



The Effect of Word Chain Game on Students' Vocabulary Mastery at SMPN 2 Baula

Irda Rusiana

SMPN 2 Baula

Email: sherly.adra3@gmail.com

Abstract

This research aimed to obtain empirical evidence about the effect of the Word Chain Game on students' vocabulary mastery at SMPN 2 Baula. A quasi-experimental design was used, involving two intact eighth-grade classes: an experimental class (VIII.A, $n = 17$) taught using the Word Chain Game, and a control class (VIII.B, $n = 17$) taught using a conventional strategy, selected through purposive sampling based on the English teacher's judgment of comparable ability. Both classes received a pre-test and, after four treatment sessions for the experimental class, a post-test using a 20-item multiple-choice vocabulary test focused on nouns. Data were analyzed using normality (Shapiro-Wilk) and homogeneity (ANOVA) tests followed by a t -test. Results showed the experimental class had a lower pre-test mean (60.2) than the control class (64.7), but a higher post-test mean (82.6 versus 73.8) and a substantially higher mean gain score (22.9 versus 10.0). The t -test produced $t = 3.25$, greater than $t_{tt} = 2.00$ at a 5% significance level with 32 degrees of freedom, leading to the acceptance of the alternative hypothesis. Cohen's d was 1.15, indicating a strong effect. It is concluded that the Word Chain Game has a significant, strong positive effect on junior high school students' vocabulary mastery and can be recommended as an alternative vocabulary teaching strategy.

Keywords: *vocabulary mastery, word chain game, quasi-experimental design, junior high school students*

Introduction

Vocabulary knowledge is a fundamental component of English language learning because learners need an adequate lexical repertoire to understand and produce language across different communicative activities. However, vocabulary learning can become ineffective when instruction relies heavily on memorization without sufficient opportunities for active retrieval, meaningful use, and repeated exposure. Recent research indicates that game-based approaches can create more interactive learning conditions and support vocabulary development by increasing learners' engagement with target words through repeated practice and meaningful tasks (Tsai & Tsai, 2018; Thompson & von Gillern, 2020). Nevertheless, the effectiveness of game-based vocabulary learning is not automatic, as learning outcomes may vary according to game design, learner characteristics, instructional context, and the way game activities are integrated into teaching (Tsai & Tsai, 2018; Yang et al., 2020).

This issue is evident at SMP Negeri 2 Baula. Preliminary classroom observation conducted on 19 September 2022 showed that only 5 of 25 students (20%) demonstrated good vocabulary knowledge and adequate speaking ability, while the researcher considered 60% a reasonable achievement target. Many students experienced difficulty recalling vocabulary that had previously been taught. The problem was associated with the limited use of English in students' daily school communication and the continued reliance on conventional classroom techniques. These conditions suggest that the main challenge is not simply the amount of vocabulary introduced, but the limited opportunities students have to actively retrieve and use vocabulary during classroom interaction.

Game-based vocabulary learning provides a potentially relevant alternative because it changes vocabulary practice from primarily receptive memorization into an active and interactive learning activity. Evidence from experimental and meta-analytic research shows that game-based learning can improve English vocabulary outcomes compared with conventional learning, although the magnitude of the effect varies across contexts and instructional designs (Thompson & von Gillern, 2020; Li, 2021). In addition, research has shown that game mechanisms such as competition, challenge, feedback, and repeated engagement can influence both vocabulary learning performance and learners' participation (Yang et al., 2020; Gao & Pan, 2023). A word chain game is particularly suitable for this purpose because students are required to retrieve and produce a word in response to a linguistic constraint rather than simply recognize a word from a list. The activity therefore provides repeated opportunities for lexical retrieval, rapid recall, spelling, and peer interaction within a relatively simple classroom procedure.

Despite the growing evidence supporting game-based vocabulary learning, an important gap remains. Much of the recent literature has focused on digital games, mobile applications, and technologically mediated vocabulary learning, while less attention has been given to simple, non-digital classroom games that can be implemented in schools with limited technological resources (Tsai & Tsai, 2018; Thompson & von Gillern, 2020; Gao & Pan, 2023). This gap is particularly relevant in Indonesian junior high school contexts where teachers may need instructional strategies that are engaging but do not depend on sophisticated devices or continuous internet access. The present study addresses this gap by examining the effect of the Word Chain Game on students' vocabulary mastery at SMP Negeri 2 Baula.

The novelty of this study lies in three aspects. First, it examines a low-resource, non-digital game as a structured vocabulary-learning intervention rather than as an occasional classroom activity. Second, it focuses specifically on vocabulary mastery among junior high school students in a local Indonesian context that has received limited empirical attention in the recent game-based learning literature. Third, the study employs a quasi-experimental design with a comparison group, enabling the researchers to examine differences between students receiving Word Chain Game-based instruction and those receiving conventional instruction. This design provides a stronger basis for estimating the differential effect of the intervention than a single-group classroom intervention, while remaining feasible within intact school classes.

Accordingly, this study investigates whether the Word Chain Game has a significant effect on students' vocabulary mastery at SMP Negeri 2 Baula. The study is expected to provide empirical evidence regarding the use of a simple and resource-efficient game for vocabulary instruction and to contribute to the broader discussion of how game-based pedagogy can be adapted to different educational and technological contexts.

Methodology

Research Design

This research used a quantitative approach with a quasi-experimental design, which identifies a comparison group as similar as possible to the treatment group in terms of baseline characteristics (Howard & Shagun, 2018). The independent variable was the Word Chain Game, and the dependent variable was students' vocabulary mastery. Both the experimental and control classes were given a pre-test; the experimental class then received four treatment sessions using the Word Chain Game while the control class continued with a conventional teaching strategy, after which both classes were given a post-test. Table 1 summarizes the design of the study.

Table 1. Design of the Study

Group	Measurement I	Treatment	Measurement II
Experimental (VIII.A, n=17)	Pre-test	Word Chain Game	Post-test
Control (VIII.B, n=17)	Pre-test	Conventional strategy (no treatment)	Post-test

Setting and Participants

The research was conducted at SMPN 2 Baula, located in Baula Subdistrict, Kolaka Regency, during the 2024/2025 academic year. The population was the eighth-grade students, consisting of two classes. Purposive sampling was used to select the sample based on the English teacher's judgment that the two classes had comparable English ability: class VIII.A (17 students) and class VIII.B (17 students). Because an interview with the English teacher indicated that VIII.A had a somewhat lower baseline vocabulary score than VIII.B, VIII.A was assigned as the experimental class and VIII.B as the control class.

Instrument

The instrument was a multiple-choice vocabulary test focused on nouns, divided into a pre-test and a post-test of 20 items each, validated against the Revised 2013 Curriculum syllabus and lesson plans. Table 1a presents the test blueprint, distributing items across three achievement indicators: identifying common nouns, identifying proper nouns, and identifying the grammatical function of a noun within a sentence.

Table 2. Vocabulary Test Grid

Achievement Indicator	Material	Pre-test Item Numbers	Post-test Item Numbers
Students can identify common nouns	Vocabulary	2, 7, 18	8, 10, 11, 13, 20
Students can identify proper nouns	Vocabulary	4, 6, 9, 10, 11, 13, 15	5, 6, 9, 12, 15, 18
Students can identify the grammatical function of a noun	Vocabulary	1, 3, 5, 8, 12, 14, 16, 17, 19, 20	1, 2, 4, 7, 14, 16, 17, 19

Technique of Data Collection

Data were collected in three stages. In the pre-test stage, 20 multiple-choice items were distributed to both classes, students were given time to answer after the procedure was explained, and papers were collected and scored. In the treatment stage, the experimental class received four sessions in which the researcher opened with greetings and prayer, explained the lesson's indicators and motivated students, introduced nouns with examples, demonstrated the word chain game, had students play it, and gave feedback on their performance, while the control class received the same material through conventional teaching without the game. In the post-test stage, the same 20-item procedure used for the pre-test was repeated for both classes after treatment was completed. Each test was scored by counting the number of correct answers and converting this to a score out of 100, using the same scoring procedure for both the pre-test and post-test so that gain scores could be compared directly across classes.

Within each treatment session, the word chain game itself followed a consistent six-step procedure. First, the teacher arranged students according to their seats so that turns could proceed in a clear order. Second, the teacher explained the rules: each student had to produce a noun beginning with the last letter of the word given by the previous student, no word could be repeated, and each student had only three to five seconds to respond before forfeiting their turn. Third, once students confirmed they understood the rules, the teacher began the game. Fourth, the teacher modeled the pattern with an example, for instance, starting with "apple," to which students would continue with words such as "elephant," "tie," and "eraser", so that the last-letter linkage was clear before students played independently. Fifth, any student who failed to produce a valid word within the time limit was eliminated from that round. Sixth, the game continued in this way until three students remained as the round's winners, at which point the teacher moved on to feedback and, in the final session, to review before the post-test.

Technique of Data Analysis

Prior to hypothesis testing, a normality test (Shapiro-Wilk, via SPSS 20) was used to check whether the pre-test and post-test data were normally distributed, with a significance value above 0.05 taken as evidence of normality, and a homogeneity test (ANOVA, via SPSS 20) was used to check whether the two classes had similar variance, again using a threshold of 0.05. The main hypothesis test was an independent t-test comparing the mean gain scores of the experimental and control classes, calculated as

$t_o = (M1 - M2) / SEM1-M2$, where M1 and M2 are the mean gain scores of the experimental and control classes and SEM1-M2 is the standard error of the difference between them, derived from each group's standard deviation and standard error of the mean. The resulting t_o was compared against the t -table value (t_t) at a 5% significance level with degrees of freedom equal to $(N1 + N2) - 2$. The alternative hypothesis ($H1$: there is a significant effect of the Word Chain Game on students' vocabulary mastery) was accepted if $t_o > t_t$, while the null hypothesis (H_o : there is no significant effect) was accepted if $t_o < t_t$. Finally, the magnitude of the effect was estimated using Cohen's d , calculated as the difference between the two groups' mean gain scores divided by their pooled standard deviation, and interpreted using the criteria 0–0.20 as a weak effect, 0.21–0.50 as a modest effect, 0.51–1.00 as a moderate effect, and above 1.00 as a strong effect.

Findings and Discussion

Findings

Before treatment, the pre-test showed that the experimental class (VIII.A) had a lower mean score (60.2, range 35–80) than the control class (VIII.B), which scored a mean of 64.7 (range 30–85), indicating that the two classes began the study with somewhat different vocabulary knowledge, with the control class initially ahead. After four treatment sessions using the Word Chain Game in the experimental class and conventional teaching in the control class, the post-test showed a reversal of this pattern: the experimental class achieved a mean score of 82.6 (range 75–90), higher than the control class's mean of 73.8 (range 50–95). The mean gain score, the difference between each student's post-test and pre-test score, was 22.9 for the experimental class (range 5–50) compared with 10.0 for the control class (range -5–30), indicating that students taught with the Word Chain Game improved substantially more than those taught conventionally, despite starting from a lower baseline. Table 2 summarizes these results.

Table 3. Pre-test, Post-test, and Gain Score Summary

Measure	Experimental Class (VIII.A)	Control Class (VIII.B)
Pre-test mean	60.2	64.7
Pre-test range (min–max)	35–80	30–85
Post-test mean	82.6	73.8
Post-test range (min–max)	75–90	50–95
Mean gain score	22.9	10.0
Gain score range (min–max)	5–50	-5–30

Table 2a presents the individual pre-test, post-test, and gain scores of every student in both classes, illustrating the range of individual variation underlying the summary statistics in Table 2.

Table 4. Individual Student Scores by Class

No.	Exp. Pre	Exp. Post	Exp. Gain	Ctrl. Pre	Ctrl. Post	Ctrl. Gain
1	60	95	35	50	65	15
2	55	75	20	60	55	-5
3	65	90	25	65	70	5
4	75	85	10	75	85	10
5	55	90	35	75	75	0
6	75	80	5	50	65	15
7	70	85	15	80	90	10
8	75	80	5	70	80	10
9	60	75	15	75	75	0
10	60	75	15	60	75	15
11	60	80	20	30	60	30
12	35	85	50	85	85	0
13	50	80	30	40	65	25
14	65	80	15	55	80	25
15	80	100	20	75	70	-5
16	45	85	40	75	80	5
17	40	75	35	80	95	15

Categorizing the post-test scores further (Table 2b) shows that none of the experimental class students scored below 75, with the large majority (76.5%) falling in the “good” band and nearly a quarter (23.5%) in the “excellent” band, whereas the control class had a more spread-out distribution, with 41.2% of students still scoring in the “fair” or “poor” bands after instruction. Looking at individual gain scores in Table 2a, 10 of the 17 experimental class students (58.8%) improved by 20 points or more from pre-test to post-test, compared with only 3 of the 17 control class students (17.6%), reinforcing that the larger average gain in the experimental class reflected a broad pattern of improvement across most students rather than a small number of unusually large individual gains.

Table 5. Post-test Score Distribution by Category

Category	Experimental Class	Control Class
Excellent (90–100)	4 students (23.5%)	2 students (11.8%)
Good (75–89)	13 students (76.5%)	8 students (47.1%)
Fair (60–74)	0 students (0%)	6 students (35.3%)
Poor (below 60)	0 students (0%)	1 student (5.9%)

Preliminary statistical checks confirmed that the data were suitable for a parametric t-test: the Shapiro-Wilk test showed both the pre-test and post-test data were normally distributed ($p > 0.05$ in each case), and Levene's/ANOVA-based homogeneity tests showed the pre-test data (significance 0.296) and post-test data (significance 0.053) were both homogeneous, since both values exceeded the 0.05 threshold (Table 3).

Table 6. Normality and Homogeneity Test Results

Test	Statistic / Significance	Result
Normality (Shapiro-Wilk), pre-test	$p > 0.05$	Normally distributed
Normality (Shapiro-Wilk), post-test	$p > 0.05$	Normally distributed
Homogeneity (ANOVA), pre-test	Sig. = 0.296 > 0.05	Homogeneous
Homogeneity (ANOVA), post-test	Sig. = 0.053 > 0.05	Homogeneous

The independent t-test comparing the mean gain scores of the two classes produced a mean gain of 23 for the experimental class and 10 for the control class, a standard error of the difference of 4.00, and a resulting t of 3.25. With 32 degrees of freedom and a 5% significance level, the t -table value (t_t) was 2.00. Because t (3.25) was greater than t_t (2.00), the alternative hypothesis (H_1) was accepted and the null hypothesis (H_0) was rejected, indicating a statistically significant effect of the Word Chain Game on students' vocabulary mastery. The magnitude of this effect, calculated using Cohen's d , was 1.15, which exceeds the threshold of 1.00 and is therefore classified as a strong effect (Table 4).

Working through the calculation step by step: the mean gain score of the experimental class (M_1) was 23 and of the control class (M_2) was 10; the standard deviation of the gain scores was 12.36 for the experimental class (SD_1) and 10.14 for the control class (SD_2); the standard error of the mean was therefore 3.09 for the experimental class (SEM_1) and 2.50 for the control class (SEM_2); combining these gave a standard error of the difference ($SEM_1 - M_2$) of 4.00, and dividing the difference in means ($23 - 10 = 13$) by this standard error produced $t = 3.25$. For the effect size, the pooled standard deviation of $(12.36 + 10.14) / 2 = 11.25$ was divided into the same mean difference of 13, giving Cohen's $d = 1.15$.

Table 7. Summary of t-test and Effect Size Results

Statistic	Value
Mean gain, experimental class (M1)	23
Mean gain, control class (M2)	10
Standard error of the difference (SEM1-M2)	4.00
t-observed (to)	3.25
Degrees of freedom (df)	32
t-table (tt), significance level 5%	2.00
Decision	to > tt → H1 accepted, Ho rejected
Cohen's d (effect size)	1.15 (strong effect)

Discussion

These findings indicate that the Word Chain Game had a significant and, by conventional standards, strong positive effect on students' vocabulary mastery. The reversal between pre-test and post-test results is particularly notable: although the experimental class began with a lower mean score than the control class, it ended with a substantially higher mean score and a more than double mean gain, suggesting that the improvement observed cannot be attributed simply to the experimental class being a stronger group from the outset. Because the two classes were shown to be statistically comparable in variance both before and after the intervention, and both datasets met the normality assumption required for a valid t-test, the observed difference in gain scores is more plausibly attributed to the treatment itself than to pre-existing group differences or a violation of statistical assumptions.

This result is consistent with the theoretical basis for the game outlined earlier: because the Word Chain Game requires students to actively retrieve and produce vocabulary under mild time pressure, repeatedly and in a low-stakes, game-like format, it likely supported stronger retention than the conventional strategy used in the control class, which relied more heavily on direct instruction and memorization. This interpretation is consistent with research demonstrating that game-based approaches can facilitate vocabulary learning by increasing opportunities for active vocabulary processing and repeated exposure. Thompson and von Gillern (2020), for example, found a moderately large overall effect of video-game-based instruction on English language learning, including vocabulary acquisition. Similarly, Wu et al. (2020), based on a meta-analysis of 2,160 test samples, reported that digital games significantly promoted English vocabulary learning among Asian learners. These findings support the broader argument that game-based learning can create learning conditions that are more engaging and conducive to vocabulary development than approaches relying predominantly on conventional instruction.

The findings are also consistent with previous research on game-based vocabulary learning. Rather than relying only on studies specifically examining the Word Chain Game, the present findings can be situated within the broader empirical literature on vocabulary games. Chen et al. (2018) demonstrated through a meta-analysis that digital game-based vocabulary learning can have positive effects on vocabulary development, with the effectiveness influenced by features of game design. Kohnke et al. (2019) likewise found that a mobile game-based vocabulary learning application could improve vocabulary acquisition and retention among EFL learners. More recently, Li (2021) reported that game-based vocabulary learning significantly improved Chinese EFL learners' vocabulary achievement compared with conventional paper-based word-list learning, while also producing positive effects on motivation and self-confidence. Taken together with the present study's quasi-experimental evidence and strong effect size, these findings provide converging support for the use of game-based approaches as an effective means of developing vocabulary among EFL learners.

This study is nonetheless limited by its relatively small and school-specific sample (34 students across two intact classes at a single school), by the reliance on intact classes rather than random assignment to condition, and by the two classes' unequal starting point on the pre-test, which, although statistically comparable in variance, leaves open the possibility that regression toward the mean contributed in part to the experimental class's larger gain. Replication with larger and more varied samples, and with random assignment where feasible, would help confirm the size of the effect observed here. Such caution is particularly appropriate because previous meta-analytic research has shown that the effects of game-based vocabulary learning can vary according to characteristics such as game design, learning context, and learner characteristics (Thompson & von Gillern, 2020; Wu et al., 2020).

From a practical standpoint, the size of the effect observed, a strong effect by Cohen's criteria, suggests that the Word Chain Game may be worth incorporating into regular vocabulary instruction rather than treated only as an occasional supplementary activity, particularly for noun-focused vocabulary units similar to those used in this study. Because the game requires minimal preparation and no special materials beyond a clear explanation of its rules, it is a strategy that teachers with limited resources could adopt readily, which may make it particularly relevant for schools in settings similar to SMPN 2 Baula. This practical implication is supported by research showing that game-based vocabulary activities can produce positive learning outcomes without necessarily requiring highly sophisticated technological resources. The broader literature suggests that the pedagogical value of games derives not only from technology itself but also from opportunities for repeated practice, active participation, and meaningful engagement with target vocabulary (Li, 2021; Yang et al., 2020).

These results also map cleanly onto the conceptual framework guiding the study, in which the experimental class was taught vocabulary through the Word Chain Game while the control class was taught the same material through a conventional strategy. The clear separation between the two classes' outcomes after treatment, despite the experimental class starting from a lower baseline, supports the framework's underlying assumption that the choice of teaching strategy, rather than the students' initial ability alone, was the more decisive factor in the vocabulary gains observed. This interpretation is consistent with evidence from game-based vocabulary research indicating that learning activities incorporating game elements can provide learners with repeated opportunities to interact with target words and can increase engagement during vocabulary learning (Yang et al., 2020; Li, 2021).

It is also worth situating the size of this effect within the broader context of educational research, where effect sizes in the moderate range are more typical for classroom interventions. An effect size of 1.15 is therefore comparatively large, and should be interpreted with appropriate caution given the study's modest sample size and single-school setting; even so, the magnitude is compatible with the generally positive direction of effects reported in meta-analytic research on game-based vocabulary learning. Thompson and von Gillern (2020) reported an overall effect size of approximately 0.70 for video-game-based instruction in English language learning, while Wu et al. (2020) similarly found significant positive effects of digital games on English vocabulary learning. The present effect size of 1.15 is larger than these broader estimates, which strengthens the importance of interpreting the result cautiously while also suggesting that the Word Chain Game may offer substantial benefits under the specific classroom conditions examined in this study.

Conclusion

Based on the findings, it can be concluded that the Word Chain Game has a significant effect on students' vocabulary mastery at SMPN 2 Baula. Although the experimental class (VIII.A) began with a lower pre-test mean (60.2) than the control class (VIII.B, 64.7), it achieved a higher post-test mean (82.6 versus 73.8) and a substantially higher mean gain score (22.9 versus 10.0) after four sessions of treatment. The t-test confirmed this difference was statistically significant, with $t(3.25)$ exceeding $t(2.00)$ at a 5% significance level, leading to the acceptance of the alternative hypothesis, and Cohen's d of 1.15 indicated that the effect was strong. These results support the use of the Word Chain Game as an effective alternative strategy for teaching vocabulary to junior high school students.

Several suggestions follow from this research. Teachers are encouraged to use the Word Chain Game as an engaging medium for vocabulary instruction, ensuring that the rules are explained clearly before play begins and, where appropriate, offering small incentives to keep the activity encouraging and competitive in a positive way. Students are encouraged to stay active and attentive during lessons and to ask for clarification whenever they are unsure of the material being taught. Schools are encouraged to provide the simple materials needed to support game-based teaching so that lessons can be more effective and engaging for both teachers and students. Future researchers may use this study as a reference for further research on the Word Chain Game or related vocabulary games, ideally with larger samples, random assignment, or application to other language skills.

Curriculum developers and English subject coordinators may also consider these findings when planning vocabulary units: because the effect observed here was strong and consistent across a short, four-session intervention, embedding brief word-chain activities into existing lesson plans, rather than requiring a separate curriculum overhaul, appears to be a low-cost way of strengthening vocabulary outcomes within current classroom time constraints.

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