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Application for Grammar Skills: A Case Study of Thai EFL Undergraduates

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Article information	
Abstract	The objective of this study was to investigate the influence of the popular Duolingo App on learning English in Thailand. Parts of the Duolingo English course for Thai speakers were used in a classroom-based intervention with two sections of English for Professional Purposes courses at a Thai university (n = 128). The students were split into two groups of users (n = 70) and non-users (n = 58), and a pre-test/post-test assessment of verb tense knowledge was conducted. The results showed that the Duolingo users had a significantly higher mean improvement in verb tense knowledge. Multiple regression showed that frequency of Duolingo use, perceived achievement, and perceived enjoyment positively influenced performance among the user group. Moderation analysis also showed that prior use of Duolingo partially moderated the relationships of level completion and achievement on score improvement. The implication is that Duolingo is a potentially useful supplement to classroom learning although its effects may change over time as users become habituated.
Keywords	Duolingo, verb tenses, English for professional purposes, Thai EFL undergraduates
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1. Introduction

English is the most important foreign language in Thailand, constituting both a trade language with other countries in the region and a language widely used in professional and service settings within Thailand itself (Khumphee, 2015). Because of its importance, Thai students are taught English from the primary level. However, it has been observed that, all too often, English is taught perfunctorily at the primary and secondary school levels. This results in a number of Thai students being unable to communicate effectively in English due to inadequate grammar and vocabulary knowledge. Also, from the second language acquisition viewpoint, L1 interference most likely comes into play, preventing them from becoming successful English language learners and users (David, 2018). Thai English learners also have a variety of characteristic challenges in using English effectively, which result from a combination of L1 interference and inadequate grammar and vocabulary knowledge (Bennui, 2016; Kulsirisawad, 2014; Sermsook et al., 2017). Among many types of errors committed by Thai EFL learners, verb usage errors are considered acute and need serious consideration, especially from the technological point of view. One of the most common classes of errors is verb usage errors, including verb tense errors, subject-verb agreement, and the use of irregular verbs (Khumphee, 2015; Kulsirisawad, 2014; O'Donnell, 2016; Sermsook et al., 2017).

Many solutions have been proposed to remedy the low English proficiency problems among Thai students ranging from classroom management, instructional activities, and teacher development to the inclusion of technology. It is the role of technology that is going to be emphasized in this paper, in particular that of Duolingo. Duolingo is a web- and app-based computer assisted language learning (CALL) platform that uses gamification to promote language learning (Munday, 2016; Munday, 2017; Savvani, 2019). The platform uses a translation-based approach, with all four skills used to promote grammar and vocabulary acquisition and utilization (Nushi & Eqbali, 2017). Duolingo was chosen because Thai undergraduate students have high levels of online access and are also technically

savvy, making routine use of mobile apps for communication, social interaction, and play (Suthiwartnarueput & Ratanakul, 2018). With a minimal learning curve and the gamified aspects of Duolingo, including its fun and competitive approach and its quirky and engaging content (Savvani, 2019), it was thought that this may be one of the most effective tools to get students to engage with English learning outside of the classroom. However, questions did remain about how effective it would be for grammar learning. While some studies have indicated that it is effective at improving vocabulary acquisition and use and some aspects of grammar (Ajisoko, 2020; Syahputra, 2019), other authors have cautioned that it is not a complete learning tool on its own (Finardi et al., 2016; Munday, 2016).

The objective of this research was to investigate how Duolingo can be used to improve verb knowledge and usage among Thai undergraduate students who were not English majors. It used a quasi-experimental approach to assess the efficacy and influence of Duolingo application use outside the classroom to determine if supplementary and independent use of Duolingo could improve verb tense knowledge.

2. Literature Review
2.1 Challenges Faced in Learning English by Thai Native Speakers

Thai English learners face several challenges in learning English, which lead to characteristic grammar errors. One of the most common types of grammar errors is verb-related errors. Indeed, one analysis of second-year undergraduate students majoring in English found 26 distinct grammatical errors common to written work (Khumphee, 2015). The most common of these were usage errors with punctuation, nouns, propositions, verbs, and articles. The errors in verb usage were typically of three types: subject-verb agreement, verb tense, and handling of irregular verbs. Such errors may be even more prevalent than recorded by Khumphee (2015) in certain types of writing. For example, an analysis of Thai English learners' controlled dialogue writing found that verb tense errors accounted for more than 50% of errors recorded (O'Donnell, 2016). Another study

of sentence writing among undergraduate students found that subject-verb agreement and verb tenses were common errors (Sermsook et al., 2017). Others have identified problems such as verb omission and incorrect conjugation of common irregular verbs (Khumphee, 2015; O'Donnell, 2016).

In part, these errors can be attributed to L1 interference (Bennui, 2016). Since subject-verb agreement and irregularly conjugated verbs do not exist in Thai, and verb tenses are structured differently, learners attempting to translate directly from Thai to English are likely to make errors (Kulsirisawad, 2014). The specific problem with verb tense for Thai speakers is that time and tense are not related in the same way in the two languages. Therefore, Thai speakers may miss the transformation of verb forms which occurs in English, but not in Thai (Bennui, 2016). However, there are also other potential reasons for verb-related errors (Sermsook et al., 2017). Among the reasons identified by Sermsook et al. (2017) were limited knowledge of grammar and vocabulary rules, particularly among beginner learners, which led to improvisation in order to communicate without strict knowledge of the rules. Therefore, improving both grammar knowledge and vocabulary, as well as training students away from direct translation—a technique that leads to L1 interference (Bennui, 2016)—can be identified as ways to reduce verb-related errors

2.2 Affordances for Learning

The concept of affordances is relevant to understanding the utility of tools like Duolingo. An affordance refers to the properties of a particular object or environment, specifically what it provides to those that may encounter or make use of it (Gibson, 1979). In the context of information systems, the concept of affordances can be extended to include both technological affordances and social affordances, and to include affordances for practice (Fayard & Weeks, 2014). Affordances of digital technologies for language learning may include opportunities to read and write in the language; to communicate verbally; to receive instruction, evaluation, and correction; and to encounter natural speech among others

(Warschauer & Matuchniak, 2010; Zheng & Warschauer, 2017). However, these affordances are not necessarily inherent in the technology itself; instead, the technology must be designed so that users can see the affordances offered and make use of those that are required to perform specific tasks (Zheng & Warschauer, 2017). Furthermore, the design by which affordances are offered to users can make or break the user experience, with users finding tools like Duolingo rewarding or frustrating depending on this underlying design (Gholizadeh et al., 2022). Thus, the affordances offered by technological tools are highly relevant to the user's experience and learning outcomes.

2.3 Gamification of Grammar Learning

Although Thai undergraduate students have been exposed to English as their primary foreign language since early childhood, overall quality of English teaching may not always be high, with more emphases placed on passive skills—reading and listening—and often with poor quality grammar and vocabulary teaching (David, 2018). This creates a situation where Thai undergraduate students are often passive learners, with little visible engagement in classroom activities or the learning process (David, 2018). However, successful learning at the undergraduate level requires engaged critical thinking, making it necessary for undergraduates to overcome their passive learning habits (Shaila & Trudell, 2010).

Games are one possible route to improving student engagement and learning of grammar in the EFL classroom. Communicative activities that use games and fun to encourage learning is an established practice in the EFL classroom (Paris & Yussof, 2013). Game-based grammar learning activities allow students to relax and reduce anxiety around grammar learning, improving self-confidence and creating a positive environment for change (Paris & Yussof, 2013). Technology-based games such as Kahoot have also been shown to have a positive effect on student use of verb tenses (Idris et al., 2020). Thus, there are many possible benefits to using games in the classroom. However, in the undergraduate learning environment in which this study was conducted in, there was limited

classroom time and a large quantity of material to be covered. Therefore, the type of board games frequently used in classrooms for younger learners (Paris & Yussof, 2013) were not appropriate. As a result, attention turned to how technology could be used in the classroom instead.

2.4 Apps for Learning in the EFL Classroom

Thai undergraduate students have high rates of Internet access (Suthiwartnarueput & Ratanakul, 2018). Most have smartphones and are highly technically savvy, routinely using communication tools like Facebook and Line. This has led to investigations of how Line, in particular, could be used to improve writing capabilities, for example. Suthiwartnarueput and Ratanakul (2018) showed that use of communication app Line to write paragraphs was highly effective at improving paragraph structure. However, as noted previously, Thai students also have gaps in their vocabulary and grammar knowledge, particularly at lower undergraduate levels (Sermsook et al., 2017). This raises the question of whether apps designed for language learning specifically could be used more effectively to improve grammar usage.

One app that has been identified as potentially helpful is Duolingo, a state-of-the-art online and app-based program that uses translation exercises to teach grammar and vocabulary (Savvani, 2019). Duolingo is structured in small, bite-sized 'skills,' which integrate a single point of grammar or usage along with new vocabulary into existing knowledge. Learning within the App takes place across multiple levels to gradually improve knowledge. Activities including bidirectional translation, word matching, and speaking and listening exercises are scaffolded using vocabulary prompts and other tools (Nushi & Eqbali, 2017). Programs are extensively tested before release, with periodic updates to improve learning structure (Savvani, 2019). Duolingo is also intensively gamified, with learners earning XP and "lingots" (or in-game currency) for finishing skills, achieving levels, and meeting other goals (Munday, 2017). Furthermore, classes are tailored for

speakers of different native languages and address common L1 interference errors.

Several authors have assessed Duolingo's effectiveness at teaching various aspects of the English language. A study of Indonesian students found that practicing at the "normal" intensity level (20XP or two lessons per day) significantly improved vocabulary knowledge (Ajisoko, 2020). Another study showed that Duolingo use reduced grammatical errors in writing (Syahputra, 2019). Duolingo may also be helpful in promoting independent learning and learner autonomy (Tsai, 2016). However, Duolingo does have limitations. Both students and teachers who have used Duolingo have agreed that it is a useful supplement but is not a substitute for classroom learning because it does not promote interaction or spontaneous language use (Finardi et al., 2016). It also does not directly promote communicative competence (Munday, 2016). Nevertheless, both Munday (2016) and Finardi et al. (2016) support the use of Duolingo as a supplementary tool for classroom learning. Therefore, overall, there is evidence that Duolingo is a useful supplementary tool and could improve classroom learning of verb tenses, although it is not a direct substitute. What is less clear is whether aspects of language that are not part of Duolingo's core focus but where there is a significant L1 interference problem, such as verb tenses in the case of Thai learners, are similarly affected.

3. Methodology

3.1 Study Design

This study utilized a quasi-experimental design to compare the English learning outcomes of students who used Duolingo with similar students who did not use the App.

3.2 Sample and Intervention

The study was conducted using students from two classes of Thai undergraduate EFL learners at Srinakharinwirot University in Bangkok, Thailand.

Both classes were first-year English for Professional Purposes classes, offered to students who were not majoring in English but still needed English for their future professional life. Other than the out-of-class intervention—use of Duolingo App—students received the same instruction, assessments, and other learning opportunities.

Students in Class 1 (n = 65) were asked to use Duolingo (English for Thai Speakers) at the "normal" activity level (20XP or two lessons/day) for five days a week during the class period. Students in Class 2 (n = 63) were not offered this intervention. However, they were asked at the end of the final assessment whether they had used Duolingo while taking the course, and if they had done so data were collected about their use frequency and level attainment. This was done because as Duolingo is a popular self-directed learning platform, it was likely that some students were already using it.

At the end of the intervention period, students in Class 2 that indicated they were using Duolingo as a supplementary tool were moved to Class 1's group, while students in Class 1 who did not use Duolingo at all were moved to Class 2's group. This resulted in final groups of Duolingo users (n = 70) and Duolingo non-users (n = 58).

3.3 Data Collection

Data were collected using a pre-test/post-test structure, which allowed the researcher to investigate outcomes during the test period (Lodico et al., 2010). Data were collected using a combination of English verb tense assessments and a supplementary questionnaire that examined Duolingo use frequency, completion, achievement, and enjoyment (See the Appendix.). The verb tense assessment was administered at the beginning of the semester and again eight weeks into the course, with student outcomes recorded. The supplementary questionnaire was conducted following the second assessment.

3.4 Data Analysis

Data analysis took place in two stages. First, mean differences in Duolingo users and non-users were examined using paired t-tests ($p < .05$). This determined whether students' verb tense management improved over the term and whether Duolingo users achieved a higher mean difference than non-Duolingo users. The next stage of analysis focused on the Duolingo user group. It examined whether the self-reported frequency of use, completion of levels, goal achievement, and enjoyment had a significant effect on mean difference of pre-test and post-test scores using multiple regression analysis. It also compared regressions between previous user and non-user groups to determine whether there was a moderating effect of previous use. This helped determine which characteristics of Duolingo attainment were significant in verb tense improvement.

4. Results

4.1 Sample Demographics

A total of 128 students participated, including 70 in the intervention group (using Duolingo) and 58 in the control group (not using Duolingo). There were slightly more female students ($n = 68$) than male students ($n = 56$), while four students did not specify gender or did not respond. Most participants were aged between 18 and 20 years ($n = 84$) or between 21 and 23 years ($n = 31$), with a small number of older students ($n = 13$). Most were undergraduate students ($n = 120$), but there were a few postgraduate students ($n = 8$). The majority were in the first year of their program ($n = 97$), with the remainder in their second year ($n = 31$). This is broadly consistent with the demographics of the Foundation English class at the university, which typically includes a mix of first-year undergraduates and older students either repeating the course or taking it for the first time. Among all students, 70 students had used Duolingo previously, while 58 had not.

4.2 Use of Duolingo

Information was collected from the students that used Duolingo in the course on their frequency of use, number of levels completed, and feelings of perceived

achievement and enjoyment of the program. Use frequency and levels completed are summarized in Table 1. Most of the participants in this sample had previously used Duolingo (n = 50). Although participants in the intervention class were asked to complete ten sessions of Duolingo a week, in practice most used it much less often, typically five times a week or less (n = 40). However, there was a smaller group which was more consistent in their use, using it six to ten times a week (n = 30). As regards levels completed, Duolingo's English course for Thai speakers has a total of five levels, each with up to 60 brief lessons. Five students did not complete any of the levels all the way through, while just over half the sample completed one level (n = 39). There was also a small number of students that completed two levels (n = 13) or more (n = 13). Therefore, the overall use of Duolingo can be characterized as low to moderate among the students that used it.

Table 1

Use of Duolingo

Prior Use of Duolingo	N	%
No prior use	20	28.6%
Prior use	50	71.4%
Weekly Use Frequency	**N**	**%**
Once to three times a week	24	34.3%
Four to five times a week	16	22.9%
Six to seven times a week	9	12.9%
Eight to nine times a week	15	21.4%
Ten times a week	6	8.5%
Levels Completed	**N**	**%**
No levels	5	7.1%
One level	39	55.7%
Two levels	13	18.6%
Three levels	8	11.4%
Four levels	5	7.1%

4.3 Changes in Performance

In order to investigate the effects of the Duolingo intervention on student performance, a pre-post comparison of the verb tense assessment was conducted. A summary of descriptive statistics for the full sample, as well as the use and non-use groups, is provided in Table 2. This table also shows the outcomes of the independent t-tests for difference in means that were conducted, to determine whether there were mean differences between the two groups.

These descriptive statistics included the raw mean and standard deviation for pre-test, post-test, and pre-post score differences. At the pre-test stage, the students scored a mean of 49.73 points (SD = 14.426) out of 100 possible points on the assessment score. Students that used Duolingo did have a slightly higher mean score (M = 50.26, SD = 14.913) than those that did not (M = 49.10, SD = 13.918). However, this difference was not significant according to t-test analysis. At the post-test stage, the means for both groups had risen, with the Duolingo user group (M = 57.47, SD = 14.907) now having a noticeably higher score than the non-user group (M = 54.03, SD = 14.218). However, this difference was also not significant based on the t-test. On average, Duolingo users increased their scores by 7.07 points (SD = 6.470), compared to only 4.93 points (SD = 3.602) for non-users. This difference was significant. Thus, while the overall mean scores were not significantly different between groups at the pre-test or post-test stages, there was a significantly higher mean score difference in the Duolingo user group compared to the non-users.

4.4 Factors in Performance

The next aspect of analysis was identifying the role that Duolingo use frequency, completion rates, perceived achievement, and enjoyment played in verb tense test score improvement among the Duolingo user group. The results of the multiple regression analysis conducted are provided in Table 3. The model was well-fitted, with an adjusted R-squared of .760, indicating that 76% of the variance in the pre-post score difference was explained by the variance in the predictors.

Among the predictors, the strongest effect was observed for the achievement measure (B = 2.639, p < .001), followed by weekly use frequency (B = .722, p = .016) and enjoyment (B = 1.538, p = .029). However, the effect of levels completed was not significant (B = -.800, p = .294). Therefore, while weekly use frequency, perceived achievement, and perceived enjoyment all positively influenced the post-test scores, there was no significant influence of the number of levels completed.

Table 3

Multiple Regression: Factors in Mean Score Difference in Duolingo User Group

	Unstandardized Coefficients		Standardized Coefficients		
	B	**S.E.**	**Beta**	**t**	**p**
(Constant)	7521	1.483		-5.071	.000
Weekly Use Frequency	.722	.292	.269	2.469	.016
Levels Completed	-.800	.755	-.116	-1.059	.294
Achievement	2.639	.715	.522	3.690	.000
Enjoyment	1.538	.687	.258	2.239	.029

Note: R-squared = .774; Adjusted R-squared = .760; F(4, 95) = 55.029, p < .001.

4.5 Moderating Effects of Prior Use

Finally, the moderating effects of prior use of Duolingo were investigated using hierarchical multiple regression (Table 4). This analysis revealed that prior use moderated the relationship between current use and both the levels completed and achievement. Specifically, prior use was positively associated with the number of levels completed (B = 6.015, p < .001), suggesting that those who had used Duolingo before were able to complete more levels. Conversely, prior use was negatively associated with perceived achievement (B = -3.822, p < .001), indicating that those with prior experience of Duolingo perceived lower achievement compared to new users.

Table 4

Testing of Moderation Effects

	Unstandardized Coefficients		Standardized Coefficients		
	B	S.E.	Beta	t	p
(Constant)	-1.378	3.731		-.369	.713
Weekly Use Frequency	.633	.268	.234	2.366	.021
Levels Completed	-4.177	1.264	-.605	-3.305	.002
Achievement	5.042	.908	.997	5.550	.000
Enjoyment	.182	1.203	.031	.152	.880
Use of Duolingo * Prior Use	-4.569	4.003	-.321	-1.141	.258
Levels * Prior Use	6.015	1.568	1.203	3.837	.000
Enjoyment * Prior Use	.586	1.433	.176	.309	.684
Achievement * Prior Use	-3.822	-3.822	-1.032	-3.693	.000

Note: R-squared = .838; Adjusted R-squared = .817; $F(8, 91)$ = 39.518, p < .001.

4.6 Hypothesis Test Outcomes

The outcomes of the hypothesis tests are summarized in Table 5. As shown, Hypotheses 1, 3, and 4 were supported, while Hypothesis 2 was not supported. In addition, Hypothesis 5 was only partially supported.

Table 5

Summary of Hypothesis Test Outcomes

Hypothesis	Relationship	Outcome
1	Frequency of use → Verb tense improvement	Support
2	Level completion → Verb tense improvement	No support
3	Achievement → Verb tense improvement	Support
4	Enjoyment → Verb tense improvement	Support
5	Prior use moderates effects on verb tense improvement	Partial support

5. Discussion

The findings of this study reiterate that no single factor can account for or be responsible for either success or failure in education. Overall, all students showed improvement in the post-test, which was expected since students had eight weeks of instruction covering verb tenses (as well as other materials). However, the t-test analysis showed that there was a significant difference in post-test improvement for Duolingo users, who showed an average of 2.14 points more improvement in the post-test compared to the pre-test. This indicates that Duolingo users showed small, but significantly higher levels of improvement between the pre-test and post-test assessments than the students who did not use Duolingo. This was consistent with findings reported by other studies which have shown that Duolingo use is associated with improvements in areas like English vocabulary (Ajisoko, 2020) and written grammar (Syahputra, 2019), as well as promotion of independent learning (Tsai, 2016). The overall modest improvement, however, also supports the arguments of other authors that Duolingo on its own is an inadequate approach to learning (Finardi et al., 2016; Munday, 2016; Munday, 2017).

The regression test showed that frequency of use, perceived achievement, and perceived enjoyment had significant positive influences on the post-test score difference, which measured verb tense knowledge improvement. However, levels achieved were not a significant factor. These factors had not been directly tested in prior research, though they were suggested by prior studies which have shown for example that Duolingo is effective because of its design for frequent short use (Ajisoko, 2020; Savvani, 2019) and that the gamification aspects of Duolingo support fun and achievement aims (Munday, 2017). Thus, these findings contribute to understanding of how Duolingo supports learning. Although it is unclear from the literature, the non-significant influence of level completion may be due to a perverse effect of gamification, which encourages level completion for rewards (Munday, 2016; Munday, 2017). Put simply, some students may be prone to skimming through levels too quickly to absorb learning in order to gain

achievement rewards, which may have meant they did not actually learn as much as they intended to. This is something that should be investigated further, as it may influence the utility and utilization of the program.

Finally, there was a partial moderation effect of prior use on the achievement outcomes. Prior use positively moderated level completion, but it negatively moderated achievement. This may be due to habituation of users to the gamified effects of Duolingo due to prior exposure, which could both increase the familiarity with the program (allowing faster progress through levels) and reduce feelings of achievement. This has not been investigated in the context of Duolingo, but it is consistent with other studies on gamification in education, which do sometimes show falling effects over time (Sanchez et al., 2020; van Roy & Zaman, 2018).

6. Limitations and Recommendations for Further Research

There are some limitations to how far the study's findings can be applied. First, it investigated only one aspect of language knowledge, which was verb tenses, in the Thai-English language program. This was intentional, as the assessment had to be integrated into an existing curriculum and coursework without negatively affecting student work. However, it does mean that results may have been different if other types of language knowledge or another language program were investigated. Secondly, while there were some suggestive findings about the influence of the gamification aspect of Duolingo and its potential effect on users in the long term, this was not investigated in detail. This offers room for further research, as it may be possible to more directly examine the effects of user experience with Duolingo on both the psychological motivations of achievement and enjoyment and the use of the tool (e.g., level and lesson completion).

7. Conclusion

In conclusion, this study has shown that Duolingo can have a positive effect on English learning, albeit small. It would seem that frequency of use, perceived

achievement, and perceived enjoyment positively influence such learning. Also, prior use of Duolingo has a moderating role in some of these factors' influence on improvement of language learners shown in verb tense assessment.

8. About the Author

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11. Appendix

Student Information

Age: __ 18-20   ___ 21-23   __24 to 26   __ 27 and older

Gender: __ Female   __ Male   __ Other/Prefer not to say

Program: __ Undergraduate   __ Graduate

Program Year: Select (1/2/3/4)

Major: _____

Previous Duolingo Use

Have you used Duolingo before the class started? Select (Yes/No)

If Yes: Which languages have you tried? _____

If you have used Duolingo for English, how many levels have you fully completed before you started this course? Select (1/2/3/4/5)

Duolingo Use During the Course

At the start of the course, it was recommended that you sign up for Duolingo (if you did not already have an account), and that you use the program for about 15 minutes (20XP) a day. Which of these did you do?

Use of Duolingo

I signed up for Duolingo (or I already had an account). Select (Yes/No)

I set a 20XP/day goal. Select (Yes/No)

If you chose not to use Duolingo, can you explain briefly why?

(Non-users: Please skip to the end)

For the next several items, please indicate your level of agreement with the statement.

	Totally agree (5)	Somewhat agree (4)	Do not agree or disagree (3)	Somewhat disagree (2)	Totally disagree (1)
Frequency of Use					
I used Duolingo most days during the course.					
I tried to make time to use Duolingo.					
I was motivated to use Duolingo every day.					
Completion					
I went up one or more levels in Duolingo during the course.					
I completed one or more lessons every day.					
I felt motivated to reach my goal every day.					

	Totally agree (5)	Somewhat agree (4)	Do not agree or disagree (3)	Somewhat disagree (2)	Totally disagree (1)
Achievement					
I improved my English through Duolingo.					
Duolingo helped to improve my vocabulary.					
I feel a sense of achievement from using Duolingo.					
Enjoyment					
I enjoyed using Duolingo every day.					
I looked forward to using Duolingo.					
Duolingo is a fun way to learn.					