

Effect of Doodle Note-taking on Recall and Retention in Science 10

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Abstract. Doodle note-taking is a visual note-taking strategy that combines words, drawings, symbols, and colors to help learners organize and understand information effectively. It allows students to represent ideas visually, making complex concepts easier to process, analyze, and remember during learning activities. Recall and retention refer to students' ability to remember, understand, and retrieve learned scientific concepts over time. Strengthening these abilities is essential for improving students' academic performance, particularly in subjects like Science where understanding and remembering key ideas are important. This study examined the effect of doodle note-taking on the recall and retention of Grade 10 students in Science. A quasi-experimental research design under the quantitative approach was employed to determine whether there was a significant difference between students' pre-test and post-test scores after the use of doodle note-taking. The respondents of the study were 35 Grade 10 students from Section Fidelity of Maguikay National High School. A researcher-made two-page test questionnaire was used to gather data on students' recall and retention before and after the intervention. The instrument obtained a Cronbach's Alpha of 0.72, indicating that the test was reliable for measuring students' performance. The collected data were analyzed using the t-test to determine if there was a significant difference between the pre-test and post-test results. The findings revealed a significant improvement in students' post-test scores compared to their pre-test scores after the implementation of doodle note-taking. Thus, doodle note-taking proved to be an effective instructional strategy that enhances students' recall and retention in Science 10 and contributes to improved learning outcomes, deeper understanding of concepts, and more active student engagement.

Introduction

Doodle note-taking is a visual learning strategy that combines drawings and written text to enhance focus, understanding, and memory retention. According to Macagba (2024), doodling is often seen as a sign of inattention, yet it is a universal, spontaneous act that emerged especially during moments of boredom or fatigue. Macagba describes doodles as informal, unplanned, and often meaningless sketches made without the intention of creating art. Unlike refined drawings, doodles are continuous and relaxed in gesture, disconnected from formal artistic practice. On the other hand, recall is the ability to retrieve information from memory. According to Phillips (2023), recall is the process of retrieving information from memory without external cues, whereas recognition is the process of identifying previously seen items. On the other hand, Retention is the ability to keep or remember information over time. According to Comighud (2021), Retention is the remembering and retaining of information, such as class lectures or steps in solving problems, especially for academic tasks. The pre-survey data showed that most students are familiar with note-taking. Of the total respondents, 122 students (95.38%) know how to take notes, while only 6 (4.62%) do not. Similarly, 121 students (94.57%) take notes during lectures, showing that note-taking is common among them. However, when it comes to doodle note-taking, there is a noticeable difference. 68 students (53.33%) are not familiar with this method, while 60 students (46.67%)

are. This indicates that while simple or traditional note-taking is widely used, more creative techniques, such as doodle note-taking, are less familiar to many students. Given that 53.33% of students are unfamiliar with doodle note-taking, there is a clear opportunity to explore how introducing this method could enhance learning and engagement. Continuing this study could provide valuable insights into whether doodle note-taking improves information retention or benefits different learning styles compared to traditional methods.

Internationally, a study entitled "The journey from Recall to Knowledge: A Study of Two Factors - Structured Doodling and Note-Taking on a Student's Recall Ability" authored by Nayar and Koul (2020), given that 53.33% of students are unfamiliar with doodle note-taking, there is a clear opportunity to explore how introducing this method could enhance learning and engagement. Continuing this study could provide valuable insights into whether doodle note-taking improves information retention or benefits different learning styles compared to traditional methods. Disengagement in traditional classrooms is a global issue. Research indicates that structured doodling and note-taking are effective, low-tech alternatives to passive listening, significantly improving students' recall. The study, conducted at NMIMS University in Navi Mumbai, India, showed minimal differences in effectiveness between the two methods. This suggests that simple, readily available techniques can significantly enhance engagement and memory retention in the classroom.

Nationally, a study conducted by Dela Cruz and Ramos (2024) entitled "Analysis of Doodles and Listening Comprehension of College Students", found that doodling improves college students' listening comprehension, particularly at the literal level. While doodling did not significantly impact higher-order comprehension, it did boost literal comprehension scores compared to a non-doodling control group. This suggests doodling is a valuable tool for enhancing basic comprehension skills in academic settings. The study also showed no correlation between demographic factors and comprehension outcomes.

According to a local study by Jamero et al. (2024) entitled "The Impact of Handwritten Note Taking On Information Retention On Senior High School Students" conducted at Our Lady of the Pillar Academy in Sibonga, Cebu, results from an independent-samples t-test showed no significant difference in Retention between the two groups, with a p-value of 0.227, indicating that handwritten note-taking did not significantly improve memory retention compared to no note-taking. These findings suggest that traditional handwritten note-taking may not be as beneficial for Retention as commonly believed, highlighting the need to explore alternative learning strategies.

The gap in this study is that it does not fully explore how doodle note-taking helps students improve. While some findings suggest that these strategies help with recall or literal comprehension, they do not show whether these methods are effective in improving higher-level thinking. Most studies also focus on college students, leaving out Senior High School learners who may benefit differently. There is limited research in the Philippine context that combines both strategies in a single experiment to determine which works better, especially in regular classroom settings.

Thus, this study aimed to determine the effectiveness of doodle note-taking in enhancing recall and retention among Grade 10 students in their Science class at Maguikay National High School during the first semester of the school year 2025–2026.

Statement of the problem

This research examined the effect of doodle note taking on recall and retention in Science class of grade ten students at Maguikay National High School S.Y. 2025-2026, first semester. The results of this study served as the basis for recommendations. Specifically, this answered the following questions:

1. What is the pre-test scores of students in Science 10?
2. What is the post-test scores of students after using doodle note taking?
3. Is there a significant difference between pre test scores and post test scores after using doodle note taking?
4. Based on the results, what recommendations may be proposed?

Statement of the Hypotheses

At 0.05 level of significance, the hypotheses below were tested:

H0: There is no significant difference between pre test scores and post test scores after using doodle note taking.

H1 : There is a significant difference between pre test scores and post test scores after using doodle note taking.

Methodology

This chapter outlined the research methods and procedures for the study titled "The Effect of Doodle Note-Taking on Recall and Retention in Science 10." As noted by Patel and Patel (2019), it discussed the techniques used for data collection,

analysis, and interpretation, emphasizing that researchers needed to understand both the methods and the reasoning behind their use. The chapter covered the research design, setting, participants, instruments, data collection methods, and statistical analyses.

Research Design

This study employed a quasi-experimental design under a quantitative approach. Specifically, it implemented a pretest and post-test design without a control group to assess the impact of doodle note-taking on recall and Retention in science classes for Grade 10 students. To select participants, all Grade 10 sections underwent a pretest, and the section with the lowest average score was selected for the study. As stated by Maciejewski (2020), quasi-experimental designs were particularly appropriate for educational settings, provided that careful attention was given to internal validity and to ensuring that the groups being compared were relatively equivalent prior to the intervention.

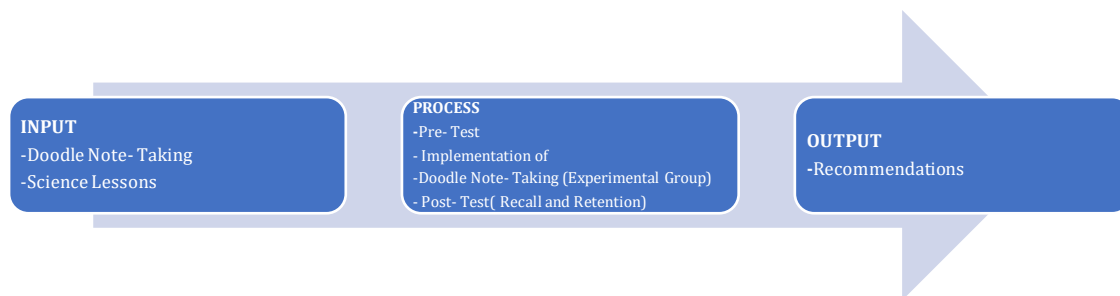


Figure 1. Flow on "Effect of Doodle Note-Taking on Recall and Retention in Science Classes"

Quantifiable data were collected to provide accurate and dependable conclusions. A quasi-experimental technique was used in this investigation. In addition, the researchers assessed the effect of doodle note-taking on the recall and retention of science lessons among Grade 10 students.

Research Subjects

The subjects of this study were Grade 10 students, with a population of 163 learners at Maguikay National High School, divided into four sections: Faith, Fidelity, Focus, and Fortitude. Before the intervention, all students in these sections completed a pretest to assess their baseline understanding of doodle note-taking. Among the four sections, Grade 10 Fidelity, comprising 35 students, obtained the lowest pretest score and was therefore selected as the subject of the study. This approach guaranteed that the intervention was applied to a group with limited prior knowledge of the concept, making it more suitable for assessing its impact on recall and Retention. Rai and Thapa (2015) stated that purposive sampling was a commonly used non-probability sampling method in which participants were deliberately selected based on specific characteristics pertinent to the study, enabling targeted, context-aware analysis.

Research Environment

The study was conducted at Maguikay National High School. To examine the effect of doodle note-taking on the recall and Retention of Grade 10 students in science classes, the researchers utilized this school as the primary research site. All relevant data were gathered within the school premises. MNHS was established in September 2007, with its first school building constructed in 2018 and the second in 2019. The school had six junior high school teachers and five senior high school teachers. The school actively participated in science-related competitions, including the Science Quiz Bowl held at Benedicto on February 13, 2024, and the Division-Level Science and Math Quiz Bowl on October 18, 2024.

Research Instruments

A researcher-developed pretest questionnaire was administered to establish participants' baseline performance, followed by an immediate post-test to assess short-term recall and a delayed post-test to measure long-term Retention. To ensure the questionnaire was reliable and valid, a pilot test was conducted. According to Ikart (2019), expert reviews played a vital role in identifying issues related to question content, phrasing, and potential measurement errors, thereby allowing researchers to enhance the instrument before it was fully deployed. Questionnaire items 1–5 focused on organisms as having feedback mechanisms coordinated by the nervous and endocrine systems. Items 6–10 covered how these feedback mechanisms helped organisms maintain homeostasis for reproduction and survival. Items 11–15 dealt with the information

stored in DNA being used to make proteins, including how changes in DNA might affect its products and how mutations that occurred in sex cells were heritable. Items 16–20 addressed how evolution by natural selection could lead to biodiversity. Items 21–25 focused on the influence of biodiversity on ecosystem stability and the capacity of ecosystems to support a limited number of organisms. The pilot test yielded a score of 0.75, indicating that our Researcher made questionnaire was reliable.

Research Procedure

The researchers distributed a multiple-choice questionnaire to participants only after obtaining the science teacher's consent. Before giving out the forms, they carefully described the objectives of the study and the type of information being collected, ensuring that participants fully understood. Maintaining a systematic approach to data collection was essential to minimize errors and ensure accurate findings. According to Ivan Buljan (2023), research procedures involve a series of organized steps in conducting a study, beginning with the development of a research idea and continuing through planning the analysis and sharing of collected data to ensure responsible and reliable scientific outcomes.

The following procedures were utilized to collect the data:

Phase 1. Approval of the Transmittal Letters and the Multiple choices Questionnaire

Phase 2. Identification of the Research Setting and Subjects.

Phase 3: Data Collection

Steps in Using Doodle Note-Taking

1. Prepare Materials

Students prepared blank paper or notebooks, along with pens, pencils, and colored markers.

2. Introduce the Lesson

The teacher briefly explained the topic to be discussed and highlighted the key concepts or vocabulary that students should capture in their notes.

3. Listen and Doodle

While the teacher presented the lesson, students wrote down important terms, phrases, or definitions. Alongside these, they drew simple doodles, diagrams, symbols, or icons that represented the ideas.

4. Organize Ideas Visually

Students connected related concepts using arrows, shapes, or mind-map layouts. They used borders, bubbles, or sections to group information for clarity.

5. Add Colors and Highlights

Students shaded or color-coded important parts of their doodles to make recall easier. Colors represented categories (e.g., green for processes, blue for terms, red for examples).

6. Review and Refine

After the lesson, students revisited their doodle notes, clarified details, and added any missing information.

7. Use for Recall and Retention

Students studied using their doodle notes by tracing the visuals, retelling the concepts aloud, or covering the words and recalling the meaning from the doodles.

Retrieval Phase

After the students had completed their answers, the researchers gathered all of the test questionnaire they had filled out and ensured that they were complete.

Tabulation and Tallying Phase

Once all the necessary data had been collected, the researchers tabulated and tallied the results.

Statistical Treatment of Data

The main statistical analysis in this study was the t-test, which was used to determine whether there was a significant difference between two related sets of scores. Mishra et al. (2019) explained that the choice of statistical method depended on the objectives of the study, the type and distribution of data, and whether the observations were paired or unpaired. They also emphasized that while descriptive statistics, such as the mean and median, summarized data, inferential statistics, such as the Student's t-test, were used to test hypotheses and identify meaningful differences. In this study, the t-test helped

determine whether there was a statistically significant improvement between the students' pretest and post-test scores, thereby showing the effect of doodle note-taking on recall and Retention in Science 10.

Pilot Testing

A pilot study served as a preparatory step for a larger research project, acting as a miniature version of the main study to evaluate research instruments, procedures, recruitment strategies, and data collection methods. This preliminary investigation helped identify and refine potential issues before the full-scale study. According to Fraser et al. (2018), a pilot test was a small-scale version of a planned study conducted with participants similar to those in the main study, designed to assess the feasibility of recruitment procedures, the usability and validity of the questionnaire, and the practicality of the research protocols. In this study, the pilot test helped determine whether the doodle note-taking intervention and assessment tools were understandable, appropriate, and functional for Grade 10 students at MNHS. It also provided evidence of the feasibility of the main research and the likelihood of obtaining reliable results. The pilot test's findings emphasized the importance of refining instructions, improving question clarity, and addressing potential low response rates to ensure the success and accuracy of the full-scale study. The pilot test yielded a score of 0.75, indicating that our Researcher made questionnaire was reliable.

Cronbach's Alpha

A statistic called Cronbach's alpha was used to evaluate internal consistency, or the degree to which a set of items is related to one another. This was regarded as a scale-dependability metric, as initiated by Hayes and Coutts (2020). A measure's "high" alpha number did not necessarily indicate that it was unidimensional. Two other investigations that could be conducted were to demonstrate that the scale was unidimensional and to assess its internal consistency. One way to verify dimensionality was to examine exploratory factors. In technical terms, Cronbach's alpha (also known as consistency) was a coefficient of dependability rather than a statistical analysis.

For conceptual reasons, we present the Cronbach's alpha formula below, which is expressed as a function of the number of test items and the average intercorrelation of the items:

No. Coefficient	of Cronbach's Alpha	Reliability Level
1	0.81-1.00	Very Reliable
2	0.60-0.80	Reliable
3	0.40-0.60	Enough Reliable
4	0.20-0.40	Somewhat Reliable
5	0.0-0.20	Less Reliable

Table 1. Cronbach's Alpha Interpretation Table

Cronbach's alpha, which assesses how closely a scale's items measure a single core concept, is a widely used metric for internal consistency. When the Cronbach's alpha value of an elevated A scale is high, it indicates that the scale is genuine since the components consistently measure the same concept. The pilot test yielded a reliability of 0.75 it means reliable.

Ethical Considerations

Ethical considerations in research refer to the practice of following moral principles and guidelines to ensure that a study is conducted honestly, safely, and with respect for all participants and stakeholders. According to Hasan et al. (2021), ethical considerations refer to the moral principles, guidelines, and standards that researchers must follow to ensure fairness, honesty, and respect for participants' rights, dignity, and well-being throughout the research process. It involves protecting participants':

Dignity. All participants will be treated with respect and fairness throughout the study. Their values, opinions, and individuality will always be acknowledged.

Rights. Participants had the freedom to decide whether to participate in the study. They could also withdraw at any time without facing any negative consequences.

Welfare. The study ensured that no harm came to the participants. Their safety and well-being were always prioritized above all else.

Confidentiality. All personal details shared remained private and protected. Information was used only for research purposes and was not disclosed to others.

Anonymity. The results did not include any identifying information about the participants. This ensured that their identities remained completely hidden.

Results and Discussion

This chapter explains and examines the data collected from the pretest and post-test results of the study. The findings are carefully interpreted in light of the researchers' formulated research questions. The discussion centers on the pretest and post-test performance of Grade 10 students in Science, specifically focusing on their recall and Retention after the implementation of doodle note-taking. Statistical measures such as frequency counts, percentages, and weighted means are applied to present and interpret the data clearly. The results aim to identify the influence of doodle note-taking on students' recall and Retention of scientific concepts. Related literature and previous studies are used to support and validate the interpretation of the findings.

Score Range	f	%	Level
21-25	0	0	Excellent
16-20	7	20	Very Good
11-15	10	29	Good
6-10	14	40	Poor
1-5	4	11	Very Poor
Total	35	100	
Mean	10.43		Poor

Table 2. Pretest Scores of the Student's in Recall and Retention

With a sample size of 35 students, Table 2 displays the distribution of respondents' pre-test scores in Recall and Retention, including their frequency, percentage, and weighted mean. Table 2 shows that the majority of students (40%) obtained scores ranging from 6–10, interpreted as Poor, while 4 students (11%) obtained scores ranging from 1–5, interpreted as Very Poor. Overall, the pretest results indicated that Science 10 students had low recall and Retention of science concepts prior to the intervention, underscoring the need for innovative instructional strategies, such as doodle note-taking, to enhance understanding and engagement. Stated by Respondent 2 " (Na Challenge ko sap ag drawing kay feel nako wala koy creative mind. First nag struggle ko sap ag think kung unsaon nako pag present sa ubang concept visually. Pero na realized nako nga drawing dili need og perfect para maka help. And importante ni improve akong scores ng ana recall ko during sap ag lesson. Bisag unsa ka simple ang e drawing ni trigger akong memory. In the end, doodle note – taking ni boost akong confidence and naka help sa sa akong performance academically". I was challenged by the drawing part because I feel like I do not have a very creative mind. At first, I struggled to think of ways to represent some concepts visually. However, I realized that the drawings did not need to be perfect to be helpful. What really improved my scores was recalling what I had drawn during the lesson. Even simple sketches helped trigger my memory. In the end, doodle note-taking boosted my confidence and helped me perform better academically.) This finding is consistent with Boggs, Cohen, and Marchand (2017), who reported that students' memory recall is not consistently improved when learning activities lack sufficient engagement and appropriate task complexity, suggesting that traditional teaching approaches may not adequately support cognitive engagement. Furthermore, the study by Spencer-Mueller and Fenske (2024) found that doodling alone does not necessarily improve recall or reduce boredom compared to structured note-taking, indicating that instructional strategies must be carefully designed and guided to be effective. Taken together, these studies support the interpretation that the low pretest performance may be due to limited student engagement in traditional learning settings and underscore the importance of implementing structured, engaging instructional approaches, such as guided doodle note-taking, to improve learning outcomes in Science.

Score Range	f	%	Level
21-25	2	6	Excellent
16-20	5	14	Very Good
11-15	18	51	Good
6-10	10	29	Poor
1-5	0	0	Very Poor
Total	35	100	
Mean	13.31		Good

Table 3. Post-test Scores of the Student's after using Doodle Note- Taking

Table 3 shows the distribution of the respondents' post-test scores in Recall and Retention after the use of Doodle Note-Taking, with the same sample size ($n = 35$). Table 3 shows that the majority of students (51%) obtained scores ranging from 11 to 15, which are considered Good. On the other hand, 2 students (6%) scored between 21 and 25, which is described as Excellent. The results indicate a noticeable improvement in students' recall and Retention after the implementation of Doodle Note Taking. This suggests that doodle note-taking had a positive effect on Science 10 students by helping them better understand, organize, and remember scientific concepts. Stated by Respondent 1 " (Yes, and doodle note -taking kay naka improve sa akong memory or naka retention. Naka organize siya sa akong information with pictures og drawings naka help nga maka engage actively sa learning kaysa sap ag paminaw. Naka pa coonect siya sa akong ideas easily og maka understand sa concept in creative way. Ang mga biswal nga elemento nakapahimong mas nindot ug mas sayon hinumduman ang mga leksyon panahon sa quizzes ug exams. Imbes nga mabati ko nga nabagot, mas nakatutok ug motivated ko sa pag-apil sa klase. Sa kinatibuk-an, ang doodle note-taking nakapahimong mas lingaw ug epektibo ang pagtuon para nako." Yes, doodle note-taking significantly improved my memory and retention. Organizing information with pictures and drawings helped me engage actively in learning instead of just listening. It allowed me to connect ideas more easily and understand concepts in a creative way. The visual elements made the lessons more interesting and easier to recall during quizzes and exams. Instead of feeling bored, I felt more focused and motivated to participate in class. Overall, doodle note-taking made studying more enjoyable and effective for me). The findings align with the study of Mangen and Balsvik (2016), who found that handwriting and drawing activities promote deeper learning and better recall than typing, highlighting the role of kinesthetic engagement in learning. The improved performance from Good to Excellent levels suggests that combining visual representation with motor activity through doodle note-taking helped learners process information more effectively, leading to enhanced comprehension and long-term Retention of scientific concepts among Science 10 students.

Variable	t-value	P-value	Decision	Remarks
Effect of Doodle Note taking on Recall and Retention	6.8695	0.0000	Reject Ho	Significant

***significant at $p < 0.05$ (two-tailed)*

Table 4. Significant difference between the Pre-test and Post- test scores of the students.

The computed t-value of 6.8695 with a p-value of 0.0000 indicates a statistically significant difference between the pretest and post-test scores of the students. Since the p-value is less than the 0.05 level of significance, the null hypothesis is rejected. This result suggests that students' performance after the intervention significantly improves compared to before. The large t-value further implies that the difference in scores is not due to chance. Overall, the findings confirm that the instructional strategy used had a meaningful effect on students' learning outcomes. Stated by respondent 2 ("Ingon usa ka visual learner, nakit-an nako nga dako kaayo ang natabang sa doodle note-taking kay pinaagi lang sa pagtan-aw sa mga doodle nga akong gihimo, dali ra nako mailhan kung unsang bahin sa leksyon ang unsa. Kini nga pamaagi nakatabang nako sa dali nga pag-ila ug paghinumdom sa mga yawe nga konsepto. Pinaagi sa kombinasyon sa mga drawing, simbolo, ug sinulat nga notes, mas sayon kaayo para nako ang pagproseso ug pagtipig sa impormasyon." As a visual learner, I found that doodle note-taking helped me a lot because just by looking at the doodles I created, I could easily recognize which part of the lesson was which. This approach allowed me to quickly identify and recall key concepts. Using a mix of drawings, symbols, and written notes, it made processing and retaining information much easier for me.) The study's findings are supported by the Visual Learning Theory proposed by Fleming and Mills (1992), which emphasizes that learners comprehend and retain information more effectively when it is presented through visual elements such as diagrams, symbols, and colors. Doodle note-taking aligns with this theory by integrating visual representations with written text, allowing students to process information in multiple ways. This approach increases engagement and enhances memory retention. As a result, students are better able to understand and recall the lesson content, which explains the significant improvement observed between the pretest and post-test scores.

Furthermore, Visual Learning Theory supports the idea that learning becomes more effective when information is presented in visually meaningful ways that help learners organize and interpret content. Fleming and Mills (1992) emphasized that visual elements such as charts, diagrams, colors, and symbols aid learners in making connections between concepts and in retaining information for longer periods. In this study, doodle note-taking enabled students to represent key scientific ideas visually, making abstract concepts more concrete and easier to understand. This visual organization of information likely enhanced students' focus and comprehension during lessons, thereby reinforcing memory retention and contributing to the significant improvement observed in the post-test results.

Conclusion and Implications

Conclusion

The study's findings clearly indicate that doodle note-taking is an effective instructional strategy for improving the recall and Retention of Grade 10 students in Science. The low pretest scores indicate that students initially struggle to remember and understand scientific concepts when using traditional methods. In contrast, the post-test results show a marked improvement after the implementation of doodle note-taking, with most students achieving good to excellent performance levels and a statistically significant difference between pretest and post-test scores. These results support the Visual Learning Theory of Fleming and Mills (1992), which emphasizes that learners process and retain information more effectively when it is presented visually. By combining images, symbols, colors, and organized text, doodle note-taking allows students to structure information spatially and create stronger cognitive connections. Thus, integrating visual elements into note-taking enhances students' comprehension, focus, and long-term memory, confirming that doodle note-taking is a valuable and theory-supported strategy for improving learning outcomes in Science.

Implications

Doodle note-taking can be effectively used in science learning by transforming complex scientific concepts into organized visual representations that combine drawings, symbols, arrows, keywords, and color-coding. Based on Visual Learning Theory, learners understand and retain information better when it is presented through visual means rather than text alone, because the brain processes images more efficiently and forms stronger memory connections. In science subjects where topics such as cell structure, the water cycle, chemical reactions, and body systems involve processes and relationships, doodle notes allow students to visually map out connections, label diagrams, and simplify abstract ideas into meaningful illustrations. This approach aligns with the VARK model developed by Neil Fleming and Colleen Mills (1992), which emphasizes that visual learners prefer spatial organization and image-based content. By integrating sketches with short explanations, doodle note-taking enhances comprehension, focus, and long-term retention, making it a practical and theory-supported strategy for improving students' performance in science learning.

Recommendations

Based on the findings and conclusions drawn from the study on the effect of doodle note-taking on the recall and Retention of Science 10 students at Maguikay National High School, the following recommendations are proposed:

Students. Students are encouraged to use doodle note-taking during Science lessons to improve their recall and Retention of scientific concepts. By combining words, symbols, and drawings, students can better organize information and enhance their understanding of complex topics. (1) Students. Students are encouraged to use doodle note-taking during Science lessons to improve their recall and retention of scientific concepts. By combining words, symbols, and drawings, they can better organize information and enhance their understanding of complex topics. (2) Teachers. Science teachers are recommended to incorporate doodle note-taking as a teaching strategy in Science 10 classes by providing guided doodle note templates and allowing students to represent lessons creatively, which may increase engagement and improve post-test performance. (3) School Heads and Administrators. School heads are encouraged to support the integration of doodle note-taking in classroom instruction by providing professional development opportunities and instructional materials for teachers to promote innovative teaching practices that enhance students' learning outcomes in Science. (4) Curriculum Planners. Curriculum developers may consider including doodle note-taking as an alternative or supplementary note-taking strategy in Science subjects to support diverse learning styles and improve students' recall and retention. (5) Future Researchers. Future studies are encouraged to examine factors that affect the effectiveness of doodle note-taking on recall and retention, such as students' learning styles, prior knowledge, motivation, grade levels, lesson complexity, intervention duration, and other learning outcomes, as well as its impact on comprehension, critical thinking, and overall academic performance, to further optimize its use as a strategy for enhancing science learning.

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Data Availability Statement

Data sharing is available upon submitting a formal request letter to the authors of the study.

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Appendices

No appendices are attached in this study