

DUOLINGO GAMIFICATION: DOES IT REDUCE STUDENTS' GRAMMATICAL ERRORS IN WRITING?

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Abstract

The study is aimed to examine the effectiveness of Duolingo Gamification Platform to reduce the students' grammatical errors in writing a report text. The participant of this study were 25 students in the second grade of Methodist Senior High School in Banda Aceh, Indonesia. The research utilized a pre-experimental design with one group pre-test post-test. The instrument of this study is a test divided into pre and post-test. The data were analyzed using the t-test. The study revealed that the mean score of the pre-test is 53.8, and the mean score of post-test is 55.4. The standard deviation for pre-test was 7.18 and for post-test were 7.29 and the score of the standard of error of pre-test was 1.43 and post-test was 1.45. The t-score of the study was 4.0, with the degree of freedom 24, and the t-table was 1.69. The data showed that the t-score was higher than t-table, which leads us to the interpretation that the H_a was accepted and H_0 was rejected. It indicated that the use of Duolingo Gamification platform was sufficient to reduce the students' grammatical errors in writing report text. Therefore, the platform was highly recommended to use to increase the quality of students' writing skill, especially in the report text.

Keywords: *Duolingo, Gamification, Writing, Technology*

INTRODUCTION

Technology has become a part of the essential tools in our daily life. Its utilization is not only limited to communication, self-entertainment but it's also extended to pedagogical scope. One of the technological tools that its benefit is inevitable is a Smartphone. Over the last decades, Smartphone Technological Advancement has been developed massively in the form of the complexity of the hardware and sophistication of the software that allows the users to stay connected to the relatives and be entertained and educated with various apps, features, and games.

This attractiveness of Smartphone has made teenager depend on their life to its features. It is undeniable that the phenomenon of its excessive use has spread drastically among Indonesian students. According to the GSM Association and the

Mobile Society Research Institute (2013) that 77% of teenagers own their Smartphone, which the 87% use dominantly for various games.

Many experts have disseminated the various negative impacts of the excessive use of smartphone either from educational of the medical field of expertise. Salvation (2017) found out that the benefits and harms of the addict use of smartphone in academia are mediated by what applications that the user commonly access. If the user regularly uses the smartphone as a learning tool such as for searching information required for the assignment, conducting a test or learning through the courses that provided in the apps, the benefits of the addict use of a smartphone could weight its harm. Vice versa, if the learner is addicted to access smartphone for social application or personal entertainments, the impact of its

addiction would potentially reduce the academic ability of the users.

Moreover, according to Jones (2014), the over-use of the gadget will cause a psychological effect on the individual conditions and time-wasted that consumes many productive potentials of the users. The over-use behavior is not only hazardous to the educational output but also the mental situation of the future generation.

However, the use of Smartphone in the educational field has been under discussion based on whether or not it has more benefits than its barriers. Riasati, Allahyar, and Tan (2012) found that the use of technology in education has advantageous in many aspects of learning such as, engagement, improvement in academic ability, a paradigm shift in teaching and learning, an assessment shift, collaborative learning enhancement, and lowering learning anxiety level.

The other side of the coin of Riasati, Allahyar and tan's (2012) finding is that the use of Smartphone in formal educational context could lead the pedagogical process to some barriers such as lack of access to the practical training on the healthy use of the technological tools, teacher's attitude, students' attitude, and time over-consumption issue.

In another hand, the existence of technology in the world has become narrower; that is why the collaboration and competition among the international society are greater. The absence of a border between one nation to others on the internet of thing (IoT) era is a massive trigger to the growth of the competitive and collaborative environment in the society.

Education should equip the students with skills that make this competition and collaboration to face this

rising global competitiveness in many fields for future generations.

One of the essential aspects that makes this collaboration in competition possible is by having language as a tool of communication between diverse backgrounds. Hence, it required an effective teaching and learning process in the English language.

Therefore, education needs to pay a great deal of attention to the barriers of this unstoppable development of the Smartphone and the competition and collaboration challenges among the international community. Moreover, it could alternate most of the gadget operation to the benefit of the students' language education, such as e-learning interfaces and gamified platforms as an effort to develop the language skills of the learners.

One among four skills of language that need to be mastered by the students to face global challenges is writing ability. Leonard (2019) stated that the writing skill is essential in establishing collaboration and winning the competition in business to define the influential brand, building loyal relationships, and offering the ease of distribution of the product. It is understandable that the writing skill could help them to develop a new collaboration or to survive in the competition.

Writing skill is not only able to strengthen the learners' preparation for future challenges but also it directly impact the language skill of the individual. This statement has been supported by Klimova (2012) who stated that the writing skill acquisition is not only connected to the three language skills (listening, speaking and reading) but it also requires the writer to master a metacognitive skill.

Through his survey, Klimova (2012) revealed that the students'

difficulties in writing in formal context are limited knowledge of grammar (e.g.) article, word order, and tenses)

The result of the conducted preliminary study survey strengthened the statement of Klimova. It revealed that the teaching English in the second grade of Methodist Senior High School, especially

in the writing skill which was still far from perfection. There are three types of mistakes that redundantly found in students' writing in term of grammar, such as sentence formation, usage, and mechanics. The chart below displayed the results of the preliminary study.

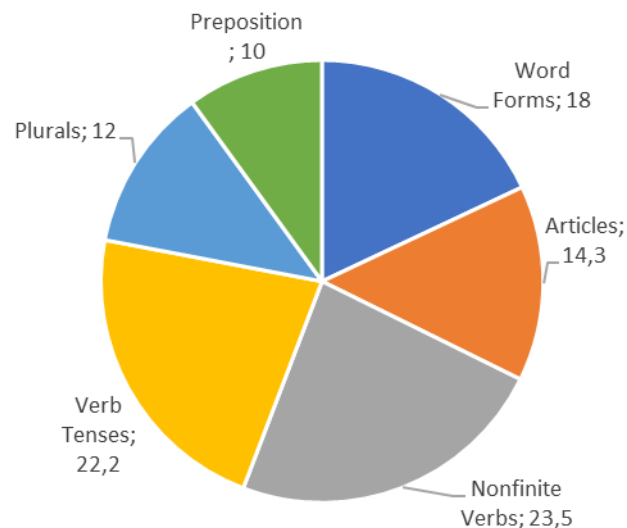


Chart 1. The Grammatical Error in Students' Writing

As the chart above, it can be seen that after conducting the preliminary study with 60 students as sample that the frequent errors found in students' writing is nonfinite verbs (23.5%), verb tenses (22.2), plurals (12%), prepositions (10%), articles (14.3%) and word forms (18%). The most fundamental error that needs to be reduced is nonfinite verbs and verb tenses.

Moreover, through the observation and teachers' interview, it was found that most of the students were experiencing the difficulty in constructing writing with minimum grammatical errors. Therefore, a study under the area of the issues was extremely required to conduct as a response to the challenges.

Duolingo is a gamified platform for learning a foreign language which was

launched in 2012 that consists of two major components: grammar and vocabulary exercises and an interface to translate articles in a form the web (Magnuson, 2014). According to Mehtala (2015), the first course of Duolingo is its top-down lessons' structure which was divided into small vary collections that called skills tree. It has been observed that each of the courses consist of 20 exercises. It requires the users to answer the questions in various forms such as translating, repeating, transcribing, opting multiple choice, arranging provided words, matching word-picture cards and word-translation pairs, All of the students' activity in Duolingo can be virtually reported to the teachers as either a daily or weekly report.

The researcher has investigated some relevant researches that could justify the H_a hypothesis of this study.

De Castro, Macedo & Basto (2016) conducted a study to establish the reflections on English Learning using Duolingo. Their study found out that the Duolingo usage in the formal educational environment could increase the students' vocabulary, pronunciation, and simple grammatical structures. Besides De Castro, Macedo & Basto (2016) stated that Duolingo motivated students to practice the target language daily.

As a gamified platform, Duolingo could hypothesize as a potential solution to decrease students' grammatical error in composing report text due to its attractiveness. Hence, the problem in this study stated as follow: does the use of Duolingo platform effective in decreasing students' grammar errors in writing report text?

METHOD

The writer designed the study as a pre-experimental study with one group pre-test post-test to identify the ability of the treatment to reduce the students' grammatical errors in writing a report text after applying the treatment.

Through purposive sample technique, the research opted the second grader of Methodist Senior High School. This class consisted of 25 students; surprisingly, all students participated in all phase of data collection (pre-test, treatment, and post-test). The instrument of this research was a test which consisted of pre and post-test.

This research was conducted in one meeting of pre-test and one session of post-test, while the treatments were

performed through the Duolingo Application.

In the pre-test, the teacher instructed the students to write a report text in between 250 to 300 words under the theme "horse" to find out a clear portrayal of the students' ability to avoid any grammatical error during in the report text writing. The writing of each of the students will be scored based on the grammatical errors made by them in their writing.

While in the treatments were conducted in four days in the form of assignment for the students to finish 21 Duolingo Courses in the given duration. The treatments were an independent duty that was conducted through the students' devices. The process and progress of the treatment were monitored by the web-page interfaces of Duolingo for School that specified only for teachers that can be accessed from www.school.duolingo.com. Through this webpage account, the teacher was not only able to monitor each student's progress and result but also to assign a new challenge that required to be done by students in a certain amount of time. Moreover, the teacher announced the daily progress of their Duolingo score through a class-wall magazine.

Moreover, the post-test was conducted similarly to the pre-test. Each student was instructed to write a report text in between 250 to 300 words with the theme "Zebra." The objective of this post-test is to investigate the improvement of the students after conducted the treatments by evaluating the students writing using a similar method to the pre-test assessing procedure.

Lastly, the researcher then compared the score pre-test and post-test using *paired sample t-test* to discover

whether or not the effort to reduce students' error in writing is effective.

The result of the data analysis was produced from the students' pre and post-test scores to discover the students' grammatical errors made in their writing. The pre and post-test result was obtained by analyzing the students' writing using the rubric of Wright (2015), which was adapted

from O'Malley & Pierce rubric. The rubric was analyzed respectively, based on three aspects, sentence formation, usage, and mechanism. The domain score for each criterion is 1-4.

The scoring rubric used for this research is based on the following table.

Table 1. The Analytical Scoring Rubric for sentence formation.

<i>Skill to assess</i>	<i>Scores</i>	<i>Indicators</i>
<i>Sentence formation</i>	4	Standard word order; no run-on sentences; no sentence fragments; effective transitions
	3	Mostly standard word order, some run-on sentences; some sentence fragments; occasional omission of words; errors do not detract from the meaning
	2	Some non-standard word order; several run-on sentences; several sentence fragments; omissions of several words; errors somewhat detract from the meaning
	1	Many nonstandard word order; mostly run on sentences or sentence fragments; omissions of many words; errors frequently detract from the meaning.

Wright (2015)

This first scoring rubric for sentence formation was used to find out the score based on the grammatical errors that found in the students' writing in terms of sentences' fragments, transition, run on sentence, and non-standard word orders.

To enrich the evaluation of the students' grammatical errors, the researcher equipped the scoring rubric by analyzing the usage. The rubric can be seen in the following table.

Table 2. The Analytical Scoring Rubric for usage.

<i>Skill to assess</i>	<i>Scores</i>	<i>Indicators</i>
<i>Usage</i>	4	Correct use of inflection (e.g., verb conjugations, plurals, prefixes, suffixes, adverbs); consistent tense; consistent subject-verb agreement; standard word meaning.
	3	Mostly correct use of inflections; Mostly consistent tense and subject-verb agreement; mostly standard word meaning; errors do not detract from the meaning

2	Some correct use of inflections; some consistency in tense and subject-verb agreement; several errors in word meaning; errors somewhat detract from the meaning
1	Little to no correct use of inflections; frequent tense shifts; little to no subject-verb agreement; many errors in word meaning; errors fully detract from meaning.

Wright (2015)

The above scoring rubric was used to investigate the students' grammatical error on the use of inflection that includes verb conjugations, plurals, prefixes, suffixes, adverbs, tenses, consistent subject-verb agreement, standard word meaning.

As the completion of the assessment, the researcher also investigated the students' grammatical errors in the form of mechanics. The scoring rubric for mechanics is in table.3 below.

Table 3. The Analytical Scoring Rubric for Mechanics.

<i>Skill to assess</i>	<i>Scores</i>	<i>Indicators</i>
<i>Mechanics</i>	4	Correct use of mechanics (capitalization, punctuation, spelling), and formatting.
	3	Mostly correct use of mechanics and formatting; errors do not detract from the meaning
	2	Some correct use of mechanics and formatting; errors somewhat detract from the meaning
	1	Little to no correct use of mechanics or formatting; errors fully detract from the meaning

Wright (2015)

The third scoring rubric was intended to portray the students' grammatical error on the form of capitalization, punctuation, spelling, and formatting.

To ease the clarification of the scores into the scale of 1-100, the researcher used the scoring criterion of Arikunto (2014) as the table.4 below.

Table 4. Scoring Criterion

<i>Score</i>	<i>Scoring Criterion</i>	<i>Scale</i>
1	Failing	0-25
2	Poor	26-50
3	Good	51-77
4	Excellent	78-100

Arikunto (2014)

In the next step, the research analyses the students' score in pre and post-test to discover the mean score by using these formulas.

$$\text{Pre-test} \rightarrow \bar{X}_1 = \frac{\sum x_1}{n}$$

$$\text{Post-test} \rightarrow \bar{X}_2 = \frac{\sum x_2}{n}$$

Sugiyono (2015)

Remarks:

- \bar{X}_1 = Mean of Pre-test
- \bar{X}_2 = Mean of Post-test
- n = Sample quantity
- $\sum x_1$ = Sum of Pre-test Score
- $\sum x_2$ = Sum of Post-test Score

Then the data were calculated using the below mathematical formula purposed to discover the standard deviation for pre-test and post-test scores.

$$\text{Pre-test} \rightarrow SD_1 = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}}$$

$$\text{Post-test} \rightarrow SD_2 = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}}$$

Sugiyono (2015)

Remarks:

- SD_1 = Standard Deviation for Pre-test
- SD_2 = Standard Deviation for Post-test
- x_i = Data Point
- \bar{x} = Mean
- n = Sample Quantity
- \sum = Sum

Then, the data were statistically calculated to find the standard of error as a measurement of the distance of the error reduction before and after conducting the

treatment. The formula deployed to measure the standard of errors were displayed as follow.

$$\text{Pre-test} \rightarrow s\bar{X}_1 = \frac{SD_1}{\sqrt{n}}$$

$$\text{Post-test} \rightarrow s\bar{X}_2 = \frac{SD_2}{\sqrt{n}}$$

Sugiyono (2015)

Remarks

- $s\bar{x}_1$ = Standard error of pre-test
- $s\bar{x}_2$ = Standard error of post-test
- $\sum x_1$ = Standard Deviation of Pre-test
- $\sum x_2$ = Standard Deviation of Post-test
- n = Sample Quantity

Then the data were statistically calculated using paired t-test formula to discover the answer to the research question whether or not the Duolingo Gamified Platform is useful to reduce students' grammatical errors in writing report text. The study used the following formula.

$$t = \frac{(\sum D)/n}{\sqrt{\frac{\sum D^2 - \frac{(\sum D)^2}{n}}{(n-1)(n)}}$$

Sugiyono (2015)

Remarks:

- $\sum D$ = Sum of the Differences
- $\sum D^2$ = Sum of the Squared Differences.
- $(\sum D)^2$ = Sum of the Differences Squared

Lastly, the results of the calculations were interpreted and lead to an answer to the research question of the study.

RESULT AND DISCUSSION

Result

The writer presented and analyzed the data through pre-test and post-test. The following is the students score in writing the report text in pre and post-test based on

the errors that commonly done by students in Methodist Senior High School. Sentence formation, usage, and mechanics. The following table is the pre and post-test scores of the students.

Table 5. Students' Scores in pre and post test.

NO	Students' Initial	X1	X2
1	A	55	54
2	CW	45	48
3	CT	60	60
4	CLP	65	65
5	DI	65	67
6	DI	45	47
7	F	45	47
8	HAS	60	63
9	L	60	63
10	NA	45	48
11	NA	45	47
12	PL	50	53
13	SJHW	45	44
14	SP	50	52
15	S	60	62
16	Y	55	56
17	M	65	67
18	DH	65	68
19	K	45	45
20	AT	70	73
21	A	55	55
22	M	55	56
23	CHJ	45	45
24	C	40	43
25	DW	55	57

Moreover, the data were further analyzed statistically to find the mean score of the data. The calculation is as follow.

a. Mean Scores

$$\begin{aligned} \text{Pre-test } \rightarrow \bar{X}_1 &= \frac{\sum x_1}{n} \\ \rightarrow \bar{X}_1 &= \frac{1345}{25} \end{aligned}$$

$$\rightarrow \bar{X}_1 = 53.8$$

$$\text{Post-test } \rightarrow \bar{X}_2 = \frac{\sum x_2}{n}$$

$$\rightarrow \bar{X}_2 = \frac{1382}{25}$$

$$\rightarrow \bar{X}_2 = 55.4$$

The results of the calculation above are a mean score for pre-test 53.8, and the result of the mean score for post-test is 55.4. Based on the estimates above, it can be seen that there is a slight number of differences in the mean score of pre and post-test conducted through the result of the mean score of each test.

Afterward, the data were calculated using the formula of the standard deviation to measure the spread of the data. The calculation is as follow.

b. Standard Deviation

$$\begin{aligned} \text{Pre-test} \quad \rightarrow SD_1 &= \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}} \\ \rightarrow SD_1 &= \sqrt{\frac{(1345 - 53.8)^2}{25}} \\ \rightarrow SD_1 &= \sqrt{51.6} \\ \rightarrow SD_1 &= 7.18 \end{aligned}$$

$$\begin{aligned} \text{Post-test} \quad \rightarrow SD_2 &= \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}} \\ \rightarrow SD_2 &= \sqrt{\frac{(1385 - 55.4)^2}{25}} \\ \rightarrow SD_2 &= \sqrt{53.2} \\ \rightarrow SD_2 &= 7.29 \end{aligned}$$

The standard deviation score was 7.18 for pre-test and 7.29 as the standard deviation for post-test. Based on the calculation of the standard deviation of the test, the result of the calculation shows that the score for post-test is higher than the standard deviation score in the pre-test.

Then the standard of error measurements was conducted for both pre-test and post-test to discover the accurate response of the samples which representable to the actual population.

c. Standard of Error.

$$\begin{aligned} \text{Pre-test} \quad \rightarrow S\bar{X}_1 &= \frac{SD_1}{\sqrt{n}} \\ \rightarrow S\bar{X}_1 &= \frac{7.18}{\sqrt{25}} \\ \rightarrow S\bar{X}_1 &= 1.43 \end{aligned}$$

$$\begin{aligned} \text{Post-test} \quad \rightarrow S\bar{X}_2 &= \frac{SD_2}{\sqrt{n}} \\ \rightarrow S\bar{X}_2 &= \frac{7.29}{\sqrt{25}} \\ \rightarrow S\bar{X}_2 &= 1.45 \end{aligned}$$

The statistical calculation above shows that the standard of error score for pre-test is lower than the standard of error score for post-test. This data could be interpreted that the sample of the pre-test is a more accurate reflection of the actual population compared to the post-test. However, the score differences between the standard of errors in pre and post-test were slight.

Lastly, the data were calculated using a paired t-test sample.

d. t-test Score

$$t = \frac{(\sum D)/n}{\sqrt{\frac{\sum D^2 - \frac{(\sum D)^2}{n}}{(n-1)(n)}}$$

$$t = \frac{40/25}{\sqrt{\frac{108 - \frac{(40)^2}{25}}{(25-1)(25)}}$$

$$t = \frac{1.6}{\sqrt{\frac{108 - (6.4)}{600}}$$

$$t = \frac{1.6}{\sqrt{\frac{101.6}{600}}$$

$$t = 4.0$$

Based on the calculation, the data can be interpreted that the one tail t-test score found through the analysis is 4.0, and the t-table of the score is 1.69.

$$t_{\text{test}} > t_{\text{table}} = 4.0 > 1.69$$

Discussion

Through the displayed calculations, the lowest score found during the pre-test was 40, and the highest score among all the students was 70. After the treatment conducted, the minimum score for post-test was 43, and the maximum score was 73. It shows a slight difference between the score of pre-test and post-test. It indicates that there is a reduction on students' grammatical errors after the treatment using Duolingo gamification platform.

Besides, the mean score of students in pre-test was 53.8, and the mean score of the student in post-test was 55.4. The different mean score between pre-test and post-test is evident then it can be concluded that the treatment using Duolingo Gamification Platform was successful in reducing students' grammatical error in writing a report text.

Moreover, the standard deviation of pre-test score was 7.18 while the standard deviation score of post-test was 7.29; this indicated that the pre-test and post-test were highly polarized where the students have no reliability issues.

While the score of the standard of error in the pre-test, which was 1.43 and post-test, which is 1.45 prove that the sample of the pre-test is a more accurate reflection of the actual population compared to the post-test. However, without comparing both of the scores, the

results have shown that both of the tests were an accurate reflection of the real samples and population in the field.

Additionally, the statistical calculation conducted using the t-test, the result showed that pre-test and post-test scores are significantly different. It can be concluded through the t-test result. It found that the t-test score was 8,02 as stated in hypothesis testing that if the t-test result was higher than the t-table, which was 1.69 derived from the degree of freedom, which was 29. Therefore, hypothesis testing has shown that the Alternative Hypothesis (H_a) of the study is accepted. Otherwise, the data also showed that the null hypothesis (H_0) is rejected. So, the theory was confirmed. The statement indicates that using Duolingo platform to reduce students' writing errors in composing report text is effective.

Also, the researcher found that during the treatment given using Duolingo gamification platform, students were very excited and consistent in finishing the Duolingo Courses through their smartphone. The excitement of the students can be identified from the eagerness of the students to compete with other students to complete all the courses. When the teacher published the rank of the students' daily progress, all of the students were being motivated to be on the top of the list. This encouragement is highly effective in triggering their enthusiastic and attitude toward English, especially in writing skill.

Moreover, some of the students finish all the courses in Duolingo earlier than the deadline. Most of them finish the four days courses in 1 and two days. Even some of them did not complete all the courses more prior, but they were not exceeding the duration given by the teacher. The short-duration of students in

completing the trails is a sign of their enthusiastic in learning English using Duolingo Gamification Platform.

However, using Duolingo Gamification Platform required a medium-technology-literate-teacher that could operate a computer, smartphone, and the application of Duolingo and School of Duolingo website. The requirement of the students to be medium-technology-literate-teacher is because, during the treatment, the teacher mostly found the students' inquiry about the application usage and the solution to the technical error of the smartphone, which was not only limited to Duolingo Apps.

CONCLUSION

This study has revealed the conclusion that the use of Duolingo Gamified Platform is an effective tool to reduce students' grammatical error in composing report text. This statement can be interpreted from the obtained mean of pre-test 52.7 and post-test 66.4; both of the results shows that the data of pre-test and post-test are significantly different.

Due to the obtained data and statistical analysis conducted by the researcher, the t_{test} score 8.02 is higher than the t_{table} score 1.69. The result of the mathematical calculation indicates that the students' ability in constructing report text and avoiding grammatical error in post-test are improved after using Duolingo courses as a treatment.

Besides, the students' interest and motivation during the treatment was increased. However, the challenge that could be potentially faced by the teacher is a computer-related question that sometimes outside of the professionalism of the English teacher. That is why the writer suggested

that during the use of Duolingo Gamified Platform that the teacher should be at least a computer-literate users that at least master Computer and Smartphones basic setting and fixing mechanism and understanding the Duolingo App and Duolingo for School website interface.

However, the researcher understands that there many more information that could be dug from the use of Duolingo App in the classroom context. That is why the researcher suggested to other fellow researchers to further investigate the external and internal factors that made students' interest using the Duolingo app was increased and how far the Duolingo app can be used in various teaching materials, contexts and environments.

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