

The Development of ESP Students' English Vocabulary Knowledge and Reading Skills Using the PQRST Technique with News Articles

การพัฒนาคำศัพท์และทักษะการอ่านภาษาอังกฤษของผู้เรียนภาษาอังกฤษเพื่อวัตถุประสงค์เฉพาะโดยใช้เทคนิค PQRST ร่วมกับบทความข่าว

Wanlop Yoodee and Kriangsak Thanakong*
วัลลพ อยู่ดี และ เกียรติศักดิ์ ฐานะกอง*

Department of English, School of Liberal Arts, University of Phayao

สาขาวิชาภาษาอังกฤษ คณะศิลปศาสตร์ มหาวิทยาลัยพะเยา

**Corresponding author, E-mail: kriangsak.th.up@gmail.com, โทร. 080-5005297*

วันที่ส่งบทความ 7 กุมภาพันธ์ 2566 วันที่แก้ไขครั้งสุดท้าย 30 มีนาคม 2566

วันที่ตอบรับบทความ 31 มีนาคม 2566 วันที่เผยแพร่ออนไลน์ 1 กรกฎาคม 2567

บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อ 1) เปรียบเทียบความรู้ด้านคำศัพท์ภาษาอังกฤษของนักศึกษาวิศวกรรมสิ่งแวดล้อมก่อนและหลังการใช้เทคนิค PQRST ร่วมกับบทความข่าวในห้องเรียนภาษาอังกฤษเพื่อวัตถุประสงค์เฉพาะ 2) เปรียบเทียบทักษะการอ่านภาษาอังกฤษของนักศึกษาวิศวกรรมสิ่งแวดล้อมเฉพาะก่อนและหลังการใช้เทคนิค PQRST ร่วมกับบทความข่าวในห้องเรียนภาษาอังกฤษเพื่อวัตถุประสงค์เฉพาะ และ 3) ศึกษาทัศนคติของนักศึกษาต่อการใช้เทคนิค PQRST ร่วมกับบทความข่าวสำหรับการพัฒนาคำศัพท์และทักษะการอ่านภาษาอังกฤษ กลุ่มตัวอย่างงานวิจัยประกอบด้วยนักศึกษานักศึกษาวิชาวิศวกรรมสิ่งแวดล้อมจำนวน 20 คน ที่ลงทะเบียนเรียนรายวิชาภาษาอังกฤษเพื่อวัตถุประสงค์เฉพาะในมหาวิทยาลัยในกำกับของรัฐบาลแห่งหนึ่งในประเทศไทย เครื่องมือที่ใช้ในงานวิจัยประกอบด้วยแผนการสอนที่ใช้เทคนิค PQRST ร่วมกับบทความข่าวในการพัฒนาคำศัพท์และทักษะการอ่านภาษาอังกฤษจำนวน 7 แผนการสอน แบบทดสอบความรู้ด้านคำศัพท์ แบบทดสอบการอ่านแบบสอบถาม และการสัมภาษณ์แบบกึ่งโครงสร้าง ผู้วิจัยใช้ค่าเฉลี่ยและส่วนเบี่ยงเบนมาตรฐาน ในการวิเคราะห์ข้อมูลจากแบบทดสอบการอ่านภาษาอังกฤษก่อนเรียนและหลังเรียน และค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และการวิเคราะห์เนื้อหาในการวิเคราะห์ข้อมูลทัศนคติของนักศึกษาต่อการใช้เทคนิค PQRST ร่วมกับบทความข่าวในการพัฒนาคำศัพท์และทักษะการอ่านภาษาอังกฤษ

ผลการศึกษาพบว่าความรู้ด้านคำศัพท์และทักษะการอ่านภาษาอังกฤษของนักศึกษาเพิ่มขึ้นอย่างมีนัยสำคัญหลังการใช้เทคนิค PQRST ร่วมกับบทความข่าว และนักศึกษามีทัศนคติในด้านบวกต่อการเรียนโดยใช้เทคนิค PQRST ร่วมกับบทความข่าวในห้องเรียนภาษาอังกฤษเพื่อวัตถุประสงค์เฉพาะ

คำสำคัญ: ภาษาอังกฤษเพื่อวัตถุประสงค์เฉพาะ คำศัพท์ ทักษะการอ่าน

Abstract

The purposes of this research were to: 1) compare the English vocabulary knowledge of environmental engineering students before and after using the PQRST technique with news articles in an ESP classroom, 2) compare the English reading skills of environmental engineering students before and after using the PQRST technique with news articles in the ESP classroom, and 3) examine the students' attitudes towards the use of the PQRST technique with news articles to enhance their English vocabulary knowledge and reading skills. The study sample included 20 third-year environmental engineering students enrolled in an ESP course at a public university in Thailand. The research instruments comprised seven lesson plans employing PQRST with news articles, vocabulary tests, reading tests, an attitude questionnaire, and semi-structured interviews. Mean and standard deviation (S.D.) calculations were adopted to analyze the data from the pre-tests and post-tests of the vocabulary and English reading tests. Mean and S.D. scores as well as content analysis were used to investigate students' attitudes toward the use of PQRST with news articles to improve their vocabulary knowledge and reading skills. This study found that the ESP students' vocabulary knowledge and English reading skills improved significantly after employing PQRST with news articles, and that the students held positive attitudes towards the use of PQRST with news articles in the ESP classroom.

Keywords: *English for specific purposes, Vocabulary, Reading skills*

Introduction

English language proficiency is increasingly included as a requirement on job applications (Un-udom & Jantuma, 2022). However, in Thailand, English usage among students in the higher education sector remains a significant issue to be addressed (Sathianpan & Chulerk, 2020). With regards to improving students' English language proficiency as required by the job markets, English for Specific Purposes (ESP) plays an important role in enhancing students' English language knowledge and skills along with the specific content. ESP is an approach to English language learning for a specific group of students based on their needs and interests (Hutchinson & Waters, 1987). In this regard, the principal goal of an ESP course is to design the contents and objectives to meet the students' needs (Inkaew, 2021; Kaowiwattanakul, 2020). Reading is the ability to understand the meaning of written texts. It is integral to the improvement of learners' language skills, academic success, and personal development (Promluan & Sukying, 2021). Reading proficiency is also considered a critical language skill for professional success. That is, everyone must be able to read in order to compete in the twenty-first century labor market (Wangchuk & Chalermnirudorn, 2019). In turn, engagement with the English language through reading can contribute to the development of other language skills related to listening, speaking, and writing, all of which university students may seek to employ for effective communication in their future careers (Yakian & Kaweera, 2019). In addition, reading skills are highly prized by

government agencies in Thailand because staff might need to use these skills to complete some tasks (Un-udom & Jantuma, 2022). Therefore, students need to be equipped with English language reading skills in order to apply for future jobs.

However, Thai students tend to have difficulties understanding a text when reading it in English (Jarernkit & Swatevacharkul, 2020). In this regard, students may experience difficulties reading a text written in English due to the lack of vocabulary (Nation, 2009). Vocabulary knowledge is a major factor in students' ability to comprehend the contents of the reading material (Tharawan & Adipattaranan, 2019). This ability is significantly predicted by one's vocabulary knowledge, implying a relationship between vocabulary size and reading comprehension (Al-Khasawneh, 2019). Therefore, it is critical to develop students' reading abilities and vocabulary knowledge in order for them to flourish in a classroom setting (Boonpradit, Na-Soonthorn, & Wattanakeeree, 2021; Chatkeaw & Tachom, 2021; Tharawan & Adipattaranan, 2019).

Considering the relationship between reading and vocabulary, reading can improve students' mastery of vocabulary (Rohani, & Suyono, 2021; Yulia & Lastri, 2020). In classroom settings, exposure to new words while reading is an effective way to expand the vocabulary of students (Pellicer-Sánchez, Conklin, & Vilkaite-Lozdiene, 2021). Going back to basics, English newspapers available online are considered authentic reading materials (Prathoomthin, 2020) for integration into the learning activities in ESP classrooms. Reading English newspapers assists students in improving not only their reading skills but also their vocabulary (Ahmmed, 2016; Pitafai, 2022). When reading newspapers, students can strengthen their English language skills and gain general knowledge (Thiagarajah & Razali, 2021). Newspaper articles have long been utilized in general English classrooms and may be integrated into teaching and learning techniques in ESP classrooms. However, such articles sometimes present technical vocabulary that is challenging for readers to understand. According to needs analyses on reading and vocabulary presented in previous studies, students report the need to master both general and technical vocabulary (Inthapat, Sorapat, & Eungrasamee, 2020; Yulia & Lastri, 2020). With this in mind, learning general and technical vocabulary before reading assists students in understanding the contents of news articles.

It is widely acknowledged that the teaching materials and learning activities implemented in ESP classrooms, along with the application of reading techniques, can help students improve their vocabulary knowledge (Viriyapanyanont, 2021). One reading technique considered beneficial in language learning classrooms is PQRST (Preview, Question, Read, Summarize, and Test). PQRST is recognized as one of the most extensively utilized learning strategies for enhancing students' reading skills (Parameswari, Ikhsanudin, & Arifin, 2021; Syafitri, 2017; Wormeli, 2005). The PQRST strategy encourages students to be more engaged in the classroom, which, in turn, can improve their reading engagement (Parameswari et al., 2021).

As previously discussed, English vocabulary knowledge and reading skills are crucial for entry into the job market. Further research is therefore required on how to improve the English

language knowledge and skills of undergraduate students to meet their needs. Realizing that news articles provide opportunities for students to improve their English language skills, attention is turning to the use of news articles via the PQRST technique in ESP settings to improve students' general and technical vocabulary and reading skills. Therefore, the current study aims to investigate the extent to which the use of news articles via the PQRST technique enhances the vocabulary and improves the reading skills of environmental engineering students enrolled in an ESP course.

Research objectives

- 1) To compare the environmental engineering students' English vocabulary knowledge before and after using the PQRST technique with news articles in the ESP classroom
- 2) To compare the environmental engineering students' English reading skills before and after using the PQRST technique with news articles in the ESP classroom
- 3) To examine the students' attitudes toward the use of the PQRST technique with news articles to enhance their English vocabulary knowledge and reading skills

Methodology

1. Participants of the study

Participants were selected using the purposive sampling method. Based on one of the participating researchers' assigned ESP teaching courses in the first semester of the academic year 2022, 20 third-year environmental engineering students enrolled in the course at a medium-sized public university in northern Thailand were selected.

2. Research instruments

The present study employed a mixed-methods design comprising both qualitative and quantitative data collection. A one-group pretest-posttest design was implemented to compare the students' English vocabulary knowledge and reading skills before and after the implementation of the PQRST technique with news articles. The instruments employed in this study included lesson plans using PQRST with news articles, English vocabulary tests, English reading tests, and a five-point Likert scale questionnaire. Semi-structured interviews were conducted to examine the attitudes of the students.

3. Research instrument construction

3.1 Lesson plans

Firstly, seven lesson plans implementing the PQRST technique with news articles to improve students' English vocabulary knowledge and reading skills were constructed by the researchers.

Then, six online newspaper articles from the Bangkok Post presenting at least six environmental issues were selected for each of the six lessons: 1) 'The flora of Laos' (biodiversity), 2) 'Amazon deforestation threatens jaguars, giant eagles' (extinctions), 3) 'Pattaya sea

water quality gets ‘poor’ grade’ (water pollution), 4) ‘Climate change threatens Hadrian’s Wall treasures in England’ (climate change), 5) ‘Moving toward a cleaner future’ (energy), and 6) ‘Fight the PM2.5 war for clean air now’ (air pollution). In addition to the six articles, a lesson plan was needed to facilitate the students’ implementation of the news articles using the PQRST teaching strategy. The lesson plans and the news articles were reviewed for accuracy and appropriateness and ultimately approved by three ESP experts with at least seven years of experience teaching ESP courses. Using news articles not only enhances students’ knowledge of the reading content but also their English language proficiency.

Each lesson plan comprised 4 parts: objectives, vocabulary (10 B1-level words and 3-4 subject-specific or technical words), a reading passage (an online newspaper article published by the Bangkok Post), and a reading exercise corresponding to the article and the T (test) in the PQRST teaching strategy. Considering the preferences of some students to read texts printed on paper (Clinton, 2019), printed (PDF) versions of the news articles were distributed to the students. They were, however, permitted to use personal electronic devices to read the online articles or read the PDF documents on their applications rather than the printed version provided to them. Furthermore, the university at which the students were studying aims for students to achieve at least B1-level according to the Common European Framework of Reference for Languages (CEFR). Based on this, 60 words identified as B1 according to the online Cambridge Dictionary were selected from the news articles and included in the vocabulary section. In addition, 20 technical terms (3-4 words in each lesson excluding the introduction lesson) relevant to the fields of environmental studies and engineering were drawn from the news articles. This was accomplished by searching for glossary words in Career Paths: Environmental Science (Evans, Dooley, & Blum, 2015) and Career Paths: Environmental Engineering (Evans, Dooley, & Rodgers, 2018), together with the Environmental Engineering Dictionary and Directory by Pankratz (2000). With this, the total number of words was 80.

When implementing each lesson plan, the researcher first stated the objectives of the lesson, provided some details to the students on what they would learn, and then requested that they participate in the activities.

Preview step (P): The students previewed the news article to identify its main parts.

Question step (Q): The students read the questions related to the news article prior to reading the article. They were also asked to formulate questions to which they wanted to find answers (e.g., “What is the purpose of the reading passage?”, “What are the answers to the reading questions?”, and “How will this information be used in environmental studies?”).

Read step (R): Before reading the news article, the B1-level vocabulary and terminologies related to the students’ fields of study were presented. This was done to support the aim of the study, which was to investigate whether use of the PQRST technique with news articles improved ESP students’ vocabulary. The students then read the news article. They were invited to read each article twice and were asked to highlight only the main ideas or keywords.

State or summarize step (S): The students stated the main idea or theme or summarized the passage in their own words.

Test step (T): The students answered the questions they had developed in the Q step along with the provided questions on the passage.

The students were permitted to use their electronic devices in class. As such, they could record notes on device applications during all the PQRST steps, especially during the reading step.

3.2 Vocabulary knowledge tests

Secondly, tests were designed in order to assess the students' English vocabulary knowledge before and after utilizing the news articles via the PQRST teaching strategy. The content of the posttest was the same as the pretest; however, the order of the questions and the answers were rearranged. The posttest aimed to investigate whether or not the students' vocabulary improved after implementing the newspaper articles using the PQRST strategy. Each of the tests consisted of 30 items, including 25 B1-level vocabulary items and 5 technical vocabulary items. The sample group was required to take the CEFR tests created by the university's language center and achieve at least B1-level. The assessments of vocabulary in these tests comprised multiple-choice questions, and, with this in mind, the current study's vocabulary tests also comprised multiple-choice questions with four options: one correct answer and three distracters.

The Item-Objective Congruence (IOC) index was then utilized to indicate the content validity of the tests of English vocabulary knowledge. Items with scores lower than 0.5 were revised, whereas those with scores higher than or equal to 0.5 were reserved. The three experts who approved the news articles were asked to perform the IOC. The overall IOC score of the survey on the vocabulary knowledge tests was 0.98.

3.3 Reading tests

Thirdly, reading tests were constructed using the same pretest and posttest format to assess students' English reading skills. Each test comprised 20 multiple-choice questions related to four news articles from the Bangkok Post, unseen by the students. The articles were relevant to the environmental topics covered in the lessons, as approved by the three experts. Similar to the vocabulary tests, an IOC was conducted by the same experts, with an overall score of 0.98 for the survey on the reading tests.

3.4 A questionnaire and semi-structured interview questions to investigate the students' attitudes A five-point rating scale questionnaire was also developed. This was to investigate the students' attitudes toward the implementation of news articles using the PQRST strategy in the ESP classroom to develop their English vocabulary and reading skills. The questionnaire consisted of 12 items and was divided into two sections: students' attitudes toward the selected newspaper articles, and students' attitudes toward the learning activities related to the news articles based on the PQRST strategy in the ESP classroom. The five-point Likert-scale

interpretation (Chetsadanuwat, 2018) was employed to indicate the ‘levels’ of the students’ attitudes, as presented in Table 1:

Table 1 Likert-scale interpretation

Likert scale	Interval range	Difference	Interpretation
5	4.21-5.00	0.79	Highest
4	3.41-4.20	0.79	High
3	2.61-3.40	0.79	Moderate
2	1.81-2.60	0.79	Low
1	1.00-1.80	0.80	Lowest

The three experts accordingly approved the questionnaire. The overall IOC was 0.97. In response to the experts’ recommendations, changes were made to some statements in the questionnaire.

Finally, semi-structured interview questions were designed to examine the participants’ attitudes toward implementing news articles via the in-class PQRST activities. The questions aimed to investigate the students’ attitudes toward the news articles used and the benefits of using the PQRST strategy. However, additional questions were employed if needed.

4. Data collection

The fieldwork for this research took place between July and September 2022. A purposive sampling method was utilized to select 20 third-year environmental engineering students enrolled in the ESP course at a public university in the first semester of 2022. The students were required to participate in the tests of vocabulary and English reading (pretests) prior to experiencing the PQRST strategy to examine their English vocabulary knowledge and reading skills. Then, the students were introduced to the PQRST strategy with the aim of promoting their understanding of how the learning strategy may be used during the lessons. The seven lesson plans were employed in the classroom over 7 weeks: 3 hours each week for a total of 21 hours. Using each lesson plan, the students were introduced to the 10 B1-level words and 3–4 technical terms given focus in the lesson. They were then instructed to read the lesson’s designated news article using the PQRST strategy. Other technical terms or difficult words were also discussed while running each lesson. Following the completion of all seven lessons, the posttests were conducted to assess the students’ knowledge of English vocabulary and reading skills. After completing the posttests, the researcher distributed the attitude questionnaire to the students. The students were individually interviewed face-to-face, using the semi-structured interview questions to examine their perspectives toward the use of the news articles and the PQRST activities in the classroom. The interviews were conducted in Thai. Each interview took approximately 20 minutes. Content analysis of the interview responses was performed based

on the two main themes, including the students' attitudes toward the news articles used and the benefits of the PQRST strategy.

Approval for this research study was granted by the Human Ethics Committee of the university where the students were enrolled.

5 Statistics analysis

Mean, t-test, and standard deviation (S.D.) calculations were attained for the English vocabulary knowledge and reading pretest and posttest results and used for data analysis. Mean and S.D. calculations were also performed for the students' responses to the attitude questionnaires, and a content analysis was conducted.

Results

1. Comparison of students' English vocabulary knowledge before and after implementing the PQRST technique with news articles

To achieve the first research objective, the students' English vocabulary pretest and posttest scores were analyzed using descriptive statistics to determine the mean score and S.D.

Table 2 Comparison of students' English vocabulary knowledge before and after implementing the PQRST technique with news articles (N=20)

Test	Min.	Max.	Mean	S.D.	t-test	Sig.
Pretest	7	20	13.25	3.37	-16.995	.000
Posttest	12	26	19.15	3.86		

Regarding the vocabulary tests in Table 2, the average pretest score for English vocabulary knowledge among students was 13.25 (S.D.=3.37) out of a total of 30 points, whereas the average posttest score was 19.15 (S.D.=3.86). This increase is statistically significant ($t = -16.995$, $p < 0.05$).

2. Comparison of students' English reading skills before and after implementing the PQRST technique with news articles

To achieve the second research objective, the students' English reading pretest and posttest scores were similarly analyzed using descriptive statistics to determine the mean score and S.D.

Table 3 Comparison of students' English reading skills before and after implementing the PQRST technique with news articles

Test	Min.	Max.	Mean	S.D.	t-test	Sig.
Pretest	7	16	9.65	2.43	-10.559	.000
Posttest	8	18	13.20	2.40		

As shown in Table 3, the average reading pretest score among the students was 9.65 (S.D.=2.43) out of a total of 20 points, which increased to 13.20 (S.D.=2.40) in the posttest after the instruction. This indicates a statistically significant ($p = 0.00$) level of improvement in the students' English reading skills from use of the PQRST technique.

Students' attitudes

Table 4 Attitudes toward the news articles used in the classroom to enhance English vocabulary knowledge and reading skills

No.	Statements	Mean	S.D.	Interpretation
1	I think the news articles are interesting.	4.40	0.50	Highest
2	I think the news articles are appropriate to my English language proficiency level.	4.10	0.64	High
3	I think the news articles provide B1-level vocabulary which is what I need to achieve according to the university's requirement.	4.55	0.51	Highest
4	I think the news articles provide technical vocabulary which I can use in my future career.	4.10	0.79	High
5	I think the news articles provide environmental engineering knowledge which I can use in my future career.	4.20	0.41	High
6	I think the news articles encourage me to enhance my reading skills.	4.55	0.51	Highest

In terms of the students' attitudes toward the news articles used during the lessons, the majority believed the articles included examples of the B1-level vocabulary they needed to achieve to meet the university's requirement (Mean=4.55 and S.D.=0.51). They also indicated that the articles encouraged them to improve their reading skills (Mean=4.55 and S.D.=0.51). Furthermore, according to the lowest mean scores, the students believed that the news articles were appropriate to their English language proficiency levels (Mean=4.10, S.D.=0.79), and that they provided technical vocabulary that they could use in their future careers (Mean=4.10, S.D.=0.79).

Table 5 Attitudes toward the PQRST strategy used in the classroom to enhance English vocabulary knowledge and reading skills

No.	Statements	Mean	S.D.	Interpretation
1	I think the PQRST strategy is easy to follow.	4.65	0.93	Highest
2	I think the PQRST strategy is appropriate to all English language proficiency levels.	4.50	0.51	Highest
3	I think the PQRST strategy helps me to improve my B1-level vocabulary.	4.40	0.68	Highest
4	I think the PQRST strategy helps me to improve my technical vocabulary related to my future professional fields.	4.25	0.55	Highest
5	I think the PQRST strategy helps me to improve my reading skills.	4.55	0.51	Highest
6	I think the PQRST strategy helps me to participate in the classroom activities in a non-threatening and relaxing atmosphere.	4.50	0.51	Highest

Based on the data gathered using the second category of questionnaires, most students appeared to hold positive attitudes toward the benefits of the PQRST strategy at the highest level in all aspects. Regarding the first two highest aspects, the students indicated that the PQRST strategy was easy to follow (Mean=4.65, S.D.=0.93), and that it helped them improve their reading skills (Mean=4.55, S.D.=0.51). Moreover, they believed the PQRST strategy was appropriate for use across all English language proficiency levels (Mean=4.50, S.D.=0.51). Furthermore, they indicated that it helped students engage in classroom activities in a non-threatening and relaxing atmosphere (Mean=,4.50 S.D.=0.51), to improve their B1-level vocabulary (Mean=4.40, S.D.=0.68), and that it enhanced their technical vocabulary related to their future professional fields (Mean=4.25, S.D.=0.55), respectively.

Interview results

The responses obtained from the semi-structured interviews were analyzed qualitatively. The purpose of this analysis was to confirm or complement the survey results by expanding on how the students thought about the selected news articles and the PQRST technique.

Employing news articles

“I am not used to reading newspapers, but the topics are related to my fields. I can relate them to what has been taught in my major subjects. For example, the PM2.5 passage makes me aware of the previous air pollution situations in the northern part of Thailand, as presented by a teacher in my major” (Student 12).

“I think the selected words in the B1-level vocabulary part is useful for me as I have to take the university’s CEFR exam” (Student 5).

“The passages are interesting. However, I would like you (the teacher) to choose news articles or online passages that provide more technical terms, since there are a few technical terms in each of the selected lesson articles in this course” (Student 8).

“As the news articles are related to my major, I found the technical terms like ‘waste disposal’ and ‘biomass’ in other texts that I have to study in my major. However, I think that there should be more technical terms presented because it is necessary for my current study” (Student 14)

“Prior to reading, you (the teacher) present some words, including their Thai definitions and how to pronounce them, which helps me understand the texts better. However, there are many words that I am not familiar with, and you allow us to use the Internet to look up words in online dictionaries. This also helps me get a better understanding of the texts” (Student 13).

The above excerpts are from the interviews conducted in Thai. They were translated into English for clarity and comprehension. As shown, the majority of students stated that the articles were related to their study fields, and they could relate them to their prior knowledge. Regarding the importance of the B1-level university test, fourteen students indicated that the B1-level vocabulary parts were important. Moreover, using the environmental engineering dictionary and online Cambridge dictionary to access definitions of new vocabulary helped the students to better comprehend the selected texts. However, although the results of the questionnaire revealed that the articles provided technical terms at high level, some students expressed that they were interested in learning more terminologies.

Furthermore, the relationship between vocabulary knowledge and reading comprehension is made apparent. The students revealed that being given explanations of the vocabulary in class and using online dictionaries helped them learn the definitions of unfamiliar words and, as a result, they could better comprehend the texts.

Employing the PQRST technique

“I think English is important for my current studies and future careers. I think everyone in class is willing to learn new techniques that can improve his/her English proficiency, and this technique (PQRST) is also interesting for vocabulary and reading practices” (Student 8).

“I think I gain a lot of new words from the Reading step. I also use interesting words found in the passages including those explained in the Summary step before reading.” (Student 14)

“The technique is easy to follow. The Preview step, especially looking at figures and their descriptions, helps me to guess what happened in the passage. In the Reading stage, if I don’t understand the texts, I normally ask someone else like you (the teacher) and my friends” (Student 19).

The students were likely to express a positive attitude toward the reading technique. Given that English is important for their current studies and future careers, they were keen to learn new techniques, including PQRST. The excerpts also represent how they utilized the technique while reading. The students believed that they learned new words by reading and summarizing the passages, and that they could ask their language instructor and their peers to explain the passages. This also suggests that their friends understood at least some parts of the passages and summarized or explained what they knew from the passages to their friends.

Discussion

This study aimed to compare students' English vocabulary knowledge and reading skills before and after using PQRST with news articles in the ESP classroom. It also aimed to examine students' attitudes toward the use of PQRST with news articles to enhance English vocabulary knowledge and reading skills. The data analysis results show that implementing the news articles using the PQRST technique over the ESP lessons led to significant improvement in students' vocabulary and reading abilities. The overall results related to the students' attitudes demonstrate that this attempt to improve their vocabulary knowledge and reading skills employing the PQRST technique with news articles was a positive and beneficial move. These positive results could be attributed to several possible explanations.

Firstly, exposure to the use of the PQRST technique with news articles over seven weeks revealed that the students' English vocabulary knowledge significantly increased. Supported by the semi-structured interview responses, the students held positive attitudes toward the use of the PQRST technique with news articles. With this regard, the findings bear significant implications. For instance, when considering the presentation of vocabulary during the Reading step, the students were exposed to 10 B1-level words and 3-4 technical terms in each lesson before Reading. This assists the students in recognizing the vocabulary used in the news articles and to get a better understanding of the articles' contents. This aligns with the assertion by Shakibaei, Namaziandost, and Shahamat (2019) that students' language acquisition and vocabulary development can benefit from the use of authentic materials including news articles. Moreover, the environmental engineering students revealed during interviews that the news articles were valuable and significant to them in terms of equipping them with new terminologies, acknowledging that they could relate the presented words to their study field.

Moreover, a key implication of the interview responses for Thai ESP practitioners is that presenting key vocabulary, especially technical terms, found in any ESP reading materials is beneficial to student language learning. This study suggests that ESP students should be exposed to the correct pronunciations of new words, especially technical terms, and their definitions using their first language (L1). The students may require word explanations in L1, particularly technical terms as this makes it easier for them to relate the new words to their specific backgrounds or field, and it is more time-effective compared to explaining the words

in English. Teachers could aid ESP students to gain a precise understanding in L1 by providing translation in that language at the end of an explanation, following the provision of several second language (L2) inputs (Shin, Dixon, & Choi, 2020). Importantly, the judicious use of L1 in support of L2 learning should be carefully used. When deciding how to support L2 learning, the amount of L1 use should be recognized by its purpose, content, and task styles (Shin et al., 2020). However, the technical terms in this study are considered inadequate for the students. Although the questionnaire results reveal the students agreed that the news articles provide technical terms at a 'High' level, the interview results show that they need to be exposed to more technical terms. As such, the ESP students believe that the technical terminologies are important for their current study.

Secondly, there was a significant difference between the English reading pretest and posttest mean scores before and after the PQRST technique with news was employed. This result provides more empirical data to support the findings in previous studies. This finding clearly demonstrates that the technique facilitates the development of ESP students' reading skills. In line with this, previous studies have shown that the PQRST technique helps students improve their reading skills (Abdillah, 2020; Arista, Angraini, & Ulfah, 2022; Indahwati, 2020). In regards to the positive results of students' attitudes, Latifa and Manan (2018) stated that the technique is an enjoyable learning strategy. Arista et al. (2022) mentioned that the steps of the PQRST technique help students recall the information they gained from the reading texts, which supports students when discussing the texts with their peers. Moreover, as shown in this study, this technique was principally accomplished by shifting the reader's role from passive to active throughout the five phases of the technique. Every step in the PQRST technique provides students with the opportunity to explore the reading text and discuss it with their peers. Regarding the use of this technique in the present study, during the Preview step, the titles and provided figures, for example, are recognizable to the students as important components of the article. They used their prior knowledge and what they had seen in the Preview step to formulate questions in the Question step. The Reading step helped the students explore the whole passage. The post-reading activities (state and test) assisted the students in creating their summaries, responding to the passage, assessing their own comprehension of the passage, and responding to their own questions from the Question step.

Considering the importance of using authentic materials to support language learning in ESP classrooms (as discussed above), this study asserts that the incorporation of news articles using the PQRST technique into the learning activities was useful to improve students' vocabulary and reading skills. Rao (2019) noted that teachers may utilize daily breaking news published in newspapers as authentic materials to teach English to their students. Furthermore, this technique can activate pupils' prior knowledge (Indahwati, 2020; Latifa & Manan, 2018). In this ESP setting, a possible explanation is that engaging the students with news articles using the PQRST method helped the students to connect with the contents of the articles. For example,

the students could relate the topic of air pollution in the article ‘Fight the PM2.5 war for clean air now’ to their field of study. PM 2.5 had a direct impact on the students’ university in the north of Thailand. In turn, during the State step, after summarizing or stating the passage’s main idea, the students could discuss the topics and the impact of pollutants in northern Thailand. This indicates that the technique could help students activate their background knowledge, which is helpful for them to get a better understanding of the reading texts, including news articles, and to discuss the topics in the State step.

However, it should be cautioned that careful planning is required for the incorporation of authentic materials into English classrooms. For instance, when using online materials, students may experience difficulties with poor internet connections and access to electronic devices. Therefore, the news articles can be printed and distributed to students in class. In addition to employing news articles as authentic materials, this study suggests that students use digital devices such as mobile phones, laptops, tablets, and iPads in the classroom. In the present study, the ESP students were provided with the printed versions of the online news articles, the PDF files, and the website links to access the news articles online. In turn, the students indicated that they preferred the printed versions and PDF files over use of the website links because they could record notes on the paper or on their devices using applications such as GoodNotes, which they could then use to review the lessons. Moreover, the students reported that access to their electronic devices provided them with the opportunity to look up unfamiliar terms in addition to those presented in class using online dictionaries, as well as search for further resources for information about the lesson topic. It is generally acknowledged that the use of electronic gadgets in language classrooms can potentially benefit L2 teaching and learning. Nonetheless, the utilization of technology devices by students in class should be regulated and monitored by the teacher to avoid their misuse by students and any issues around student distraction. If digital technology is used effectively and sparingly in language classrooms, language learners may fully utilize it to improve their overall language abilities (Abbasova & Mammadova, 2019).

Conclusion

This study presents the potential benefits to ESP students from the incorporation of news articles using the PQRST method into an ESP course. Students’ attitudes toward use of the PQRST method to engage with online news articles were positive in all aspects, and the quantitative results show the students competency in reading skills and vocabulary knowledge improved after their engagement with the news articles using the PQRST method. However, this study includes some limitations. As indicated in the Discussion section, although the news articles provide some technical terms for environmental engineering students, they were considered to be inadequate in that the students needed to be presented with more terms related to their fields of study and future careers.

Suggestions

1. Suggestions for applying the research results

1.1 When employing news articles in classrooms, printed versions, PDF files, and website links to access the articles online should all be distributed to the students so that they can decide if they want to take notes either on the papers or in applications on their devices.

1.2 Given the importance of technical terms in ESP discipline, explaining any technical terms in L1 can be considered as an approach to instruction by the teacher; however, the judicious use of L1 in support of L2 learning should be a priority.

1.3 To optimize the benefits to ESP students from implementing news articles using the PQRST technique, the news articles should be carefully selected to ensure they are relevant and meaningful to the students' area of study.

1.4 When allowing students to use electronic devices in class, the students should be cautioned to not misuse them or to be a distraction from the learning activity.

2. Suggestions for further research

2.1 It would be interesting to observe PQRST implications and its effect on productive skills like speaking and writing.

2.2 Observational research methods may be employed in future qualitative studies of the use of the PQRST technique to deepen the research understanding of the experiences of teachers and students.

2.3 Given the limited scale of this study, a broader study integrating a larger number of students and a course of PQRST instructions could be conducted to accurately validate the positive outcomes of the technique.

2.4 The results of this study provide further evidence of the need for ESP students to engage with and understand technical terms. Findings from future research studies implementing alternative techniques in ESP classrooms would be intriguing and add to the field of L2 teaching.

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