

EFFECTIVENESS OF FLASHCARDS IN ENHANCING VOCABULARY LEARNING AMONG 4TH GRADERS AT HUNG LONG 1 PRIMARY SCHOOL

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Abstract: This study aimed to investigate the effectiveness of flashcards in vocabulary learning of fourth graders at Hung Long 1 Primary School. The study used a mixed methods approach with pre-and post-test vocabulary measures using multiple-choice questions, as well as questionnaires and classroom observations of 100 fourth graders to measure student perceptions and interviews with two experienced teachers of English. Flashcards were typically used in one to two teaching periods per week (students had four lessons and used English in one week) and were associated with the introduction of new words to students to support vocabulary learning through imagery and memory, resulting in the increased number of words learned. Students reported that they were more engaged and remembered more information, while teachers also indicated improved teaching outcomes. The purpose of this study was to investigate how effective flashcards are in developing vocabulary in young learners and to provide some implications for integrating flashcards into primary education.

Keywords: electronic flashcards, flashcards, mixed methods, primary education, teaching tool, vocabulary learning

1. INTRODUCTION

Teaching English vocabulary to primary school students presents difficulties, as traditional learning methods often involve forced memorization, causing a lack of interest and low retention rates. To address these issues, educators and researchers have introduced innovative teaching methods, such as using traditional and electronic flashcards with integrated images, sounds, and example sentences. According to Nuryani & Odo Fadloeli (2021), flashcards help teachers deliver lessons more effectively while increasing student engagement and enthusiasm for learning English. Similarly, Aba (2019) highlights that flashcards can be used for vocabulary introduction, classification, and memory games, stimulating cognitive processes.

Furthermore, flashcards enable teachers and students to enhance the learning experience by reinforcing vocabulary through interactive activities. Teachers can

integrate flashcards into classroom games, such as having students match cards to lesson content or use them in review exercises. These methods help improve vocabulary retention, foster active participation, and create a more engaging learning environment for primary school students.

Vocabulary development is essential for acquiring the four language skills: listening, speaking, reading, and writing. However, traditional teaching methods do not effectively support rapid and lasting vocabulary retention. At Hung Long 1 Primary School, as well as other educational institutions, there is a need to address these challenges and implement optimal teaching strategies.

Grade 4 students were selected for research due to the observed difficulties they faced in learning vocabulary through conventional methods, such as rote memorization and note-taking, which lack creativity and are limited in effectiveness.

One major reason for continued reliance on traditional methods is that some teachers do not update their teaching strategies, leading to student disengagement. This can result in negative attitudes toward learning new words, difficulty in understanding vocabulary meaning, and a lack of enthusiasm for English learning.

Moreover, students struggle to apply learned vocabulary in practice, which affects their confidence, particularly during tests. A limited vocabulary also hinders communication skills, reducing their willingness to engage in English conversations. As a result, frequent mistakes in vocabulary-related assessments discourage students, diminishing their motivation and interest in learning English.

1. How effective are electronic flashcards in improving vocabulary acquisition, as measured by test scores and retention rates, among 4th-grade students at Hung Long 1 Primary School?

2. How do students and teachers perceive the effectiveness and engagement level of flashcards compared to standard vocabulary teaching methods at Hung Long 1 Primary School?

2. LITERATURE REVIEW AND RESEARCH METHODS

2.1. Literature Review

2.1.1 *Definition of Electronic Flashcards*

Electronic flashcards enhance vocabulary acquisition through multimedia elements, adaptive feedback, and spaced repetition algorithms (Nation, 2013; Karpicke & Roediger, 2008). They reinforce word associations using visual and auditory stimuli and support retrieval-based learning. Digital flashcards are categorized as static, resembling traditional ones, or interactive, incorporating quizzes and speech recognition for engagement. Their spaced repetition systems optimize review

intervals to improve retention (Kornell & Bjork, 2009). While effective, electronic flashcards should be integrated with communicative and contextual learning for a more comprehensive vocabulary acquisition strategy (Schmitt & Schmitt, 2020).

2.1.2. *Features of Effective Electronic Flashcards*

Electronic flashcards are an effective tool for fourth graders to learn vocabulary due to their interactive features, which include self-testing, feedback, and pronunciation practice. They incorporate games like matching words, puzzles, and rapid word recall, enhancing engagement and memory retention (Baddeley, 2019). Unlike traditional flashcards, electronic versions use multisensory elements such as images, sounds, and animations, aligning with dual coding theory to improve recall (Paivio, 2014). Spaced repetition further supports long-term retention by scheduling reviews based on learning levels (Cepeda et al., 2008). Game-like features, including points, leaderboards, and progress tracking, increase motivation (Deterding et al., 2011). Additionally, teachers can customize flashcards to suit students' skill levels, optimizing vocabulary instruction in elementary education (Ellis, 2015).

2.1.3. *Benefits of Electronic Flashcards in Vocabulary Learning*

Electronic flashcards enhance vocabulary acquisition in fourth graders by enabling quick reflex practice, memorization, and efficient learning. Their use of spaced repetition optimizes long-term retention by reviewing words at ideal intervals (Cepeda et al., 2006). A multisensory approach, integrating text, images, audio, and animation, supports deeper processing and comprehension (Paivio, 2014). Gamification elements, such as rewards, points, and progress tracking, increase engagement and

intrinsic motivation (Deterding et al., 2011). These flashcards also provide flexibility for self-paced learning (Ellis, 2015) and offer immediate feedback, reinforcing learning through real-time error correction (Baddeley, 2019). Additionally, teachers can customize them to match students' proficiency levels, making vocabulary instruction more effective (Nation, 2001).

2.1.4. Challenges in Implementing Electronic Flashcards in Classrooms

Despite the advantages of electronic flashcards in vocabulary learning, their implementation in primary classrooms faces several challenges. Limited technology and accessibility, particularly in under-resourced schools, hinder their widespread use (Selwyn, 2021). Technical issues such as unreliable internet and software glitches further disrupt learning. Teacher training and pedagogical integration are also significant barriers, as educators need adequate technological knowledge and support to use electronic flashcards effectively (Hennessy et al., 2015). Resistance to technology and concerns over screen time can further limit adoption (Tondeur et al., 2017). Additionally, excessive reliance on digital tools may lead to distraction and cognitive overload, reducing deep learning (Sweller, 1988). Content quality is another concern, as pre-made flashcards may lack contextual richness, requiring teachers to invest time in customization (Nation, 2001).

2.1.5. Comparison between Electronic Flashcards with Integrated Artificial Intelligence (AI) and Traditional Flashcards

Traditional flashcards are simple paper-based tools often used in repetitive activities, which can lead to passive learning and reduced student engagement. Electronic flashcards, like those on Anki or Quizlet, offer greater accessibility and use spaced repetition to enhance memory but lack

interactive features and progress tracking. In contrast, AI-integrated flashcards personalize learning by analyzing student data, creating customized content, adjusting difficulty levels, and including features such as native pronunciation, voice recognition, and educational games. These tools also save teachers preparation time. However, their adoption remains limited due to technical challenges, lack of awareness, copyright restrictions, and inadequate infrastructure in rural schools, making traditional flashcards still more commonly used in many settings.

2.2 Research Methods

2.2.1. Research Design

In the study, the researcher used an exploratory design to examine the competing effects of flashcards in teaching fourth-grade vocabulary at Hung Long Primary School, which used a mixed methods approach. This system included both quantitative and qualitative exploration strategies that were not included in other methodological options related to measuring the use of flashcards in vocabulary acquisition. The mixed systems study combines the strengths of qualitative and quantitative data to more fully answer the proposed question. The quantitative system will include both pre-and post-tests to measure the effects of flashcards on vocabulary comprehension. This perspective is consistent with Nation's (2001) distinction that, of course, only statistical evidence is important in evaluating educational interventions. Statistical analyses will explore differences in vocabulary acquisition and retention when flashcards are used compared to traditional vocabulary instruction in the study.

2.2.2. Participants

In the study, the sample will include 100 the fourth graders, in which 45 boy – pupils and 55 girl – pupils, and two experienced teachers of English, along with two experienced teachers from Hung

Long 1 Primary School. All participants are volunteers in the study. The target population includes the fourth graders with different vocabulary and word memory abilities.

2.2.3. Instruments

The study employs a mixed-methods approach to investigate the impact of flashcards on fourth-grade vocabulary learning at Hung Long 1 Primary School. Data collection includes standardized vocabulary tests, questionnaires, and classroom observations. Pre- and post-tests assess vocabulary acquisition through receptive and written tasks (Nation, 2001). Questionnaires capture students' perceptions and teachers' evaluations of flashcard use (Creswell, 2017). Classroom observations, guided by a structured checklist, document real-time interactions (Tashakkori & Teddlie, 2010). By integrating quantitative and qualitative data, the study aims to provide a comprehensive analysis of flashcards' effectiveness in vocabulary instruction.

2.2.4. Data Analysis

The data analysis in this study employed a mixed-methods approach, combining quantitative and qualitative techniques to evaluate the effectiveness of flashcards in vocabulary learning among fourth-grade pupils. Quantitative analysis involved

descriptive statistics, paired-sample t-tests, and effect size calculations (Cohen's d) to measure differences in vocabulary acquisition before and after the intervention, along with reliability tests such as Cronbach's alpha for internal consistency. Additionally, differential item analysis and regression analysis explored factors influencing vocabulary gains. Qualitative analysis was conducted through thematic coding of open-ended questionnaires and interviews with pupils and teachers, identifying recurring patterns related to engagement, perceived effectiveness, and challenges. Test scores, questionnaire data, and interviews ensured a comprehensive interpretation, offering both statistical evidence and contextual understanding of flashcard use in primary education.

3. RESULTS AND DISCUSSIONS

3.1. Results

3.1.1. Pre-test

The pre-test scores in EG and CG are given in Table 1. The control group, consisting of 50 participants, exhibited a mean pre-test score of 8.0800 (SD=1.53649, SEM= 0.21729). In contrast, the experimental group also 50 participants, displayed a mean pre-tets score of 8.6600 (SD=1.39401, SEM=0.19714).

Table 1. Pre-test scores of EG and CG

	CLASS	N	Mean	Std. Deviation	Std. Error Mean
Pre-test results	Control class	50	8.0800	1.53649	.21729
	Experimental class	50	8.6600	1.39401	.19714

Comparing the mean pre-test scores between the two groups, it is clear that the experimental group started with a higher mean score of 8.6600, while the control group had a slightly lower mean pre-test score of 8.0800. This suggests that, on

average, participants in the control group started the study with higher performance levels than those in the experimental group.

The standard deviations of both groups were relatively close, with the Experimental group showing a value of 1.39401 and the

control group showing a slightly higher standard deviation of 1.53649. This suggests a similar amount of variation or dispersion of scores around the mean within each group.

When looking at the standard error of the mean, we see relatively low values for both groups: 0.19714 for the experimental group and 0.21729 for the control group. A low standard error indicates a precise estimate of the sample mean, suggesting that these

means are likely to be close to the true population mean.

Therefore, the experimental group started with a higher average pretest score than the control group. The standard deviation and standard error indicate a reasonable degree of variability and precision in estimating the population mean for both groups. Independent samples t-tests were conducted to compare the pretest scores between the control and experimental groups in Table 2.

Table 2. Pre-test results of Independent Sample T-Test

	Independent Samples Test									
	Levene's Test for Equality of Variances			t-test for Equality of Means					95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper	
Pre_test_results	Equal variances assumed	.422	.517	-1.977	98	.051	.58000	.29340	-1.16224	.00224
	Equal variances not assumed			-1.977	97.086	.051	.58000	.29340	-1.16230	.00230

Examining the independent samples test results, Levene's Test for Equality of Variances shows an F-value of 0.422 with a significance value of 0.517. Since the significance value is greater than 0.05, the assumption of equal variances is met. Consequently, the analysis proceeds with the row for "Equal variances assumed."

The t-test reveals a t-value of -1.977 with 98 degrees of freedom (df) and a significance value of 0.051. While this p-value is slightly above the conventional threshold of 0.05, it suggests a marginal difference in the pre-test scores between the two groups. The mean difference is -0.5800, indicating that the experimental group had a lower average score compared to the control group. The 95% confidence interval for the mean difference ranges from -1.16224 to 0.00224, which includes zero, further supporting the lack of a statistically

significant difference between the groups.

The standard error of the mean difference is 0.29340, indicating a moderate level of precision in estimating the difference between group means. Overall, while the control group demonstrated a slightly higher mean pre-test score than the experimental group, this difference is not statistically significant at the 0.05 level, suggesting comparable baseline performance levels between the two groups.

3.1.2. Post-test

The mean score indicates the central tendency of the data. In the post-test, Table 3 showed that the "Experimental" group had a higher mean post-test score (9.1200) compared to the "Control" group (8.8200). This suggests that, on average, participants in the Control group performed better in the pre-test.

Table 3. Post-test scores of EG and CG

Group Statistics					
	CLASS	N	Mean	Std. Deviation	Std. Error Mean
Pre-test results	Control class	50	8.8200	1.70533	.24117
	Experimental class	50	9.1200	1.32002	.18668

The table illustrates the descriptive statistics for the posttest results in the experimental and control groups. The average score for the Control group was 8.8200, while the experimental group had a slightly higher average score of 9.1200, suggesting that participants in the control group outperformed those in the experimental group on average.

The standard deviation reflects the variation in scores within each group. The control group had a higher standard deviation of 1.70533 compared to 1.32002

in the experimental group, indicating greater variation in performance in the experimental group. This indicates a wider distribution of posttest scores in the experimental group.

The standard error of the mean, which estimates how much the sample mean is expected to deviate from the true population mean, was smaller in the experimental group (0.18668) than in the control group (0.24117). This difference shows slightly higher accuracy in estimating the mean value of the control group compared to the experimental group.

Table 4. Post-test results of Independent Sample T-Test

Independent Samples Test										
Levene's Test for Equality of Variances			t-test for Equality of Means							
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
Post_test_results	Equal variances assumed	4.565	.035	-2.361	98	.020	-.72000	.30498	-1.32522	-.11478
	Equal variances not assumed			-2.361	92.207	.020	-.72000	.30498	-1.32570	-.11430

The t-statistic is -2.361 with 98 degrees of freedom under the assumption of equal variances. Additionally, when equal variances are not assumed, the t-statistic remains the same (-2.361), but the degrees of freedom are adjusted to 92.207. The associated two-tailed p-value is 0.020, which is below the 0.05 threshold for statistical significance.

Levene's Test for Equality of Variances has an F-statistic of 4.565 with a significance value (Sig.) of 0.035, indicating that the assumption of equal variances is violated as the p-value is below 0.05. Therefore, the results for the row "Equal variances not

"assumed" should be interpreted.

The mean difference between the groups is -0.72000, with a standard error of 0.30498. The 95% confidence interval for the mean difference ranges from -1.32570 to -0.11430. Since this confidence interval does not include zero, it suggests that there is a statistically significant difference in post-test scores between the two groups.

3.1.3. *Questionnaire*

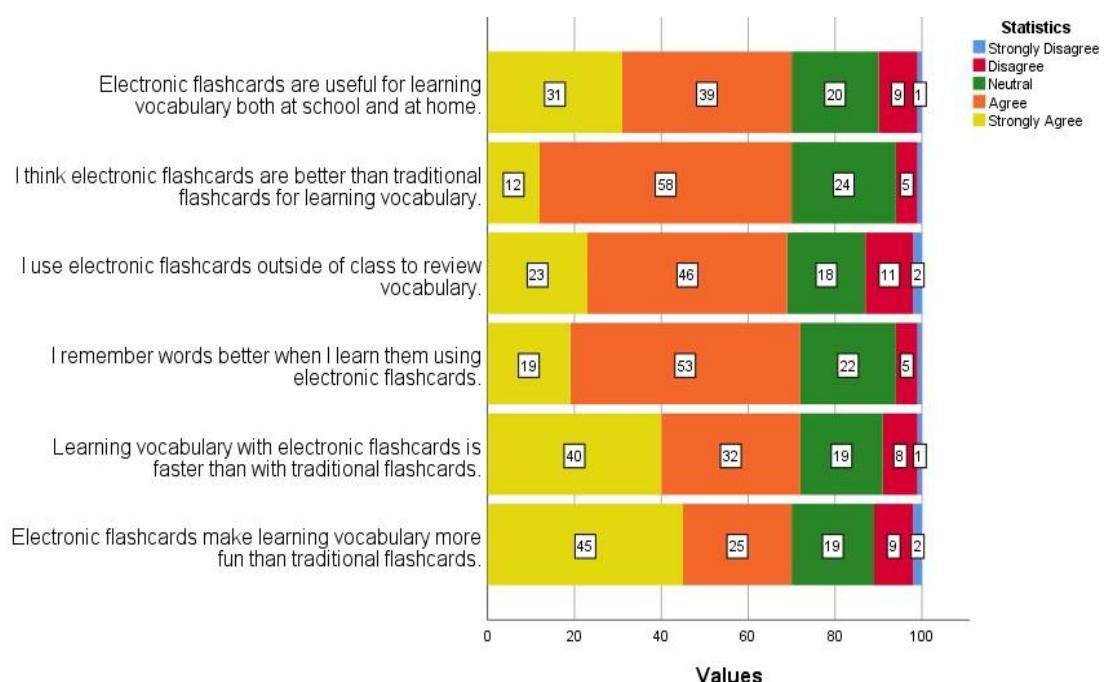
The reliability of the questionnaire and constructs related to the effectiveness of electronic flashcards in improving English vocabulary learning are shown in Table 5.

Table 5. Reliability of the questionnaire and construct

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.855	.853	6

The Cronbach's alpha value of 0.855 indicates a high level of internal consistency between the items, indicating that the questionnaire is reliable in assessing the proposed solutions. This suggests that the items measure the same underlying concepts related to the effectiveness and engagement of flashcards for fourth graders.

Furthermore, this reliability supports the validity of the questionnaire in capturing students' views on the proposed engagement levels. It ensures that the findings can provide meaningful insights into strategies to enhance vocabulary memorization for primary school students.

**Figure 1. The effectiveness of e-flashcards compared to traditional flash cards**

The majority of respondents, with 39% agreeing and 20% strongly agreeing, said that e-flashcards are useful for learning vocabulary both at school and at home. This suggests that digital tools play a supportive role in vocabulary acquisition both inside and outside the classroom.

A significant proportion of respondents,

with 58% agreeing and 24% strongly agreeing, believe that e-flashcards are better than traditional flashcards for learning vocabulary. This suggests that many students prefer digital methods over traditional methods for learning vocabulary.

A significant proportion of respondents, with 46% agreeing and 18% strongly

agreeing, use electronic flashcards outside the classroom to review vocabulary. However, 23% disagreed, stating that while many students find digital flashcards useful, others may not engage with them outside of school.

In terms of vocabulary retention, 53% agreed and 22% strongly agreed that they remembered words better when using electronic flashcards. This highlights the effectiveness of digital flashcards in supporting long-term vocabulary retention.

When it comes to learning speed, 40% agreed and 32% were neutral that learning vocabulary using electronic flashcards was faster than traditional flashcards. This shows that while a large number of students consider digital flashcards to be a more effective tool, some are still uncertain about their advantages over traditional methods.

Finally, 45% of respondents agreed and 25% were neutral, while 19% strongly agreed that electronic flashcards make learning vocabulary more fun than traditional flashcards. This indicates that digital tools contribute positively to students' engagement and interest in vocabulary learning.

3.2. Discussions

This study confirms the effectiveness of electronic flashcards in improving vocabulary acquisition among primary school students. Pre- and post-test comparisons indicate significant vocabulary recall improvement among students using electronic flashcards, aligning with previous research on their benefits of flashcards for young learners.

Student responses from the questionnaires showed a generally more positive attitude towards e-flashcards than traditional flashcards. At the same time, it highlighted the role of electronic flashcards in making learning more engaging and supporting rapid

vocabulary memorization through visual and interactive methods that traditional flashcards could not provide. E-flashcards not only aid vocabulary learning but also enhance motivation by providing a concrete approach to abstract linguistic concepts.

Beyond vocabulary acquisition, the study suggests that electronic flashcards can promote student-centered learning by replacing passive memorization with interactive engagement. This is particularly important at Hung Long 1 Primary School, where students have limited exposure to English outside the classroom due to economic constraints. Electronic Flashcards offer an adaptable and structured approach to support learning in such contexts.

However, the study has limitations. It focuses only on vocabulary acquisition, without assessing grammar, pronunciation, or long-term retention. Additionally, the research was limited to fourth-grade students and did not explore its applicability to other grade levels. Future studies should examine the broader impact of flashcards on language learning and their long-term effectiveness.

4. CONCLUSION AND SUGGESTION

4.1. Conclusion

The study confirmed that electronic flashcards significantly improved vocabulary acquisition compared to traditional flashcards in 4th graders at Hung Long 1 Primary School. The results of the pre- and post-tests showed improved vocabulary retention, as flashcards supported memorization through repeated exposure, increased interactivity, and significantly supported memory, cognitive processing, and vocabulary consolidation.

Student responses to exposure to electronic flashcards highlighted their effectiveness in making learning engaging and motivating students during vocabulary

acquisition. Their structured and repetitive nature allowed for dynamic, self-directed vocabulary review, making them more effective than rote memorization.

However, challenges remained, as some students benefited more from electronic flashcards with images and audio. Individual differences in learning suggest that combining electronic flashcards with other methods may optimize their impact.

4.2. Suggestion

Research confirms the effectiveness of flashcards, especially electronic flashcards, in improving vocabulary acquisition in primary school students and provides some recommendations for optimizing the use of electronic flashcards.

Teachers should incorporate electronic flashcards into daily vocabulary lessons and integrate them with interactive activities such as jigsaw puzzles and storytelling to enhance engagement and retention. Structured lesson plans can ensure consistent practice and prevent passive learning.

Electronic flashcards should complement or replace traditional methods of using

flashcards, as interactive features such as audio and animation can support vocabulary acquisition. Access to mobile or online applications can promote self-regulated learning outside the classroom.

Teacher training programs should provide strategies for effective use of flashcards or workshops that can help educators adapt flashcard activities including electronic flashcards to different learning styles, ensuring inclusivity.

Future research should examine the long-term effects of flashcards on vocabulary retention, as well as their effects on other language skills and the differences in retention performance between traditional and electronic flashcards.

Encouraging parent involvement by promoting electronic flashcard-based activities at home through exposure to platforms such as Quizlet, Baamboozle, and Wordwall. Schools in conjunction with English language teachers can support parents through workshops and guidance on effective vocabulary practice.

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HIỆU QUẢ CỦA FLASHCARD TRONG VIỆC NÂNG CAO VIỆC HỌC TỪ VỰNG CHO HỌC SINH LỚP 4 TRƯỜNG TIỂU HỌC HƯNG LONG 1

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Tóm tắt: Nghiên cứu này nhằm khảo sát hiệu quả của việc sử dụng flashcards trong việc học từ vựng của học sinh lớp 4 tại Trường Tiểu học Hưng Long 1. Nghiên cứu áp dụng phương pháp hỗn hợp, bao gồm bài kiểm tra từ vựng trước và sau can thiệp, bảng khảo sát và quan sát lớp học đối với 100 học sinh lớp 4 để đo lường nhận thức của học sinh, đồng thời phỏng vấn hai giáo viên tiếng Anh có kinh nghiệm. Flashcards thường được sử dụng trong một đến hai tiết học mỗi tuần (học sinh có bốn tiết tiếng Anh mỗi tuần) và được áp dụng khi giới thiệu từ mới nhằm hỗ trợ việc học từ vựng thông qua hình ảnh và ghi nhớ, giúp tăng số lượng từ vựng mà học sinh học được. Học sinh cho biết các em hứng thú hơn và ghi nhớ thông tin tốt hơn, trong khi giáo viên cũng ghi nhận hiệu quả giảng dạy được cải thiện. Mục tiêu của nghiên cứu là tìm hiểu mức độ hiệu quả của flashcards trong việc phát triển vốn từ vựng cho học sinh tiểu học, đồng thời đưa ra một số hàm ý cho việc tích hợp flashcards vào chương trình giáo dục tiểu học.

Từ khóa: công cụ giảng dạy, flashcards, flashcards điện tử, giáo dục tiểu học, học từ vựng, phương pháp hỗn hợp

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Ghi chú

Các tác giả xác nhận không có tranh chấp về lợi ích đối với bài báo này.