Effect of Text Methods, Visual Representation, and Learning Combination on the Learners Ability to Retain Information

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ABSTRACT

This study explored differences of the learner's ability to retain information across three learning preferences: text-only, visual, and combined. Forty-five undergraduate students aged 18–24 from various departments were randomly assigned to these groups. PowerPoint slides with text, images, and assessment sheets were used to measure responses in a true experimental design with a between-subjects approach. Statistical analysis, including mean, standard deviation, Shapiro-Wilk test for normality, and Kruskal-Walli's analysis, found no significant differences in the ability to retain information among the groups (χ^2 (1) = 3.02, p = 0.221, η^2 = 0.0686). These findings suggest that the mode of content delivery—whether text-only, visual, or combined—does not significantly affect the learner's ability to retain information, with learning preferences accounting for only a small variance. This study underscores the need for flexible teaching methods to address diverse learning needs. The limited sample size and the potential influence of uncontrolled factors may restrict the generalizability of its findings. Future research should implement stricter controls to enhance the reliability and validity of the conclusions.

Keywords: Learning preferences, memory retention, text representation, visual presentation, true experimental research design, between- subject design

INTRODUCTION

Academic performance mainly depends on our capacity for learning and memory of facts. Nonetheless, learners approach education differently depending on cognitive techniques and personal preferences (Barsalote et al., 2023). Textual and visual learning strategies have been very popular among students to efficiently acquire knowledge in the modern age of rapid information flow (Shuvankar Madhu & Bhattacharyya, 2023). This variety in learning preferences emphasizes the requirement of customized pedagogical interventions, mainly since student retention is still a significant concern for educational institutions (Hani Brdesee et al., 2022). Retention in the context of education is the capacity of a student to absorb, evaluate, and remember knowledge gained throughout instruction (Udu et al., 2022). It entails realizing how a given stimulus relates to a related event, item, or action (Kaneko et al., 2019). Whether in short-term or long-term memory, retention capacity—vital for the efficient recall or recognition of knowledge—is the capacity to keep information over time. Essential for education, learning retention helps students understand and apply knowledge acquired inside and outside the classroom (Valderrama & Oligo, 2021).

The impact of learning preferences on student outcomes has attracted great interest in educational research. Students' academic performance and degree of learning involvement are much affected by how they interact with and understand knowledge. Although some visual learners succeed with conventional text-based resources, others usually gain from tools such as graphs, films, and charts. They enhance memory and knowledge application by matching teaching approaches to individuals' chosen learning styles (Udu et al., 2021). Developing students' talents and maximizing their capabilities in a fast-evolving educational environment depends on an awareness of their preferences as teaching strategies and learning techniques have evolved over generations (Barsalote et al., 2023). While still necessary for improving understanding and critical thinking skills, the growing use of information and communication technology in education balances traditional text-based courses. However, the effectiveness of text-based learning relies on several factors, including previous

knowledge, working memory capacity, and reading skills (Désiron et al., 2021).

Additionally, a famous concept by George Miller in 1956 states that a person's short-term memory can store around seven (plus or minus two). Known as Miller's Law, this idea highlights the limits of working memory and the need for chunking to improve its capacity. Jacobs (1887), as referenced in McLeod (2023), backed Miller's conclusions with the digit span test, showing that people remember digits (average 9.3) more efficiently than letters (average 7.3), presumably because of the item complexity. Furthermore, chunking, the technique of organizing individual bits of information into more important, meaningful chunks, significantly increased the appropriate capacity of short-term memory. Usually restricted to 15 to 30 seconds, short-term memory only extends with practice. Reflecting the fleeting character of short-term memory, Peterson and Peterson (1959), as quoted in McLeod (2023), showed that recall drastically falls as the time between encoding and retrieval increases. If this information is not stored in long-term memory, it is vulnerable to interference and causes forgetting. Short-term memory efficiency depends on elements like the kind of information, distractions, and degrees of attention. Understanding memory constraints is essential in customizing instructional strategies to maximize learning results.

Moreover, studies show that by employing visual aids such as graphic organizers and infographics, which swiftly absorb visual information, knowledge retention and comprehension increase (Williams, 2023; Ahmad et al., 2024). Providing a substitute for conventional teaching methods, visual learning aids such as infographics have raised student involvement, satisfaction, and learning results (Ahmad et al., 2024). Better academic performance and less disengagement have been linked to customizing instructional approaches to students' learning preferences (Barsalote et al., 2023). Poor academic performance, low motivation, and increased dropout rates might follow from mismatches between instructional approaches and learning preferences. Although its accessibility and richness make text-based learning, for example, often favored, it may induce cognitive overload and poor engagement among struggling readers (Samat & Aziz, 2020).

Meanwhile, visual learning techniques—including animations and diagrams—have been connected to higher engagement and retention (Ralph, 2022; Vanichvasin, 2020). Especially crucial in the Philippines, where dropout rates are still high, is matching teaching strategies with students' learning styles. Research shows that increasing brain connections and visual literacy using infographics and other visual aids may help to increase long-term memory and recall (Pho & Trang, 2023). Still, text-based learning is essential for developing critical thinking and in-depth knowledge—mostly when students interact actively with the material (Nguyen, 2021). Many studies have examined learning styles, but few have compared how visual, text-based, or combined approaches affect students' retention capacity (Shier, 2020). This research explores how students' visual, text-based, and blended learning preferences affect memory recall. Thus, the data may help instructors create inclusive teaching tools suitable for different learning styles, enhancing student performance and retention. In lieu wit this, his experimental study aims to understand and explore the learning preferences of participants, including text, visual, and combination methods, in relation to their ability to retain information. This data will serve as the basis for answering the following questions:

1. What is the effect of the type of learning preference (visual, text, combination) on retention capacity?
2. Is there a significant difference in retention capacity among students exposed to visual, text, and combination learning methods?
3. Which type of learning preference produces the highest retention capacity for students?

METHODS

Participants

Participants were randomly chosen from a college in the Mindanao area to participate in the experiment. Forty-five undergraduate students, ages 18 to 24, of both sexes participated in the research. Students had to be healthy, free of visual impairments, neurological conditions, or cognitive impairments, and free of past formal instruction in visualization methods to be eligible to participate. Students with a history of neurological or cognitive impairments, learning problems, visual impairments (not repaired by lenses or surgery), or previous formal training in memory or visualization methods were not allowed to participate. The researchers used simple

random sampling to provide an impartial selection procedure, ensuring that every student had an equal chance of being chosen for the study. Participants were then assigned randomly using a random number generator or selecting numbers from a hat to one of three conditions (text-only method, visual representation, or mix of text and visual representation). There were 15 individuals in each condition.

The demographic makeup of the study's participants. N=45 students in a college in the Mindanao region participated in the experimental study. Regarding the total number of samples deployed (N=45, 100%), most of them were aged 18-19 years old (N=35, 77.8%), then 20-21 years old (N=9, 20.0%), and 24 and above (N=1, 2.2%). The participants also mostly consist of the 1st year (N=34, 75.6%), followed by the 3rd year (N=8, 17.8%), and lastly the 2nd year (N=3, 6.7%). Additionally, there were more female samples (N=34, 62.2%) following the male samples (N=12, 26.7%) and LGBTQ+ (N= 5, 11.1%). Moreover, the Department of Arts and Sciences accounted for (N=25, 55.6%) of the respondents, while the Department of Teacher Education and Department of Criminal Justice Education accounted for (N=6, 13.3%), following the Department of Technical Program at (N=5, 11.1%), the Department of Accounting Education at (N=2, 4.4%), and lastly, the Department of Business Administration at (N=1, 2.2%) after that.

Instrument

To accomplish the experiment's purpose, the researchers establish their own assessment in order to better understand how people acquire and retain information. The experimenters used text and images encoded in the PowerPoint that was displayed on the screen, to allow participants to read, see, and remember what was being projected at random. On the other hand, the experiment used answer sheets on which students recorded everything they remembered from either text or images, depending on the conditions they were given.

The experimenters did not assign numbers to each of the 15 slides that contain the text and images based on the conditions they were given because this could cause participants to lose focus and answer based on how they will complete the assessment rather than on the information they remembered, which could lead to biased and unreliable results. In the same way, the answer sheet simply contains their background data, such as age, year level, gender, department, and program, in order to analyze the experiment's results. The answer sheet did not offer numbers from 1 to 15, but it did include directions on what to do.

Furthermore, participants are exposed to the same content but have different conditions. The first set of sample N=15 was in charge under text-only method learning preference, while the second batch of sample N=15 was assigned under visual representation learning preference. Ultimately, another set of N=15 participants performed under a combination of text and visual learning preferences as the third batch. In addition, here is the sequence of content presented via text and images: horse, Instagram, shoes, laptop, guitar, ribbon, bag, lipstick, keyboard, bird, watch, telescope, flower, thumb, and strawberry.

Procedure and Design

The study used a true-experimental research method, which uses random assignment to determine cause-and-effect relationships and account for unrelated variables. The Between-Subjects design was implemented to avoid progressive error, ensuring that prior conditions did not influence participant responses. This random assignment ensured that each participant had an equal probability of being assigned to any experimental conditions, minimizing potential biases in the allocation process.

This study tested groups of participants under different conditions, implying that each group tried only one condition. In this way, the study can avoid the changes in performance of students caused by fatigue, boredom, or irritation and changes in performance that happen when someone repeats a task (Jhangiani et al., 2019). The first experimental group was exposed to visual representation, and the second experimental group was exposed to a combination of both. In contrast, the control group was exposed to textual presentation as a standard among three conditions. Moreover, participants are not allowed to join on other conditions and only try one condition in which they are assigned, respectively. Additionally, this investigation employed a true experimental design with random assignment, incorporating fundamental elements such as a control group and an experimental group (DeCarlo et al., 2022). Over and above that, participants were randomly assigned to groups or treatments in the

experiment by random number generator, which made the study a true experiment design.

The study utilized assessments constructed by researchers. Text and images were used to present the instrument, and participants were given an assessment sheet wherein they wrote all the information they had remembered. In this experiment, Batch 1 became the control group, and Batch 2 and Batch 3 became the experimental group, which was decided through a random number generator. This randomization guarantees that each participant has an equal chance of being assigned to any of the three conditions, minimizing selection bias and ensuring balanced allocation in group assignment. The data of the study were collected in the same procedure across all conditions. Before participants came inside the place where the experiment was tested, the experimenter ensured that the environment would be quiet, calm, and distraction-free. Comfortable seating arrangements will be ensured. Participants were informed about the nature of the study, task instructions, and their rights (including the provision of informed consent).

During the first stage of data collection for Batch 1, the researchers prepared seating arrangements and led participants to their respective seats. Afterwards, the experimenter briefly discussed the concept of text-only learning preference, explaining its purpose and how it differs from visual representation. After discussing and providing a few instructions and rules, participants then allocated their time to the screen by reading 15 randomly presented words or text, each projected for 3 seconds. They are encouraged to focus on each word carefully to recall as much detail as possible before proceeding with the assessment. Following, experimenters distributed the paper on which participants would write everything they remembered from the text presented, and they were given 3 minutes to do it. The paper also includes a section for the demographic profile that participants should fill out. After participants write down everything, they remember from the words that were projected, the facilitator will collect the papers to assess the scores they earn, and participants will receive an award as a token of appreciation for their efforts and participation in the study.

Throughout the second stage of data collection for Batch 2, the researchers prepared seating arrangements and led participants to their respective seats. Eventually, the experimenter briefly introduced visual representation, discussing its purpose as one of the learning preferences. After discussing and providing a few instructions and rules, participants allocated their time to the screen by observing 15 randomly presented pictures, each projected for 3 seconds. They are encouraged to concentrate on each image carefully to recall as much detail as possible before proceeding with the assessment. Otherwhile, the researchers will distribute the paper on which participants will write everything they remember from the displayed pictures, and they were given 3 minutes to do it. The paper also includes a section for the demographic profile that participants should fill out. After participants write down everything, they remember from the pictures that were projected, the experimenter collected the papers to assess the scores they earn, and participants will receive an award as a token of appreciation for their efforts and participation in the study.

In the course of the third stage of data collection for Batch 3, the researchers prepared seating arrangements once more and led participants to their respective seats. Subsequently, the experimenter will fundamentally establish the idea of combining visual and text-only representations, highlighting the importance of presenting both together on a single screen. Then participants spent their time on the screen by observing and reading 15 randomly presented pictures accompanied by descriptive text below each illustration, projected for 3 seconds each. They are encouraged to focus carefully on both the pictures and the text to recall as much detail as possible before proceeding with the assessment. Thereupon, the researchers distributed a sheet where participants will write everything they remember from the presented pictures and text, and they were given 3 minutes to do it. The sheet also includes a section for participants to complete their demographic profile. After participants write down everything they remember from the projected pictures and words, the facilitator will collect the papers to assess the scores they earned. Participants will then receive an award as a token of appreciation for their efforts and participation in the study.

Ethical Considerations

A comprehensive consent form explaining the study's objectives, technique, possible risks, as well as the benefits of participation was given to participants. For better understanding, the request form was written in simple, unambiguous language. Participants must read, comprehend, and sign the form acknowledging their informed

consent before they could take part. The study's complete voluntary nature was pointed out and participants have been made aware of their freedom to withdraw from participation at any time without incurring fines or other negative repercussions.

Anonymity and confidentiality were strictly observed throughout the entire study. To guarantee which all data remained anonymous and could not be linked to any particular person, no identifying information was gathered or associated with any participant's responses. Just authorized members of the research team had access to the data, which was kept confidentially.

Following the study's ending, participants received a comprehensive debriefing. Participants were encouraged to voice any concerns or ask any inquiries that they might have had during the debriefing, and they received a more thorough explanation of the research's objectives and implications. In order to enable them to implement these conclusions in their personal learning environments, participants in this process obtained instructional resources and materials on subject matter of learning preferences and techniques to improve information retention.

To maintain the integrity and legitimacy of the study, the researchers also promptly followed ethical research guidelines and standards. They confirmed towards the fact that there were absolutely no instances of plagiarism at any point during the research process and that all relevant information sources were properly referenced and cited. By adhering to these ethical guidelines, the researchers showed that they were dedicated to carrying out the study in a way that respected each participant's rights and welfare.

RESULTS

This section unveiled the results after data gathering to answer the research question of the study.

Table 1. Mean and Standard Deviation of Demographics

Demographics	**M**	**Sd**
Age	1.27	.580
Year Level	1.42	.783
Gender	1.49	.695
Department	2.13	1.561

Among the age, department, year level, gender, the department obtained the highest mean (M=2.13, SD=1.561). The gender soars the second highest mean (M=1.49, SD=.695). Next to it is the year level (M=1.42, SD=.783). The age garners the lowest mean (M=1.27, SD=.580).

Table 2. Normality Test (Shapiro-Wilk)

	W	**p**
Retention Capacity Scores and Learning Preferences	0.950	0.051

To assess if the data was normally distributed, a Shapiro-Wilk test was conducted. The statistics show that there is a significant deviation from normality (W= 0.950, p=0.051). These results suggest that the assumption of normality was violated for this variable; specifically, the data was not normally distributed, so the researchers used a non-parametric statistical tool specifically, Kruskal-Walli’s analysis, to get the significant difference and effect size between the two tested variables.

Table 3. Descriptives of Retention Capacity Scores and Learning Preference

Learning Preference	N	Mean	Median	SD	SE
Text-Only	15	9.47	10	1.77	0.456
Visual Representation	15	10.53	10	1.85	0.477
Combination	15	10.67	11	1.80	0.465

Descriptive statistics displayed that the mean of retention capacity scores in the text-only learning preference was M=9.47 (SD=1.77, SE=0.456), on the other hand, the mean obtained by retention capacity scores under the visual representation learning preference was M=10.53 (SD=1.85, SE=0.477). As for combination learning preference, it earned M=10.67 for the mean with (SD=1.80, SE=0.465). Each condition included N=15 participants using a Between-Group Subject Design.

Table 4. Kruskal-Wallis Analysis between Retention Capacity and Learning Preference

	χ^2	df	p	ε^2
Learning Preference on Retention Capacity	3.02	2	0.221	0.0686

The study was conducted to evaluate whether students can easily retain information from either text-only, visual representation, or a combination of both. Since the study consists of three conditions where 15 participants were assigned to their respective conditions, the experimenters utilized one-way ANOVA Kruskal-Wallis analysis as based on the results of the normality test above (see Table 3), non-parametric analysis should be used since the data was not normally distributed. A Kruskal-Walli's test was conducted to assess whether there was a significant difference in retention capacity when exposed to different learning preferences. The data showed that there is no significant difference, χ^2 (1) =3.02; p=0.221. The degrees of freedom (df=2) corresponded to the number of categories of the independent variable minus two, while the effect size weighed using eta-squared (η^2) was η^2=0.0686. Since the p-value was higher than the threshold of 0.05, the null hypothesis, which stated that there is no significant difference in retention capacity between participants' who learn using visual representation, text-only representation, and combination of visual and text-only representation, was accepted. Therefore, the study accepted the null hypothesis and rejected the alternative hypothesis, suggesting that there is no significant difference in retention capacity across the three learning preferences: textual, visual, and combined.

DISCUSSION

The findings of this study suggest that, although different learning preferences exist in terms of retention capacity, these differences do not significantly impact how students retain information. This result is consistent with previous studies, including the work of Altmyer and Yang (2010), as cited in Chung et al. (2022), which examined the relationship between learning styles and academic achievement. Their study found that learning styles, including visual, auditory, and textual preferences, had no significant impact on retention or academic performance. Similarly, a study by Maya et al. (2021) published in MDPI Sustainability indicated that learning styles were not consistently linked to better performance or retention across various tests. Both studies highlight that teaching techniques focusing on adaptability and various approaches are more effective in improving student achievement than focusing on specific instructional methods. In contrast, Liu and Lahoz (2024) found that learning styles correlated moderately with short-term and long-term memory retention, suggesting that each learning style can positively influence retention. This supports using a multisensory approach that combines tactile, auditory, and visual strategies to enhance retention and learning success. Halil Taş and Muhammet Baki Minaz (2024) also found that differentiated instructional activities based on learning styles significantly improved retention scores, further supporting the efficacy of personalized approaches to learning. These studies suggest that incorporating different learning styles into instructional strategies can lead to more engaging and

compelling learning experiences. However, other studies, such as those by Kampwirth & Bates (1980) and Tarver & Dawson (1978), referenced in Patil & Newton (2023) and Boland & Amonoo (2021), argue that learning styles have little to no significant impact on academic outcomes. Similarly, American (2022) found that following students' preferred learning modes did not statistically affect academic achievement, suggesting that universal teaching strategies are often more effective than individualized ones.

The present study also contradicts George Miller's classic theory of short-term memory capacity, which suggests that short-term memory can only hold five to nine pieces of information simultaneously. Participants retained more than nine pieces of information in the current study, challenging Miller's model. This finding aligns with Dirlam's (Cha et al., 2023) mathematical analysis, which found that the most effective chunk size for memory retention is three to four items. Additionally, the study by Starr et al. (2020) suggests that semantic information can enhance working memory by reinforcing representations of individual objects and enabling the chunking of multiple items. Although no significant differences in retention capacity were found across learning preferences, the results of this study underscore the importance of understanding how learning preferences can influence students' engagement and learning experiences. Students who preferred the combination learning method achieved the highest retention scores ($M = 10.67$, $SD = 1.80$), consistent with findings by Rcademy (2023), which showed that combining text and visuals enhances retention by engaging multiple cognitive pathways. Visual representation learning ($M = 10.53$, $SD = 1.85$) came in second, supporting that visual learners often benefit from incorporating images and graphics into their learning process (Wahyudin & Wahyuni, 2022). However, students with a text-only learning preference scored the lowest ($M = 9.47$, $SD = 1.77$), which suggests that text-based learning may be more challenging for students due to its complex nature (Rahayu, 2024). While the results suggest that the specific learning preference may not significantly influence retention, they highlight the potential benefits of combining different instructional methods to accommodate diverse learning styles. In line with Mayer's (2024) research, combining text and visual aids activates multiple cognitive processes, improving overall retention and comprehension. This is particularly important when considering students' diverse learning preferences, as it helps create a more inclusive and flexible learning environment.

The study's findings also have implications for instructional strategies. Although students may prefer specific learning modes, the evidence suggests that educators should focus on integrating various approaches into their teaching. By adapting teaching methods to meet the needs of different learners, educators can create a more engaging and effective learning environment. Furthermore, this study highlights the need for flexibility in educational settings, where students and teachers adapt to each other's preferences to enhance teaching and learning outcomes. In conclusion, while the study found no significant differences in retention across learning preferences, the results suggest that incorporating diverse instructional strategies may improve student engagement and overall academic achievement. Future research should continue to explore how different teaching methods, including those based on learning styles, impact memory retention and academic performance while also considering other factors, such as the learning environment and instructional content.

CONCLUSION

This investigation produced no significant differences in memory retention across the three conditions—text methods, visual representation, and learning combination. This implies that students' capacity to remember material is not significantly influenced by the manner of content presentation—textual, visual, or a mix of both. However, individual preferences may still influence students' engagement, motivation, and overall satisfaction with the learning process. Future studies should try to control extraneous factors, given the limited sample size, to improve the results' validity. Future investigations might also examine other study strategies, like correlational studies, to probe the links among learning presentations, Text Methods, Visual Representation, and Learning Combination on the Learner's Ability to Retain Information

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REFERENCES

1. Ahmad, A. K. A., Aziz, M. N. A.., Ramlie, M. K., Rahaman, A. A., & Abdullah, M. (2024). Systematic Literature Review on Adaption of Infographic and Acceptance Factors in Summarizing Medical Health Literature in Higher Education. International Journal of Research and Innovation in Social Science, 8, 4213-4226.
2. Barsalote, C.C., Moya, A. M. H., & William, S. (2023). Learning preference among accounting students of the University of Mindanao. Technion Soc. Sci. J., 46, 39.
3. Boland, R. J., & Amonoo, H. L. (2021). Types of Learners Psychiatric Clinics of North America, 44(2), 141-148. https://doi.org/10.1016/j.psc.2020.12.001
4. Cha, M. C., Kim, H. C., & Ji, Y. G. (2023). The Unit and Size of Information Supporting Auditory Feedback for Voice User Interface. International Journal of Human–Computer Interaction, 1–10. https://doi.org/10.1080/10447318.2023.2179214
5. Chung, J., McKenzie, S., Schweinsberg, A., & Mundy, M. E. (2022). Correlates of Academic Performance in Online Higher Education: A Systematic Review. Frontiers in Education, 7. https://doi.org/10.3389/feduc.2022.820567
6. Désiron, J. C., Bétrancourt, M., & de Vries, E. (2021). Cross-Representational Signaling and Cohesion Support Inferential of Text-Picture Documents. Frontiers in Psychology, 11. https://doi.org/10.3389/fpsyg.2020.592509
7. Halil Taş, & Muhammet Baki Minaz. (2024). The Effects of Learning Style-Based Differentiated Instructional Activities on Academic Achievement and Learning Retention in the Social Studies Course. SAGE Open, 14(2). https://doi.org/10.1177/21582440241249290
8. Hani Brdesee, Wafaa Alsaggaf, Naif Radi Aljohanni, & Hassan, S. -U. (2022). Predictive Model Using a Machine Learning Approach for Enhancing the Retention Rate of Students At-Risk. International Journal on Semantic Weband Information Systems, 18(1), 1-21. https://doi.org/10.4018/ijswis.299859
9. Jhangiani, R. S., Chiang, I.-C. A., Cuttler, C., & Leighton, D. C. (2019). Experimental Design. Kpu.pressbooks.pub. https://kpu.pressbooks.pub/psychmethods4e/chapter/experimental-design/
10. Kaneko, S., Masuda, R., & Yamashita, Y. (20219). Memory retention capacity using two different training methods, appetitive and aversive learning, in juvenile red sea bream Chrysophrys major. Journal of Fish Biology, 94(2), 231-240 https:/)doi.org/10.111/jfb. 13876
11. Liu, K., & Lahoz, E. A. (2024). Impact of Learning Styles on Students' Retention of Information. International Journal of Education and Humanities, 17(1), 207-212. https://doi.org/10.54097/0qpvve72
12. Maya, J., Luesia, J. F., & Pérez-Padilla, J. (2021). The Relationship between Learning Styles and Academic Performance: Consistency among Multiple Assessment Methods in Psychology and Education Students. Sustainability, 13(6),3341. https://doi.org/10.3390/su13063341
13. Mayer, R. E. (2024). The Past, Present, and Future of the Cognitive Theory of Multimedia Learning. Educational Psychology Review, 36(8), 1-25. https://doi.org/10.1007/s10648-023-09842-1
14. McLeod, S. (2023, May 10). Short term Memory in Psychology: Types, Dotation & Capacity. Simply Psychology. https://www.simplypsychology.org/short-term-memory.html
15. Nguyen, U. (2021). Title Effect of Paraphrasing on Memory Semantic Scholar. https://www.semanticscholar.org/paper/The-Effect-ofParaphrasing-on-Memory-Nguyen/d0a796b248096d65af57040e265fb98fd76eb
16. Patil, A., & Newton, P. M. (2023). What happens to the Principles of Evidence Based Practice When Clinicians Become Educators? A Case Study of the learning Styles Neuromyth. Medical Science Educator. https://doi.org/10.1007/s40670-023-01849-1
17. Pho, L. T., & Trang, N. H. (2023). Investing the Effects of Infographics-Based Teaching on Efl Students Grammar Retention. International Journal of Social Sciences and Human Research, 6(08). https://doi.org/10.47191/ijsshrv6-i8-07

18. Rahayu, Ade. (2024). Elementary School Students' Explanatory Text Learning Innovation Using the Problem Based Learning Model Assisted by Diorama Media. International Journal of Research and Review. 11. 279-289. 10.52403/ijrr.20240730.
19. Ralph, C. (2022, June 14). 65% of People Prefer Visual Learning, Is Teaching Keeping Up? Blog.videoscribe.co. https://blog.videoscribe.co/65-of-people-prefer-visual-learning-is-teaching keeping-up
20. Rcademy. (2023, August 30). The power of visual aids in enhancing communication [best 5]. RCADEMY. https://rcademy.com/the-power-of-visual-aids-in-enhancing-communication/
21. Samat, A., & Aziz, A. (2020). The Effectiveness of Multimedia Learning in Enhancing Reading Comprehension among Indigenous Pupils. Arab World English Journal, 11(2), 290-302. https://eric.ed.gov/?id=EJ1265894
22. Shier, M. (2020, September 11). 2.1 Learning Preferences and Strengths. Opentextbc.ca; Campus. https://opentextbc.ca/studentsuccess/chapter/learning-preferences-and-strengths/
23. Shuvankar Madho, & Bhattacharyya, D. (2023, November 26). Learning Styles Preferences Among the Students. Research Gate: unknown. https://www.researchgate.net/publication/375915801_Learning _Styles_Preferences_Among_the _Students
24. Starr, A., Srinivasan, M., & Bunge, S. A. (2020). Semantic knowledge influences visual working memory in adults and children. PloS one, 15(11), e0241110.
25. Udu, D. A., Nmadu, J., Uwaleke, C. C., Anudu, A. P., Okrchineke, B. C., Attamah, P. C., Chukwuemeka. C. O., Nwalo, C. N., & Orgonna, O. C. (2022). Innovative Pedagogy and Improvement of Students' Knowledge Retention in Science Education: Learning Activity Package Instructional Approach. Pertanika Journal of Social Sciences and Humanities, 30(3), 1404-1426. https://doi.org/10.47836/pjssh.30.3.25
26. Vanichvasin, P. (2020). Effects of Visual Communication on Memory Enhancement lf Thai Undergraduate Students, Kasetsart University. Higher Education Studies, 11 (1), 34. https://doi.org/10. 5539/hes. v11n1p34
27. Wahyudin, A. Y., & Wahyuni, A. (2022). Exploring Students' Learning Style and Proficiency at a University in Indonesia: A Quantitative Classroom Research. TEKNOSASTIK, 20(2), 77-85. https://doi.org/10.33365/ts.v20i2.2150
28. Williams, J. (2023, December 7). Visual Learning: Effective Strategies and Best Practices. Instructive. https://www.instructive.com/resources/blog/visual-learning-effective-strategies-and-best-practices