Preliminary Indicators of EFL Essay Writing for Teachers' Feedback Using Automatic Text Analysis

Rong Phoophuangpairoj [iD]
Rangsit University, THAILAND

Piyarat Pipattarasakul* [iD]
Rajamangala University of Technology Krungthep, THAILAND

Abstract: During the pandemic of Coronavirus disease 2019 (COVID-19), English as a foreign language (EFL) students have to study and submit their assignments and quizzes through online systems using electronic files instead of hardcopies. This has created an opportunity for teachers to use computer tools to conduct preliminary assessment of the students' writing performance and then give advice to them timely. Hence, this paper proposed some indicators which were essay readability scored by Flesch Reading Ease (FRE), length of essays, errors in writing and a method to assist the teachers in providing writing feedback to the students. The results showed a large difference in FRE, the number of words, sentences, paragraphs and errors. The K-means clustering findings were applied to classify groups of students based on writing proficiency indicators. The findings also revealed that the number of words and sentences in the essays indicated some deficiencies. The concept of paragraph should be reinforced while some specific errors such as misspelling, grammatical and typographical errors found need to be eliminated. This study showcased that the computer tools should be integrated to process the students' essays so that the teachers can pinpoint the problems and make suggestions to their students in appropriate time. Lastly, the results can be served as the guidelines for the teachers to develop and adjust teaching materials pertinent to writing to enhance the writing performance of EFL learners.

Keywords: *Clustering, EFL, essay writing feedback, readability, writing errors.*

Introduction

Writing is an essential communication skill that has tailored English as a foreign language (EFL) learners to fulfill professional achievement in education and business realms as written communication via emails and other communication technologies have tremendously played a crucial role in international workplaces (Kongkaew & Cedar, 2018; Rattanadilok Na Phuket, 2015; Watcharapunyawong & Usaha, 2013). To master in writing, learners need to possess a variety of writing competences such as vocabulary knowledge, grammatical structures, organization, punctuation and spelling (Anh, 2019; Kampookaew, 2020). As a result, writing is regarded the hardest skill to acquire for EFLs and writing teachers need to spend substantial amount of time and energy to enhance writing quality and proficiency of their students (Watcharapunyawong & Usaha, 2013). Therefore, teachers are the key mentors and facilitators to analyze the students' weaknesses so as to minimize errors and strengthen their writing skills. Kamberi (2013) concluded that teacher feedback is an important tool in improving writing skills reflected from the students' perspectives. Many English language learners preferred the feedback that was informative on the content and provided metalinguistic explanations for orthographic and grammatical errors (Bastola & Hu, 2021; Zhang et al., 2021). However, inadequate and delayed feedback might hinder the development of writing performance of the learners (Kim, 2018; Sepasdar & Kafipour, 2019).

Numerous studies on writing errors have been prevalently conducted in Thai context, revealing that grammatical accuracy is the area Thai EFL teachers need to emphasize most critically. Apparently, grammatical competence can be defined as the ability to produce correct sentences in writing assignments (Kampookaew, 2020). It can be observed that EFLs still have limited grammatical competence in the sense that they could compose short simple sentences, but not the complex ones (Cahyono et al., 2016). Thus, Wali and Madani (2020) asserted that EFL learners practiced paragraph writing as the foundation for other forms of academic writing development.

Nowadays, computers have been integrated to play a monumental role in language education as technology can do many tasks, such as searching and computing faster than humans. During the spread of global pandemic, online education has replaced face-to-face classes and facilitated the interactions among the students and the teachers (Rapanta et al., 2020). This has turned the crisis into an opportunity in the sense that digital technologies overcome some teaching/learning restrictions by removing the physical and context limitations. In particular, Alavi (2021) posited that the writing courses greatly benefit from the online classes in a way that the learners can post their work through the online platforms. Online teaching context allows the teachers to provide feedback to the students in form of the returned assignments or exam answers in files.

Several computer tools can be used to identify writing errors and compute readability of an essay. Readability level of a passage is measured by the average number of syllables in one word together with the number of words in a sentence (Zamanian & Heydari, 2012). The high readability level or high FRE indicates that the students compose the essays comprising many short words with low number of words in the written sentences. This might imply that the students have insufficient grammar knowledge. When the readability is low, readers need to spend significant effort to untangle overly complex sentence structures and vocabulary. Automatic Readability Tool for English (ARTE) is a program that can automatically calculate a variety of readability formulas for texts (Choi & Crossley, 2020). Grammar and Mechanics Error Tool (GAMET) is a computer program which aids in identifying different types of errors such as duplication, grammar errors, misspelling, typography and white space errors. GAMET can be used to check hundreds of English essays at the same time and provide the error-checking results of each plain text file. Tool for the Automatic Analysis of Cohesion (TAACO) is a tool which was recently developed for text cohesion indices (Crossley et al., 2015). TAACO is used to find the number of words, sentences and paragraphs in each text file. ARTE, GAMET and TAACO have advantages over other programs for the reason that they can be easily installed in the hard drive and process many text files simultaneously without internet access.

A clustering algorithm is used to automatically classify data into groups. The K-means clustering can be used to group data into K groups. K-means clustering finds means of the K clusters in which data points are allocated. The data points are allocated by trying to minimize the distances of them and the k centroids. The centroid of each cluster then is computed from data in each cluster. It is an iterative process of computing the centroids of clusters and finding the members of each cluster by keeping clusters as small as possible until the data do not change their clusters (Shovon & Haque, 2012). The centroid or mean of each group is used as the representative of each group's data. Students can be divided into groups based on the readability grade levels, readability scores, the number of errors in an essay, etc. Teachers can classify students into groups according to their desired attributes of students' essays. Using the clustering such as K-means, the teachers do not have to sort the data and classify data into groups by themselves.

Hence, this work proposed a method to provide rapid writing feedback using automatic text analysis. Computer tools were used to find indicators consisting of readability scores, the number of words, sentences and paragraphs and writing errors for the teachers to make decisions on giving feedback to the students, contributing to enhanced writing performance. In this work, K-means clustering was studied to group the essays of EFL students based on the information obtained from the computer tools. The teachers can use these indicators as the guidelines to give rapid feedback to their students.

Research objectives

The objectives of this study were to answer the following research questions.

(1) To study the writing indicators consisting of readability of essays, the number of words, sentences, paragraphs and errors in the essays written by Thai EFL students

(2) To propose a method of combining a clustering technique with the indicators to provide feedback

Literature Review

Feedback is indispensable to improve the writing ability of the students since it is often executed in EFL writing courses all over the world (Lv et al., 2021). The methods to give feedback have been studied by several researchers. Hartshorn (2008) postulated that feedback must be manageable, timely, and meaningful. Providing feedback requires tremendous and continuous efforts from both teachers and students in a way that the teachers need to dedicate their time and energy to correct piles of papers. Meanwhile, they also need to keep track of the students' progress and make decisions upon which points to reinforce and then make meaningful remarks individually. For the students, they should be committed to produce the work pieces (Alvira, 2016).

For years the Coronavirus disease has menaced the global citizens gravely. Most educational institutes have transformed classroom-based teaching to online learning. It is stated that about 1.2 billion children in 186 countries have been affected by the school closures (Ho & Tai, 2021). This has immensely caused learning losses in education. In connection with writing courses, Yang (2016) suggested that online peer feedback could improve the writing quality of the students (Huisman et al., 2019; Noroozi & Hatami, 2019; Pham et al., 2020).

Trends of writing research have shifted focus from the writing process to study the relationship between the characteristics of the final text and quality indicators (Crossley, 2020). This is partly because the writing processes and writing strategies might be implicit whereas the text characteristics are concrete evidence which can be easily and promptly identified, contributing to enhanced writing performance.

With regard to errors, researchers have drawn attention to investigate the errors in writing because the results could be used to analyze the causes which are important attributes to reflect the students' competence (Khumphee & Yodkamlue, 2017; Kuptanaroaj, 2019; Rattanadilok Na Phuket, 2015; Waelateh et al., 2019). Consequently, these errors should be minimized. A wide range of research on the types of errors made by EFL students included grammatical and lexical errors. For example, Kuptanaroaj (2019) analyzed grammatical errors in English essays written by the undergraduate students. The results revealed that sentence fragment was the most frequently committed errors (218 errors or 20.57%). The second most frequent error was the use of subject-verb agreement (168 errors or 15.85%), followed by the use of noun endings (144 errors or 13.58%), while the type of grammatical errors with the lowest frequency of occurrence was the word order (16 errors or 1.51%). Moreover, Khumphee and Yodkamlue (2017) investigated common types of grammatical errors based on their frequency of occurrence in English essay writing of Thai EFL undergraduate students. Suvarnamani (2017) studied grammatical and lexical errors, particularly tenses, fragment, and collocation errors, found in the descriptive writing of the first year Arts students at Silpakorn University. Narrative essays composed by Thai university students were analyzed by Rattanadilok Na Phuket (2015), reporting that the students made errors about translation from Thai words most frequently. Other errors were related to word choice, verb tense, preposition and comma.

Readability refers to the level of comprehensibleness of texts, which depends on the number of words in a sentence and syllables in a word (Turkben, 2019). The FRE grades a text on a 0–100 scale (Flinton et al., 2018). The higher readability means the easier that an essay can be read. For example, FRE readability scores of 0-50 mean that the text is very difficult and the approximate reading grade level of the text is higher education. Yulianto (2019) stated that the best text contained shorter sentences and words of which score range 60-70 is widely acceptable. The reading difficulty is stemmed from longer sentences and polysyllabic words. The measurement of text readability, known as readability indices such as Flesch-Kincaid Reading Ease and Flesch-Kincaid Grade Level, was used to investigate writing tasks of the students who registered ENG214 English Writing and the high average value of Flesch-Kincaid Reading Ease of 83.2 was reported (Rodsawang, 2017).

In general, the existing automated essay scoring systems incorporate the length of essays as a quality indicator. It was assumed that the longer essays tended to have better quality than the short ones (Lim et al., 2021). In contrast, the low number of words, sentences and paragraphs may be considered ineffective ones, resulting from the student's insufficiency of lexical and grammatical knowledge.

Aside from the pertinent factors previously mentioned, Macedo et al. (2018) applied K-means algorithm to classify the groups of distance learning students based on grammar errors when they studied online. Another relevant research conducted by Wright el al. (2018) used K-means 3-cluster procedure to categorize the students while they practiced English conversation online.

Methodology

Research Design

To answer the research questions, ARTE was used to find the FRE readability index while GAMET was utilized to identify the errors in the essays. TAACO found the number of words, sentences and paragraphs in each essay. There are several readability formulas such as classic formulas like Flesch Reading Ease, Flesch-Kincaid Grade Level, Automated Readability Index and SMOG readability which could be easily derived by using ARTE, for providing the preliminary feedback. In this study, FRE was applied because it is integrated in famous writing software that is Grammarly and it is widely acceptable. Each tool was executed to find out the characteristics from the essays, all of which the essay text files were stored in a computer folder.

Data Collection

A total number of 96 English essays were collected from Thai English major undergraduate students enrolled in an Essay Writing course. In the writing quiz, the students were instructed to write a narrative essay on the topic of "New normal in your life during the global pandemic COVID-19" with a length of 3-5 paragraphs. The quiz was conducted online and the duration was three hours. The text files were submitted to the teachers. To process the writing quiz, the students' names, student ID and the essay topic were removed from the texts before processing using the computer tools.

Instruments

ARTE, GAMET and TAACO were applied to analyze the students' essays. These three programs were free computer tools that could be easily downloaded and installed in a computer while SPSS (Rangsit University License) was used to cluster the essays into groups.

Analyzing of Data

The results were analyzed and the K-means clustering was applied to group the essays into 3-5 groups based on the FRE, the number of words and the number of errors. The clustering method assisted the teachers in grouping the students based on their proficiency, enabling them to make decisions more effectively on providing advice and eventually adjusting the course to suit the students' competence.

Findings / Results

Descriptive Statistics of the Preliminary Indicators

Table 1 showed the number of essays, ranges, the minimum value, the maximum value, means and standard deviation of the preliminary indicators studied in this work. The ranges of each indicators presented the inhomogeneity of the students' skills. As a result, the teachers could use these indicators to identify the students' shortcomings and provide them timely feedback.

Table 1. Descriptive Statistics of the Preliminary Indicators

	Range	Minimum	Maximum	Mean	Std. Deviation
Flesch Reading Ease	37.31	47.70	85.01	69.83	8.44
Number of words	427	49	476	247.27	80.35
Number of sentences	27	3	30	16.70	5.56
Number of paragraphs	9	1	10	4.53	1.58
Number of errors	16	0	16	3.99	3.32
Number of grammatical errors	10	0	10	.97	1.46
Number of misspelling errors	8	0	8	1.59	1.76
Number of typographical errors	11	0	11	1.24	1.91
Number of duplication errors	1	0	1	.02	.14
Number of white space errors	2	0	2	.17	.50

Flesch Reading Ease

Figure 1 showed the readability index of the essays composed by the students, which could help the teachers to know which essays obtained low or high FRE readability scores. These scores enabled the teachers to decide which essays needed investigating the vocabulary usage and sentence structures, in particular, the ones which had FRE higher than 80. Provided that the students wrote very high readability essays, it was assumed that they were incapable of using advanced vocabulary and constructing complex sentence structures.
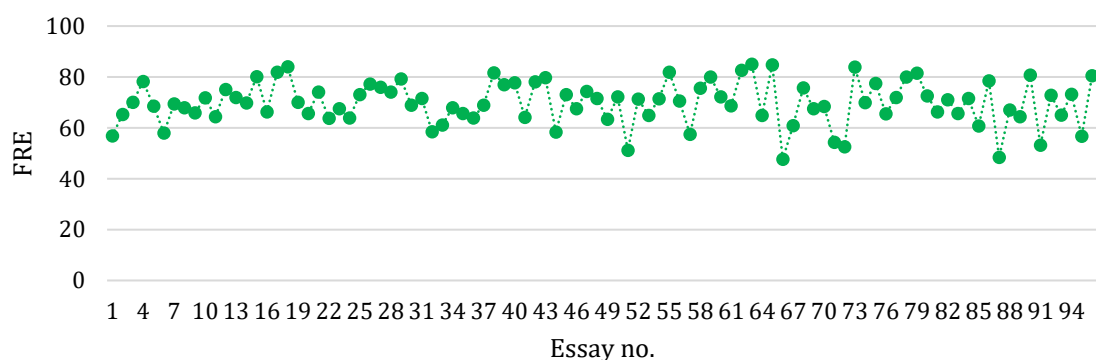

Figure. 1. FRE of Each Essay

Number of Words, Sentences and Paragraphs in Each Essay

Figures 2-4 illustrated the number of words, sentences and paragraphs in each essay. The results indicated that the number of words and sentences varied greatly among the essays. Figures 2-3 showed that a student wrote the short essay consisting of low number of words and sentences (49 words and 3 sentences), so the teachers should pay more attention to this student.
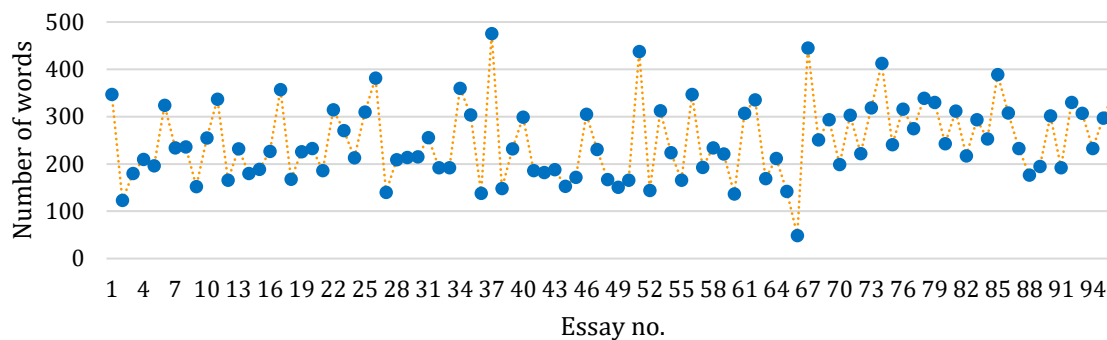
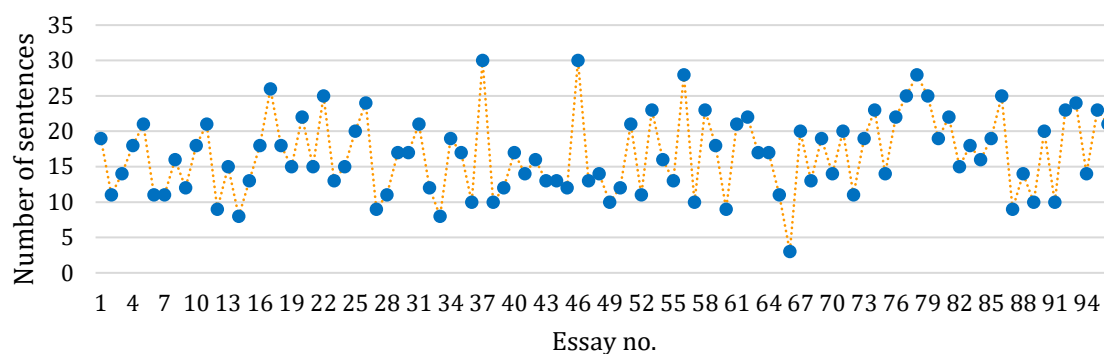*Figure. 2. The Number of Words in Each Essay*

Figure. 3. The Number of Sentences in Each Essay

Figure 4 presented the number of paragraphs in each essay. The graph indicated that 5 students wrote the essays with 8 or 10 paragraphs and 4 students wrote the essays with 7 paragraphs. There were 3 students who composed the essays with only one paragraph. According to the testing instructions, the students were asked to compose an essay consisting of 3-5 paragraphs. Writing too large or small number of paragraphs may result from the fact that the students may not understand how to combine sentences into a paragraph and overly divide sentences into paragraphs. Therefore, it is necessary the teachers give feedback to their students to improve their performance.
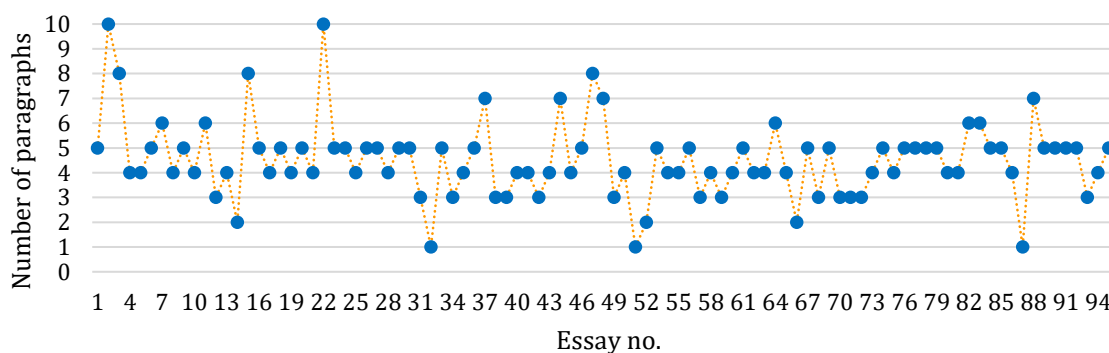

Figure. 4. The Number of Paragraphs in Each Essay

Errors in Essays

Figures 5-10 exhibited the number of errors including types of errors derived from the GAMET. The results allowed the teachers to identify the students who committed high number of errors and then pay attention to such errors which were grammatical, misspelling and typographical errors to pinpoint the weaknesses of the students. Examples of the grammatical errors were shown in Table 2.
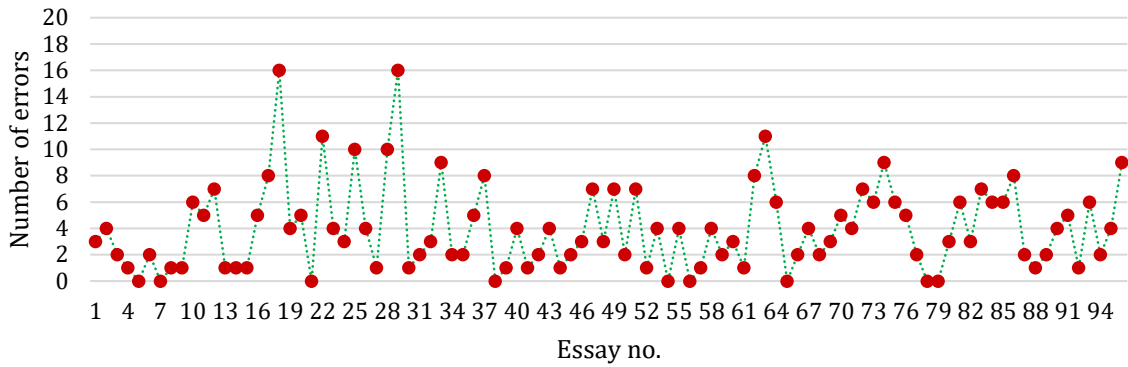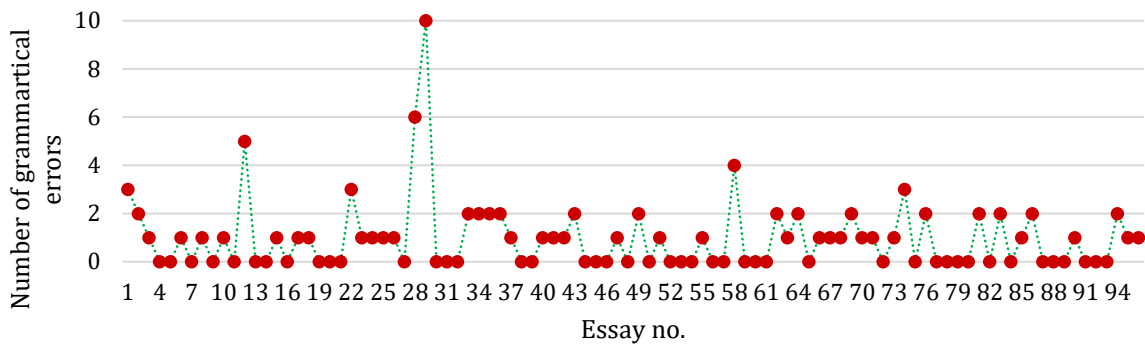
Figure. 5. The Number of Errors in Each Essay

Figure. 6. The Number of Grammatical Errors in Each Essay

Table 2. Examples of the Grammatical Errors

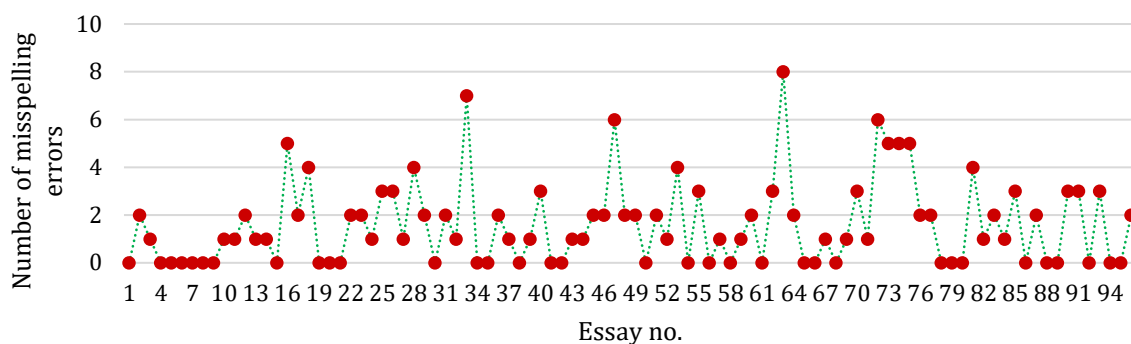| No.	Sentences and errors (reported from GAMET)
1.	Since the outbreak of COVID-19 Everything in the world has changed. (…Maybe a comma, question or exclamation mark is missing, or the sentence is incomplete and should be joined with the following sentence.)
2.	Sometimes, we could misunderstanding and confused of online chatting. (The verb 'could' requires the base form of the verb: 'misunderstand')
3.	Both in terms of life, society, economy, education, as well as national security that has changed too much to return to normal as before. (Probable usage error. Use 'and' after 'both'.)
4.	First in life making my life more difficult. Because the disease can spread easily. (Maybe a comma, question or exclamation mark is missing, or the sentence is incomplete and should be joined with the following sentence.)
5.	I want my normal life back anyway because I thinking of my friends. (Did you mean 'I am'?)
6.	Next, my mind and my feeling is bad too because I need to stay at home and I can't go outside to meet a friends or anyone as much as I want that make me feel sad and upset. (Don't use indefinite articles with plural words. Did you mean 'a friend' or simply 'friends'?)
7.	In conclusion, before pandemic is the best things in nowadays everyone need it to return our normal life. (nowadays is used without 'in'. Use simply: 'nowadays'.)
8.	… you have get less income because COVID makes people don't come outside just stay at home … (Use past participle here: 'got', 'gotten'.)

Figure. 7. The Number of Misspelling Errors in Each Essay

Examples of the misspelling errors were shown in Table 3.

Table 3. Examples of the Misspelling Errors

| No.	Sentences and errors (reported from GAMET)
1.	I thing the government should be manage this situation better. (Did you mean 'think' or 'thinks'?)
2.	For example, studying online is much different than going to university (Did you mean 'different 'from''? 'Different than' is often considered colloquial style.)
3.	It's very good weather and I can breath comfortable and I feel fresh. (Did you mean 'breathe'? 'breath' is a noun.)
4.	I was really laughing at myself but I kept doing this everyday until it became my new routine. ('Everyday' is an adjective. Did you mean 'every day'?)
5.	Everyone have to stay at home in stead of using vacation time somewhere beautiful. (Did you mean 'instead of'?)
6.	Currently, Thailand has a epidemic and the consequence is that there are not enough hospitals for people infected with COVID-19 … (Use 'an' instead of 'a' if the following word starts with a vowel sound, e.g. 'an article', 'an hour')
7.	I can't go outside by not wearing a mask and carry a alcohol spray and need social distancing. (Use 'an' instead of 'a' if the following word starts with a vowel sound, e.g. 'an article', 'an hour')
8.	I rarely go out with my friends and i can't study at university. (Did you mean 'I'?)
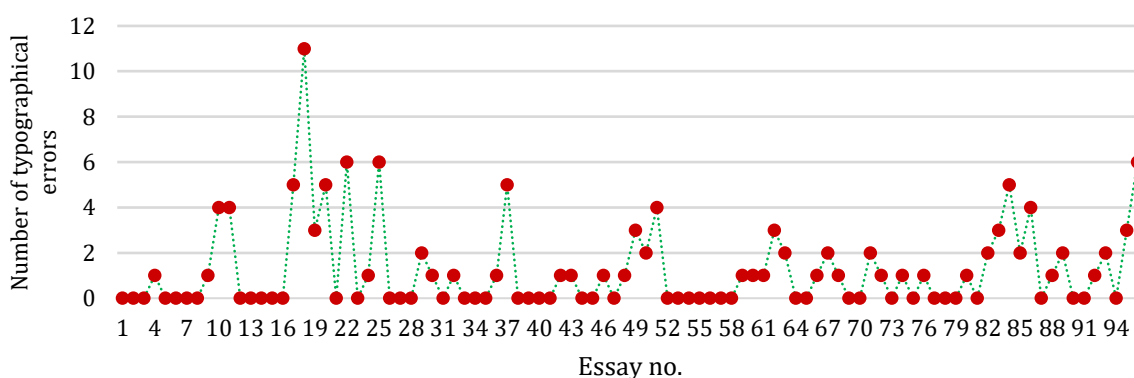
Figure. 8. The Number of Typographical Errors in Each Essay

According to the findings, the main typographical problems of the students were punctuation marks such as period, commas, quotation and capitalization as shown in Table 4.

Table 4. Examples of the Typographical Errors

No.	Sentences and errors (reported from GAMET)
1.	I have to eat the same food every <u>day. such as</u> fried eggs or instant noodles because I can't go out. (This sentence does not start with an uppercase letter)
2.	We can't go back to the old way of life, like eating at a dining table <u>together. living</u> a life called social distancing. (This sentence does not start with an uppercase letter)
3.	I never thought there was a disease that could change the lives of so many <u>people. until</u> it intensified … (This sentence does not start with an uppercase letter)
4.	Especially the trading of parcels and food delivery service or some restaurants have to screen every table to prevent the <u>spread. and</u> keep the distance of sitting between the dining table … (This sentence does not start with an uppercase letter)
5.	The daily lives of many people have to change in order to survive in age no matter what they do, they have to be very <u>careful. due</u> to COVID-19… (This sentence does not start with an uppercase letter)
6.	Today I'm going to talk about the New normal in my life during the global pandemic COVID-19.<u>"</u> (Unpaired symbol: '"' seems to be missing)
7.	The situation is not good right now. Finally he went out with his friends. (Did you forget a comma after a conjunctive/linking adverb?)
8.	Therefore<u>.</u> I want COVID-19 to disappear so that no family would lose their family and return to normal life. (Did you forget a comma after a conjunctive/linking adverb?)

The results in Figures 9 and 10 suggested that very few students made errors on duplication and white space.
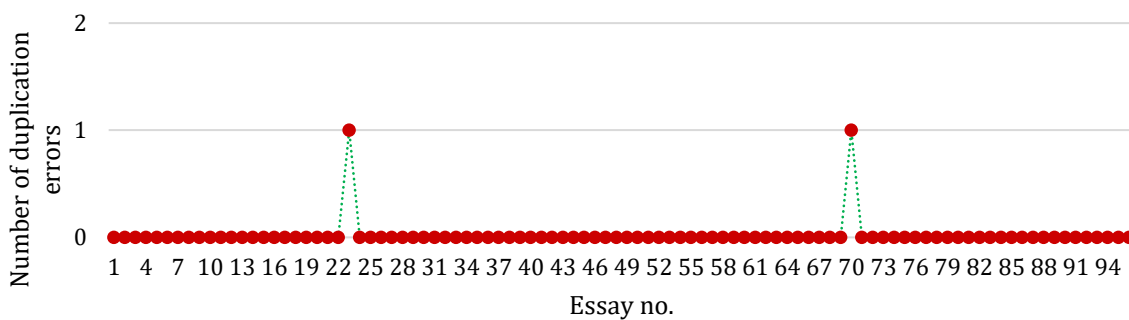
Figure. 9. The Number of Duplication Errors in Each Essay

To eliminate the duplication errors, the teachers could remind the students of rereading their work before submission. Examples of the duplication errors were shown in Table 5.

Table 5. Examples of the Duplication Errors

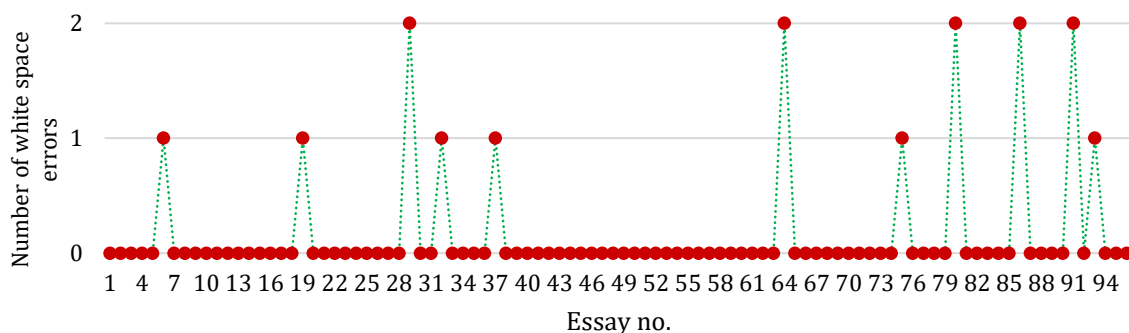| No.	Sentences and errors (reported from GAMET)
1.	For example, in the past, I could go to <u>the the</u> beach, ate some seafood, and spent my life to the fullest. (Possible typo: you repeated a word)
2.	… learn to safe myself and learn to adapted of <u>the the</u> pandemic. (Possible typo: you repeated a word)

Figure. 10. The Number of White Space Errors in Each Essay

In similar to the duplication errors, the teachers could also mark the white space errors and present them to the students so that they were more cautious when using punctuations like commas, space and period. Examples of the white space errors were shown in Table 6.

Table 6. Examples of the White Space Errors

No.	Sentences and errors (reported from GAMET)
1.	…there was an epidemic ,it's COVID19.I followed the news every day during that time because I had never been born with an epidemic. (Put a space after the comma, but not before the comma)
2.	I will be doing new activities in the university and get to know seniors, teacher and new friends.I can do everything without mask. (Add a space between sentences)
3.	I go a lot of country such as Lao , Japan , Singapore. (Put a space after the comma, but not before the comma)
4.	I said don't to go .The situation is not good right now. (Don't put a space before the full stop)

Based on the findings, misspelling, grammatical and typographical errors were the three most frequent types of errors found in the narrative essays. To solve these problems, it is suggested that the teachers add some contents to the materials to reinforce the knowledge of capitalization and punctuation marks such as commas, possessive apostrophe, space, full stop.

Clustering the Students' Essays

Based on the derived results, the essays were divided into 3-5 groups, which were classified according to the FRE, the number of words, sentences, paragraphs and errors. The outputs of the clustering allowed the teacher to make decisions on which groups together with the number of the students in the group needed more advice.

Clustering the Essays Based on FRE

The results of the essay clustering based on FRE were shown in Table 7. When dividing the essays into 5 groups, the means of the clusters were 51.25, 58.71, 66.13, 72.34 and 80.51, respectively. The number of the essays in the first through fifth clusters was 6, 9, 29, 29 and 23, respectively. As a rule, score between 81-90 could be interpreted that the level of difficulty of the essays was easy to read, equivalent to US grade 6 students (Pranay & MacDermid, 2017). The high score of the readability, the easier the text is. Therefore, the obtained results provided a guideline for the teachers' decisions to pay attention to the fifth group with a high readability of 80.51. It was speculated that the students might lack vocabulary knowledge and sentence structures.

Table 7. Results of Clustering the Essays Based on the FRE

The number of groups	Indicator	Group 1	Group 2	Group 3	Group 4	Group 5
3 groups	FRE (Means)	55.73	68.45	79.22		
	The number of essays	15	51	30		
4 groups	FRE (Means)	54.44	65.18	71.91	80.51	
	The number of essays	12	28	33	23	
5 groups	FRE (Means)	51.25	58.71	66.13	72.34	80.51
	The number of essays	6	9	29	29	23

Clustering Essays Based on the Number of Words

The results of clustering the essays based on the number of words were shown in Table 8.

Table 8. Results of Clustering the Essays based on the Number of Words

The number of groups	Indicator	Group 1	Group 2	Group 3	Group 4	Group 5
3 groups	The number of words (Means)	166	233	338		
	The number of essays	33	29	34		
4 groups	The number of words (Means)	153	219	317	424	
	The number of essays	22	38	30	6	
5 groups	The number of words (Means)	49	193	294	348	443
	The number of essays	1	55	23	13	4

According to the results, when dividing the essays into 4 groups, the teachers may investigate the short essays which had the average of 153 words written by 22 students in the first group. When dividing the essays into 5 groups, the teachers need to pay attention to the shortest one consisting of only 49 words in the first group.

Clustering Essays Based on the Number of Sentences

The results of essay clustering based on the number of sentences were shown in Table 9.

Table 9. Results of Clustering the Essays Based on the Number of Sentences

The number of groups	Indicator	Group 1	Group 2	Group 3	Group 4	Group 5
3 groups	The number of sentences (Means)	10	16	23		
	The number of essays	25	41	30		
4 groups	The number of sentences (Means)	10	14	20	26	
	The number of essays	20	28	37	11	
5 groups	The number of sentences (Means)	3	12	18	23	28
	The number of essays	1	38	31	21	5

When dividing the essays into 5 groups, the results suggested that the teachers examine the short essay containing 3 sentences promptly and find out the causes. In addition, when dividing the essays into 4 groups, the essays with 10 sentences composed by 20 students in the first group also needed investigation as well.

Clustering Essays Based on the Number of Paragraphs

The results of clustering the essays based on the number of paragraphs were shown in Table 10.

Table 10. Results of Clustering the Essays Based on the Number of Paragraphs

The number of groups	Indicator	Group 1	Group 2	Group 3	Group 4	Group 5
3 groups	The number of paragraphs (Means)	3	5	8		
	The number of essays	20	67	9		
4 groups	The number of paragraphs (Means)	2	4	7	10	
	The number of essays	6	75	13	2	
5 groups	The number of paragraphs (Means)	2	4	6	7	10
	The number of essays	6	75	6	7	2

The concept of paragraph is indispensable in composing writing tasks. It was reported that some essays were produced more or less than 3-5 paragraphs based on the instructions. For example, the 6 essays in the first group consisted of 2 paragraphs, while 7 essays containing 7 paragraphs belonged to the fourth group and 2 essays with 10 paragraphs in the fifth group. It is interesting that the teachers might look into the details of the contents to check the students 'understanding towards the concept of paragraph because one paragraph must demonstrate at least one central topic.

Clustering Essays Based on the Number of Errors

Table 11 showed the results of clustering essays based on the number of errors.

Table 11. Results of Clustering the Essays Based on the Number of Errors

The number of groups	Indicator	Group 1	Group 2	Group 3	Group 4	Group 5
3 groups	The number of errors (Means)	1	6	16		
	The number of essays	49	45	2		
4 groups	The number of errors (Means)	1	4	8	16	
	The number of essays	40	37	17	2	
5 groups	The number of errors (Means)	1	4	7	10	16
	The number of essays	40	29	18	7	2

In relation to the errors, it is recommended that the teachers use one's own discretion to probe the errors dependent upon the high number of errors found. Provided that the essays were classified into 3 groups, the teachers might focus

on 2 essays with the average errors of 16. When dividing the essays into 4 groups, the teachers might pay attention to 2 erroneous essays and 17 essays with the average errors of 8. Provided that the essays were divided into 5 groups, the teachers might look into 2 erroneous essays, 7 essays with the average errors of 10, and 18 essays with the average errors of 7.

Based on the derived findings, the model was proposed to provide preliminary feedback to the students utilizing the computer tools as the guidelines in writing tasks as shown in Figure 11.
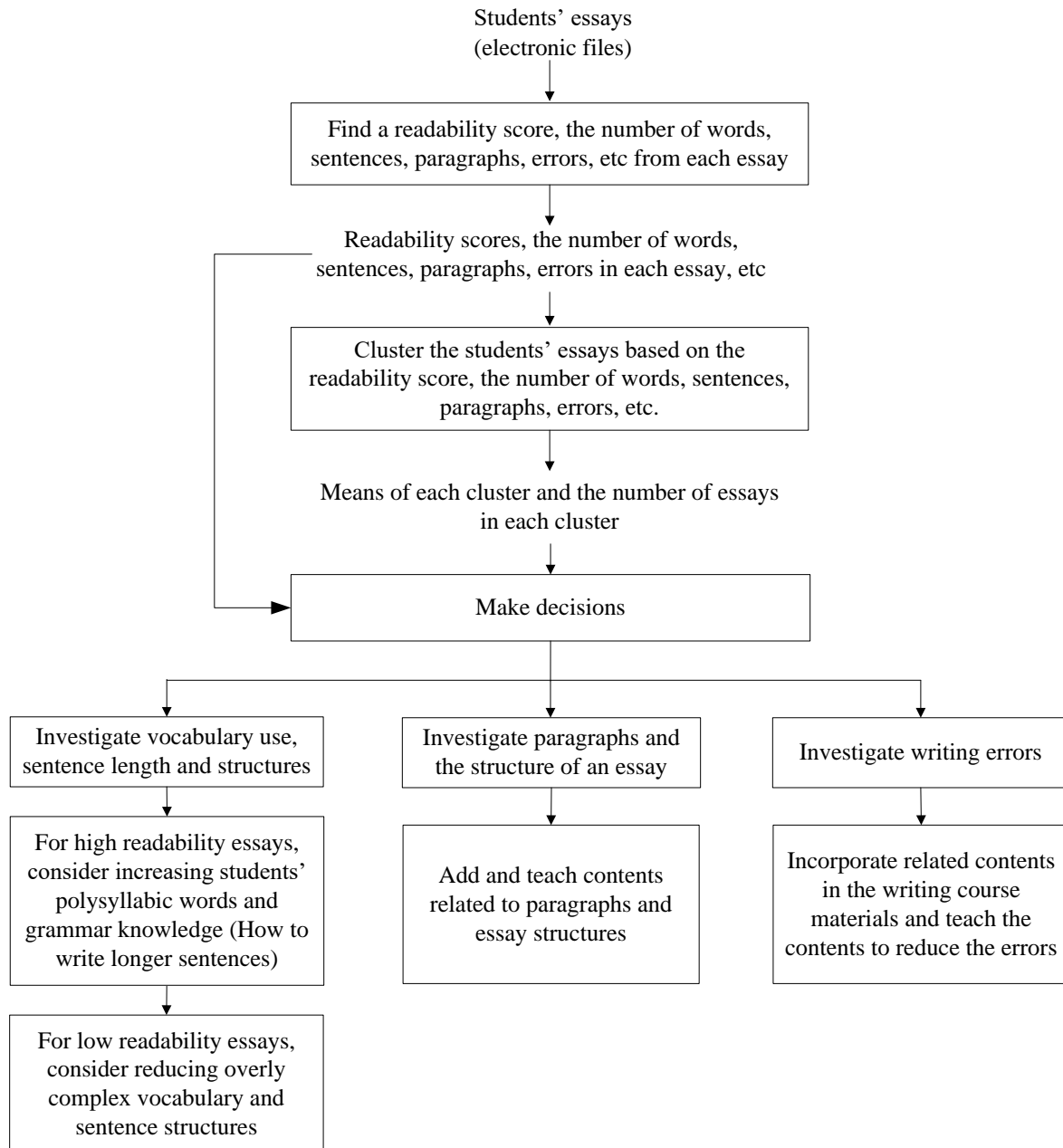

Figure. 11. Method to Provide the Feedback

The preliminary indicators which were a readability score, the number of words, sentences, paragraphs and errors were computed by using the computer tools. Having considered these indicators as the guidelines, the teachers make decisions on what kinds of feedback should be delivered to their students, contributing to enhancing their writing performance. As illustrated in the model, the teachers consider advising the students whose essays appeared high FRE to produce longer vocabulary and sentences. In the meantime, to tackle low FRE, the teachers might teach the students to write concise sentences while reducing overly complex sentence structures with wordy vocabulary. For the students who cannot correctly divide or combine the sentences into paragraphs, it is suggested that the teachers reinforce the knowledge about the concept of paragraph and essay structures including some practices so that the students can logically divide essays into paragraphs for effective writing. Moreover, the most frequent types of errors such as capitalization, punctuation marks, fragment and others need to be incorporated in the writing course materials to raise an awareness

about eliminating the errors in writing. Eventually, the students could master the art of writing for their professional development.

Discussion

Currently, it is undeniable that computer tools have been integrated in several domains to expedite the operating process and provide measurement assessment for the pursuit of quality assurance. In a similar vein, online learning environments are the platforms where teachers can request the students to submit their work in form of electronic files, thus creating an opportunity that the teachers use computer tools to process the students' work and give them feedback promptly.

Even if there are many programs that are designed to check errors in each essay file, it is still difficult for the teachers to open each file and detect the weaknesses. To cater to the writing course objectives and enhance efficiency, the computer programs enable the teachers to process all files in a folder and meanwhile they can check hundreds of essays within a short time to obtain preliminary information about the students' performance in a large class. This preliminary assessment can be served as the guidelines to provide feedback to the students for improvement. Also, the results can be used to compare with those in other research. One study conducted by Rodsawang (2017) reported that the average of Flesch-Kincaid Reading Ease was 83.2 for 27 students who registered in an English writing course, while that of the current work was 69.83, indicating the different readability levels between these two groups of university students who may also have different writing ability.

In addition, using a computer program to cluster data has several advantages. It is faster than grouping the essays manually and it gives the means of each cluster. The essays are divided into groups based on the data. Although clustering results are dependent on the number of clusters and none of the best exact number of clusters are determined, the teachers can easily adjust the number of clusters until they could obtain the desired results.

Despite the fact that the teachers can apply computer tools to obtain the readability score, the number of words, sentences, paragraphs, and errors in each essay, GAMET cannot check some types of grammatical and mechanical errors such as omission and addition of articles, misuse of articles, subject verb agreement, tenses, capitalization and punctuation marks as they were investigated in research (Kampookaew, 2020; Kongkaew & Cedar, 2018; Suvarnamani, 2017). These types of errors do not change the conveyed meanings of the sentences. Therefore, the teachers still have to investigate these errors by themselves. In the future, other features such as text cohesion which were studied by Crossley et al. (2015) should be examined to find more efficient method to enhance EFL students' writing skills.

Conclusion

The paper investigated the preliminary indicators of EFL writing for teachers' feedback and the method to provide feedback was proposed as well. The indicators were composed of the FRE, the number of words, sentences, paragraphs, and errors using computer tools. The results elucidated the inhomogeneity of the EFL students' writing skills, reflecting from a great difference among the number of words, sentences and paragraphs in the written essays. Yet, grammatical and typographical errors are major types of errors found in the essays.

In the digital era, the teachers should optimize the application of computer tools to ameliorate the ways to deliver writing feedback promptly to the students especially in the online learning environments. Additionally, the teachers can utilize the analyzed results to develop instructional scaffolding with regard to vocabulary, appropriate grammar, mechanics, and the concept of paragraphs to incrementally improve the students' writing performance.

Recommendations

Using computer tools to analyze the text is an interesting issue. We recommend that several free tools such as the tool for the automatic analysis of cohesion (TAACO) and the tool for the automatic analysis of syntactic sophistication and complexity (TAASSC) be investigated to find significant indices that can assess the quality of English essays and uncover the students' weaknesses. The method to automatically determine the number of appropriate clusters or groups of the students should be further investigated. It is recommended that feedback be given appropriately to the students in a constructive way so that they are motivated to improve their writing skills. Consequently, effective and appropriate feedback methods should be profoundly studied to derive the best outcomes for EFL learners to master in writing.

Limitations

The efficiency of the method depends on the performance of grammatical error checking tools. It is more convenient if we have a free tool that can complete all the tasks mentioned and assist the teachers in making decisions to provide writing feedback to the students.

Authorship Contribution Statement

<div align="center">

References

</div>

Alavi, S. (2021). The implementation of writing through technology-mediated English course to enhance Thai university students writing skills. *Rangsit Journal of Educational Studies*, *8*(2), 50-65. https://doi.org/10.14456/rjes.2021.11

Alvira, R. (2016). The impact of oral and written feedback on EFL writers with the use of screencasts. *PROFILE Issues in Teachers' Professional Development*, *18*(2), 79-92. https://doi.org/10.1080/14703297.2018.1431143

Anh, D. T. N. (2019). EFL student's writing skills: Challenges and remedies. *IOSR Journal of Research & Method in Education, 9*(6), 74-84. https://doi.org/10.9790/7388-0906017484

Bastola, M. N., & Hu, G. (2021). Supervisory feedback across disciplines: does it meet students' expectations? Assessment & Evaluation in Higher Education, *46*(3), 407-423. https://doi.org/10.1080/02602938.2020.1780562

Cahyono, B. Y., Mukminatien, N., & Amrina, R. (2016). Indonesian students' writing proficiency and their ability in using complex sentences. *International Journal on Studies in English Language and Literature*, *4*(9), 22-32. https://doi.org/10.20431/2347-3134.0409004

Choi, J. S., & Crossley, S. A. (2020). *ARTE: Automatic Readability Tool for English* - NLP tools for the social sciences. https://www.linguisticanalysistools.org/arte.html

Crossley, S. (2020). Linguistic features in writing quality and development: An overview. *Journal of Writing Research*, *11*(3), 415-443. https://doi.org/10.17239/jowr-2020.11.03.01

Crossley, S. A., Kyle, K., & McNamara, D. S. (2015). The tool for the automatic analysis of text cohesion (TAACO): Automatic assessment of local, global, and text cohesion. *Behavior Research Methods 48*(4), 227-1237. https://doi.org/10.3758/s13428-015-0651-7

Flinton, D. M., Singh, M. K., & Haria, K. (2018). Readability of internet based patient information for radiotherapy patients. *Journal of Radiotherapy in Practice*, *17*(2), 142-150. https://doi.org/10.1017/S1460396917000620

Hartshorn, K. (2008). *The effects of manageable corrective feedback on ESL writing accuracy* [Doctoral dissertation]. Brigham Young University, Provo, USA.

Ho, W. Y. J., & Tai, K. W. H. (2021). Translanguaging in digital learning: the making of translanguaging spaces in online English teaching videos. *International Journal of Bilingual Education and Bilingualism*, 1-22. https://doi.org/10.1080/13670050.2021.2001427

Huisman, B., Saab, N., Broek, P. V. D., & Driel, J. V. (2019). The impact of formative peer feedback on higher education students' academic writing: A meta-analysis. *Assessment & Evaluation in Higher Education*, *44*(6), 863-880. https://doi.org/10.1080/02602938.2018.1545896

Kamberi, L. (2013). The significance of teacher feedback in EFL writing for tertiary level foreign language learners. *Procedia - Social and Behavioral Sciences*, *70*, 1686-1690. https://doi.org/10.1016/j.sbspro.2013.01.241

Kampookaew, P. (2020). An analysis of grammatical errors made by Thai EFL university students in an EAP writing class: Issues and recommendations. *rEFLections*, *27*(2), 246-273. https://bit.ly/347ZNG7

Khumphee, S., & Yodkamlue, B. (2017). Grammatical errors in English essays written by Thai EFL undergraduate students. *Journal of Education Mahasarakham University*, *11*(4), 139-154. http://edu.msu.ac.th/journal/home/journal_file/388.pdf

Kim, V. (2018). Technology-enhanced feedback on student writing in the English-medium instruction classroom. *English Teaching*, *73*(4), 29-53. https://doi.org/10.15858/engtea.73.4.201812.29

Kongkaew, S., & Cedar, P. (2018). An analysis of errors in online English writing made by Thai EFL authors. *International Journal of Applied Linguistics & English Literature*, *7*(6), 86-96. https://doi.org/10.7575/aiac.ijalel.v.7n.6p.86

Kuptanaroaj, N. (2019). An analysis of grammatical errors in English essays written by the undergraduate students at Rangsit University, *Proceedings of RSU International Research Conference* (pp. 1267-1275). Rangsit University, Pathum Thani, Thailand. https://doi.org/10.14458/RSU.res.2019.24

Lim, C. T., Bong, C. H., Wong, W. S., & Lee, N. K. (2021). A comprehensive review of automated essay scoring (AES) research and development. *Pertanika Journal of Science & Technology*, *29*(3), 1875-1899.

Lv, X., Ren, R., & Xie, Y. (2021). The effects of online feedback on ESL/EFL writing: A meta-analysis. *The Asia-Pacific Education Researcher*, *30*, 643-653. https://doi.org/10.1007/s40299-021-00594-6

Macedo, M. G. M., Figueiredo, E. M. N., Soares, F. M. B., Siqueira, H., Maciel, A. M. A., Gokhale, A., & Bastos-Filho, C. J. A. (2018). Clustering students based on grammatical errors for on-line education. *Journal of the Brazilian Society on Computational Intelligence*, *16*(1), 26-40. https://doi.org/10.21528/LNLM-vol16-no1-art2

Noroozi, O., & Hatami, J. (2019). The effects of online peer feedback and epistemic beliefs on students' argumentation-based learning. *Innovations in Education and Teaching International*, *56*(5), 548-557. https://doi.org/10.1080/14703297.2018.1431143

Pham, T. N., Lin, M., Trinh, V. Q., & Bui, L. T. P. (2020). Electronic peer feedback, EFL academic writing and reflective thinking: Evidence from a Confucian context. *Sage Open*, *10*(1) https://doi.org/10.1177/2158244020914554

Pranay, J., & MacDermid, J. C. (2017). Assessing reading levels of health information: uses and limitations of flesch formula. *Education for Health*, *30*(1), 84-88. https://doi.org/10.4103/1357-6283.210517

Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online university teaching during and after the Covid-19 crisis: refocusing teacher presence and learning activity. *Postdigital Science and Education, 2*, 923-945. https://doi.org/10.1007/s42438-020-00155-y

Rattanadilok Na Phuket, P. (2015). Understanding EFL students' errors in writing. *Journal of Education and Practice*, *6*(32) 99-106.

Rodsawang, S. S. (2017). Writing problems of EFL learners in higher education: A case Study of the Far Eastern University. *FEU Academic Review*, *11*(1), 268-284. https://bit.ly/3rqt5ZD

Sepasdar, M., & Kafipour, R. (2019). The immediate and delayed effects of explicit and implicit corrective feedback types on EFL learners' phonological errors. *Pertanika Journal of Social Science and Humanities*, *27*(3), 1493-1506.

Shovon, H. I. M., & Haque, M. (2012). An approach of improving student's academic performance by using K-means clustering algorithm and decision tree. *International Journal of Advanced Computer Science and Applications*, *3*(8), 146-149. https://arxiv.org/pdf/1211.6340

Suvarnamani, S. (2017). A study of grammatical and lexical errors in descriptive writing of first year arts students at Silpakorn University. *Silpakorn University Journal of Social Sciences, Humanities, and Arts*, *17*(2), 239-264. https://bit.ly/3GogFpn

Turkben, T. (2019). Readability characteristics of texts in middle school Turkish textbooks. *Educational Policy Analysis and Strategic Research*, *14*(3), 80-105. https://doi.org/10.29329/epasr.2019.208.5

Waelateh, B., Boonsuk, Y., Ambele, E. A., & Jeharsae, F. (2019). An analysis of the written errors of Thai EFL students' essay writing in English. *Songklanakarin Journal of Social Sciences and Humanities*, *25*(3), 55-82. https://bit.ly/3AEUV7c

Wali, O., & Madani, A. Q. (2020). The importance of paragraph writing: An introduction. *International Journal of Latest Research in Humanities and Social Science*, *3*(7), 44-50.

Watcharapunyawong, S., & Usaha, S. (2013). Thai EFL students' writing errors in different text types: The interference of the first language. *English Language Teaching*, *6*(1), 67-78. https://doi.org/10.5539/elt.v6n1p67

Wright, J., Ahn, Y. -H., & Lee, K. (2018). Investigating language learning strategies in English conversation using non-hierarchical cluster analysis. *English Teaching*, *73*(1), 183-200. https://doi.org/10.15858/engtea.73.1.201803.183

Yang, Y. F. (2016). Transforming and constructing academic knowledge through online peer feedback in summary writing. *Computer Assisted Language Learning*, *29*(4), 683-702. https://doi.org/10.1080/09588221.2015.1016440

Yulianto, Y. (2019). An analysis on readability level of English reading texts for Eighth grade students. *J-SHMIC: Journal of English for Academic*, *6*(1), 81-91. https://bit.ly/3AEKZL7

Zamanian, M., & Heydari, P. (2012). Readability of texts: State of the art. *Theory and Practice in Language Studies*, *2*(1), 43-53. https://doi.org/10.4304/tpls.2.1.43-53

Zhang, T., Chen, X., Hu, J., & Ketwan, P. (2021). EFL students' preferences for written corrective feedback: do error types, language proficiency, and foreign language enjoyment matter? *Frontiers.in Psychology*, *12*, 1-12. https://doi.org/10.3389/fpsyg.2021.660564