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Research Article

DEVELOPMENT OF PRIMARY SCHOOL STUDENTS' ENGLISH SENTENCE CONSTRUCTION THROUGH PICTURE WORD INDUCTIVE MODEL (PWIM) AND LINE APPLICATION

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Abstract

This study investigated the impact of the Picture Word Inductive Model (PWIM) combined with the LINE app (a short form of application) on Thai primary school students' English sentence construction performance. A mixed-mode approach with a one-group pretest-posttest design was employed, involving a class of 30 students selected randomly from four Grade 4 classes. The study assessed improvements in sentence construction, students' perceptions post-intervention, the correlation between their sentence construction performance and perceptions, and their learning experiences from the intervention. Instruments used were a pre- and post-test, a perception questionnaire, observation fieldnotes, and semi-structured interviews. Results indicated a notable improvement in sentence construction post-intervention, with pre-test scores averaging 44.40 (S.D. = 20.284) and post-test scores averaging 64.83 (S.D. = 16.463). Students recognized the benefits of PWIM at the strongly agree level (average score: 4.622, S.D. = 0.273), though they rated the advantages of LINE app slightly lower (average score: 4.513, S.D. = 0.544). Nevertheless, students strongly agreed that the combined use of PWIM and LINE app was beneficial (average score: 4.564, S.D. = 0.138). No correlation was found between their construction abilities and perceptions. Qualitative findings highlighted the advantages, challenges, and unique experiences students had with the intervention.

Keywords: Picture Word Inductive Model (PWIM), LINE App, Mobile Learning, Sentence Construction, EFL Learning

Introduction

For students around the world, and especially in Thailand, English plays a pivotal role in expanding communication capabilities and opening doors to promising future career opportunities (Ministry of Education, 2008). Yet an alarming concern is that many Thai students encounter difficulties in navigating the complexities of constructing English sentences. This hindrance not only affects their current academic achievements but also persists, leading to written communication challenges even at the college level (Hinnon, 2014).

The majority of Thai students' difficulties with English sentence construction can be attributed to the prevalent use of traditional teaching methods in Thai institutions. (Weawong & Singhasiri, 2009) These methods emphasize teacher-centered and grammar exercises, which regrettably do not often foster the practice of sentence composition. This emphasis results in a noticeable deficit in students' ability to construct basic English sentences (Chanaroke & Niemprapan, 2020). Given this context, the search for effective interventions to improve their proficiency in English sentence construction becomes crucial.

To address this issue, previous research has explored various approaches, such as picture-word prompts, audio-visual prompts, explicit instruction, and editing skills (Philippakos, 2019). In Thailand, traditional methods and grammar-focused exercises are commonly used, so schools in Thailand have observed students' difficulty in composing basic sentences.

The PWIM is a method that shows promise in this particular implementation. The PWIM is designed to effectively enhance students' vocabulary and writing abilities. It aids in the identification, classification, and proficient utilization of words within well-structured sentences and paragraphs (Calhoun, 1999). Numerous studies constantly emphasize the potential of the PWIM in enhancing sentence structure and overall writing proficiency (Novia, 2015; Suraya, Novita, & Fergina, 2017; Boonpan & Bhiasiri, 2018).

Furthermore, integrating LINE app, a mobile learning (M-learning) tool, with PWIM can enhance English sentence construction and student engagement (Hirun, 2019; Tathong et al., 2019; White & Namwong, 2020). LINE apps provide learning resources, and students can practice sentence formation through typing or modifying LINE stickers.

Several scholarly investigations have examined the effectiveness of Picture-Word Inductive Model (PWIM) and the incorporation of different digital tools in various educational and linguistic contexts (Alhmoudi, 2020; Chuang & Chen, 2021; Li & Li, 2021). However, there is a noticeable research gap concerning the utilization of PWIM together with the LINE app to enhance the sentence construction performance of primary school students. In order to address this gap, the overarching focus of the current study is to evaluate the efficacy of the combined PWIM and LINE app on fourth-grade students' English sentence construction performance as well as gain insights into their perceptions of the integrated teaching strategy.

The decision to concentrate the study on fourth graders is supported by the emphasis on sentence construction in the national core curriculum and the substantial teaching experience of the researcher with primary school students in grades 1-6 (Ministry of Education, 2008). Significantly, despite the curriculum's emphasis on sentence construction, fourth-grade students consistently exhibited a declining level of interest.

The decrease in students' performance can be ascribed to the complex and occasionally intimidating sentence illustrations found in textbooks. Furthermore, the emergence of the COVID-19 pandemic in 2021 caused this feeling of isolation even more due to the implementation of strict health protocols that disrupted peer connections, which are considered crucial in the process of language acquisition (Boonmoh et al., 2022).

Research Questions

The study aimed to answer the following research questions.

1. Is there a significant difference between the students' English sentence construction before and after implementing PWIM and LINE app?

2. What is the perception level of the students towards English sentence construction after using the intervention?

3. Is there a significant relationship between the students' English sentence construction and their perception towards English sentence construction after using the intervention?

4. What are the learning experiences the students obtained from using the intervention in terms of benefits and challenges of using PWIM and LINE app?

Research Hypotheses

1. There is no significant difference between the students' English sentence construction before and after implementing PWIM and LINE apps.

2. There is no significant relationship between the students' English sentence construction and their perception towards English sentence construction after using the intervention.

Literature Review

English sentence construction and its challenges

English sentence construction, often understood as a fundamental foundation in linguistics, is essential in holistically conveying ideas, typically through a sequence of a subject and a predicate (Houghton, 2011). Sentences, while adhering to standard patterns such as the Subject-Verb-Object (SVO) structure, can flexibly adjust based on context (Thornbury, 2015; Killgallon, 2003). However, in the realm of education, particularly in English as a Foreign Language (EFL) contexts, instructors encounter persistent challenges when imparting knowledge on sentence construction. These challenges become even more pronounced given the diverse formats sentences adhere to, ranging from simple to compound structures. Despite the existence of numerous strategies, such as visual aids, peer interactions, and grammar lesson integration, ensuring proficient sentence construction remains a Herculean task (Richards & Rodgers, 2001). Furthermore, to gauge students' progress and proficiency, educators employ diverse evaluation tools, with rubrics, constructive feedback, and assorted evaluation methods being paramount (Thornbury, 2005).

The Affordances of PWIM in Enhancing Sentence Construction

Within the expansive realm of educational techniques, the development of the PWIM by Calhoun in 1976 emerged as a major instructional tactic. The utilization of this strategy is highly regarded in Thai primary education due to its ability to cultivate vocabulary and enhance writing abilities, with a primary focus on utilizing pictures as a central medium (Boonpun & Piasiri, 2015). These visual elements, rather than solely serving visually pleasing goals, go beyond their fundamental function. Functioning as potent pedagogical tools, they ignite the imagination and furnish students with related contexts for constructing sentences, enhancing the educational encounter (Harmer, 2004).

An exploration of the mechanics of PWIM uncovers its inherent worth. By using recognizable visual stimuli, it stimulates students to recall words from their auditory lexicon. This guided interaction facilitates a comprehensive engagement with vocabulary while also allowing students to improve their pronunciation and enhance their ability to comprehend diverse sentence forms. As a result, these valuable observations are effectively applied to both reading and writing assignments, thereby improving overall language proficiency (Calhoun, 1999).

Moreover, the efficacy of PWIM is not limited to theoretical claims. The effectiveness of this approach is supported by concrete empirical research, which demonstrates notable progress in writing skills, particularly in primary school settings (Jiang, 2015; Lee, Hwang, & Chen, 2015). The praiseworthy aspect of the subject under discussion lies in its remarkable adaptability. The methodology of the Picture-Word Inductive Model (PWIM) has been effectively utilized and praised for its results in various educational environments, both domestically in Thailand and internationally (Wolther et al., 2014; Boonpan & Piasiri, 2018), whether in traditional physical classrooms or digital platforms.

Within the wider context of English language development, the influence of PWIM is multifaceted. According to Calhoun (1999), the scope of its influence extends from the acquisition of phonics through the evolution of grammar, accomplished by the use of organized sentence modeling. The integration of other models, such as the CIPPA, which places emphasis on constructivist learning, in conjunction with PWIM results in more comprehensive outcomes. The utilization of such amalgamations enables pupils to effectively construct cohesive paragraphs by incorporating visual stimuli (Boonpan & Piasiri, 2018). According to Srithamma and Songserm (2020), the integration of PWIM with mind mapping has demonstrated the ability to enhance spelling proficiency and improve word-level reading. In agreement with this viewpoint, Sari and Santika (2019) assert the significance of visual aids, positing that they have the potential to establish a foundation for more comprehensive language learning encounters, particularly among novice learners. By utilizing these many techniques, PWIM effectively harnesses and enhances students' ability for inductive thinking.

In conclusion, the affordances of PWIM are apparent. In addition to its fundamental function in developing vocabulary and sentence structure, it plays a crucial role in stimulating excitement, facilitating inductive reasoning, and eventually enhancing students' proficiency in the English language.

Integration of LINE App with the PWIM

Although the integration of the PWIM with technology has shown promising results, a specific gap exists in understanding how digital applications, such as the LINE app, can amplify its effects, especially concerning enhancing English sentence construction and students' perceptions (Sun, 2020; Li & Li, 2021). Mobile learning, or M-Learning, which harnesses the power of mobile devices for education, has gained traction in recent years (Klimova, 2019). The LINE application, a global social platform, has been selected for M-Learning to improve performance in sentence construction. LINE app provides instant messaging, voice and video calls, stickers and emojis, a timeline, official accounts, group chats, a sticker and game shop, and an open chat feature.

The LINE messaging feature offers a variety of useful features (Risani, 2020). It grants high-quality audio and video technology for clear voice and video conversations. Stickers and emojis enable users to convey emotions and feelings in their messages, while the timeline function allows users to share updates and thoughts with their peers. The games and stickers store gives users the option to download games and stickers that can be purchased with LINE coins, a virtual currency. Additionally, businesses, brands, and celebrities can establish official LINE accounts, allowing users to receive updates and advertisements from their preferred entities.

LINE OpenChat is a feature that is especially useful for creating and joining public conversation rooms (Risani, 2020). Using features such as voice-to-text, voice messages, and picture editing, users can personalize their chat rooms, moderate discussions, and exchange information effectively. They can also respond to messages, report inappropriate behavior, and react to messages. In addition, LINE OpenChat allows users to create notes and relays as well as react to peer's sentences using stickers and emotion via reply function, facilitating the efficient exchange of information between chat room participants.

During the COVID-19 pandemic lockdown, LINE has become a popular educational resource due to its remote learning capabilities, instant messaging, group chats, video calls, file sharing, and notification features (Tanaka & Takasaki, 2020). These advantages make LINE a versatile tool for education during the pandemic, allowing students and teachers to stay connected and engaged in the learning process even when they are physically separated. However, as evidenced in previous studies (Hsu, Lin, & Chiang, 2018; Lee, Lee, & Hwang, 2019; Liu, Liu, & Zhou, 2019), there are limitations to the use of LINE apps as an e-learning resource, including a lower level of interactivity, a lack of multimedia support, difficulty measuring learning outcomes, limited assessment options, privacy and security concerns, limited accessibility and functionality, and distractions. To address these limitations, researchers have conducted surveys and provided students with internet access through school-provided tablets and SIM cards. Using LINE OpenChat can also protect student privacy by preventing chat room participants from accessing students' genuine accounts.

Research Methodology

Research Method and Participants

The researchers employed explanatory research (Creswell, 2011) using a mixed-mode method that involved both quantitative and qualitative parts in order to investigate PWIM and LINE apps' effectiveness in

English sentence construction and the relationship between students' perceptions and the intervention. A one-group pretest-posttest design was used to obtain quantitative and qualitative data from a single set of participants.

A research design of a pre-experimental one-group pre-test post-test was also used to measure English sentence construction scores before and after lesson plan implementation to gather quantitative results. After that, students completed a perception questionnaire to rate their perception level towards the strategy intervention.

With regard to the research participants, 30 fourth-grade students from four classes (three in IEC program, one in regular program) were randomly selected as research participants. They took an English sentence construction pre-test, engaged in proposed learning activities, and completed an English sentence construction post-test and perception questionnaire. Ten participants were interviewed for a semi-structured interview.

Research instruments for Data Collection

There were four instruments used for collecting data:

1. Pre- and post-tests on English sentence construction: Three intervention lessons served as the inspiration for the creation of customized pre- and post-tests to evaluate participants' English sentence construction abilities in the context of food, drink, and restaurant scenarios. These tests, consisting of illustrations from kitchen and restaurant settings, required participants to construct five sentences, each worth 20 points, using various sentence forms. Administered four weeks after traditional learning, the pre- and post-tests were allocated 50 minutes. The evaluation was based on a rubric emphasizing vocabulary, spelling, and sentence mechanics (Brown, 2004; Ayhan & Turkyilmaz, 2015; Furey, 2019). The test's development involved thorough curriculum reviews, expert consultations, and an Index of Item Objective Congruence (IOC) analysis, which confirmed a high relevance score, ensuring its effectiveness in gauging English sentence construction capabilities.

2. Perception questionnaire: The perception questionnaire used in the study was adapted from Gu and Lornklang's design (2021) and modified by the researchers. It focused on students' perceptions of English sentence construction and included additional questions about PWIM and LINE apps features. It was administered after the intervention during a homeroom activity. The participants responded to 20 closed questions on a 5-point Likert scale from strongly agree (5), agree (4), neutral (3), disagree (2), to strongly disagree (1). The questionnaire was translated into Thai, revised, and piloted with grade 5 students before being given to grade 4 students one day after completing all lesson plans. The questionnaire was piloted with fifth-grade students to ensure clarity and comprehensibility, and later given to fourth-grade students to refine it for younger audiences. The piloting strategy aimed to provide a more age-appropriate and comprehensible instrument.

3. Interview: A semi-structured interview was used to interview volunteers. Ten participants discussed the pros and cons of using PWIM and LINE apps in the classroom. Eight of the 16 questions were sub-eight. According to previous studies on PWIM's benefits (Jiang & Perkins, 2013; Wolther et al., 2014; Novia, 2015),

the semi-structured interview questions were pre-determined and related to the topics. No research examined the use of PWIM with LINE apps; therefore, the challenges of merging them were set aside as another pre-determined theme. The pre-determined questions were: PWIM and LINE apps' advantages include pictures, technology, and feedback; their challenges include boredom, unengaging activities, and sentence construction tasks; learning experiences, including vocabulary elicitation through pictures; cooperation; engagement; technology experience; and a new approach to sentence construction.

4. Observational fieldnotes: The researcher and another research assistant taught and recorded what was observed after each lesson plan segment in each period (three lessons in total). 12 field observations were made. They were employed to collect data on the students' engagement in learning activities implementing PWIM and LINE apps, the challenges, and how the researchers assisted the students. The researchers also described students' facial expressions, body language, and interactions with peers and teachers.

Intervention Program

The intervention program employed the LINE app, specifically an OpenChat called "D2/2 Fantastic English Room," to allow a systematic learning process that incorporated the PWIM in four separate stages. The proposed activities encompass four key stages: 1) Word identification, pronunciation, and spelling practice; 2) Word classification and inductive grammar learning; 3) Sentence construction via sentence modeling and prompted questions; and 4) Sentence revision using self-revision and peer feedback. OpenChat has several essential features to support the diverse communication needs within its platform (see Figure 1). These features included chat rooms that facilitated different types of conversation, the ability to conduct polls, photo editing capabilities, and the option to relay notes. These features were specifically designed to coincide with the multiple stages of the PWIM. In order to promote inclusion and enhance accessibility, a survey was undertaken prior to the implementation of the intervention to determine the extent of personal device availability among fourth-grade students. Under the condition of obtaining guardian consent, students were granted permission to bring their own personal devices to the school and use the school's free Wi-Fi. Nevertheless, students who did not possess the requisite resources were provided with tablets by the school. These tablets were equipped with SIM cards, thereby guaranteeing uninterrupted access to the LINE application and internet connectivity for all participants.

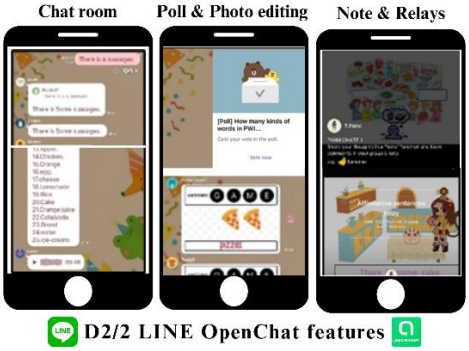

Figure 1 An intervention LINE OpenChat and its sub-features

The intervention program was divided into six procedures (see Table 1). Table 1 depicts the intervention procedures and the learning stages of combining PWIM with LINE apps.

Table 1 The intervention procedures of implementing the strategy intervention in the classroom

Intervention procedures	Stages of combining PWIM with LINE apps	Learning activities
1. Doing pre-test	n/a	Writing sentences to answer five questions about the two pictures given in the test
2. Attending Orientations	Generating the class LINE OpenChat and introducing its features and sub-functions	Practicing using each function during the homeroom session for five meetings
3. Implementing session 1: Food and drinks (Lesson plan 1–4)	Stage 1: Word identification and pronunciation	A picture of food and drinks on a table
	Stage 2: Word classification and inductive grammar learning	Countable versus uncountable nouns and the uses of a/an/some
	Stage 3: Sentence construction through sentence modelling and prompted questions	Constructing affirmative sentence through prompted questions: What's on the table?
	Stage 4: Sentence revision through self-revision and peer feedback	Using Relay, emoji, and reply features in LINE OpenChat to give feedback and revise the constructed sentences
4. Implementing session 2: What's in the kitchen? (Lesson plan number 5-8)	Following the same stages done in session 1	Repeating the same process as in session 1, but focusing on constructing negative sentences about food and drinks
5. Implementing session 3: At home versus in a restaurant (Lesson plan number 9–12)	Following the same stages done in session 1-2	Repeating the same process as in session 1-2, but focusing on constructing interrogative sentences about food and drinks and making orders at the restaurant
6. Doing post-test	Following the stage 1 and 2 done in session 1-3	
	Doing the post-test individually	Constructing sentences to answer five questions about the two pictures given in the test

Data analysis

Quantitative data analysis involved using SPSS Statistics Version 28 to assess pre- and post-test scores. Descriptive statistics, including mean ($\overline{X}$) and standard deviation (S.D.), and inferential statistics: paired sample t-test, were employed to compare sentence construction scores and answer the research question. The relationship between sentence construction and perceptions was examined using the Pearson Product-Moment correlation coefficient.

For qualitative data analysis, thematic analysis was applied to interview data and observation fieldnotes. This involved identifying and analyzing themes and patterns based on the research questions using established coding, concepts, and themes (Savin-Baden & Major, 2013). The process involved transcribing, coding, familiarizing with the data, and constructing a theory from emerging categories and concepts (Gray, 2014).

Research Findings

The research findings are reported to address the research questions and they are divided into quantitative and qualitative parts and aim at answering four research questions (RQs).

1. Quantitative Parts

1.1 RQ 1: The significant difference between the students' English sentence construction before and after implementing PWIM and LINE app

Table 2 shows the test of difference between the pre-test and post-test performance of the participants in English sentence construction. Overall, the pre-test gained an average score of 44.40 (S.D. = 20.284), whereas the average score of the post-test was 64.83 (S.D. = 16.463). The t score was 6.546 with a degree of freedom (df) of 29 and a significant value of.000, which is less than the specified significant difference (.05). When statistically contrasted, this indicated that the differences in the English sentence construction performance of students before and after the PWIM and LINE apps interventions were significantly different. This manifested that the English sentence construction of the participants improved after receiving the strategy intervention. After the intervention had been given to the participants, the component on handwriting and spacing demonstrated significant improvement, with mean and S.D. scores of $\overline{X}$ = 18.67, S.D. = 0.00; however, the component on capitalization indicated the least improvement, with mean and S.D. scores of $\overline{X}$ = 9.03, S.D. = 5.223.

Table 2 The comparison of English sentence construction performance's pre-test and post-test

English sentence construction aspects	Pre-test		Post-test	
	Mean	S.D.	Mean	S.D.
Vocabulary and spelling	11.73	6.275	17.20	3.438
Sentence structure	5.13	2.529	9.20	4.752
Capitalization	6.33	4.365	9.03	5.223
Punctuation	5.90	4.172	10.73	5.924
Handwriting and spacing	15.30	6.298	18.67	2.123
Overall	**44.40**	**20.284**	**64.83**	**16.463**

1.2 RQ 2: The perception level of the students towards English sentence construction after using the intervention

The average and standard deviation of each perception aspect, as well as the overall perceptions regarding the implementation of PWIM with LINE apps, are displayed in Table 3. Overall, the students strongly agreed that the implementation of PWIM with LINE apps was advantageous to their English sentence construction learning ($\overline{X}$ = 4.564 and S.D. = 0.138). The students' perceptions of the benefits of PWIM received the highest average scores ($\overline{X}$ = 4.622 and S.D. = 0.273), whereas their perceptions of the affordances of LINE applications received the lowest average scores ($\overline{X}$ = 4.513 and S.D. = 0.544). The other perceptual aspect scores, which measured the benefits of PWIM and LINE applications, received a mean score of 4.608 and a standard deviation of 0.440.

Table 3 The overall mean and S.D. scores of the perception questionnaire towards implementing PWIM and LINE apps

No.	Perception aspect	Mean	S.D.	Description
1	Benefits of PWIM	4.622	0.273	Strongly agree
2	Affordances of LINE apps	4.513	0.544	Strongly agree
3	Advantages of PWIM and LINE apps	4.608	0.444	Strongly agree
	Overall	**4.564**	**0.138**	**Strongly agree**

1.3 RQ 3: Test of relationship between the students' English sentence construction and their perceptions towards English sentence construction after the intervention

According to Table 4, from the Pearson Product Moment method analysis of the correlation coefficient, it was determined that it was equal to 0.238, indicating a slight relationship (Cohen, 1988), which was positive but not statistically significant (because the significant value (sig.) is greater than 0.05).

This demonstrates that there was no correlation between the students' English sentence construction performance and their perception questionnaire scores.

To explain, as evidenced in Table 3, the S.D. was 4.8 of the average scores of the perception questionnaires of each student were not distributed, which indicated that most of the students or almost everyone rated each perception item at a strongly agree level. As a result, the correlation between the students' English sentence construction test scores and their perception questionnaire scores were not very strong.

Table 4 The Pearson correlation between the students' English sentence construction scores and their perception questionnaire scores

Variables	N	Pearson Correlation	Sig.
Students' English sentence construction performance and perception	30	.238	.206

2. Qualitative Part:

RQ 4: The learning experiences the students obtained from using the intervention in terms of benefits and challenges of using PWIM and LINE app

2.1 Theme 1: Usability of PWIM with LINE apps

The first theme relates to participants' perceptions on the many benefits of the implementation of PWIM and LINE apps to help improving their English sentence construction tasks and constitutes the following sub-themes: being convenient to participate in the lesson; being useful to practice and improve English sentence construction; and being useful to learn and review the lesson anywhere anytime.

When the interviewees were asked about their perceptions regarding the integration of PWIM and LINE apps, they conveyed a predominantly response concerning on "the convenience for participating in the lesson" with the accessibility and student involvement in lessons and classroom activities. LINE's Open Chat platform capabilities, such as voice-to-text and keyboard functions, make typing and responding easier because It's much easier for me to type or use the voice-to-text function to respond to the teacher's questions." "I can type" (P6). In addition, another participant stated that the voice-to-text capability "lets me speak and the phone types for me." (P3). To practice and improve their English sentence construction performance, some participants felt that LINE apps was useful to participate in the class's activities and the sentence constructing tasks. One participant expressed her feelings regarding the LINE OpenChat features, namely chat reply, emoji reaction, poll, note, and relay features "were helpful for writing sentences even if I cannot type fast" (P5). Besides, three participants agreed on the learning mobility of using LINE apps as "I can learn and review lessons anywhere and anytime I want" (P1, 2, and 4).

The aforementioned interview results were triangulated with the researcher's fieldnotes in the following descriptions:

Fieldnote 1:

All students are excited to use the LINE app to study and chat with friends. It could be seen when the teacher allowed the student to send messages to answer questions. Students answered them very quickly. Many students found it easy and convenient to participate in the class activities via the LINE OpenChat. Students gave full cooperation when reading aloud. They concentrated on listening and were able to pronounce the target vocabulary simultaneously because words had pictures and sounds for them to see. Overall, the students could identify the vocabulary about food and drinks through the PWIM picture chart 1. They used their prior knowledge to identify foods that they were familiar with, such as cake, cola, or banana, despite some spelling mistakes.

Fieldnote 2:

The students didn't have time to do the exercises on completing phrases with a/an/some, so many of them did the exercises after school. They were told to review the vocabulary and how to use a/an/some in the note and the files functions in the LINE Open Chat. If they had any questions, they could ask the teacher or their friends in the chat.

2.2 Theme 2: Challenges of using PWIM with LINE apps

The second theme relates to participants' perceptions on the challenges of the implementation of PWIM and LINE apps and consists of the following sub-themes: time allocation for doing all activities; limitation of internet access; typing skill; and the difficulty of writing though picture editing function.

Despite the benefits of using the PWIM with LINE apps, during the interview, many participants still pointed out that using mobiles and tablets were challenging for them in learning to construct English sentence. Firstly, one participant stated that "the time while using LINE is too long, it should be only 10-15 minutes so I can have more time writing on my textbooks" (P2). Another challenge using technology in the classroom is the unstable connection of Internet as supported by the other participant who pointed out that "...Even if the teacher shared the internet via mobile Hot Spot, the internet still ran very slow because many students were using it at the same time." (P9). Nevertheless, the weak connection of the Internet still allowed the participants to join the LINE OpenChat, but some features like photo editing were "hard and slow to edit the picture and add texts to the picture" (P5). Also, even though most participants enjoyed using the LINE apps to chat with the teacher and their peers, their inability to type the text caused slow responses so at the beginning, a few participants felt that "it was a bit challenging" for them." (P6-8).

The aforementioned interview results were triangulated with the researcher's fieldnotes in the following descriptions:

Fieldnote 3:

In this class, most students focused on the problems of various devices, such as Internet connection problems, device problems, and the inability to connect to the LINE apps. Moreover, some students are slow typist and did not know how to dent the error. Some students found it hard to construct the sentences by typing or writing in the picture through picture editing function and sent the message to the LINE apps.

2.3 Theme 3: Learning experiences the students obtained from using PWIM with LINE apps

The final theme relates to participants' perceptions on learning experiences the students obtained from using PWIM with LINE apps and contains the following sub-themes: Increasing the participation from all students and getting collaboration from the whole class; learning vocabulary through elicitation from pictures and inductively learning grammar rules; and learning from peer responses and feedbacks.

Throughout the interviews, all participants appreciated the learning experience that they "never faced" in the regular classes. One participant viewed that I feel that I engage in the class activities more than in the traditional classes as in the regular classroom, she had to raise her hand and "wait for the teacher to choose" her, but through LINE apps, she could respond to the teacher's answer or play game "at the same time with other friends" (P10). Also, as a number of sample model sentences were given the students inductive learned the target grammars and structures because "the pictures used as PWIM picture charts are appropriate and it is very fun" (P4) when she gradually learned words through vocabulary elicitation method. It was, thus, evident that collaboration from the whole class contribute to the opportunity to learn from peer feedbacks through "friends' emoji reaction on chat, note, and relay features" (P7). Therefore, the participants could edit some mistakes in their sentences.

The aforementioned interview results were triangulated with the researcher's fieldnotes in the following descriptions:

Fieldnote 5:

The students observed the words with different pictures. Most of them were able to classify the words into singular countable nouns, plural countable nouns, uncountable nouns. However, while discussing they could not write the category correctly, so many of them used their devices to google each category and pressed on the audio to learn how to pronounce them.

Discussion

RQ 1: The effect of the PWIM with LINE app on the English sentence construction performance of students

The findings of this study strongly suggest that the PWIM combined with the LINE app significantly enhanced the English sentence construction performance of students. Specific areas requiring improvement include vocabulary, spelling, grammar structure, and basic writing mechanics including capitalization, punctuation, and spacing. This is consistent with previous studies such as Jiang (2015); Lee et al. (2019); and Wahyuni et al. (2020), which attested to the effectiveness of PWIM in enhancing diverse English language abilities. The use of pictures in PWIM is particularly effective at capturing students' attention and bridging the divide between prior knowledge and new information. Through this method of integration, students broaden their linguistic repertoire, thereby enhancing their comprehension of language mechanics.

RQ 2: The efficacy of LINE OpenChat features in facilitating PWIM

Figure 1 illustrates the importance of integrating LINE OpenChat features into each phase of the PWIM process. From stage 1's voice text and text typing functions, which strengthened vocabulary comprehension and language production, to the later stages' sentence modeling, revision, and collaboration, each function played a crucial role in improving the learning process. The immediate feedback mechanism, increased engagement, and collaborative features introduced by LINE OpenChat significantly improved the students' performance to construct sentences. This corroborates the benefits of technology in language learning as highlighted by Risani (2020) and Tanaka & Takasaki (2020), where mobile tools provide diverse learning resources and promote language practice in a variety of contexts.

RQ 3: The relationship between student perceptions and English sentence construction performance

Interestingly, despite the obvious benefits and the overwhelming positive feedback from students about the use of PWIM and LINE app, there was no significant correlation between students' perceptions and their actual performance on the English sentence construction test. Although a faint positive correlation was observed, it was insufficient to establish causation. This observation is consistent with findings from studies such as Baker and MacIntyre (2000), which discovered a tenuous relationship between language proficiency and perceptions. This lack of correlation could be due to a number of factors, including the possibility that the perception questionnaire did not accurately reflect language proficiency or the overarching influence of motivation, aptitude, and individual learning processes. According to previous research, motivation may be a more influential factor in determining language proficiency.

RQ 4: Students' perceptions of the PWIM and LINE app

The majority of students viewed the combination of PWIM and LINE as beneficial to their learning experience. They mentioned advantages such as improved sentence construction, increased vocabulary, peer feedback, convenience, and a more positive attitude toward technology. Wahyuni et al. (2020); Li and Li (2021), among others, have supported the use of technology and social media in language acquisition. Nevertheless, integrating these platforms presents challenges, such as time management and internet restrictions. These challenges echo the issues expressed in previous research on mobile learning, highlighting the significance of pedagogical design, technical support, and user interface optimization (Ratnaningsih, 2018; Wang & Li, 2020).

Conclusions and Limitations

The findings of this study provide strong evidence that the integration of PWIM into LINE app significantly improves students' performance in constructing English sentences. The use of PWIM's four stages provides students with a systematic and comprehensive method to enhance their proficiency in a foreign language. These stages involve various aspects, including word identification, pronunciation, sentence revision, and self-assessment through peer feedback. By following this structured and holistic approach, students are

better equipped to manage the complexities and challenges associated with learning a foreign language. It is apparent that the participants shown improvement not only in areas such as vocabulary, grammar, and spelling, but also in their proficiency in writing mechanics. This study highlights the significance and effectiveness of digital tools, specifically LINE apps, in promoting student engagement and peer interaction, as well as developing technological proficiency within today's learning environment.

Nevertheless, the study also identifies various limitations that could hinder the smooth incorporation of PWIM into LINE app. A few obstacles can be identified, including difficulties in managing time effectively, limited access to the internet, inadequate typing skills, and issues in accessing the complex capabilities of the LINE program. In order to achieve effective implementation, it is crucial to provide a complete orientation to the application's usage, along with specific practice sessions focused on typing skills. It is imperative to establish separate time intervals for M-learning that are distinct from conventional book-based learning sessions. The research also highlights the need of using pictures with a high resolution while employing PWIM for constructing English sentences. The combination of new technical tools, such as LINE app, has the potential to greatly enhance collaborative learning, provide immediate feedback, and increase student engagement. It is imperative for teachers to prioritize the emphasis on inductive grammar acquisition, while also allowing sufficient time for the processes of sentence construction and subsequent corrections.

Future study in this domain should endeavor to ascertain the enduring implications of integrating PWIM with LINE app by examining its efficacy across diverse contexts and its impact on individuals with varying degrees of linguistic proficiency.

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