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Original Article

Effect of Digital Game-Based Learning Instructional Strategy on Achievement in English Vocabulary In Relation To Learning Style among Secondary School Students

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Abstract

This research investigated the effects of digital game-based learning instructional strategy on achievement in English vocabulary in relation to learning style among secondary school students.This study uses an experimental design which involves two groups; one group is taught through digital game-based learning (DGBL) instructional strategy while another group is taught through conventional method. The participants consisted of 260 students of IX grade from secondary school (CBSE), from district Amritsar,selected via random sampling. The total of 130 students from the experimental group experienced DGBL method while 130 other students from the controlled group experienced conventional method. The research instruments included an achievement test in English vocabulary (developed by investigator), 15 lesson plans based on digital game-based instructional strategy, and learning style inventory by Mishra (2012). The t-test, One-Way ANOVA, and Two-Way ANOVA analyses were used to analyze the quantitative data. The results revealed that there were achievement in English vocabulary of the group taught through digital game-based learning instructional strategy was higher than the group taught through conventional method. Further, no differences was revealed in achievement in English vocabulary with respect to learning styles. In addition, the study also revealed no interaction between digital game-based learning instructional strategy and learning styles on achievement in English vocabulary. The study supports integration of digital game-based learning in school curricula, particularly in English language instruction, to promote interactive and student-centered classrooms

Keywords: *Digital game-based instructional strategy, conventional method, English vocabulary, academic achievement, learning style.*

Introduction

English vocabulary as a second or foreign language plays an important role considering that students' English skill is depending on the total number of words they know (Rabu & Talib, 2017). English vocabulary teaching method is to help students learn the meaning of various words, so that they can communicate effectively and write in English with confidence and creativity (Baumanm et al., 2003). Over the past few years, there have been a number of developments in the approaches of teaching second languages. These modifications were made to establish an enjoyable and interactive educational atmosphere (Ibharim et al., 2015). Digital generation kids who are increasingly exposed to various computer technologies and software, gadgets and portable tools require technology-based learning methods which allow them to be actively involved in a learning environment that can improve their vocabulary success in accordance with the 21st century learning environment while also offering enjoyment and significance (Rabu & Talib, 2017). As a result, a number of novel approaches have been put forth, such as educational techniques involving digital games (Ibharim et al., 2015). Digital games that are normally considered as a form of entertainment have been proposed as one of the effective tools if they were combined with education to promote student involvement and a delightful learning experience (Prensky, 2003).In this era, technology greatly influence all aspects of life. Especially in the field of education, technology has become one of the most powerful tools of acceptance of English, and in fact, the numbers of teachers using computers and the presence of internet access in classrooms is on the rise (Hikmah, 2019; Katemba, 2019).

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Additionally, schools require educators to utilize technology proficiently during their teaching sessions (Katemba, 2020). Similarly, Shyamlee and Phil (2012) concurred that technology has been transforming language teaching methods.Digital games offer a relevant context for vocabulary study and bring fun to the classroom, digital games are an effective tool for vocabulary acquisition. According to Pomerantz and Bell (2007) suggest that employing a digital game, for instance, adds an enjoyable aspect and plays a crucial role in children's learning process. Mahali et al. (2016) consider digital games as an influential innovative means to enhance children's English learning in the knowledge age. Currently, educators and researchers have acknowledged that games can aid in the English language acquisition process. Consequently, they have begun exploring more effective methods to incorporate games into classroom settings. They evaluate the application of games in tasks associated with various subjects and lessons. Aghlara and Tamjid (2011) carried out research on how a digital computer game influences vocabulary learning among Iranian children and found that it plays a significant role and the mean scores of children in the experimental group were notably greater than those in the control group, suggesting that utilizing digital games positively influences the teaching of English vocabulary to children.There was a significant difference in the children's performance, according to Saffarian and Gorjian (2012) (i.e., children with games-based learning were better than others). The research included 418 educators of English and 111 children. Some of the children learned in class utilizing computer games, while the remaining children were taught using regular activities. Reinders (2012) stated that in the world of digital game-based language learning, acknowledging the potential of digital games in language learning as highly engaging to motivate learners. Additionally, it promotes learner-centered engagement, greater usage of the target language, and active learner participation with a positive attitude, all of which lead to increased acquisition of the target language. Mifsud et al. (2013) conducted an experimental study with a group of students to determine the effectiveness of video game use in the English language classroom. The findings indicate that the students in the experimental group (EG) achieved notable improvements in English in comparison to the students in the control group (CG). The results shows that significant differences were obtained for all the tasks, which were grammar, vocabulary and homonyms except of antonyms and synonyms. The EG and the CG started out with similar levels of ability in English, but a significant gain in performance was attained by the EG but not by the CG. Calvo-Ferrer (2017) reported that participants who studied vocabulary through game play over a brief period significantly outperformed peers who learned via conventional methods on post-test assessments. Moreover, integrating this interactive approach increased student engagement and motivation to expand their English lexicon. In a similar vein, Lukasl et al. (2020) introduced the card game U-NO-ME and found that learners acquired and recalled new terms more rapidly, exhibiting heightened enthusiasm for continued vocabulary study. Chen and Tu (2021) compared digital game-based learning with standard instructional techniques and observed superior academic outcomes among students who used educational games. Sultan (2023) further evaluated technology-driven games by contrasting experimental and control groups; the data revealed that game-supported vocabulary practice yielded substantially greater proficiency gains. Tuba (2024) examined high-school students' use of the Wordwall platform for online vocabulary exercises and documented notable improvements in English word mastery. Finally, Amzalag et al. (2024) explored the interplay between digital learning games and factors such as motivation, engagement, knowledge retention, and performance, concluding that students who supplemented traditional teaching with game-based practice achieved significantly higher results Islam et al. (2025) investigated the effect of video game playing on vocabulary learning in comparison between Gamers and Non-Gamers and incorporating games into EFL instruction might make language learning easier. Bakhsh (2025) carried out a study on the use of games for teaching vocabulary to young learners, emphasizing that instructors should take into account the time and resources when selecting or crafting a game. While games come with both benefits and drawbacks in teaching vocabulary, incorporating them allows young learners to engage with the material in an enjoyable way, facilitating easier retention of all the vocabulary.

Though each student has a unique learning style, a combination of both conventional and technological approaches can improve the effectiveness of vocabulary acquisition. Learning vocabulary by standard methods is likely tedious and uninteresting for students, particularly those who have grown up in the digital era. The Internet and the limitless resources accessible in technology might make vocabulary development for students more engaging, simple, long-lasting, and enjoyable. Due to the increasing integration of digital technologies into our daily lives, children nowadays spend more time playing digital games than their previous generations, and as a result, education is changing Fang et al., (2022). Learning style, as defined by Dunn & Dunn (2011), refers to "the manner in which each learner focuses on, processes, takes in, and remembers new and challenging information." Sopiatin and Sahrani (2011) state that "learning styles encompass the activities children find enjoyable while interacting with their classmates." Uno (2008) "suggests that learning styles are the most efficient and effective way for individuals to take in information from their surroundings." Gappi (2013) found no statistically significant relationship between academic performance and students' expectations of learning styles based on the results. Narayani (2014) examined the learning styles of higher secondary students in connection with their academic achievements. The research involved 300 participants and made use of the Barbara and Solomon Learning Styles Questionnaire (LSQ). The results indicated that there was no significant difference in academic performance between active and reflective learners. Wilkinson et al. (2014) indicated in their findings that learning styles hinder academic success and that there is no correlation between learning styles and outcomes. Ovez et al. (2016) explored how teachers design learning environments based on their personal learning styles, noting a strong connection between teachers' learning styles, students' learning styles, and students' achievements. According to Cimermanova (2018), the learning styles of students and teaching methods do not influence academic performance. Ganesen et al. (2020) found a positive correlation between students' learning styles and their achievements. Kaur et al. (2021) discovered that students instructed using multimedia strategies outperformed those taught through traditional methods. However, no significant interaction was found between multimedia use and learning styles in terms of achievement. Zenakou et al. (2023) examined Greek teenagers and found an average emotional intelligence (EI) level of 46.4%, with a higher level recorded at 53.6%. They observed that visual learning styles were more common than auditory and kinesthetic styles. Lastly, Efendi et al. (2025) observed significant differences in English vocabulary mastery between experimental and control groups, suggesting that Quizizz effectively enhances vocabulary skills, regardless of the learners' styles.

Along with the developing and changing technological tools, students' attitudes toward education and training are also changing. Students' expectations in the 21st-century classroom have changed as a result of changing economic circumstances, interpersonal relationships, and technological advancements. Today, students, who are born into technology, likely demand a learning environment in which technological tools are included in the education and training process. This generation has certain expectations for the educational system because they have grown up in a period marked by rapid technological advancement, globalization, and information availability. Students' approaches to learning and obtaining information might be shaped by the huge amount of material accessible through technology. For this group of students, technology is an essential element of their everyday life. They can expect the advantages of digital and interactive learning resources. Given that every student has unique learning needs, they can anticipate individualized learning experiences. They might seek flexible, interactive, collaborative learning environments outside of the conventional classroom setting, as well as educational materials and techniques appropriate to their learning style and speed. Students might wait for a greater emphasis on issues of diversity and cultural sensitivity in lessons and learning environments. The expectations of students in the 21st-century may be different from those of conventional teaching methods. To meet the needs of each student and the demands of our times, one must now shift from conventional teaching methods and techniques to those that incorporate numerous Internet technologies (Hatunoğlu et al., 2023). Comparing digital games to traditional methods of acquiring English vocabulary, the learning experience is enhanced; also, as gaming has become more popular, the seriousness of knowledge acquisition has been deliberately lowered, making word memorization enjoyable (Wu et al., 2020). The traditional approach is neither considered the only one to teach nor is it accepted by students as an effective strategy (Nejati et al., 2018). India's National Education Policy (NEP) 2020 has introduced major reforms and modifications to the educational landscape, emphasizing the importance of digital learning. The Digital India Campaign is revolutionizing education throughout the nation by leveraging technology.

Finally, based on the overall discussion that is presented in the background. Therefore the investigator has conducted a study entitled "Effect of Digital Game-Based learning instructional strategy on achievement in English vocabulary in relation to learning styles among secondary school students."

Objectives

1. To develop lessons based on digital game based instructional strategy for selected topics of English.
2. To develop lesson based on conventional method of teaching for selected topics of English.
3. To develop achievement test for selected topic of English vocabulary.
4. To compare the mean gain scores of achievement in English vocabulary of groups taught through digital game-based instructional strategy and conventional method.
5. To compare the mean gain scores of achievement of the students in English vocabulary with respect to learning styles (enactive, figural and verbal).
6. To study the interaction effect of instructional strategy and learning style on mean gain scores of achievement in English vocabulary.

Hypotheses

Based on the problem and objectives of the study, the following hypotheses are formulated to achieve the objectives of the study :

Ho 1: The mean gain scores of achievement in English vocabulary of groups taught through Digital Game-Based instructional strategy will be significantly higher than that of group taught through conventional method.

Ho 2: There exsists no significant difference in the mean gain scores of achievement in English vocabulary with respect to learning styles.

Ho 3: There exsists no significant interaction effect of Digital Game-Based instructional strategy and learning styles on achievement in English vocabulary.

Research Design

This study followed an experimental research (Pre-test-Post-test control group) design to examine the effect of digital game-based instructional strategy on achievement in English vocabulary in relation to learning style among secondary school students. In this design, two groups were formulated as Experimental group and Control group. Experimental group was taught through digital game-based instructional strategy, but control group was taught through conventional method. 2×3 Factorial design was used in this study to study the interaction effect of learning strategy (Digital game-based learning instructional strategy and conventional method) and Learning Styles (Enactive, Figural, and Verbal) on achievement in English vocabulary.

Sample of the Study

The study comprises a total of 260 secondary school students, equally divided into an experimental group (n=130) and a control group (n=130). Participants were randomly selected from four schools in District Amritsar, Punjab.

Tools Used

The following tools have been used in the study:

- An Achievement Test in English Vocabulary (developed by investigator).
- Learning Style Inventory by Misra (2012).
- Lesson plans based on Digital Game-Based Learning instructional strategy (developed by investigator).

Statistical Techniques Used

The data was analyzed by using Mean, SD, t-test, One-way ANOVA and Two-way ANOVA.

Result and Dicussions

Table 1:- Showing Mean Gain Scores, Standard Deviation Of Academic Achievement.

Variable	Group	Learning Styles			Total
		Enactive	Figural	Verbal	
Academic Achievement	Experimental Group	M- 16.72 SD- 2.97 N- 36	M- 16.37 SD-3.09 N- 53	M- 16.48 SD- 3.88 N-41	M- 16.63 SD- 3.31 N-130
	Control Group	M- 7.00 SD- 2.74 N-40	M-6.34 SD-2.05 N-38	M-7.38 SD-2.29 N-52	M-6.96 SD- 2.39 N-130
Total		M-11.60 SD-5.65 N-76	M-12.36 SD-5.79 N-91	M- 11.39 SD-5.48 N-93	M- 11.76 SD- 5.63 N-260

Table 2:- Showing Summary Of Analysis Of Variance (Groups × Learning Styles)

Dependent variable	Source of variation	Type III Sum of Squares	df	Mean Square	F	p value
Achievement in English vocabulary	Group(A) Instructional strategy	6006.77	1	6006.77	715.67	0
	Learning Style(B)	9.11	2	4.55	0.543	0.582
	(A×B)	17.14	2	8.57	1.02	0.362
	Error	2131.874	254	8.393		

Main Effect

Type Of Instructional Strategy (A)

The table 2 has shown that the F-ratio for the main effect of type of instructional strategy is 715.67 which is significant as $p<.05$.

Further, Table 1 also reveals that the mean gain scores of experimental groups taught through Digital Game-Based instructional strategy and control group taught through conventional strategy are 16.63 and 6.96 respectively. It indicates that the academic achievement of students taught through digital game-based instructional strategy (EG) is higher than academic achievement of students taught through conventional strategy (CG).

Learning Styles (B)

The table 2 has shown that the F-ratio for the main effect of learning styles on achievement in English vocabulary is 0.543, which is insignificant. This indicates that students with different learning styles do not differ in academic achievement in English vocabulary.

Interaction Effect

The table 2 has shown that the F-ratio for the interaction between type of instructional strategies and learning styles is 1.02, which is insignificant. The insignificant interaction is indicative of the fact that academic achievement in English vocabulary is independent with respect to the type of instructional strategy and learning styles.

Discussion

The main purpose of this study was to explore the effect of Digital Game-Based learning instructional strategy on academic achievement in English vocabulary in relation to learning styles among secondary school students, particularly when compared with conventional instructional methods. This supports the growing body of research advocating for technology-integrated, student-centered learning environments in English language education. The study highlights the pedagogical potential

of platforms like WordHippo, Knoword, Quizizz, and Nearpod in transforming passive vocabulary memorization into active, engaging learning.

Our findings are clear: students in the experimental group, who engaged with DGBLIS activities, achieved significantly higher mean vocabulary scores than their peers in the control group. This aligns with Saffarian and Gorjian's (2012) observations that game-based learners outperform their conventionally taught counterparts, and with Aghlara and Tamjid's (2011) conclusion that digital games boost long-term word retention. By focusing specifically on secondary students in India, this study confirms the broader applicability of those earlier results within our national context.

Contrary to some expectations, preferred learning style did not influence performance. Visual, auditory, and kinesthetic learners all benefited equally from the game-based approach. These results corroborate Gappi's (2013) and Narayani's (2014) findings of no significant link between learning-style preference and academic achievement, as well as Cimermanova's (2018) assertion that instructional method and learning style operate independently. A two-way ANOVA further confirmed that neither modality preference nor its interaction with DGBLIS produced any statistically significant effect on vocabulary outcomes—a result echoed by Efendi et al. (2025), who reported uniform gains across all learner types using the Quizizz platform.

Taken together, these insights support a shift toward technology-enhanced, student-centered instruction that India's NEP 2020 has expressly recommended. Rather than occasional "gamified" exercises, educators might embed interactive platforms such as WordHippo and Knoword throughout their English curricula, ensuring vocabulary practice remains engaging and rigorous. By adopting DGBLIS universally—regardless of individual learning styles—teachers can address common challenges like disengagement and vocabulary attrition, while promoting equitable outcomes across diverse classrooms.

Conclusions

The results of the study clearly indicate that digital game-based instructional strategies are more effective than traditional methods in teaching English vocabulary at the secondary school level. Additionally, the effectiveness of these strategies appears to be independent of students' preferred learning styles, making them suitable for diverse classroom environments. There was no interaction effect found between instructional strategy and learning style, which means that digital games work effectively regardless of how students prefer to learn. Thus, digital game-based instruction emerges as a flexible, inclusive, and efficient approach to vocabulary teaching, with the potential to be integrated into mainstream curriculum design without the need for differentiated instruction based on learning styles.

Based on the results of the present study, the teachers are recommended to adopt digital game-based tools like WordHippo, Knoword, Quizizz, and Nearpod to enhance vocabulary acquisition, particularly in language learning environments that require high engagement. Since learning style differences did not impact the effectiveness of digital strategies, educators can apply such strategies across diverse groups of learners without needing to tailor content to individual preferences.The study supports integration of digital game-based learning in school curricula, particularly in English language instruction, to promote interactive and student-centered classrooms.It is essential to include training on digital tools and game-based pedagogy in teacher education programs to equip teachers with modern strategies for effective vocabulary instruction, like using operating digital devices (laptop, tablets, smartboards), educational apps and platform (Kahoot, Quizizz, WordHippo, Knoword), demo session on using digital vocabulary games.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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