effectively stimulate students' interest in learning. Teachers can help students solve difficulties according to the response of the teaching platform. Teachers assign tasks, set up oral situations solve the sentence patterns so that students can store the necessary knowledge for later oral practice. Teachers gradually arrange sentences dialogue, paragraph, text and other tasks, guide students to step by step, imitate pronunciation, intonation, pause, etc., and understand the organization, constructive and linguistic features.

Week 4: Students with different English proficiency complete tasks of different difficulty, so as to prevent some students from completing tasks, you can only wait for other students to finish the task. The background of the spoken language training system automatically determines the students' pronunciation accuracy, reading fluency

score for flexibility. While students are practicing, teachers can view the students analyzed by the system in the background of the oral training system. The completion and existing problems can be spot checked for each student's practice audio, and then targeted one-to-one guidance can be given. Before the end of the class, teachers can assign similar tasks, guide students to apply what they have learned, and independently completely new tasks.

Week 5: Form works, share and comment on each other, and students continue to cooperate after class, having dialogues in groups and imitating speeches. The peer corrects each other, corrects mistakes, and improves the manuscript. Then the dialogue is imported into the spoken language training system, and the system automatically synthesizes speech. After reading the materials, the students can correct the pronunciation errors until they can speak fluently. Then, students will make their conversation and play a role. The dialogue or speech is recorded into audio and uploaded to the teaching platform. Teachers can make comments and select excellent works and the whole class share. Students can evaluate each other to achieve the effect of mutual learning.

Week 6: The title is: Where would you like to visit? Make full use of the AI application to create teaching scenarios related to the topic of this lesson, such as world maps, scene dialogues of various famous scenic spots, etc. Centering on the teaching objectives of this unit, design some teaching tasks that are close to the students' actual situation, and let students talk about where they want to go to express their love and yearning for the world, so as to further enhance their English listening, speaking, reading and writing abilities and language practical application abilities.

3.3.2 Procedure

Step 1: The researcher studied theories of English conversation and attitude measurement to develop the questions in the pretest, posttest, and questionnaire.

Step 2: The pretest, posttest and questionnaire were reviewed by the researcher’s advisor and other experts in the field.

Step 3: The pretest, posttest and questionnaire were piloted with 30 grade 7 students who enrolled in the English conversation subject but were in not the same group as the participants of the study.

Step 4: A group of 30 grade 7 students, who were enrolled in the subject of English Conversation at the NO.2 middle school, China was assigned to complete the pretest. The test time was approximately one hour.

Step 5: The researcher created the lesson plan based on applying use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. This lesson plan was designed for six weeks and approved by the researcher's advisor and experts in the field.

Step 6: The researcher ran the class based on the lesson plan. The students were taught English conversation through use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language for six weeks. After that, they were assigned to complete both the post-test and questionnaire. The test time was approximately one hour.

3.3.3 Study the efficiency of use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

3.3.3.1 Find the use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language according to E1/E2 = 80/80 (Chaiyong Brahmawong, 2009). (E1) is the percentage of the average or means of all scores the students earn from their activities or assignments, such as drills, exercises, project works, etc., or other types of formative evaluation. (E2) is the percentage of the average or means of all scores the students earn from their post-test, final examinations, and other summative evaluation.

3.3.3.2 Evaluation of use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language from three content experts and three media experts.

1) The assessment of content quality aspects of use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language for content experts. The content experts who work in the field of English were asked to check the appropriateness of the content used in the artificial intelligence application for individual difference in English language.

2) The assessment of media quality aspects of use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language for media experts. The media experts who work in the field of information technology, computer and education technology or related fields were asked to check the appropriateness of the media used in the use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

3) The researcher did the following steps:

Step 1: The assessment in this study has been developed to fit the study hypothesis. Consequently, it was developed based on both theories that have been utilized in this study. The study shows that use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. The aim of questionnaire has two main sections.

Part 1: The first section aims to measure experts' opinion with the use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. This part was a close-ended questionnaire that was based on the five (5) point Likert-type scales. The participants were asked to rate their degree of agreement on each statement from numbers 1-5. The interpretation of each number is described as follows:

5 = Strongly Agree
4 = Agree
3 = Undecided
2 = Disagree
1 = Strongly Disagree

Table 3.1 Range of mean and verbal interpretation

Range Value	Verbal Interpretation
4.50 - 5.00	Excellent
3.50 - 4.49	Good
2.50 - 3.49	Average
1.50 - 2.49	Poor
1.00 - 1.49	Very Poor

Part 2: This part was an open-ended questionnaire. The participants were asked to express their opinions and suggestions through use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

Step 2: Before trying out the assessment, three measurement and evaluation experts who work in the field of measurement and evaluation or education were asked to check the appropriateness of the language used in the questionnaire. The data obtained were used to calculate the Item Objective Congruence index (IOC).

The results of evaluation assessment with content quality of item objective congruence index (IOC) by measurement and evaluation experts found that the value of item objective congruence index (IOC) was 0.93 then take the assessment to content experts for further evaluation and results of evaluation assessment with media quality of item objective congruence index (IOC) by measurement and evaluation experts found that the value of item objective congruence index (IOC) was 0.93 then take the assessment to media experts for further evaluation.

The evaluation criteria were used for checking the congruence between objectives and items of the test as follows:

Table 3.2 Value of item objective congruence index (IOC) and verbal interpretation

+1	item is considered congruent with the objectives.
0	item is considered neutral in terms of whether it was congruent with the objectives.
-1	item is considered not congruent with the objectives.

The total mean score of the Item-Objective Congruence (IOC) Index is supposed to be higher than 0.5 for acceptable data.

Step 3: The assessment will be used by experts. For the assessment of content quality aspects of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language for content experts and the assessment of media quality aspects of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language for media experts.

3.3.4 The achievement assessment (Pretest and Posttest)

A pretest and posttest shared the same items. Both contained 40 questions related to English conversation that they have learned in the class: 20 items contained English conversation taught with an artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language approach. The students were assigned to do the pretest before learning English conversation through the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language and do the posttest after learning through this approach. The researcher went through the following steps:

Step 1: The researcher selected the test types. Multiple-choice tests were chosen to use in the study.

Step 2: The second section of the questionnaire has been developed to measure students' academic achievement on artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

Step 3: Three measurement and evaluation experts who work in the field of measurement and evaluation or education were asked to check the congruence between objectives and items in the test. The data obtained were used to calculate the Item Objective Congruence index (IOC).

The evaluation criteria were used for checking the congruence between objectives and items of the test as follows:

Table 3.3 Value of item objective congruence index (IOC) and verbal interpretation of achievement assessment

+1	a test item is considered congruent with the objectives.
0	a test item is considered neutral in terms of whether it is congruent with the objectives.
-1	a test item is considered not congruent with the objectives.

The total mean score of the Item-Objective Congruence (IOC) Index is supposed to be higher than 0.5 for acceptable data.

Step 4: Both the pretest and posttest were tried out with 30 students of secondary students who have English conversation subjects who were enrolled in the NO.2 middle school, China but were not the samples of this study. After the tests have been tried out, used in finding the difficulty index, discrimination index and reliability index of the achievement test. it was found that the difficulty index should be between 0.2-0.8, the discriminant index should be 0.2 or higher and reliability should be 0.8 or higher using Kuder-Richardson's K-R#20 formula.

Step 5: The pretest and posttest are used with the participants to explore their English conversation knowledge before and after learning English conversation through artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

3.3.5 The questionnaire on students' satisfaction with artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

The questionnaire was used to ask about the students' learning using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. The researcher did the following steps:

Step 1: The questionnaire in this study has been developed to fit the study hypothesis. Consequently, it was developed based on both theories that have been utilized in this study. The study shows that using the artificial intelligence application to enhance

learning achievement of secondary students with individual difference skill in English language. The aim of questionnaire has two main sections,

Part 1: The first section aims to measure students' satisfaction with the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. This part was a close-ended questionnaire that was based on the five (5) point Likert-type scales. The participants were asked to rate their degree of agreement on each statement from numbers 1-5. The interpretation of each number is described as follows:

5 = Strongly Agree
4 = Agree
3 = Undecided
2 = Disagree
1 = Strongly Disagree

Table 3.4 Range of mean and verbal interpretation

Range Value	Verbal Interpretation
4.50 - 5.00	Excellent
3.50 - 4.49	Good
2.50 - 3.49	Average
1.50 - 2.49	Poor
1.00 - 1.49	Very Poor

Part 2: This part was an open-ended questionnaire. The participants were asked to express their opinions and suggestions towards learning through artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language in terms of achievements and satisfaction.

Step 2: Before trying out the questionnaire, three measurement and evaluation experts who work in the field of measurement and evaluation or education were asked to check the appropriateness of the language used in the questionnaire. The data obtained were used to calculate the Item Objective Congruence index (IOC).

The evaluation criteria were used for checking the congruence between objectives and items of the test as follows:

Table 3.5 Value of item objective congruence index (IOC) and verbal interpretation of questionnaire on students' satisfaction

+1	item is considered congruent with the objectives.
0	item is considered neutral in terms of whether it was congruent with the objectives.
-1	item is considered not congruent with the objectives.

The total mean score of the Item-Objective Congruence (IOC) Index is supposed to be higher than 0.5 for acceptable data.

Step 3: The questionnaire will be used by the participants to explore their satisfaction with learning through artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. The questionnaires were applied to secondary students.

3.4 Data Collection

Step 1: Introduce students to artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language of the NO.2 middle school, China.

Step 2: Produce the student's pre-test in order to receive the score.

Step 3: Conduct the learning activities with students by utilizing the lessons through the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

Step 4: Give student's a post-test after they studied with the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language, and the score to analyze by applying statistical methods.

3.5 Data and Statistical Analysis

3.5.1 The researcher conducted the data analysis as the following procedures:

3.5.1.1 Find the efficiency of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language according to E1/E2 = 80/80 (Chaiyong Brahmawong, 2009). (E1) is the percentage of the average or means of all scores the students earn from their activities or assignments, such as drills, exercises, project works, etc., or other types of formative evaluation. (E2) is the percentage of the average or means of all scores the students earn from their post-test, final examinations, and other summative evaluation.

Evaluation of use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language from three content experts and three media experts by mean and standard deviation.

3.5.1.2 Compare the achievement test before and after using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language by applying the t-test dependent.

3.5.1.3 Study the satisfaction of students in artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language by mean and standard deviation.

3.5.2 The basic statistics in data analysis are:

3.5.2.1 The formula for calculating the arithmetic mean ($\bar{X}$) is:

$$\overline{X} = \frac{\sum X}{N}$$

Whereas $\bar{X}$ = Average or Arithmetic Mean

$\sum X$ = Sum of all score result

N = Number of students

3.5.2.2 The formula for calculating the standard derivation (S.D.) is:

$$S.D. = \sqrt{\frac{\sum \left(x - \bar{x}\right)^2}{N}}$$

Whereas S.D. = Standard derivation

N = Number of students

$\bar{X}$ = Mean value

X = Student's score

3.5.2.3 The formula used to determine the quality of the instruments were: In finding content validity of the achievement test, we conducted the IOC formula (Item Objectives Congruence) by following the formula below:

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

Whereas IOC = Index of correspondence between the test and the objective

$\sum R$ = Sum of individual expert's value

R = Expert's rating

N = Number of experts

3.5.2.4 The formula used in finding the difficulty index of the achievement test were

$$p = \frac{R_{H+}R_L}{N_H + N_L}$$

Whereas P = difficulty level

RH = the number of people who chose the highest option rate

RL = the number of people who chose the lowest option rate

NH = the total number of people in the high group

NL = the total number of people in the low group

Table 3.6 Range of difficulty index and verbal interpretation

Difficulty Index	Verbal Interpretation
0.00 – 0.20	Very Difficulty
0.21 – 0.40	Difficult
0.41 – 0.60	Average / Moderately Difficult
0.61 – 0.80	Easy
0.81 - 1.00	Very Easy

3.5.2.5 The formula for calculating the item discrimination of the achievement test is:

$$r = \frac{R_H - R_L}{N_H or N_L}$$

Whereas r = Discrimination index

R_H = Number of correct responses in the high group

R_L = Number of correct responses in the low group

N_H = Total number of students in the high group

N_L = Total number of students in the low group

Table 3.7 Range of discrimination index and verbal interpretation

Discrimination Index	Verbal Interpretation
0.40 and above	Very Discriminating / Very Good Item
0.30 to 0.39	Discriminating / Good Item
0.20 to 0.29	Moderately Discriminating Item
0.10 to 0.19	Not Discriminating / Marginal Item
Below 0.10	Poor / Questionable Item

3.5.2.6 The formula for calculating the reliability of the achievement test K-R#20 by Kuder-Richardson is:

$$\text{rtt} = \frac{k}{k-1}\left[1 - \frac{\sum pq}{S^2}\right]$$

Whereas rtt = Reliability index

k = Number of test items

p = The proportion of the correct answer

q = The proportion of the incorrect answer

$S2$ = The variation of the entire test

3.5.2.7 The formula for calculating the variability of the achievement test is:

$$S^2 = \frac{n\sum fx^2 - \left(\sum fx^2\right)}{n(n-1)}$$

Whereas $S2$ = Variance

n = Number of students

x = Achievement test score

f = Data of frequency

3.5.2.8 The formula used to verify the hypothesis were: The formula used in analyzing the differences in achievement scores using the dependent t-test was:

$$t = \frac{\sum D}{\sqrt{\frac{n\sum D^2 - \left(\sum D\right)^2}{n-1}}}$$

Whereas $\sum D$ = Sum of variance score of achievement test

$\sum D^2$ = Sum of different squares of achievement test scores

$(\sum D)^2$ = Sum of variance score of the square test

n = Number of students

D = Difference between pre-test and post-test scores

3.5.2.9 The formula for calculating the efficiency values of E1/E2 = 80/80 are as follows:

$$E_1 = \frac{X_1}{A_1} \times 100$$

Whereas E_1 = Efficiency of the process

X_1 = Average score all students earned from the test

A_1 = Full scores of formative evaluations such as scores from activities, and assignments etc.

$$E_2 = \frac{X_2}{A_2} \times 100$$

Whereas E_2 = Efficiency of the product

X_2 = Average score all students earned from the test

A_2 = Full scores of summative evaluations such as scores from post-test or final works assigned to the students

CHAPTER 4
RESEARCH RESULT

This chapter reports descriptive analysis the use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. The findings are presented as follows:

4.1 Descriptive Data Statistic

4.2 Analysis Results

4.1 Descriptive Data Statistic

4.1.1 Study the efficiency for use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language by E1/E2 and evaluation of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language from three content experts and three media experts by mean and standard deviation.

4.1.2 Compare the learning achievement of students between pre-test and post-test scores using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language by t-test.

4.1.3 Study the satisfaction of students who using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language by mean and standard deviation.

4.2 Analysis Results

4.2.1 Study the efficiency for use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

4.2.1.1 Artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

Table 4.1 Results of evaluation efficiency of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language

Items	n	$\overline{X}$	Percentage	Standard	E_1/E_2
Ongoing score	100	86.10	86.10	80	82.27
Post-test score	20	16.22	81.10	80	81.00

From Table 4.1, the average mean score of ongoing score was 82.27, and the mean score of post-tests was 81.00, which indicated a substantial improvement upon the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. The result revealed that the value of efficiency of E_1/E_2 as 82.27/81.00. To summarize, artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language is developed according to the standard criteria 80/80 defined.

4.2.1.2 Evaluation of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language from three content experts.

The 10 items of evaluation consist of the form issued by three content experts. A 5-point rating scale is utilized in this section to represent the content experts' opinion. Each criterion rating is identified as illustrated in Table below.

Table 4.2 Results of evaluation of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language by three content experts

Evaluation Items	$\bar{X}$	S.D.	Result Interpretation
1. Consistency between content and learning objectives.	5.00	0.00	Excellent
2. The content is interesting.	5.00	0.00	Excellent
3. Content and activities are appropriate for learners.	4.67	0.58	Excellent
4. The amount of content in each activity is appropriate.	4.67	0.58	Excellent
5. Content sorting is appropriate.	4.67	0.58	Excellent
6. Content accuracy.	5.00	0.00	Excellent
7. The language used in the content is appropriate for the learners.	5.00	0.00	Excellent
8. Activities are consistent with the content.	5.00	0.00	Excellent
9. There is a presentation format to stimulate the learners' interest.	4.67	0.58	Excellent
10. The overview of the content is complete.	5.00	0.00	Excellent
Total	4.87	0.23	Excellent

From Table 4.2, the results of the content quality assessment of the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language evaluated by three content experts. The overall quality was excellent level ($\bar{X}$= 4.87, S.D. = 0.23). When considering each item, it was found that consistency between content and learning objectives, the content is interesting, content accuracy, the language used in the content is appropriate for the

learners, activities are consistent with the content and the overview of the content is complete were excellent level ($\bar{X}$= 5.00, S.D. = 0.00), respectively.

4.2.1.3 Evaluation of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language from three media experts

The 10 items of evaluation consist of the form issued by three media experts. A 5-point rating scale is utilized in this section to represent the media experts' opinion. Each criterion rating is identified as illustrated in Table below.

Table 4.3 Results of evaluation of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language by three media experts

Evaluation Items	$\bar{X}$	S.D.	Result Interpretation
1. Learning through artificial intelligence is easy to understand.	4.67	0.58	Excellent
2. The sequence of activities and content is appropriate.	4.33	0.58	Good
3. Easy to use, uncomplicated.	4.67	0.58	Excellent
4. The images are consistent with the content.	4.33	0.58	Good
5. The images convey the meaning clearly.	4.33	0.58	Good
6. The activities are appropriate for the learners.	4.00	0.00	Good
7. Interesting content.	4.33	0.58	Good
8. Interest in learning.	4.33	0.58	Good
9. Makes it possible to understand the content more.	4.33	0.58	Good
10. The details are clear and easy to understand.	4.67	0.58	Excellent
Total	4.40	0.58	Good

From Table 4.3, the results of the media quality assessment of the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language evaluated by three media experts. The overall quality was good level ($\bar{X}$= 4.40, S.D. = 0.58). When considering each item, it was found that learning through artificial intelligence is easy to understand, easy to use, uncomplicated and the details are clear and easy to understand were excellent level ($\bar{X}$= 4.67, S.D. = 0.58), respectively.

4.2.2 Compare the learning achievement of students between pre-test and post-test scores using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

By completing the tests, students were able to learn English through the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language, and conduct Post-test, which was consistent with objective 2, illustrating the results of analysis as shown in Table 4.4

Table 4.4 Comparison of average score before and after of the students using the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language

Items	n	$\bar{X}$	S.D.	df	t-test	Sig. (2-tailed)
Pre-test	30	12.43	1.89	29	10.08	.000
Post-test	30	16.20	2.10			

**p< .05

From Table 4.4, presented the efficiency of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. The mean score of pre-tests was 12.43, and the score of standard deviation (S.D.) was 1.89. The result after using the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language constituted a substantial improvement in students which translated into a high post-test 16.20 and standard deviation (S.D.) 2.10 and t-test

analysis before and after the treatment 10.08 which demonstrated a considerable difference was statistically significant at the .05 level.

4.2.3 Study the satisfaction of students who using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

Evaluation of students' satisfaction questionnaire on learned with artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

Table 4.5 Result of evaluation of students' satisfaction with artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language

Evaluation Items	$\bar{X}$	S.D.	Result Interpretation
1. Learning English through artificial intelligence is fun.	4.50	0.51	Excellent
2. Learning English through artificial intelligence creates a good atmosphere in the classroom.	4.60	0.50	Excellent
3. Learning English through artificial intelligence provides you with more chances to participate in learning.	4.50	0.51	Excellent
4. Learning English through artificial intelligence helps you memorize more words.	4.47	0.51	Good
5. Learning English through artificial intelligence helps you spell words correctly.	4.53	0.51	Excellent

Table 4.5 Result of evaluation of students' satisfaction with artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language (Cont.)

Evaluation Items	$\bar{X}$	S.D.	Result Interpretation
6. Learning English through artificial intelligence provides you with a chance to practice using words you have learned.	4.50	0.51	Excellent
7. Learning English through artificial intelligence makes you feel more enthusiastic about vocabulary learning.	4.53	0.51	Excellent
8. Learning English through artificial intelligence develops your creativity.	4.67	0.48	Excellent
9. Learning English through artificial intelligence develops your English proficiency.	4.43	0.50	Good
10. Learning English through artificial intelligence improves your reading fluency.	4.57	0.50	Excellent
Total	4.53	0.50	Excellent

From Table 4.5, the results of evaluation of students' satisfaction with artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language by 30 students. The overall students' satisfaction was excellent level ($\bar{X}$= 4.53, S.D. = 0.50). When considering each item, it was found that learning English through artificial intelligence develops your creativity was excellent level ($\bar{X}$= 4.67, S.D. = 0.48) and learning English through artificial intelligence creates a good atmosphere in the classroom was excellent level ($\bar{X}$= 4.60, S.D. = 0.50), respectively.

CHAPTER 5
CONCLUSION AND RECOMMENDATION

In the study of use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language, there are three major objectives 1) study the efficiency to use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language 2) compare the learning achievement of students between pre-test and post-test scores using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language and 3) study the satisfaction of students who using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. The sample of this study were 30 students of grade 7 with English Conversation subject at No.2 middle school, in China, during the school year 2022. They were selected by using purposive sampling. The research instruments consisted of (1) artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language (2) content and media quality questionnaire for artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language (3)) learning achievement questionnaire of students between pretest and post-test scores using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language and (4) satisfaction questionnaires to assess the student's level for artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. The conclusion, discussion and suggestion of the research are as follows:

5.1 Discussion

5.2 Conclusion

5.3 Recommendation

5.4 Suggestion for Further Study

5.1 Discussion

The discussion of the study for use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language is as follows:

5.1.1 Study the efficiency for use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

5.1.1.1 Results of evaluation efficiency of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

The average mean score of ongoing score was 82.27, and the mean score of post-tests was 81.00, which indicated a substantial improvement upon the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. The result revealed that the value of efficiency of E_1/E_2 as 82.27/81.00. To summarize, artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language is developed according to the standard criteria 80/80 defined because there is a process for finding the effectiveness of lessons that are consistent with the research process that is accurate and clear. The results of this experiment are consistent with the research results of Suchat Phetthianchai (2021) conducted the development of football learning application for Muban Chombueng Rajabhat University student, and the result showed that the efficiency of football learning application was 82. 90/ 90. 83, consistent with the research results of Arporn Maneenin (2016) conducted of the development of mobile application in Mathematics for Computer subject about base number system for second year students of vocational certificate majoring in Business Computer and the result showed that the mobile application in Mathematics for computer subject about Base Number System for second year students of vocational certificate majoring in Business Computer met the efficiency criteria at 81.77/85.11 level.

5.1.1.2 Results of evaluation of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language by three content experts and three media experts.

The results of the content quality assessment of the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language evaluated by three content experts. The overall quality was excellent level ($\bar{X}$= 4.87, S.D. = 0.23). When considering each item, it was found that consistency between content and learning objectives, the content is interesting, content accuracy, the language used in the content is appropriate for the learners, activities are consistent with the content and the overview of the content is complete were excellent level ($\bar{X}$= 5.00, S.D. = 0.00), respectively. The results of the media quality assessment of the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language evaluated by three media experts. The overall quality was good level ($\bar{X}$= 4.40, S.D. = 0.58). When considering each item, it was found that learning through artificial intelligence is easy to understand, easy to use, uncomplicated and the details are clear and easy to understand were excellent level ($\bar{X}$= 4.67, S.D. = 0.58), respectively. This may be due to the quality assessment process of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. There are the correct procedures and processes in a systematic manner through quality assessment from experts with real specific knowledge. The results of this experiment are consistent with the research results of Suebwong Chuensombat (2021) conducted the report on using web application based on mobile learning instructional model using brain-based learning and phonics method to enhance English vocabulary pronunciation skill, and the result showed that the web application exceled in the area of media design ($\bar{X}$= 4.57, S.D. = 0.54) and content ($\bar{X}$= 4.82, S.D. = 0.39). The efficiency of web application based on BBLP model was 69.08% which corresponding with criteria.

5.1.2 Compare the learning achievement of students between pre-test and post-test scores using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

The efficiency of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. The mean score of pre-tests was 12.43, and the score of standard deviation (S.D.) was

1.89. The result after using the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language constituted a substantial improvement in students which translated into a high post-test 16.20 and standard deviation (S.D.) 2.10 and t-test analysis before and after the treatment 10.08 which demonstrated a considerable difference was statistically significant at the .05 level. This may be due to artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language that enable participants to learn at their own pace and help learning achievement goals. The results of this experiment are consistent with the research results of Pawarit Pingmuang (2021) conducted a study of effect of mobile-assisted language learning application using task-based approach and gamification to enhance junior high school student's English writing skills, and the result showed the experiment result indicated that the samples had English writing skills in the post-test was higher than the pre-test at the .05 level of significance, consistent with the research results of Songsri Chamnanij (2021) conducted the use of game applications for measurement and evaluation in the 21st Century to improve learning achievement in the research for learning development course of bachelor of Education students, and the result showed that students who used QUZIZZ as the learning activities had higher learning achievements in the research for learning development course than students who used KAHOOT as the learning activities significant at .01 level, consistent with the research results of Chat Chuchuen (2019) conducted the learning outcome of English subject by lesson one for kids application using augmented reality technology, and the result showed it was found that learning by Lesson One could increase the potential in English vocabulary memorizing among the students at the statistical significance level of .05, consistent with the research results of Suebwong Chuensombat (2021) conducted the report on using web application based on mobile learning instructional model using brain-based learning and phonics method to enhance English Vocabulary pronunciation skill, and the result showed result of using the web application learners' English pronunciation score improved at the significant level of .05, consistent with the research results of Rungroj Srijunkaew (2022) conducted the results of using Kahoot application on knowledge in cognitive domain the basics of trigonometric ratios of students in Grade 9, and the result showed the level of satisfaction

scores of Grade 9 Students who were given the activity to develop their knowledge of the cognitive domain in basics trigonometric ratios using the Kahoot application were at a high.

5.1.3 Study the satisfaction of students who using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

The results of evaluation of students' satisfaction with artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language by 30 students. The overall students' satisfaction was excellent level ($\bar{X}$= 4.53, S.D. = 0.50). When considering each item, it was found that learning English through artificial intelligence develops your creativity was excellent level ($\bar{X}$= 4.67, S.D. = 0.48) and learning English through artificial intelligence creates a good atmosphere in the classroom was excellent level ($\bar{X}$= 4.60, S.D. = 0.50), respecttively. This may be due to the content design being interesting, engaging, and helping to enhance self-learning skills. and the nature of the picture. The font size and color used in the content are beautiful, easy to read and accurate. The results of this experiment are consistent with the research results of Songsri Chamnanij (2021) conducted the use of game applications for measurement and evaluation in the 21st Century to improve learning achievement in the research for learning development course of Bachelor of Education Students, and the result showed most of the students had a positive opinion on learning activities using KAHOOT and QUIZIZZ had more positive opinions than KAHOOT.

5.2 Conclusion

The analysis result of the above information answers to the research objectives as follows:

5.2.1 Study the efficiency of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

5.2.1.1 Results of evaluation efficiency of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

The average mean score of ongoing score was 82.27, and the mean score of post-tests was 81.00, which indicated a substantial improvement upon the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. The result revealed that the value of efficiency of E_1/E_2 as 82.27/81.00. To summarize, artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language is developed according to the standard criteria 80/80 defined.

5.2.1.2 Results of evaluation of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language by three content experts.

The results of the content quality assessment of the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language evaluated by three content experts. The overall quality was excellent level ($\bar{X}$= 4.87, S.D. = 0.23). When considering each item, it was found that consistency between content and learning objectives, the content is interesting, content accuracy, the language used in the content is appropriate for the learners, activities are consistent with the content and the overview of the content is complete were excellent level ($\bar{X}$= 5.00, S.D. = 0.00), respectively.

5.2.1.3 Results of evaluation of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language by three media experts

The results of the media quality assessment of the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language evaluated by three media experts. The overall quality was good level ($\bar{X}$= 4.40, S.D. = 0.58). When considering each item, it was found that learning through artificial intelligence is easy to understand, easy to use, uncomplicated and the details are clear and easy to understand were excellent level ($\bar{X}$= 4.67, S.D. = 0.58), respectively.

5.2.2 Compare the learning achievement of students between pre-test and post-test scores using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

The efficiency of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. The mean score of pre-tests was 12.43, and the score of standard deviation (S.D.) was 1.89. The result after using the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language constituted a substantial improvement in students which translated into a high post-test 16.20 and standard deviation (S.D.) 2.10 and t-test analysis before and after the treatment 10.08 which demonstrated a considerable difference was statistically significant at the .05 level.

5.2.3 Study the satisfaction of students who using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

The results of evaluation of students' satisfaction with artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language by 30 students. The overall students' satisfaction was excellent level ($\bar{X}$= 4.53, S.D. = 0.50). When considering each item, it was found that learning English through artificial intelligence develops your creativity was excellent level ($\bar{X}$= 4.67, S.D. = 0.48) and learning English through artificial intelligence creates a good atmosphere in the classroom was excellent level ($\bar{X}$= 4.60, S.D. = 0.50), respectively.

5.3 Recommendation

In this research, researcher have suggested that the results of the study should be applied as follows:

5.3.1 The development of artificial intelligence application should be conducted step-by-step based on best practice in this field, since it would enable the researcher to achieve the objectives of constructing lessons for artificial intelligence application which result in higher efficiency and a more successful.

5.3.2 The development of an artificial intelligence application may design activities to be more interesting by adding image, sound, and video clip. This will help attract students to want to do activities and have fun more activities.

5.3.3 From the research results, it was found that artificial intelligence applications can be used in management of teaching and learning to increase student learning achievement. Therefore, it should be applied to other courses or other content.

5.4 Suggestion for Further Study

Based on the summary and discussion of the study, the researcher has several suggestions for further study as follows:

5.4.1 New technology should be introduced in the lessons to stimulate more interest in learning.

5.4.2 Other English language skills in which students are interested should be developed using artificial intelligence application.

5.4.3 Further studies on the application of artificial intelligence should be undertaken in conjunction with other teaching methods such as cognitive skills. systematic thinking skills and critical thinking skills.

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APPENDICES

APPENDIX A

- List of Experts who reviewed research instruments

- Invitation Letter to experts to examine research instruments

List of experts who reviewed research instruments

Content Experts

1. Associate Professor: Ms Fu Hongxia

   College of teacher education, Tian Shui Normal University in GanSu province

2. Lecturer: Ms. Wang Jiaxiang

   Department of English, Beijing Foreign Studies University

3. Associate Professor: Ms Long Hongzhi

   Education Department, Xi Bei Normal University in GanSu province

Media Experts

1. Associate Professor Dr. Jia Dongyao

   Big Data and Intelligent Measurement and control,

   Professor and doctoral supervisor of Beijing JiaoTong University

2. Asst. Prof. Dr. Sawanan Dangprasert

   Faculty of Technical Education, King Mongkut's University of Technology North Bangkok

3. Dr. Kittisak Paen-Ngam

   Nakhonnayok Primary Educational Service Area Office

   University Vice Chancellor

Measurement and Evaluation Experts

1. Asst. Prof. Dr. Danucha Saleewong

   Faculty of Education, Valaya Alongkorn Rajabhat University

2. Asst. Prof. Dr. Haripon Thammanarak

   Faculty of Education, Chiang Mai University

4. Asst. Prof. Dr. Tanin Kongsila

   Department of Agricultural Extension and Communication,

   Faculty of Agriculture, Kasetsart University

MHESI 0637/2022

Office of the Dean, Faculty of Technical Education
Rajamangala University of Technology Thanyaburi
Khlong Luang, Pathum Thani 12110 Thailand
Tel:+66-2-549-4710 Fax:+66-2-577-5049

20 June, 2022

Dear Associate Professor: Ms Fu Hongxia
College of teacher education, Tian Shui Normal University in GanSu province

Subject: Respectfully Requesting for letter of Invitation of Experts for M.Ed.Thesis

I am writing to request your assistance as an honorary external research reviewer in evaluating the research instruments of Ms. Meng Yanling, Master of Education Program in Technology and Learning Innovation Rajamangala University of Technology Thanyaburi, who has been working on the thesis titled "The Effect of Using Artificial Intelligence Application for Individual Difference in English to Enhance Learning Achievement of Secondary Students, China". under the supervision of Asst. Prof. Dr. Thidarat Kulnattarawong. In this regard, I would like to request your valuable time to evaluate the research instruments as I strongly believe that your expertise will be of great value in improving the research instruments.

If you have any questions or need further information, please feel free to contact Ms. Meng Yanling, on the e-mail: meng_y@mail.rmutt.ac.th.

Yours sincerely,

(Assistant Professor Arnon Niyomphol)
Dean of Faculty of Technical Education

MHESI 0637.1 /2022

Office of the Dean, Faculty of Technical Education
Rajamangala University of Technology Thanyaburi
Khlong Luang, Pathum Thani 12110 Thailand
Tel:+66-2-549-4710 Fax:+66-2-577-5049

20 June, 2022

Dear Lecturer: Ms. Wang Jiaxiang
Department of English, Beijing Foreign Studies Universit

Subject: Respectfully Requesting for letter of Invitation of Experts for M.Ed.Thesis

I am writing to request your assistance as an honorary external research reviewer in evaluating the research instruments of Ms. Meng Yanling, Master of Education Program in Technology and Learning Innovation Rajamangala University of Technology Thanyaburi, who has been working on the thesis titled "The Effect of Using Artificial Intelligence Application for Individual Difference in English to Enhance Learning Achievement of Secondary Students, China". under the supervision of Asst. Prof. Dr. Thidarat Kulnattarawong. In this regard, I would like to request your valuable time to evaluate the research instruments as I strongly believe that your expertise will be of great value in improving the research instruments.

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Yours sincerely,

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Dean of Faculty of Technical Education

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Office of the Dean, Faculty of Technical Education
Rajamangala University of Technology Thanyaburi
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20 June, 2022

Dear Associate Professor: Ms Long Hongzhi
Education Department, Xi Bei Normal University in GanSu province

Subject: Respectfully Requesting for letter of Invitation of Experts for M.Ed.Thesis

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Office of the Dean, Faculty of Technical Education
Rajamangala University of Technology Thanyaburi
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MHESI 0637.4 / 2022

Office of the Dean, Faculty of Technical Education
Rajamangala University of Technology Thanyaburi
Khlong Luang, Pathum Thani 12110 Thailand
Tel:+66-2-549-4710 Fax:+66-2-577-5049

20 June, 2022

Dear Asst.Prof.Dr. Sawanan Dangprasert
Faculty of Technical Education, King Mongkut's University of Technology North Bangkok

Subject: Respectfully Requesting for letter of Invitation of Experts for M.Ed.Thesis

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20 June, 2022

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Nakhonnayok Primary Educational Service Area Office University Vice Chancellor

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20 June, 2022

Dear Asst.Prof.Dr. Danucha Saleewong
Faculty of Education, Valaya Alongkorn Rajabhat University

Subject: Respectfully Requesting for letter of Invitation of Experts for M.Ed.Thesis

I am writing to request your assistance as an honorary external research reviewer in evaluating the research instruments of Ms. Meng Yanling, Master of Education Program in Technology and Learning Innovation Rajamangala University of Technology Thanyaburi, who has been working on the thesis titled "The Effect of Using Artificial Intelligence Application for Individual Difference in English to Enhance Learning Achievement of Secondary Students, China". under the supervision of Asst. Prof. Dr. Thidarat Kulnattarawong. In this regard, I would like to request your valuable time to evaluate the research instruments as I strongly believe that your expertise will be of great value in improving the research instruments.

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Yours sincerely,

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Dean of Faculty of Technical Education

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Office of the Dean, Faculty of Technical Education
Rajamangala University of Technology Thanyaburi
Khlong Luang, Pathum Thani 12110 Thailand
Tel:+66-2-549-4710 Fax:+66-2-577-5049

20 June, 2022

Dear Asst.Prof.Dr. Haripon Thammanarak
Faculty of Education, Chiang Mai University

Subject: Respectfully Requesting for letter of Invitation of Experts for M.Ed.Thesis

I am writing to request your assistance as an honorary external research reviewer in evaluating the research instruments of Ms. Meng Yanling, Master of Education Program in Technology and Learning Innovation Rajamangala University of Technology Thanyaburi, who has been working on the thesis titled "The Effect of Using Artificial Intelligence Application for Individual Difference in English to Enhance Learning Achievement of Secondary Students, China". under the supervision of Asst. Prof. Dr. Thidarat Kulnattarawong. In this regard, I would like to request your valuable time to evaluate the research instruments as I strongly believe that your expertise will be of great value in improving the research instruments.

If you have any questions or need further information, please feel free to contact Ms. Meng Yanling, on the e-mail: meng_y@mail.rmutt.ac.th.

Yours sincerely,

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Dean of Faculty of Technical Education

MHESI 0637.8 / 2022

Office of the Dean, Faculty of Technical Education
Rajamangala University of Technology Thanyaburi
Khlong Luang, Pathum Thani 12110 Thailand
Tel:+66-2-549-4710 Fax:+66-2-577-5049

20 June, 2022

Dear Asst.Prof.Dr. Tanin Kongsila
Department of Agricultural Extension and Communication, Faculty of Agriculture,
Kasetsart University

Subject: Respectfully Requesting for letter of Invitation of Experts for M.Ed.Thesis

I am writing to request your assistance as an honorary external research reviewer in evaluating the research instruments of Ms. Lijie Wu, Master of Education Program in Technology and Learning Innovation Rajamangala University of Technology Thanyaburi, who has been working on the thesis titled "Multimedia Application for Improving Chinese Language Skills for International Students". under the supervision of Asst. Prof. Dr. Piyanan Pannim Vipahasna. In this regard, I would like to request your valuable time to evaluate the research instruments as I strongly believe that your expertise will be of great value in improving the research instruments.

If you have any questions or need further information, please feel free to contact Ms.Lijie Wu, on the e-mail: chinese_wu@foxmail.com.

Yours sincerely,

(Assistant Professor Arnon Niyomphol)
Dean of Faculty of Technical Education

APPENDIX B

- **Assessment of content quality**
- **Assessment of media quality**
- **Questionnaire of Students' Satisfaction**
- **Achievement Test**

Assessment of content quality aspects of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language

(For Content Experts)

Thesis Title	Use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language
Name Surname	Ms. Meng YanLing
Program	M.Ed. (Technology and Learning Innovation)
Thesis Adviser	Assistant Professor Thidarat Kulnatarawong, PhD.

The assessment is a part of the thesis, approved by the Faculty of Technical Education, Rajamangala University of Technology Thayanburi in Partial Fulfillment of the Requirements for the master's degree.

Research of Objectives:

1. To study the efficiency to use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

2. To compare the learning achievement of students between pre-test and post-test scores using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

3. To study the satisfaction of students who using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

Directions: This questionnaire is designed to examine experts' opinion toward learning English through artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. Please answer all the questions to the best of your knowledge. Your answers will be kept confidential. The questionnaire is divided into 2 parts as follows:

Part 1: Please write √ in the box that corresponds to your opinion.

Direction: Please mark √ in a box that best describes the degree of your agreement with each statement.

5 = Strongly Agree
4 = Agree
3 = Undecided
2 = Disagree
1 = Strongly Disagree

Items	Level of agreement				
	5	4	3	2	1
1. Consistency between content and learning objectives					
2. The content is interesting.					
3. Content and activities are appropriate for learners.					
4. The amount of content in each activity is appropriate.					
5. Content sorting is appropriate.					
6. Content accuracy.					
7. The language used in the content is appropriate for the learners.					
8. Activities are consistent with the content.					
9. There is a presentation format to stimulate the learners' interest.					
10. The overview of the content is complete.					

Part 2: Additional advice

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Assessment of media quality aspects of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language

(For Media Experts)

Thesis Title	Use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language
Name Surname	Ms. Meng YanLing
Program	M.Ed. (Technology and Learning Innovation)
Thesis Adviser	Assistant Professor Thidarat Kulnatarawong, PhD.

The assessment is a part of the thesis, approved by the Faculty of Technical Education, Rajamangala University of Technology Thayanburi in Partial Fulfillment of the Requirements for the master's degree.

Research of Objectives:

1. To study the efficiency to use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.
2. To compare the learning achievement of students between pre-test and post-test scores using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.
3. To study the satisfaction of students who using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

Directions: This questionnaire is designed to examine experts' opinion toward learning English through artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. Please answer all the questions to the best of your knowledge. Your answers will be kept confidential. The questionnaire is divided into 2 parts as follows:

Part 1: Please write √ in the box that corresponds to your opinion.

Direction: Please mark √ in a box that best describes the degree of your agreement with each statement.

5 = Strongly Agree
4 = Agree
3 = Undecided
2 = Disagree
1 = Strongly Disagree

Items	Level of agreement				
	5	4	3	2	1
1. Learning through artificial intelligence is easy to understand.					
2. The sequence of activities and content is appropriate.					
3. Easy to use, uncomplicated					
4. The images are consistent with the content.					
5. The images convey the meaning clearly.					
6. The activities are appropriate for the learners.					
7. Interesting content					
8. Interest in learning.					
9. Makes it possible to understand the content more.					
10.The details are clear and easy to understand.					

Part 2: Additional advice

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Questionnaire of Students' Satisfaction

Thesis Title	Use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language
Name Surname	Ms. Meng YanLing
Program	M.Ed. (Technology and Learning Innovation)
Thesis Adviser	Assistant Professor Thidarat Kulnatarawong, PhD.

The assessment is a part of the thesis, approved by the Faculty of Technical Education, Rajamangala University of Technology Thayanburi in Partial Fulfillment of the Requirements for the master's degree.

Research of Objectives:

1. To study the efficiency to use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.
2. To compare the learning achievement of students between pre-test and post-test scores using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.
3. To study the satisfaction of students who using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

Directions: This questionnaire is designed to examine secondary students' satisfaction toward learning English through a artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. Please answer all the questions to the best of your knowledge. Your answers will be kept confidential. The questionnaire is divided into 2 parts as follows:

Part 1: Please write √ in the box that corresponds to your satisfaction.

Direction: Please mark √ in a box that best describes the degree of your agreement with each statement.

5 = Strongly Agree
4 = Agree
3 = Undecided
2 = Disagree
1 = Strongly Disagree

Items	Level of agreement				
	5	4	3	2	1
1. Learning English through artificial intelligence is fun.					
2. Learning English through artificial intelligence creates a good atmosphere in the classroom.					
3. Learning English through artificial intelligence provides you with more chances to participate in learning.					
4. Learning English through artificial intelligence helps you memorize more words.					
5. Learning English through artificial intelligence helps you spell words correctly.					
6. Learning English through artificial intelligence provides you with a chance to practice using words you have learned.					
7. Learning English through artificial intelligence makes you feel more enthusiastic about vocabulary learning.					
8. Learning English through artificial intelligence develops your creativity.					

Items	Level of agreement				
	5	4	3	2	1
9. Learning English through artificial intelligence develops your English proficiency.					
10. Learning English through artificial intelligence improves your reading fluency.					

Part 2: Additional advice

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Achievement Test

(For Measurement and Evaluation Experts)

Thesis Title	Use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language
Name Surname	Ms. Meng YanLing
Program	M.Ed. (Technology and Learning Innovation)
Thesis Adviser	Assistant Professor Thidarat Kulnatarawong, PhD.

The assessment is a part of the thesis, approved by the Faculty of Technical Education, Rajamangala University of Technology Thayanburi in Partial Fulfillment of the Requirements for the master's degree.

Research of Objectives:

1. To study the efficiency to use of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.
2. To compare the learning achievement of students between pre-test and post-test scores using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.
3. To study the satisfaction of students who using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language.

Directions: This questionnaire examines experts' opinions on learning English through artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. Please answer all of the questions to the best of your knowledge. Your answers will be kept confidential. The questionnaire is divided into 2 parts as follows:

Part1: Please write √ in the box that corresponds to your opinion.

Direction: Please mark √ in a box that best describes the degree of your agreement with each statement.

Items	Level of Consistency		
	+1	0	-1
1. Is it going to rain? a) Yes, it is. b) No, it isn't. c) Yes, it isn't. d) No, it is.			
2. Are we going to have a meeting today? a) Yes, we are. b) No, it is. c) Yes, it is. d) No, it isn't.			
3. Are they appropriate for learners? a) Yes, they are. b) No, he isn't. c) I don't know. d) No, it isn't.			
4. Is he going to learn English through Artificial Intelligence? a) Yes, he is. b) No, he is. c) Yes, he isn't. d) No, it isn't.			
5. Is the boy to go to school tomorrow? a) No, the boy. b) Yes, he is. c) No, the boy isn't. d) Yes, he isn't.			

Items	Level of Consistency		
	+1	0	-1
6. Will they go there tomorrow? a) Yes, they will. b) No, they will. c) Yes, they won't. d) No, we will.			
7. Shall we go to there? a) Yes, we shall. b) No, we shall. c) Yes, we will. d) No, we won't.			
8. -___we ____ again next week? -Yes, let's make it next Wednesday. a) are, to meet b) Shall, be to meet c) Will, meet d) Are, meeting			
9. As students, we _____. a) won't smoke. b) are not to smoke c) aren't smoking d) don't smoke			
10. Who do you think ____ for the failure of their marriage? a) to blame b) to be blame c) is to blame d) is to be blamed			

Items	Level of Consistency		
	+1	0	-1
11. Look at these clouds. _____, a) It's going to rain. b) It's raining. c) It is to rain. d) It can rain.			
12. Neither you nor he _____ to the front. a) are to be sent b) is to be sent c) have to be sent d) is to be sent			
13. If the sun _____ tomorrow, what would we do? a) were not to raise b) does not rise c) would not rise d) were not to rise			
14-We just saw John at the bookstore. -That's strange examination _____ early July. a) will come b) was to come c) is coming d) is to come			
15. The final examination _____ early July. a) is to be held b) is to be taken place c) is going to hold d) will be to take place			

Items	Level of Consistency		
	+1	0	-1
16. A new hospital was to____ in this district, but the money wasn't collected yet. a) have been built b) be built c) built d) have built			
17. There _____a meeting tomorrow afternoon. a) will be going to b) will going to c) is going to be d) will go to be			
18. Charlie _____here next morning. a) isn't working b) doesn't working c) isn't going to working d) won't work			
19. He _____very busy this week, he_____free next week. a) will be ; is b) is ; is c) will be ; will be d) is ; will be			
20. There _____a dolphin show in the zoo tomorrow evening. a) was b) is going to have c) will have d) is going to be			

Items	Level of Consistency		
	+1	0	-1
21. They _____ an English evening next Sunday. a) are having b) are going to have c) will having d) is going to have			
22. Tomorrow he _____ a kite in the open air first, and then _____ boating in the park. a) will fly; will go b) will fly; goes c) is going to fly; will goes d) flies; will go			
23. He _____ very busy this week, he _____ free next week. a) will be; is b) is; is c) will be; will be d) is; will be			
24. _____ your brother _____ a magazine from the library? a) Are; going to borrow b) Is; going to borrow c) Will; borrows d) Are; going to borrows			
25. _____ you _____ free tomorrow? No. I _____ free the day after tomorrow. a) Are; going to; will b) Are; going to be; will c) Are; going to; will be d) Are; going to be; will be			

Items	Level of Consistency		
	+1	0	-1
26. Mother _____ me a nice present on my next birthday. a) will gives b) will give c) gives d) give			
27. Shall I buy a cup of tea for you? _____.（不，不要。） a) No, you won’t. b) No, you aren’t. c) No, please don’t. d) No, please.			
28. Where is the morning paper? I _____ if for you at once. a) get b) am getting c) to get d) will get			
29. _____ a concert next Saturday? a) There will be b) Will there be c) There can be d) There are			
30. If they come, we _____ a meeting. a) have b) will have c) had d) would			

Items	Level of Consistency		
	+1	0	-1
31. He _____ her a beautiful hat on her next birthday. a) gives b) gave c) will giving d) is going to giving			
32. He _____ to us as soon as he gets there. a) writes b) has written c) will write d) wrote			
33. The train _____ at 11 a) going to arrive b) will be arrive c) is going to d) is arriving			
34. Let's go to school， shall we? OK. we_____. a) will going b) be going to c) go d) are going			
35. _____ open the window? a) Will you please b) Please will you c) You please d) Do you			

Items	Level of Consistency		
	+1	0	-1
36. Let’s go out to play football, shall we? OK. I _____. a) will coming b) be going to come c) come d) am coming			
37. It _____ the year of the horse next year. a) is going to be b) is going to c) will be d) will is			
38. It _____ us a long time to learn English well. a) take b) will take c) spends d) will spend			
39. Will his parents go to see the Terra Cotta Warriors tomorrow? No, _____（不去）. a) they willn’t. b) they won’t. c) they aren’t. d) they don’t.			
40. Shall I come again tomorrow afternoon? _____（好的）. a) Yes, please b) Yes, you will. c) No, please. d) No, you won’t.			

Part2: Additional advice

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APPENDIX C

- **Result of content validity by index of item objective congruence (IOC) of achievement test**
- **Result of difficulty index (p) and discriminant index (r)**
- **Result of reliability of the achievement test**
- **Result of comparison of average score before and after**

Result of content validity by index of item objective congruence (IOC) of achievement test

The quality analysis of the achievement test was to determine the content validity by using the Index of Item Objective Congruence (IOC) formula, in which 3 measurement and evaluation experts were assigned to rate each question by considering the correspondence of the questions to the objectives of the total number of tests, 20 questions for the criteria used for consideration are questions with an IOC value of 0.50 or higher are valid questions. As for questions with an IOC value of 0.50 or less, they are questions that need to be improved or eliminated. After examining the consistency of the questions with the objectives from the experts, it was found that the experts agreed on 40 questions that were consistent, with an IOC of 0.5 or higher, and the researchers selected 20 questions to be used in pretest and posttest.

Table appC.1 Result of content validity by index of item objective congruence (IOC) of achievement test

Items	Score of experts			Total score of experts	Index of Item Objective Congruence
	Expert 1	Expert 2	Expert 3		
1	+1	+1	+1	3	1.00
2	0	+1	+1	2	0.67
3	+1	+1	+1	3	1.00
4	+1	0	+1	2	0.67
5	+1	0	+1	2	0.67
6	+1	+1	+1	3	1.00
7	+1	+1	+1	3	1.00
8	+1	+1	0	2	0.67

Table appC.1 Result of content validity by index of item objective congruence (IOC) of achievement test (Cont.)

Items	Score of experts			Total score of experts	Index of Item Objective Congruence
	Expert 1	Expert 2	Expert 3		
9	+1	+1	+1	3	1.00
10	+1	+1	+1	3	1.00
11	+1	+1	+1	3	1.00
12	+1	+1	+1	3	1.00
13	0	+1	+1	2	0.67
14	+1	0	+1	2	0.67
15	+1	+1	+1	3	1.00
16	+1	+1	+1	3	1.00
17	+1	0	+1	2	0.67
18	+1	+1	+1	3	1.00
19	+1	+1	+1	3	1.00
20	+1	+1	+1	3	1.00
21	+1	+1	+1	3	1.00
22	+1	+1	+1	3	1.00
23	+1	+1	+1	3	1.00
24	+1	0	+1	2	0.67
25	+1	+1	+1	3	1.00
26	+1	+1	+1	3	1.00
27	0	+1	+1	2	0.67
28	+1	+1	0	2	0.67

Table appC.1 Result of content validity by index of item objective congruence (IOC) of achievement test (Cont.)

Items	Score of experts			Total score of experts	Index of Item Objective Congruence
	Expert 1	Expert 2	Expert 3		
29	+1	+1	+1	3	1.00
30	+1	0	+1	2	0.67
31	+1	+1	+1	3	1.00
32	+1	+1	+1	3	1.00
33	+1	+1	+1	3	1.00
34	+1	0	+1	2	0.67
35	+1	+1	+1	3	1.00
36	+1	+1	+1	3	1.00
37	0	+1	+1	2	0.67
38	+1	+1	+1	3	1.00
39	+1	+1	+1	3	1.00
40	+1	+1	+1	3	1.00

Result of difficulty index (p) and discriminant index (r)

Table appC.2 Result of difficulty index (p) and discriminant index (r)

Items	Difficulty Index (p)	Discriminant Index (r)	Level of quality		Result Interpretation
			Difficulty Index (p)	Discriminant Index (r)	
1	0.80	0.27	Easy	Moderately	Available
2	0.77	0.47	Easy	Very Discriminating	Available
3	0.80	0.40	Easy	Very Discriminating	Available
4*	0.90	0.07	Very Easy	Poor	Remove
5	0.73	0.53	Easy	Very Discriminating	Available
6	0.87	0.27	Very Easy	Moderately	Available
7	0.70	0.33	Easy	Discriminating	Available
8	0.83	0.20	Very Easy	Moderately	Available
9	0.77	0.20	Easy	Moderately	Available
10	0.87	0.27	Very Easy	Moderately	Available
11*	0.90	0.07	Very Easy	Poor	Remove
12	0.73	0.40	Easy	Very Discriminating	Available
13	0.77	0.33	Easy	Discriminating	Available
14	0.70	0.47	Easy	Very Discriminating	Available
15	0.77	0.20	Easy	Moderately	Available
16	0.63	0.47	Easy	Very Discriminating	Available

Table appC.2 Result of difficulty index (p) and discriminant index (r) (Cont.)

Items	Difficulty Index (p)	Discriminant Index (r)	Level of quality		Result Interpretation
			Difficulty Index (p)	Discriminant Index (r)	
17*	0.80	0.13	Easy	Not Discriminating	Remove
18	0.63	0.33	Easy	Discriminating	Available
19	0.60	0.27	Moderately	Moderately	Available
20	0.70	0.20	Easy	Moderately	Available
21	0.83	0.20	Very Easy	Moderately	Available
22*	0.83	0.07	Very Easy	Poor	Remove
23*	0.73	0.00	Easy	Poor	Remove
24	0.73	0.40	Easy	Very Discriminating	Available
25*	0.97	0.07	Very Easy	Poor	Remove
26	0.77	0.33	Easy	Discriminating	Available
27	0.83	0.33	Very Easy	Discriminating	Available
28*	0.67	0.00	Easy	Poor	Remove
29	0.73	0.27	Easy	Moderately	Available
30	0.77	0.20	Easy	Moderately	Available
31	0.83	0.20	Very Easy	Moderately	Available
32	0.60	0.27	Moderately	Moderately	Available
33	0.77	0.20	Easy	Moderately	Available
34*	0.73	0.00	Easy	Poor	Remove
35	0.83	0.20	Very Easy	Moderately	Available

Table C.2 Result of difficulty index (p) and discriminant index (r) (Cont.)

Items	Difficulty Index (p)	Discriminant Index (r)	Level of quality		Result Interpretation
			Difficulty Index (p)	Discriminant Index (r)	
36	0.70	0.20	Easy	Moderately	Available
37	0.77	0.20	Easy	Moderately	Available
38*	0.87	0.00	Very Easy	Poor	Remove
39	0.83	0.20	Very Easy	Moderately	Available
40	0.70	0.20	Easy	Moderately	Available

* Remove questions

From Table appC.2, it was found that the difficulty index should be between 0.2-0.8 and the discriminant index should be 0.2 or higher. The whole test was performed using Kuder-Richardson's K-R#20 formula, 0.81, as shown in Table appC.3.

The result of reliability of the achievement test

Table appC.3 The result of reliability of the achievement test

Students	**Total score (X)**	**Total Score ($X^{2)}$**	**∑pq**
N = 30	$\sum X = 923$ $(\sum X)^2 = 851929$	$\sum X^2 = 29329$ $N\sum X^2 = 879870$	6.83
S^2	$S^2 = \frac{N\sum X^2 - (\sum X)^2}{N^2}$ $S^2 = \frac{30(29329) - (923)^2}{30^2}$ $S^2 = \frac{879870 - 851929}{900}$ $S^2 = 31.05$		
r_{tt}	$r_{tt} = \frac{k}{k-1}(1 - \frac{\sum pq}{S^2})$ $r_{tt} = \frac{30}{29}(1 - \frac{6.83}{31.05})$ $r_{tt} = 1.03(1 - 0.219)$ $r_{tt} = 1.03 * 0.781$ $r_{tt} = 0.81$		

* The result of reliability of the achievement test is 0.81

Result of comparison of average score before and after

Table appC.4 Comparison of average score before and after of 30 students

Students	Pretest score (20)	Posttest score (20)
1	10	13
2	12	14
3	12	15
4	6	11
5	10	15
6	14	16
7	11	16
8	14	15
9	13	15
10	12	15
11	11	14
12	13	16
13	14	16
14	15	17
15	10	18
16	12	19
17	12	20
18	11	15
19	14	16
20	13	14
21	12	15

Table appC.4 Comparison of average score before and after of 30 students (Cont.)

Students	Pretest score (20)	Posttest score (20)
22	13	17
23	12	18
24	14	16
25	13	20
26	14	20
27	16	19
28	12	18
29	14	17
30	14	16

Table appC.5 Compare of average score before and after of the students using artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language

Items	n	$\bar{X}$	S.D.	t-test	Sig. (2-tailed)
Pre-test	30	12.43	1.89	10.08	0.00**
Post-test	30	16.20	2.10		

**p< .05

Table appC.5 presented the learning achievement of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language. The mean score of pre-test was 12.43, and the score of standard deviation (S.D.) was 1.89. The result after applying the artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language constituted a substantial improvement in students which translated into a high post-test 16.20 and standard deviation (S.D.) 2.10 and t-test analysis before and after the treatment 10.08 which demonstrated a considerable difference was statistically significant at the .05 level.

APPENDIX D

Example of artificial intelligence application to enhance learning achievement of secondary students with individual difference skill in English language

Figure appD.1 Show the download Squirrel Ai application page.

Figure appD.2 Show preview of application

Figure appD.3 Show main menu of application

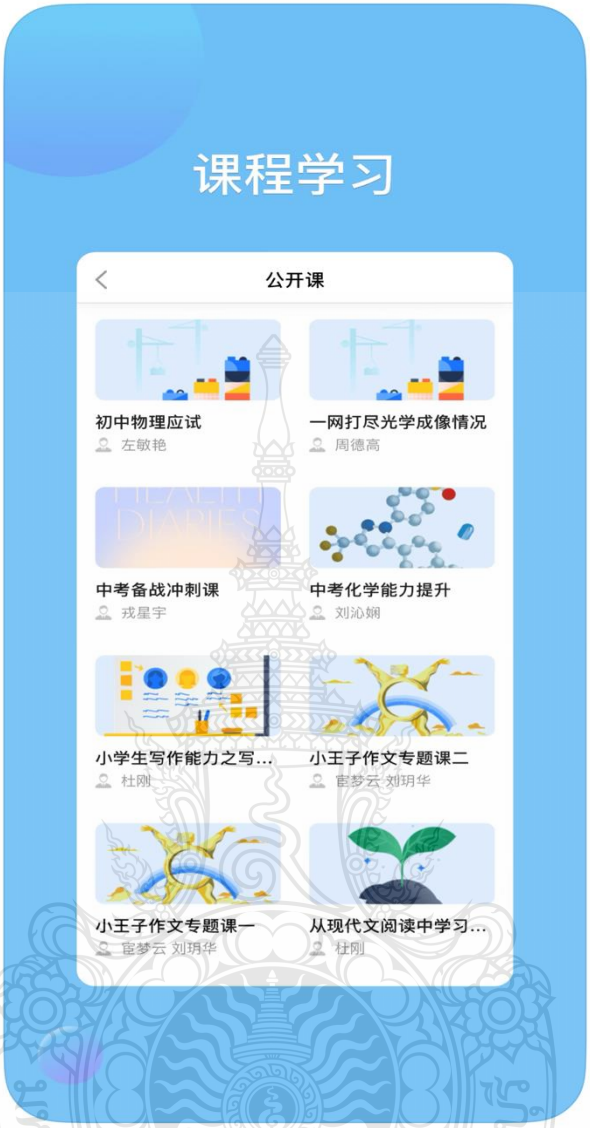

Figure appD.4 Show curriculum of application

Figure appD.5 Show data center of application

Figure appD.6 Show timeline for students on application

Figure appD.7 Show data students on application

Figure appD.8 Show login page on application

Figure appD.9 Show the menu after entering on application

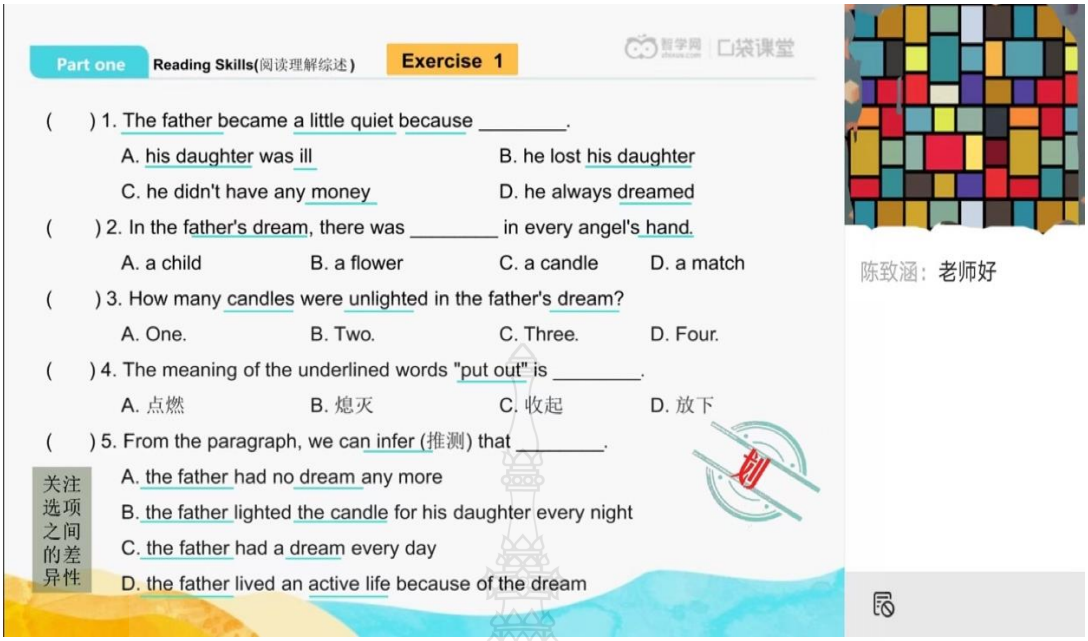

Figure appD.10 Show example of quiz on application

Figure appD.11 Show example of lesson on application

Figure appD.12 Show example of heading lesson on application

Figure appD.13 Show the content in lesson

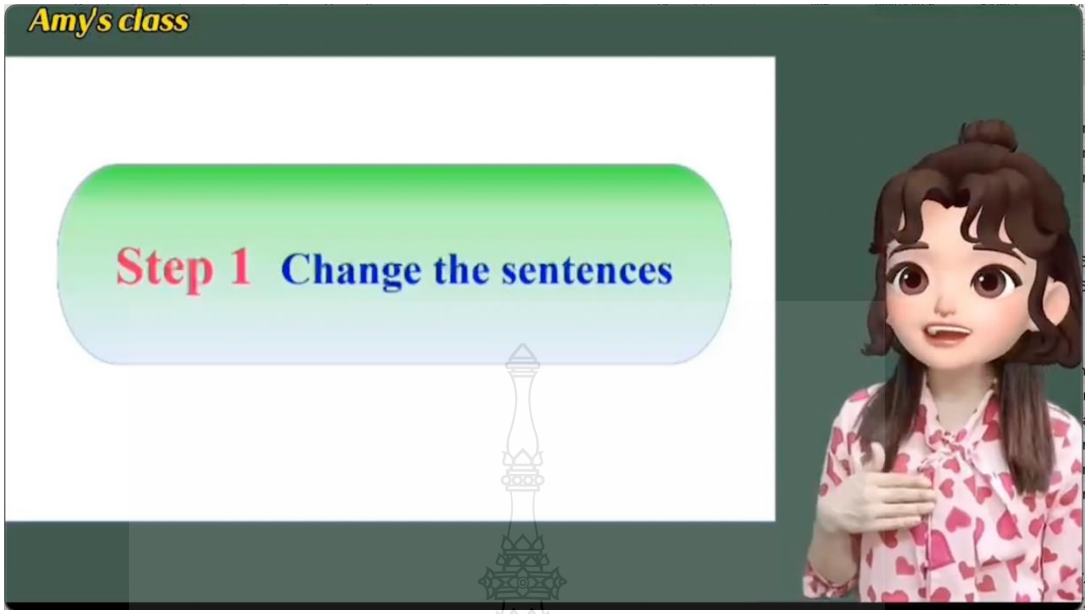

Figure appD.13 Show the content in lesson (Cont.)

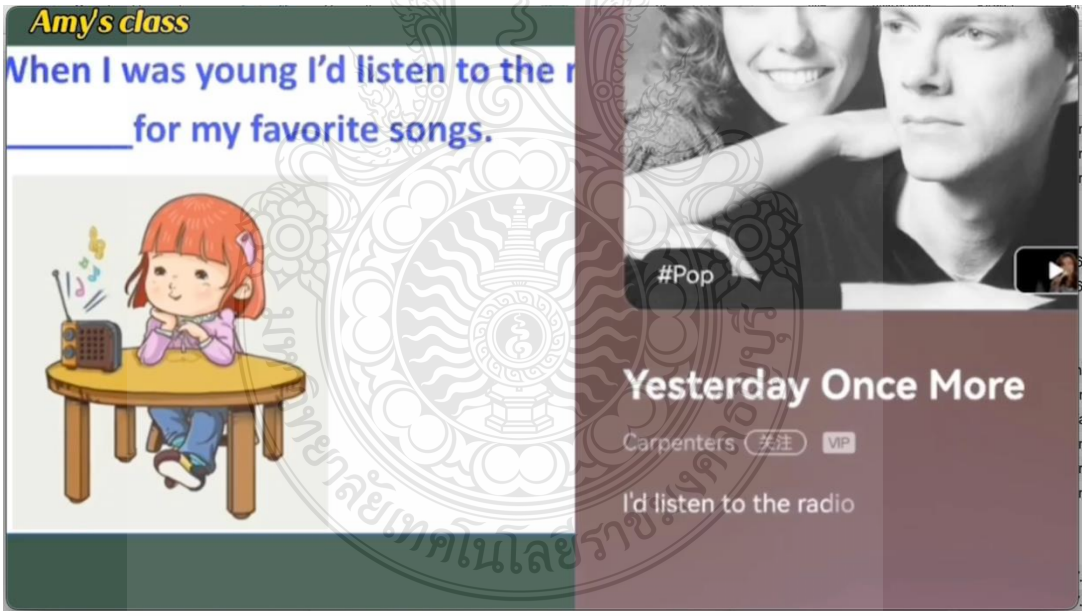

Figure appD.13 Show the content in lesson (Cont.)

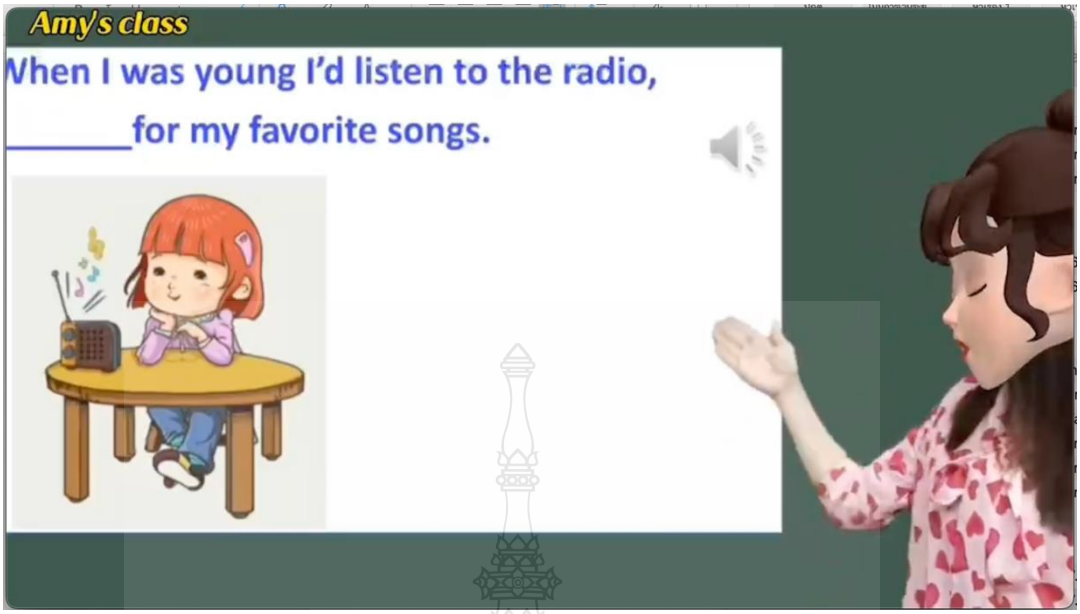

Figure appD.13 Show the content in lesson (Cont.)

Figure appD.13 Show the content in lesson (Cont.)

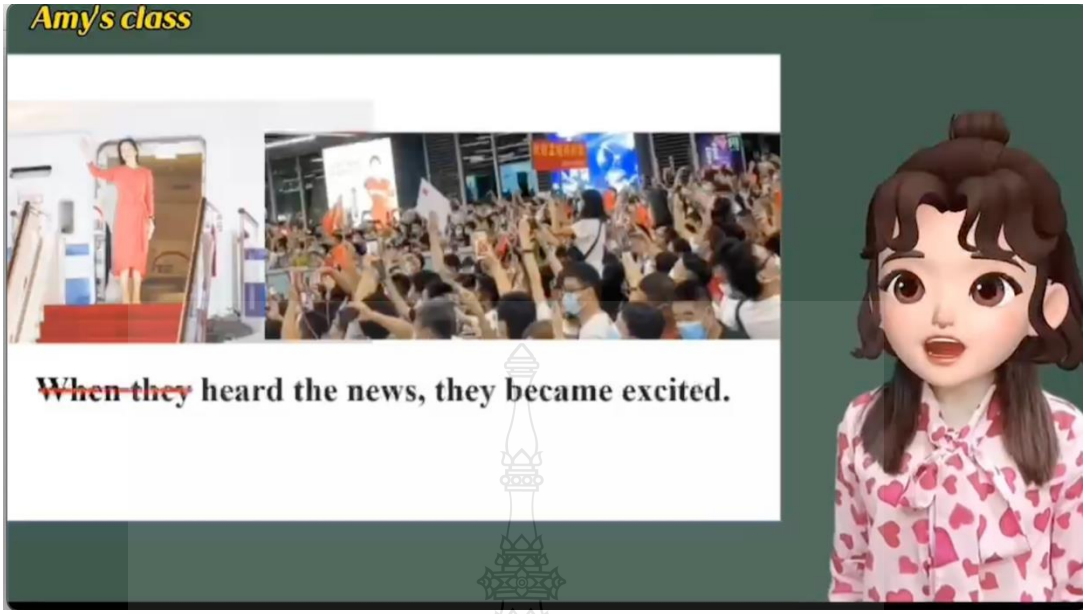

Figure appD.13 Show the content in lesson (Cont.)

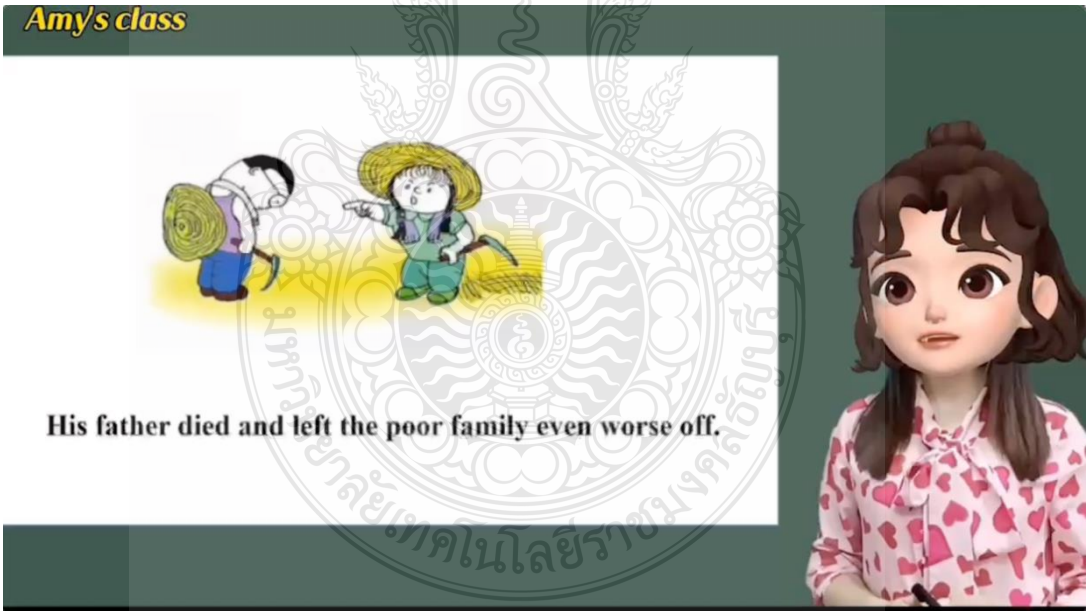

Figure appD.13 Show the content in lesson (Cont.)

Biography

Name-Surname	Mrs. MengYan ling
Date of Birth	December 4, 1984
Address	Building 2, Unit 5, 602 room, Jingcang community of LongXi in Gansu province.
Education	Bachelor of Arts, Major of English. (2007)
Work Experience	2008-present English teacher in No.2 middle school of LongXi in Gansu province.
Telephone	+(9421) 17793216639
e-mail	meng_y@mail.rmutt.ac.th