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Impact of Graphic Illustrations on English Vocabulary Acquisition in Pakistani Dyslexic Students

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Abstract

This study investigates the impact of graphic illustrations on short and long-term vocabulary acquisition among Pakistani students with and without dyslexia. The sample consisted of 20 seventh-grade students from a government-sponsored school, including 13 identified as dyslexic and seven as non-dyslexic. A mixed factorial design was employed, incorporating three experimental conditions: text-only, image-only, and a combined text-image format. Challenging vocabulary items, aligned with the Standard English curriculum, were presented using these formats to assess recognition performance. Results indicated that graphic illustrations significantly enhanced vocabulary retention in both groups, with the combined condition yielding the highest improvement. The findings offer important implications for inclusive instructional design and classroom strategies targeting learners with dyslexia. The study concludes that integrating text with image-based metaphors is an effective pedagogical approach for vocabulary development, particularly in students with reading difficulties.

Keywords: graphic illustrations, dyslexia, vocabulary acquisition, multimedia learning, mixed factorial design, inclusive education

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Introduction

Religious Vocabulary acquisition is a foundational aspect of language learning, particularly for second language learners. A robust vocabulary enhances comprehension, fluency, and communicative competence (Coady & Huckin, 1997). Learners who develop strong vocabulary knowledge are better equipped to grasp complex concepts and engage effectively in academic discourse (Boers et al., 2006; Schmitt, 2000). Conversely, limited vocabulary often impedes communication and learning outcomes (Cooper, 1999). This highlights the need for effective vocabulary teaching strategies that cater to diverse learner needs.

One group that requires particular attention in vocabulary instruction is students with dyslexia. Dyslexia is a neurodevelopmental condition that affects reading and language processing while leaving general intelligence intact. It is estimated to affect 5–10% of the population and is characterised by difficulties in recognising words, decoding symbols, and processing phonological information (Peterson, Pennington, & Olson, 2013). These challenges often extend to vocabulary learning, where students with dyslexia may struggle to retain and recall new words. Although dyslexia is widely recognised in many educational systems, it remains largely misunderstood or neglected in Pakistan. There is a significant gap in public awareness, teacher training, and institutional support, leaving many dyslexic learners without the necessary accommodations.

Recent research suggests that students with dyslexia benefit from multimodal learning environments that incorporate visual and interactive elements (Everatt et al., 2009; Snowling, 2000). The Cognitive Theory of Multimedia Learning (CTML) proposed by Mayer (2009) supports this approach, arguing that the integration of text and relevant visuals enhances learning by engaging both verbal and visual processing channels. In this context, graphic illustrations—images that accompany or enhance textual information—can serve as powerful tools for vocabulary instruction. They help students create mental associations between words and meanings, making the learning process more intuitive and memorable.

Graphic novels, which combine visual storytelling with textual narratives, are particularly well-suited for this purpose. Far from being mere entertainment, graphic novels are increasingly recognized as legitimate educational tools that support literacy development and content learning (White, 2004; Frey, 2010). These texts allow learners to engage with complex themes through a combination of images and words, thus scaffolding comprehension. Cary (2004) and Webster (2002) emphasise that graphic novels provide alternative pathways for

learners to connect literature with real-world experiences, while Holman and Harmon (1992) describe the genre as a dynamic and flexible medium for conveying knowledge.

Several studies have highlighted the potential of visual tools in supporting students with learning difficulties. Tariq and Latif (2016) found that multimedia tools involving various senses can improve reading comprehension and retention in dyslexic learners. Similarly, Anjum and Mansoor (2020) demonstrated the effectiveness of computer-assisted reading materials in enhancing English language learning for dyslexic students in Pakistani schools. Patrick et al. (2019) also noted that visual metaphors help convey abstract scientific concepts more effectively, regardless of students' reading levels.

Given the cognitive challenges associated with dyslexia, such as slower processing speed and difficulties in phonological decoding, visual attention training and graphic aids can be particularly beneficial. Visual metaphors and illustrations not only facilitate comprehension but also engage the learner's attention for longer durations, aiding in long-term retention (Pluchino, Tornotora, & Mason, 2013). These strategies align with findings that students with dyslexia often possess stronger visual-spatial skills compared to their verbal abilities (Davis & Bowers, 2006; Tafti, Hameedy, & Baghal, 2009). Thus, leveraging these strengths through graphic-based instruction can provide more equitable learning opportunities.

Despite international advancements, Pakistan continues to lack awareness and infrastructure for dyslexia support. Many educators remain uninformed, and special education services are either inaccessible or unaffordable for most families. The recent passage of the "Dyslexia Special Measures Act" (2020) is a welcome development that mandates screening, specialized instruction, and institutional accommodations for dyslexic learners. However, practical implementation remains limited. Raising awareness and integrating evidence based.

This study addresses a critical gap in Pakistani educational research by examining the impact of graphic illustrations on vocabulary retention among students with and without dyslexia. It seeks to determine whether the inclusion of images alongside text enhances short- and longterm memory of vocabulary items, especially for learners who face reading difficulties. The vocabulary selected for this study was drawn from standard curriculum units and included complex or unfamiliar words appropriate for the grade level (e.g., 'gigantic,' 'superstitions,' 'avalanches'). These words were presented in three formats: text-only, image-only, and combined text-image.

By exploring the comparative effectiveness of these formats, the study aims to offer practical insights into inclusive vocabulary instruction. It also contributes to the broader understanding of how visual stimuli affect memory and learning in dyslexic and non-dyslexic

students alike. While previous studies have focused on college-level learners or general reading comprehension, this research targets primary-level students and emphasizes vocabulary development, a crucial but often overlooked skill area in dyslexia intervention. The research investigates whether graphic illustrations can bridge the learning gap for dyslexic students in vocabulary acquisition. By doing so, it aims to inform teaching strategies that are both inclusive and effective, ultimately contributing to a more supportive educational environment in Pakistan.

Research Questions

1. Do graphic illustrations influence recognition rate or memory?
2. Do graphic novel elements improve the short and long-term memory of students having dyslexia in Pakistan?

Theoretical Framework

This study is grounded in the Cognitive Theory of Multimedia Learning (CTML), proposed by Mayer (2009). The theory posits that individuals learn more effectively when information is presented through both verbal and visual channels, rather than through verbal text alone. According to Mayer, meaningful multimedia learning involves five core steps: selecting relevant words from the material, identifying corresponding images, constructing a coherent verbal representation, building a corresponding visual representation, and integrating both forms of information with prior knowledge. This dual-channel processing facilitates deeper understanding and better retention, particularly for learners who struggle with purely textual content.

The CTML framework has informed the design of numerous educational interventions, including computer-assisted reading tools. For example, Anjum and Mansoor (2020) highlight how the application of CTML principles in localised digital reading materials has proven effective in supporting Pakistani students with dyslexia. Their findings reinforce Mayer's argument that combining text and visuals can significantly enhance comprehension and learning outcomes.

To further support this framework, the study also draws on the work of Eitel et al. (2013), who examined the specific effects of pairing text with images in the context of understanding complex logical models. Their research demonstrated that while text is more effective for conveying general concepts, images play a crucial role in communicating structural information. In cases where the text was ambiguous or complex, the presence of accompanying images led to better comprehension. Participants who viewed the image before reading the

associated text also required less time to process the structural content, indicating that visuals can serve as cognitive scaffolds that ease textual decoding and conceptual integration.

However, it is important to acknowledge that the effectiveness of illustrations is not universally guaranteed. Several studies have shown that learner characteristics and illustration types may mediate the impact of visual aids. For instance, Jian (2020), Jian and Ko (2017), and Reid and Beveridge (1986) found that illustrations often benefit high-ability students more than low-ability ones. Similarly, McTigue (2009) reported that while illustrations improved comprehension of life science texts, they had limited effect on understanding physical science content. Mason, Pluchino, and colleagues (2013) further demonstrated that students who were provided with clearly marked illustrations in textbooks performed better on recall tasks compared to those who received either no illustrations or unlabeled images.

Taken together, these theories and findings support the premise that multimedia learning, particularly the integration of text with meaningful illustrations, can enhance cognitive processing and retention of academic content. This theoretical foundation is particularly relevant for students with dyslexia, who often experience difficulties in phonological decoding and textual comprehension but may benefit from visual-spatial learning strategies. Thus, this framework underpins the present study's exploration of whether graphic illustrations can improve vocabulary recognition and memory in dyslexic and non-dyslexic learners alike.

Research Methodology

This study adopted a quasi-experimental, mixed factorial design to evaluate the impact of graphic illustrations on vocabulary retention among dyslexic and non-dyslexic students. The design included three stimulus conditions, text-only, image-only, and combined text-image, tested across short-term and long-term retention intervals.

Participants and Sampling

The study was conducted in a government-administered girls' school in Punjab, Pakistan. From a pool of 100 seventh-grade students, 70 volunteered to participate after being informed about the research purpose. All participants were screened using a 15-item dyslexia checklist, administered with prior written consent from class in-charges and the school principal.

Thirteen students scoring ≥8 was identified as dyslexic (18.5%). An additional seven students without dyslexia, but with average or below-average academic performance (as

reported by teachers), were purposively selected for comparison. The final sample included 20 female students aged 11–13 years (M = 11.27, SD = 0.31), grouped into dyslexic (n = 13) and non-dyslexic (n = 7) cohorts.

Stimulus Development

Eleven vocabulary words were selected from Chapter 13 ("Inventions and Discoveries") of the Grade 7 Punjab English textbook. These words were chosen due to their complexity and unfamiliarity to the target population. The selected words included: global village, superstition, aero plane inventor, entertainment, Mr. Martin Cooper, gigantic, avalanches, normalcy, rubble, terrain, and rehabilitate.

Each word was presented in three stimulus formats: (1) text-only (word with definition), (2) image-only (word with a symbolic graphic), and (3) combined (word with both definition and metaphorical image).

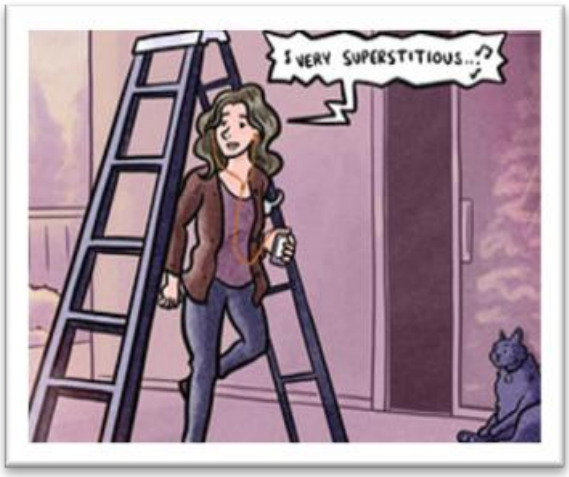

Figure 1 (Stimulus type): *Image-only version of the word "superstition."*

- **Superstition:**
- ***To belief that particular events happen in a way that cannot be explained by reason or science; the belief that particular events bring good or bad luck***
- ***According to superstition, that black cats are considered common companions of witches and bringers of misfortune if they happened to cross your path.***

Figure 2 (Stimulus type): *Definition Only version of the word "superstition"*

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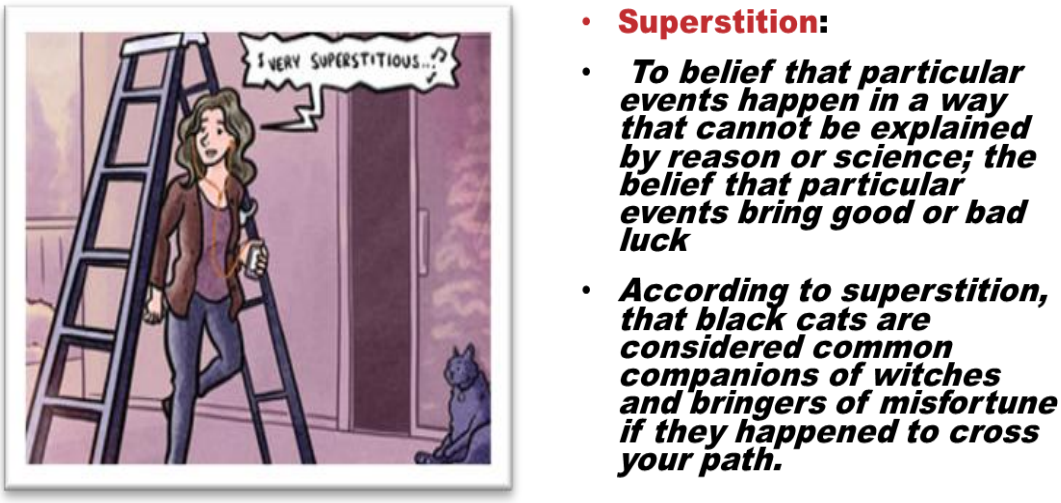

Figure 3: *Combined (Image + Definition) version of the word "superstition."*

Example multiple-choice item:

Superstition

a. To behave
b. To beat
c. To break
d. To believe

Figures 1–3 illustrate the vocabulary item superstition as it was presented to students in each of the three experimental conditions. Figure one shows the image-only format, where a symbolic graphic was displayed without textual explanation. Figure two represents the definition-only format, where students were presented with a written definition but no visual aid. Figure three displays the combined format, which included both a definition and a corresponding metaphorical image. These formats were used to evaluate the influence of graphic illustrations, verbal descriptions, and their integration on vocabulary recognition and retention in dyslexic and non-dyslexic learners.

All stimuli were created using carefully selected, copyright-compliant images sourced from open-access platforms such as Google Images under educational fair use. The vocabulary items were compiled and presented to students through PowerPoint slides during the classroom-based intervention sessions. Visual consistency was maintained across slides to minimise distraction, ensuring that only the intended variable, stimulus format, was altered across conditions.

Procedure

The study was divided into three phases: stimulus exposure, short-term testing, and long-term testing.

- **Stimulus Phase:** Each participant was randomly assigned to one of the three stimulus conditions and shown 11 vocabulary items accordingly. Exposure lasted approximately 30 minutes, with ~3 minutes allocated per word.
- **Short-Term Retention Test:** immediately after exposure): A multiple choice vocabulary test comprising 22 items (11 taught and 11 novel distractors from the same textbook unit) was administered. Each item included four answer options assessing recognition and understanding.
- **Long-Term Retention Test (Day 30):** After one month, participants were re-tested using the same 22-item MCQ to assess long-term retention without any re-exposure to the stimuli.

Instructions during both tests were standardized and read aloud by the researcher, for instance, “you will now answer some vocabulary questions. Try to remember what was shown earlier and select the most accurate answer.”

Data Collection and Materials

The vocabulary recognition test was designed to measure both short- and long-term memory. Each MCQ item presented a word with four options (not simple synonyms), requiring semantic understanding. Half of the test items were previously seen (stimulus words), and half were unseen distractors.

Stimuli and test materials were administered using the researcher’s laptop, due to technological limitations at the school. All data were collected during regular school hours, and assessments were conducted in the presence of the class in-charge.

Data Analysis Techniques

Testing Material

In this study, the English subject Punjab textbook board was used as the testing source. The testing material consists of MCQ questions that are designed to assess the memory of students. These questions are not synonyms of the vocabulary items, but rather words that

resemble the vocabulary words to test if students can understand and identify the correct answer given to them during the stimulus study phase as shown in figures 1-3.

Regarding the time taken during the test, in the short interval condition, there are 30 minutes allocated for both the study stimulus and the test. This means that students have 30 minutes to study the material and then another 30 minutes to complete the test. On the other hand, in the long retention intervals, only the test is conducted, and students have 30 minutes to complete it. This allows researchers to assess the students' memory recall without the influence of recent study stimulus.

Furthermore, the test detection of vocabulary words and functions through short and long retention phase, 22 pieces were created, half of which contained formerly studied arrangements (e.g., previously studied vocabulary words from the unique set of stimuli) and partial of which contained arrangements that had not been examined before (e.g., 'original' vocabulary words that were dissimilar from the initial stimuli). Every piece contained the designation of a vocabulary term as well as four alternative answers for the proper response (e.g., multiple-choice questions).

Ethical Considerations

Informed consent was obtained from the school principal and classroom teachers. Students participated voluntarily and were informed that their responses would remain confidential. No identifying information was recorded. The study adhered to ethical research standards for working

Results

The recognition percentage of vocabulary items was calculated by subtracting incorrect identifications ("false alarms") from correct recognitions ("hits") and dividing the result by the total number of target vocabulary words (11). Recognition was assessed for both the name and function of each vocabulary item. These scores were expressed as percentages to provide a standardised comparison across conditions. Data analysis was performed using SPSS, focusing on both group and condition-level differences.

To examine the effect of different stimulus types and retention intervals on vocabulary recognition, a paired samples t-test was conducted. This parametric test was used to compare the mean scores from related observations, such as performance under different stimulus conditions within the same group of participants. Additionally, ANOVA tests were used to

explore interaction effects involving stimulus type, dyslexia status, and retention duration. Statistical significance was determined using a 95% confidence interval, with p-values less than .05 considered significant.

Table 1: *Recognition rates by stimulus condition, retention phase, and dyslexia status*

Stimulus Type	Retention Stage	Dyslexic (M, SD)	Non-Dyslexic (M, SD)	t(df)	P(sig)
Only Definition	Short phase	31.50 (6.364)	24.00 (12.728)	1.667 (1)	0.344
	Long phase	14.50 (4.950)	24.00 (9.899)	-0.905 (1)	0.532
Only Image	Short phase	43.50 (0.707)	14.00 (1.414)	59.00 (1)	0.011
	Long phase	40.50 (0.707)	16.00 (2.828)	9.800 (1)	0.065
Combined	Short Phase	75.67 (1.528)	42.33 (1.528)	37.796 (2)	0.001*
	Long Phase	43.00 (1.000)	73.33 (3.512)	-20.877 (2)	0.002*

* $p < .05$ indicates statistically significant differences.

Vocabulary Recognition Based on Stimulus Type

Kinds of stimuli (definitions, images, combined) had an important impact on the identification rate of vocabulary items: F(1, 44) = 4.06, p = .048. After a follow-up pair-t test, a combined condition had a 13% better recognizing rate than a simple illustration state (Mean = 60.11, Std. Deviation = 17.32), p = .04, and a 20% more recognizing rate than a simple definition condition (Mean = 37.10, Std. Deviation = 10.78), p = .01, without any differences between the simple definition and the simple illustration condition, p=.46. Furthermore, because the contact between stimuli and remembering intervals is not important, the benefit of recognizing combinations of conditions appears after the two retention intervals of stimuli and other stimuli ($F < 1$).

Children in combination stimuli (Mean =81.06; Std. Deviation = 22.11) identified a 20.33 % greater name of vocabulary words than students in the only definition (Mean = 51.77; Std. Deviation = 23.28) Once a short-term of time, t(13)= -1.66, p =.016; d= 1.02. Similarly, on long-term retention stage, combined stimuli (Mean = 48.19, Std. Deviation = 20.41) recognized

21.43% more vocabulary item names than only definition students (Mean = 27.70, Std. Deviation = 14.53), t(13)=1.72, p=.06.

As shown in Table 1, no changes in recognition rate of vocabulary items as a purpose of stimuli kind were observed in children without dyslexia in the short-term interval, p > 0.12. Though, in the long-term retention gap, students under study in the combined state demonstrated a slightly meaningful detection advantage of 24.17% for the words of vocabulary items (M = 51.57, SD = 16.88) above those in the only definitions state (Mean = 20.40, Std. Deviation = 12.81), t(7) = 1.54, p =.09. There were no significant changes in vocabulary items name identification between them in combined and images only state (Mean = 30.20, Std. Deviation = 11.40), t (7) =.03, p =.13, or among the definitions only and images only states, t (6) =.59, p= .19.

Short-Term vs. Long-Term Retention Effects

Generally, members vocabulary item recognition rates decreased by 20.19% after the short (M = 60.22, SD = 19.29) to the long-retention interval (M = 37.82, SD = 16.21), F (1, 44) = 26.18, p.003. The main effect of retention interval was qualified, however, by a significant two-way interaction between retention interval and presence of dyslexia on recognition rates, F (1, 44) =10.20, p=.008. Following-up paired sample t-tests revealed a significant decrease of 34.16% in recognition speed from the short (M = 71.88, SD = 19.35) to the long interval (M = 65.44, SD = 41.00), t (19) = 3.014, p.002, d = 1.10. The Cohen's d effect size value of 1.10 for this comparison indicated that the decrease in recognition rates between the short and long retention intervals for children with dyslexia was highly practical. The 6.43% decrease in recognition rates from the short (M = 66.57, SD = 32.22) to the long interval (M = 41.08, SD = 16.45) phase was not important for the children without dyslexia, t (7) = -1.24, p =.22, d =.33.

Interaction between Dyslexia, Stimulus Type, and Retention Interval

There was no important three-way contact between remembering phase, dyslexia, and kind of stimuli on vocabulary words recognition rates. F (2, 42) = 2.43, p= .32, indicating that the type of stimuli had no effect on the two-way contact between retention interval and dyslexia. Once the short retention stage, the student with dyslexia demonstrated a 46.90% recognition advantage of vocabulary names in the combined condition (M = 89.05, SD = 2.42) over the definitions only state (M = 47.80, SD = 20.01), t (16) = 4.07, p=.005, d = 3.18, with a slightly important benefit (20.81%) of the combined above the images only state (M = 66.45, SD = 22.

Furthermore, the images only condition had no recognition benefit over the definitions only condition, t (17) =-2.02, p=.48, d =.84.

As shown in Table 1, no changes in recognition rate of vocabulary items as a purpose of stimuli kind were observed in children without dyslexia after the short interval, ps >.12. However, after the long retention interval, participants in the combined condition demonstrated a marginally significant recognition benefit of 24.17% for the names of vocabulary items (M = 51.57, SD = 16.88) over those in the definitions only condition (M = 20.40, SD = 12.81), t (7) = 1.54, p =.10, d = 1.06. There were no important changes in vocabulary items name recognition between the combined and images only conditions (M = 30.20, SD = 11.40), t (7) =.03, p =.13, d =.51, or between the definitions and images only conditions, t (6) =.59, p= .19, d= .40.

The statistical analysis indicates that combining text and image significantly improves vocabulary recognition, particularly for dyslexic learners. This means that if students study illustrative materials such as word images (pictorial representations) paired with definitions or explanations related to that material (text), they will be better able to learn. These results support the use of dual-coded educational materials in inclusive classrooms and align with the cognitive theory of multimedia learning.

Findings and Discussion

The main aim of the study was to explore whether the memory of vocabulary elements and their use of students' words (with and without dyslexia) differ depending on the manner in which stimuli are presented (e.g., definition of an illustration, metaphor for the combination of the two formats) and retention phases. To summarize, students with dyslexia who use combined stimuli (definition and figurative graphics) are much more likely to correctly recognize vocabulary elements and functions than those who use only definitions. This benefit in recognizing the names of vocabulary items and their use associated with new graphical stimuli occurred both in the short and long retention phases of students with dyslexia. However, students who did not have dyslexia who were examined with mixed stimuli only showed a slightly important recognition of the advantages of vocabulary item names and uses, unlike those defined conditions, only after a long retention phase. The benefits of long-term memory of common stimulation are almost identical to those of other simulative conditions, but the size of the effect on vocabulary and vocabulary use is well formulated, indicating the relevance of these long-term memory for students with dyslexia.

The complete data show that combined stimuli (e.g., vocabulary items associated with definitions and symbolic images) give the highest rate of recognition of vocabulary items and use in both groups of children. These data support visual metaphor assumptions in graphic novel concepts (such as Aleixo and Suman 2017; Hosler and Baram 2011) and additional illustrations (such as Mason, Tolans, and Pulsonic 2013). Previous reports have shown how real graphic novels interact with scientific texts (such as Alix and Samner in 2017 and Hosler and Boomer in 2011), but these studies have focused on university students with recognized learning disabilities that impede the completion of graphic novels.

As the study does not use complete graphics novels, the results of the study support research focusing on the use of illustrations linked to dictionary built separately (e.g. Mason, Pluchino and Tonatora 2013; Mason, Tornatora and Tonatora 2013). However, the data show that meaningful images can improve understanding of scientific content even at the fifth grade (Mason, Pulchino and Tonarala 2013; Mason, Tonarala and Tonarala 2013). The same method has also been widely used in basic and small-scale education methods (such as Lapp and others). 2012, Meier 2012), and knowledge that stimulates based on graphical types helps these learning-disabled children to further understand the entire graphical novel.

Despite the effect of graphics novel stimulation on all students, there have been significant changes in the memory abilities of students who have or do not have dyslexia. In addition, students with dyslexia are contacted by a single stimuli type and have a recognition benefit of 30.8% compared to children who are referred to only by definition of the stimuli type and an advantage of 26.2% compared to children who are referred to only by illustration. This helpful result of contact with a combined stimulus partially supports the acid hypothesis, but there is no similar effect in the long-term recognition of vocabulary words, possibly because the standard deviation between the number of measurements (e.g., 48.03%) may mask a 19.1% more effective combination recognition rate than only defined conditions. In addition, contact with vocabulary items in graphic novels improved the ability to perceive long-term concepts, comparable to short-term ones, but the main changes after long memory intervals prevented me from judging, with statistically significant differences. This change in correct responses is due to the high frequency of false alarms under this condition, as the stimulation relationship after a long period of preservation is not comparable. In short, students with dyslexia experienced memory benefits during both memory phases when combined stimulations occurred.

As far as vocabulary word recognition is concerned, memory is more difficult than simply recognition of vocabulary names, except for the memory advantages of children with dyslexia, which are more difficult. As with the results of the structural recognition tasks, the

retention intervals fell and all students under combined stimulation showed a significant improvement in the memory of vocabulary words than children exposed only to definitions. The short retention interval (42.35%) and the long retention interval (12.60%) for vocabulary words are more valuable than the memory benefits of exposure to graphic novels. In addition, students with dyslexia benefit from the combination of stimuli, and this result can be observed in a short period of retention due to the speed of cognition of vocabulary words.

Despite the reduction in short- and long-term memory of vocabulary, combined conditions have longer memory than the other two stimulation conditions and children have higher memory after longer retention. In particular, the combined condition of children with dyslexia showed almost 10% improvement in vocabulary memory in a long-term phase associated with definitions and only illustration. The results of this study are consistent with those of Alixo and Sumner (2017), Hosler and Boomer (2011), Mason, Tornatora (2013) and Pluchino (2013), which created an advantage commemorative advantage by revealing to illustrate novelization before the constituents of scientific content. Both previous studies showed behavioral improvements in the implementation of complete graphic novels, but the two subsequent reports (Mason, Pluchinnom, and Tornatora 2013; Mason, Tornatora and Pluchino 2013) showed that long-term eye contact with meaningful illustrations increased the focus of fourth and sixth graders to better remember the scientific content. Future research should include visual attention measurements using eye tracking and eye contact. Karp (2011) also points out that illustrated novels are more involved in educational environments than criterion texts. Therefore, future research may also assess the ease, involvement, and interest in different types of educational stimuli and determine whether there is a relationship between individual preferences for learning resources and their importance in memory recognition.

Several researchers have long examined the signs provided by new art to children with picture books. When illustrations and vocabulary objects are combined, a contract should be concluded between images, texts and learners. Croce, Martens, Martens and Maderazo (2009) observed three-year-old children in a classroom who studied art symbols in picture books and discovered that they had better understand the order of texts (they influenced picture books as a term, picture books). In addition, Strasser and Seplocha (2007) found that when images and words are combined in the image book, young readers learn the meaning of a rich and deep vocabulary. As in the case of illustrations, artworks interleave with writing to help young learners (Sipe 2008) and those who struggle with unfamiliar content (Moss 2008) understand the text, and researchers propose linking illustrations, page arrangements, and text to the graphic novel to support complex thinking and stimulate new understanding.

Despite the positive findings, this study has a few limitations that must be acknowledged. First, the relatively small sample size may limit the generalisability of the results, although the observed effect sizes were large and statistically meaningful. Second, the stimuli were delivered digitally via PowerPoint presentations, which may have affected engagement levels compared to tactile or printed materials. Additionally, participants' exposure to external reading materials beyond classroom sessions could not be fully controlled, potentially influencing long-term retention outcomes. Lastly, all illustrations were sourced from publicly available Google images, raising questions about visual consistency and cultural appropriateness.

Given these limitations, the findings should be interpreted with caution. Nevertheless, the study highlights the pedagogical value of integrating graphic illustrations with vocabulary instruction, particularly for learners with dyslexia. The researchers recommend that government schools in Pakistan incorporate such visual tools into English language curricula to support students with reading difficulties. Increasing awareness about the benefits of graphic-based learning and providing accessible instructional resources could play a critical role in improving vocabulary acquisition and overall literacy development in inclusive classroom settings.

Conclusion

Graphic novels are increasingly popular in educational environments because they help visual learners (Brozo, Moorman and Meyer 2013; Murakami and Bryce 2009), motivate set-and-fighters (Schwarz 2002), develop advanced logical thinking skills (Miller 2005), address students in other reading styles (Seelow 2010), and create a rich environment for adding appreciation to textbooks (Brenna 2013). In addition to these benefits, graphic novels can also be used creatively for other purposes, such as vocabulary teaching.

The current study investigates the effectiveness of graphic novels in teaching vocabulary. The results show that graphic novels, combined with illustrations and textbooks in a plot, are more effective than traditional teaching conditioning. The two ways of using graphic novels can help learners to build a strong link between the illustrations and the topological words of the textbook. In the context of educational criticism, current research indicates the importance of presenting new vocabulary to alternative language learners in various ways. In order to improve the efficiency of vocabulary literacy, the vocabulary must be presented in more than one way, and the topological words used in the graphic novel of the current study.

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As a result, the findings of this study support the use of graphics-based novel methods to restore attention, comprehension of reading, memory and basic comprehension of vocabulary materials. Furthermore, the findings of the study suggest that graphic novel components, especially in their expanded use in secondary schools, have potential as educational exit points for teaching problematic materials to children who have or have not studied disorders such as dyslexia.

As the Pakistani Dyslexia Act is being enacted, teachers working in government institutions should use graphic novels as teaching methods to help students learn difficult words and concepts. The present answer also suggests that visual novelization (or components of graphic narratives) can be particularly useful in educating material on subjects such as science (e.g., rehabilitation, avalanches and volcanoes), where the material is very difficult to incorporate into the contact of problematic new vocabulary words.

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