The Use of Algorithm System Model in Teaching English to Thai Students

Chakrit Visaltanachoti
School of Industrial Education and Technology
King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand
E-mail: Chakrit_Visaltanachoti@gmail.com

Abstract

At present, artificial intelligence technology has been used in English teaching in Thailand in support of learners' performance. In this study, the researcher aimed to (1) develop an algorithm system model for teaching English as a Second Language (ESL) to Thai students at the lower secondary level, and (2) study the effect of the algorithm system model on Thai students' learning outcome under study. The study was a quasi-experimental research using a pre- and posttest (One Group Pretest-Posttest Design) with lower secondary students. The research tool was an algorithm system model developed for teaching English to the students under study. The tool quality was obtained with a reliability coefficient of 0.97. The results showed that the learning outcome of the students from the algorithm system model in the posttest was higher than that in the pretest, and both overall and in all individual aspects were significant at the 05 level.

Keywords: *Algorithm system model, artificial intelligence technology, teaching English as a Second*
Language (ESL), lower secondary Thai students

1. Introduction and Rationale of the Study

At present, artificial intelligence technology (AI) has been increasingly used to develop learning outcome via the computer system. The use of artificial intelligence in educational activities increased by 80% in 2021. The positive impact of AI was shown in learner learning (Russell, 2010). Through learning and human decision-making methods, AI plays an important role in English learning and affects many aspects of learning outcomes shown by Thai students. Most of them listen, speak, read, and write English in class by teachers' instruction. It was noted that 75% of English teachers' English skills in primary schools are problematic in rather ow proficiency at A2 or less in the CEFR Test.

The problems in English teaching in Thailand appear to lie in the lack of integrated skills in teaching and learning (Office of the Education Council, 2017). The emphasis on grammar and vocabulary teaching leads to students' inability to use English in communication. Although efforts are made to hire foreign teachers or native speakers of English, most schools cannot maximize the use of those hired teachers to help students communicate effectively. Students have to seek tutorial classes on their own with support from their parents. Students from middle- or working-class families have a limited opportunity in upgrading their language performance in real language interactions. Some schools have tried some teaching management methods to help students, but a large-size class in provincial schools has hampered students' learning motivation to a certain extent.

Eighty percent of primary school English teachers are not English majors and as a result lack language skills to do communicative teaching. Considering these problems, the researcher would like to investigate English language teaching at the lower secondary level with the use of AI for the reason that the algorithm system model should be tried at this level prior to its extended use at the higher levels.

The researcher also would like to look at teachers' attitude toward English teaching in basic education. Education statistics show that 51.91% of teachers assumed that have improved their English language ability through professional training programs organized by their school and the Basic Education Office (Office of the Education Council). Teachers expected their school to take care of curriculum development and provide guidance for teaching plan, teaching material production, and management of teaching media. However, most English teachers had to handle all these tasks and feel overwhelmed with other additional school duties. In this regard, teachers lack systematic support and AI could serve their needs for assistance in teaching and training students to communicate at the functional level. AI can help teachers manage students' learning and consultation. AI helps create English teaching content, such as checking correct grammar in the teaching content. Only one computer with a high-performance can be available to students to learn at the time they prefer and reduce restrictions in getting help from their teachers. AI is meant for teachers to share responsibilities with students, and teachers can encourage students' positive learning attitude and autonomy.
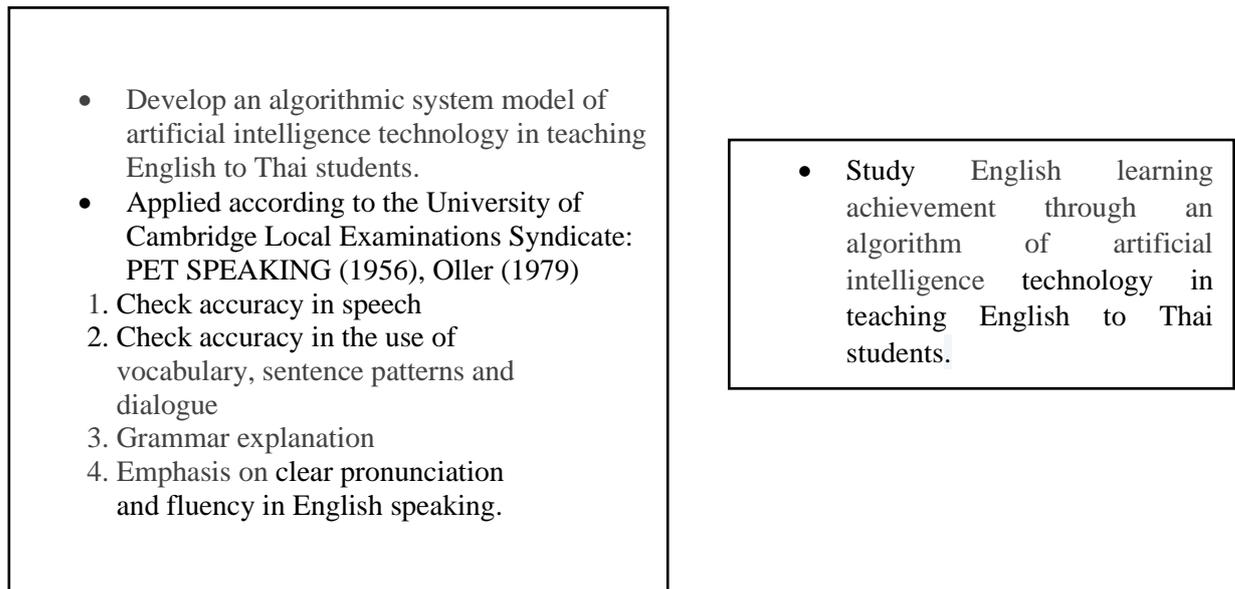
2. Research objectives

The researcher aimed at two objectives:
(1) To develop an algorithm system model for Teaching English as a Second Language (ESL) to Thai students at the lower secondary level, and
(2) To study the effect of the algorithm system model on Thai students' learning outcome under study.

3. Research Conceptual Framework

From the concepts, theories and related research in artificial intelligence technology, the development of algorithms in teaching English has become the focus of attention among language teachers. The concept of computer learning theory by machines can predict the learning outcomes by logics and the learning pattern can be generated from the data obtained (Hosch, 2009; Russel, 2010; Tatum, 2012). Teaching English focuses on the processed learning of natural language stored on large-scale and artificial neural networks, known as algorithms. The research conceptual framework is shown in Figure 1.

Figure 1: Research Conceptual Framework

- Develop an algorithmic system model of artificial intelligence technology in teaching English to Thai students.
- Applied according to the University of Cambridge Local Examinations Syndicate: PET SPEAKING (1956), Oller (1979)
  1. Check accuracy in speech
  2. Check accuracy in the use of vocabulary, sentence patterns and dialogue
  3. Grammar explanation
  4. Emphasis on clear pronunciation and fluency in English speaking.

- Study English learning achievement through an algorithm of artificial intelligence technology in teaching English to Thai students.

The researcher used two steps in conducting this study:

Step 1: Develop an algorithm system model in teaching English to Thai students

The researcher studied previous research in AI from the literature regarding theoretical concepts about algorithm systems and artificial intelligence technology. The literature dealt with patterns of recognition and the theory of computer learning by which machines predict the results of learning by themselves; the patterns are derived from the data obtained (Hosch, 2009; Russel, 2010; Tatum, 2012). English teaching focuses on the processed learning of natural language; this can be done by artificial neural networks, known as algorithms. The researcher therefore would like to develop an algorithm system model to teach English as a Second Language to Thai students at the lower secondary level to see how they react to the system with specific learning outcome.

There were three stages involved in the development of an algorithm system model. First, the researcher constructed the tool on the algorithm system with specifications of contents and learning outcomes. The tool was checked by ESL specialists for accuracy and suitability for revision to reach the final version. Second, the researcher collected data on the aspects of (1) Identify what you need from an expert, that is, accuracy in speech, (2) correctness of vocabulary, sentences and dialogues, (3) explanation of grammar, and (4) clear pronunciation and fluency in English speaking. Third, the researcher analyzed the recorded results to draft a pretest/ posttest on the four aspects, and make revision as suggested by ESL specialists for the final version. The researcher also prepared tools for measurement and evaluation of the expected learning outcomes.

Step 2: Study the results of an algorithm system model in teaching English to Thai students

Step 2 dealt with the identified problems in the four aspects on speech accuracy, correctness of vocabulary, sentences and dialogues, explanation of grammar, and clear pronunciation and speaking fluency. Verification, testing was conducted for effectiveness of the algorithm system in teaching English to Thai students. There was a pretest plan in one group before and after the test (One Group Pretest-Posttest Design).

The subjects in the study were lower secondary school students at Wat Nuan Noradit School. They were randomly selected by lottery from schools under the Secondary Educational Service Area Office 1 in the second semester, Academic Year 2020.
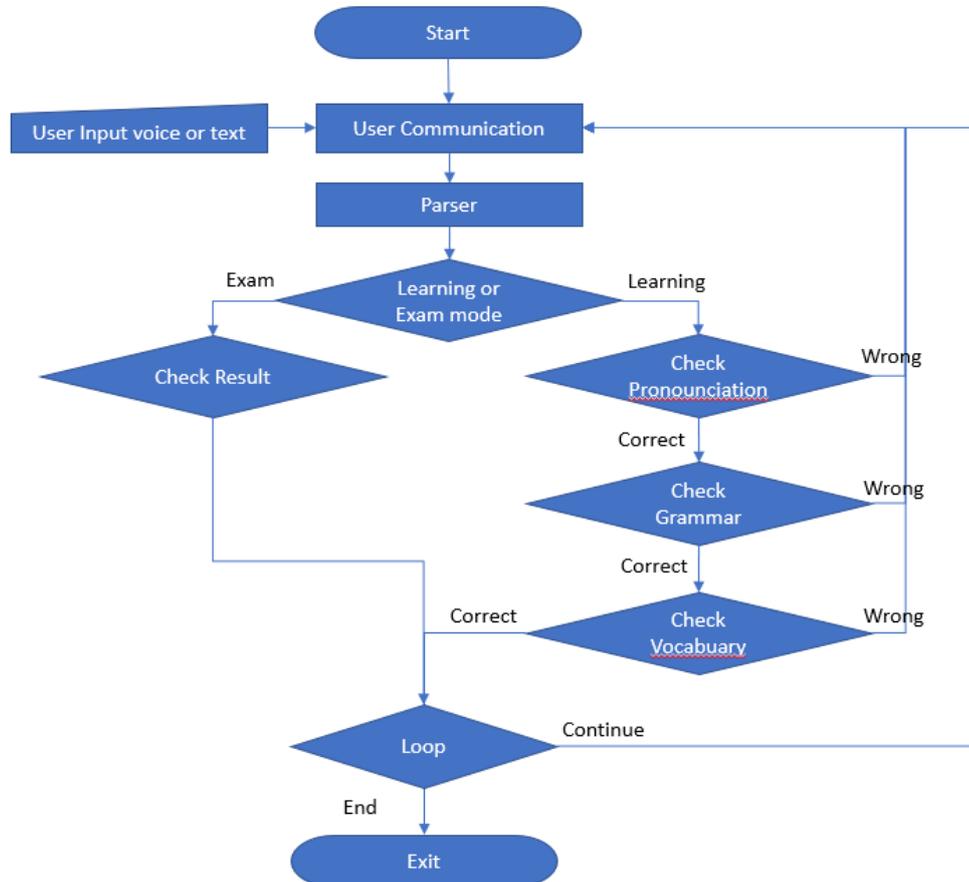
The pretest and posttest on trial consisted of 40 items on understanding of sentence structure and English vocabulary with a score of 1 for a correct answer, 0 for a wrong answer. The obtained results were used as feedback in the development of an algorithm system model in teaching English to Thai students at the lower secondary level.
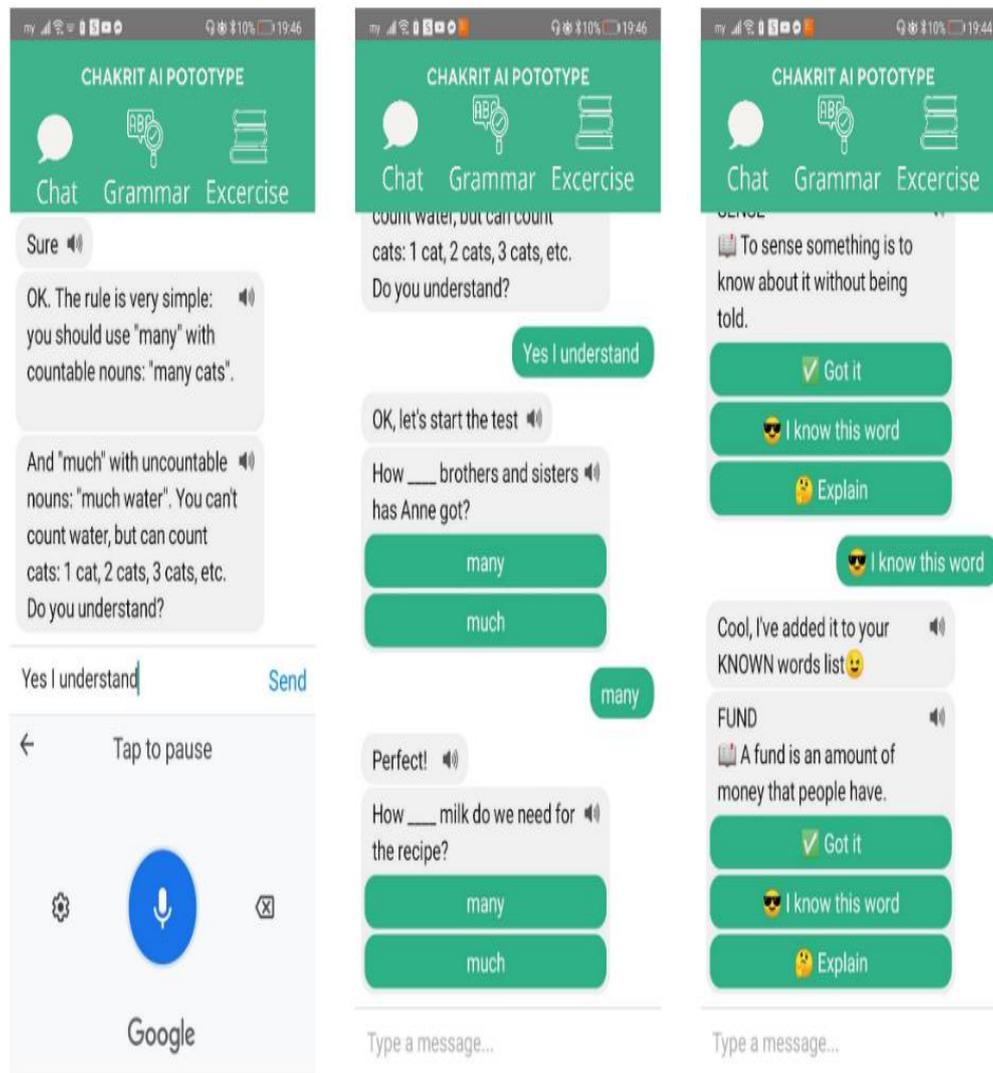
4. Results of the Study

4.1 The Development of an Algorithm System Model in Teaching English to Thai Students

The researcher reported the sequence of steps used in the algorithm system model as shown in Figures 2-4.

Figure 2: Development of an Algorithm System Model in Teaching English to Thai Students (1)

Figure 3: Development of an Algorithm System Model in Teaching English to Thai Students (2)

In the algorithm system model, students will be able to create their student profile account before starting the course. It contains the first name, last name, age, gender, and time setting in learning English.

Figure 4: The Algorithm Model System

In the development of the algorithm system model, the researcher created 40 English questions on speech accuracy, the use of vocabulary, sentence patterns and dialogues, grammar explanation, and clear pronunciation and fluency in English speaking. The model contains sentences suitable for students at the lower secondary level, content taken from the assigned course book.

When the students under study started using the model, they were able to use questions with the algorithm. The algorithm responded with correct versions when the students mispronounced words or sentences. In such a sequence of students' performance and the algorithm's responses, the students were encouraged to speak English clearly and fluently by repeating after the correct versions provided by the algorithm. The system model was classified into levels of language difficulty. In this way, teachers will need to use the system model as an assistant to help support their students to work on vocabulary, grammar, sentences, dialogues, and pronunciation practices. To the researcher, the AI

technology provides a mechanism or an algorithm containing a set of instructions or step-by-step conditions on the computer that will allow learners to learn by themselves by interacting with the pseudo teacher or the algorithm a specific teaching purpose. Students simply communicate or interact with the thinking machine that has its big data to cover what learners are expected to learn to use English in writing and speaking. The researcher designed a controlled learning by predicting results by classification of language performance-based data. Automation distinguishes and creates patterns from the received data. In this regard, the system model carries a preliminary set of commands of 40 words, for instance, in the form of questions for the algorithm to respond to the users or learners.

4.2 The Effect of the Algorithm System in Use on Thai Students

Using the developed algorithmic system model in teaching English to Thai students, the researcher used the pretest to assess speech interactions between students and the algorithm. This algorithm system model was meant to improve English learning performance of the students under study. The system can learn and predict outcomes by automatically classifying, distinguishing, and modeling from the received data. It should be noted that the system was initially programmed for an introductory set of instructions using 100 question-and-answer sets. For this particular study, the researcher used only 40 question-and-answer sets.

The results on the effect of the algorithm on the students' performance showed the following:

When considering each aspect, it was found that:

- the speech accuracy score at $\bar{x}$ = 0.900 (SD=0.810) before learning, and at $\bar{x}$=9.25 (SD=1.561) after studying, with t-value= .27.518**.
- This was followed by the second place on clear and fluent pronunciation: pre-study score at $\bar{x}$=1.900 (SD=1.236), and post-study score at $\bar{x}$=9.300 (SD=1.159), with t-value= -25.674 **.
- The third rank was on the correctness of vocabulary scores before studying at $\bar{x}$=1.550 (SD =1.467), and after studying at $\bar{x}$= 9.300 (SD=1.522), with t-value=24.391**.
- The fourth rested upon grammar points before studying at $\bar{x}$= 2.750 (SD=1.750), and after studying at $\bar{x}$= 9.275 (SD=1.320), with t-value =17.456**, respectively.

5. Discussion of Results

From the obtained findings, it can be said that after the past 20 years of the Ministry of Education in attempting to upgrade the quality of English teaching and learning, Thai students still have not achieved a good result as intended and planned in the national policy. Thai students are now facing challenges in communicating in English as a second language in their study and later on when they enter the job market. As known, Thai graduates' ability to communicate in English is still at a lower level than those of the neighboring countries. Thai educators and scholars have been trying to figure out why, and most of them tend to assume that limitation in English development could have stemmed from the use of traditional teaching methods, rather poor learners' motivation, and unfavorable attitudes

toward English learning. To the researcher, adjustment in the teaching method with the use of AI in the form of language learning algorithm could make it possible to improve performance of those language learners who are willing to learn to master the language for communication. From the researcher's teaching experience, interactions could be the key and the algorithm can be available for learning and interaction without time limit as individual learners may prefer.

In developing the algorithm system model in teaching English to Thai students, the researcher used an avatar and the system can set up an account profile for learners. Students can set time for one practice session to improve their English and select the content with vocabulary related to daily life and sentences suitable for communication. The algorithm assists with accuracy in vocabulary, grammar, pronunciation, and speaking fluency. The system can answer questions from students and show them appropriateness in language use. Repetition in practice is supported until the students get the answers or responses right. The system is divided into levels of difficulty by using a set of words from simple to complex in use. This is to facilitate gradual learning with not too much pressure; easy accessibility should be made consistent for learners (Baker & Smith, 2019).

The results of the study did not appear to yield a positive support for the developed algorithm. This could involve the monitoring method of the teacher. According to Baker & Smith (2019), AI serves as a strong motivating factor for student progress, for the reason that it enables learners to be productive and can be monitored and evaluated in accordance with the objectives of the students' progress. Therefore, the understanding of the learners' motivation in setting their goals and formulating their own learning strategies will make it possible to predict the students' future learning abilities. Some researchers argue that language teachers should focus on how to help learners use translation tools effectively. In addition, English teachers should be made aware of the possibilities and limitations in providing adequate advice to students (Cook, 2010; Tatum, 2012). Two researchers— (Baker & Smith, 2019)—asserted that AI systems with natural language, creativity and knowledge sharing can replace real-life language teachers. However, the issue of teaching management has to be well designed and monitored for the planned learning outcome in the first place. As shown in this present study, the tool or the algorithm is right there but the big question lies in how to make it work for the target learners to get improvement in their language performance.

The results of the experimental use of the developed algorithm system model in teaching English to Thai students before and after its use could be promising. The posttest found that after practice, the students were able to improve to a certain extent, the four aspects in speech accuracy, grammar, sentences and dialogues, and pronunciation and fluency in speaking. The researcher also assessed the students' satisfaction with the algorithm system model and found that they were quite positive about learning with the algorithm [Personal communication, 2021]. The satisfaction result was consistent with the research finding reported by Brusilovsky & Peylo (2003). They reported that most students enjoy using chatbots and generally feel more comfortable conversing with the bot than their peers or teachers. As a result, students feel relaxed and believe that this approach could help them learn the language. To students, regular conversations with chatbots boost their

language confidence in listening ability and in turn increasing interest in language learning. However, it is important to note that using a chatbot may not be effective for beginners. The problem is that most chatbots respond to simple keywords and cannot assess whether the language input is grammatically correct or practical. The algorithm can address such limitation and can also operate in well-defined situations with predictable conversations. The algorithm can handle mistakes as well as grammatical and spelling errors for learners.

6. Suggestions

The researcher would like to suggest to language teachers for the use of the algorithm system model as follows:

6.1 The algorithm system model in teaching English to Thai students is suitable for those who want to practice English conversation on their own. It can be used on both Android and iOS mobile phones. There is an AI system to help analyze the accuracy of pronunciation and learn with fun in interacting with the system.

6.2 Students must have a smart phone or a tablet. They need to download the application, register as a member and complete the settings. Students can choose conversation at their leisure or use a set of questions prepared on the system. They can set time to study at their own learning pace. If learners want to study to take the test in the test series, it will be in conjunction with a set of 100 questions uploaded on the system. Students can use a microphone in the smart phone, which is stable enough to work well with the system itself.

6.3 It is vitally important for the teacher to give guidance to students, follow up with their progress in practice with the algorithm, and collect feedback from them. The teacher's encouragement and support can help students feel confident to move along with the learning program on the system. The teacher should make it a must to let the students know that they can still resort to the teacher for help and clarification.

7. The Author

Chakrit Visaltanachoti is a doctoral candidate at the School of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang Bangkok, Thailand. He has a keen interest in AI technology, particularly as applied to Teaching English as a Second Language to Thai university students and their reactions to learning through the AI system.

8. References

Baker, T., & Smith, L. (2019). Educ-AI-tion rebooted? Exploring the future of artificial intelligence in schools and colleges. (Online). https://media.nesta.org.uk/documents/Future of AI and education 5WEB.pdf., January 15, 2022.

Brusilovsky, P. & Peylo, C. (2003). Adaptive and intelligent web-based educational systems. *International Journal of Artificial Intelligence in Education, 2013, 13, 156-169.*

Cook, G. (2010). *Translation in Language Teaching: An Argument for Reassessment.* Oxford: Oxford University Press.

Hosch, G. (2009). Analysis of the implementation and impact of the FAO Code of Conduct for Responsible Fisheries since 1995. FAO Fisheries and Aquaculture Circular. No. 1038. Rome, FAO, 99 pp.

Office of the Education Council. (2017). *Education in Thailand.* Bangkok: Prigwan Graphic Co., Ltd.

Russell, S. J. (2010). *Artificial Intelligence: A Modern Approach.* Upper Saddle River, N.J.: Prentice Hall.

Tatum, M. (2012). What is machine perception? (Online). http://www.wisegeek.com/what-is-machineperception.htm.Wernick, March 16, 2017.