Enhancing Grade 7 Science Academic Performance and Concept Retention through Visual Learning- Driven Pedagogy

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ABSTRACT

Science education is essential in helping Grade 7 learners develop knowledge, critical thinking, and problem-solving skills. Many science concepts are difficult to understand through text alone, highlighting the need for instructional materials that simplify learning and increase learner engagement.

This study aimed to promote engaging, visually appealing, and learner-centered learning. It also sought to identify the challenges Science teachers face in using Visual Learning-Driven Pedagogy and develop instructional materials that enhance learners' concept retention in Science. It also aimed to investigate the effectiveness of utilizing Visual Learning-Driven Pedagogy in improving academic performance and science concept retention of Grade 7 Science learners at Western Bicutan National High School in the Division of Taguig City and Pateros.

The study used a descriptive-developmental research design with a one-group pre-test–post-test approach. Surveys were administered to Science experts and teachers, while Grade 7 learners completed pre-test and post-test to measure their academic performance and concept retention.

The study concluded that Visual Learning-Driven Pedagogy -instructional materials effectively improved learners' academic performance and concept retention in Science. The findings showed that learners were able to better understand, remember, and recall Science concepts over time. Despite some challenges, Visual Learning-Driven Pedagogy remains an effective approach to improving learning outcomes when supported with proper training and resources.

Keywords: Visual Learning-Driven Pedagogy, concept retention, academic performance, infographics, learner engagement

INTRODUCTION

The education system in the Philippines keeps on progressing towards more effective ways of instruction and learning processes. With this, the used of visualization and learner-centered teaching approach that is aligned with the K to 12 Science Curriculum issued by the Department of Education in the Philippines is among the many reforms that have been initiated. The reformed curriculum emphasized the use of the inquiry method of learning instruction. The basis of this educational reform is the K to 12 Basic Education Program which was also known as the Matatag Curriculum and finally into the Revised K to 12 Curriculum.

The legal foundation of the K to 12 Curriculum under Republic Act No. 10533 (Enhanced Basic Education Act of 2013) mandates the use of teaching strategies that are developmentally appropriate and responsive to learners' needs. This curriculum, which is learner-centered and competency-based, advocates for the use of teaching strategies that call for innovations that make teaching methods responsive and cater to the diverse learning needs of learners.

To strengthen the implementation of this curriculum, DepEd Order No. 21, series of 2019, titled Policy Guidelines on the K to 12 Basic Education Program, underscores the importance of using appropriate pedagogical

approaches and learning resources that promote meaningful learning, critical thinking, and improved learner performance.

Learners are expected to retain important scientific concepts and apply them in real world situations along with developing knowledge under this curriculum. Helping learners understand difficult concepts in an interesting and meaningful way is a problem that arises in Science 7 classes, particularly when dealing with abstract or technical content.

Currently, the highest number of learners present in schools are those that fall into the category of visual. These kinds of learners respond best to the process of learning if there is an element of image in what they are expected to learn. Traditional methods of instruction have mostly been dominated by text learning. This kind of teaching method makes it difficult for learners to perform well. Since visual learning is increasingly becoming popular in the way people consume and analyze information today, it is crucial that a proper learning method be used.

The utilization of Visual Learning-Driven Pedagogy significantly supports in achieving the goals of the Revised K to 12 Curriculum through helping improve academic performance in the Science subject area. The inclusion of Visual Learning- Driven Pedagogy - instructional material in lessons may help improve learners' comprehension as well as enhance their analytical, synthesizing, and evaluative skills. This pedagogy may be considered relevant because of the performance-based nature of the curriculum.

The main objective of this study was based on the assumption that using Visual Learning-Driven Pedagogy in science education can change passive learning into an engaging, visually stimulating, and learner-focused process. It investigates how well Visual Learning-Driven

Pedagogy works as teaching aids and as a tool to help learners comprehend science concepts in the learning process and correctly complete the tasks and assessments.

This study, therefore, seeks to investigate the effectiveness of Visual Learning-Driven Pedagogy in improving the academic performance and concept retention among Grade 7 Science learners.

LITERATURE-BASED RESEARCH FRAMEWORK

Learners find it difficult to develop a comprehensive understanding of science concepts. This study was anchored on both established learning theories and relevant legal mandates that support innovative, learner-centered instructional pedagogy in teaching science. It examines how the use of Visual Learning- Driven Pedagogy-instructional material influences learners' academic performance and concept retention.

According to Richard E. Mayer's Cognitive Theory of Multimedia Learning as cited in Herras, M. (2024), learners used both their visual and hearing systems to comprehend information. When both mediums are used at the same time,

learning is more successful. This theory suggests that learners understand concepts better when information is presented through both words and visuals. By connecting new information with what they already know, learners can develop a deeper understanding and retain concepts more effectively.

The Cognitive Theory of Multimedia Learning became the basis of the study since it served as background for using visual learning-driven pedagogy as a learning-centered pedagogy that promotes active processing and deep understanding of knowledge among Grade 7 Science learners.

The study gained support from the educational policies and legal mandates that act as the firm foundation for the theories applied in this research paper. The implementation of the K-12 Basic Education Curriculum of the Department of Education (DepEd), through Republic Act No. 10533, makes use of the learner-centered, inclusive, and inquiry approach to education. Through this mandate, the DepEd also recommended the use of instructional materials like infographics in the classroom setting.

Furthermore, the DepEd Order No. 21, s. 2019 also stresses the significance of having an efficient method of

delivering instruction and using different teaching methods for better learning. The utilization of Visual Learning-Driven Pedagogy in learning is aligned with the above-mentioned requirements, as it helps learners to organize their thoughts and learn more effectively. It also noted that Visual Learning-Driven Pedagogy helped improve critical thinking, understanding of complex information, and motivated learners to learn, supporting the notion that visual instructional tools enhance learning outcomes.

METHODOLOGY

Research Design

This study which is entitled as "Enhancing Grade 7 Science Academic Performance and Concept Retention Through Visual Learning- Driven Pedagogy primarily aimed to determine the extent of utilizing a developed instructional material on learners' knowledge retention and the learner's academic performance. To attain the purpose and objectives of the study, a descriptive-developmental research design paired with a one-group pre-test-post-test design was used.

The descriptive - developmental research design was applied to effectively create and test the effectiveness of using Visual Learning- Driven Pedagogy- instructional materials in Grade 7 Science. The descriptive research design was used to gather information pertaining to learners' needs and understanding of the identified concepts in science. With the help of tools like survey questionnaires, the researcher was able to gain factual and accurate information which was the basis for designing and developing the infographic instructional material. This research strategy facilitated the collection of factual and quantifiable data from which the instructional materials were created.

Meanwhile, the developmental aspect of the study focused on the systematic development, validation, and refinement of infographic-based instructional materials for Grade 7 Science. The use of the developmental research strategy involves following a cyclical process and systematic procedure to enhance teaching through the development of learning materials.

In addition to the survey, a one – group pre-test – post-test approach is also used to determine the extent of utilization of Visual Learning- Driven Pedagogy- instructional materials on the learners' concept retention and academic performance. The pre-test was done prior to the use of instructional material to gauge the level of knowledge that the learners possessed concerning science concepts. After the implementation of the Visual Learning- Driven Pedagogy- instructional materials, a post-test was then performed to determine whether any improvement had been brought about as a result of using the instructional material.

The descriptive aspect creates benchmark information which helps in designing the instructional material, whereas the developmental aspect helps in developing and evaluating the instructional material depending upon the needs of the learners. The one-group pre-test - post-test results enabled the researchers to measure changes in learners' academic performance and determine the extent to which the instructional material contributed to improved understanding of the science concepts.

Research Locale and Participants

The study involved three primary participant groups: Science experts, Science teachers and Grade 7 learners from public secondary schools in the Division of Taguig City and Pateros. These three groups utilized the infographic materials developed. The first and second group from the five (5) secondary schools were chosen following certain criteria, which are: 1st, they were categorized as Science experts and Science teachers; 2nd, their number of years in teaching Science subject and lastly their educational attainment. Moreover, the third group were Grade 7 learners of Western Bicutan National High School where the researcher teaches.

Sampling Technique

The researcher used a purposive sampling technique. This means that a careful selection of respondents that would satisfy certain conditions necessary for this research took place. It is employed because only Grade 7 Science teachers and Science experts from five (5) secondary public schools in the Division of Taguig and Pateros

were utilized to ensure in-depth assessment of effectiveness of utilizing Visual Learning- Driven Pedagogy- instructional materials. There were one hundred thirty-seven (137) Grade 7 learners who participated in the study, along with thirty-three (33) Science teachers and sixteen (16) Science experts. Additionally, the study was conducted at Western Bicutan National High School- the school where the researcher is currently teaching, where the pre-testing and post-testing took place before and after the usage of Visual Learning- Driven Pedagogy- instructional materials.

Research Instrument

The research instruments used in this study were geared towards gathering useful data that would be essential in the attainment of the objective of this study. These were selected and tested to guarantee their suitability, clarity, and relevance utilizing Visual Learning- Driven Pedagogy- instructional materials in improving academic performance and concept retention for grade 7 science. These instruments included the following: 1. Survey Questionnaire on the Extent of Utilization of Visual Learning-Driven Pedagogy and Problems encountered by science teachers in using the Visual Learning-Driven Pedagogy, which aimed to measure how frequent does Grade 7 Science teachers integrate visual learning driven - pedagogy, such as infographics and other visual aids, in delivering science instruction and identify the instructional barriers.

2. Survey questionnaire on the acceptability of the Visual Learning- Driven Pedagogy- instructional materials. The instrument sought to evaluate the level of acceptability of the developed materials in terms of sub-variables, including objectives, content, activities, usefulness, language and style, organization, presentation, evaluation and application.

3. Knowledge Retention Tests (short and long quiz), which are administered to measure short- and long-term memory retention of learners after using Visual Learning- Driven Pedagogy- instructional materials. This is an assessment tool used to measure how well learners retain and recall science concepts after instruction.

4. Academic achievement test (Pre-test and Post-test), which was designed to evaluate the academic performance of grade 7 learners in science class. These tools, when taken together, enabled a structured assessment of the research's sub-variables, such as the effectiveness of the Visual Learning- Driven Pedagogy- instructional materials in terms of the pre-test and post-test results and the appropriateness of the materials for use as learning materials according to the identified criteria. With the help of these tools, necessary information was obtained, allowing an analysis of the learners' academic performance.

Data Gathering Procedure

The data gathering procedures were conducted from January to March 2026. After securing approval from the Schools Division Office of Taguig City and Pateros, the researcher coordinated with the participating school and obtained the necessary informed consent. The Visual Learning-Driven Pedagogy (VLDP) instructional materials were developed, validated by experts, revised, and implemented with Grade 7 learners for eight weeks. A pre-test, post-test, and knowledge retention test were administered to measure learners' performance. The collected data were then tabulated, analyzed, and interpreted with the assistance of a statistician. Finally, the completed manuscript was submitted to the research adviser for review and approval before the final oral defense.

Statistical Treatment

The following statistical tools for the interpretation of the results according to sub-problems were used:

(a) Frequency- It was the actual response to a specific item/question in the questionnaire where the respondents tick choices.

(b) Mean Performance Score (MPS)-This was used to determine the performance level of the students in the pre-test and post-test.

(c) Weighted Mean - This statistical tool was used to determine the extent of utilization of Visual Learning – Driven Pedagogy in teaching Grade 7 Science(Sub-problem 1), the problems and challenges encountered by

teachers in using Visual Learning- Driven Pedagogy- instructional materials (Sub-problem 2), and the assessment of the instructional materials.

(d) Cronbach's Alpha - This was used to determine the reliability and internal consistency of the survey questionnaires and test instruments after pilot testing.

(e) Shapiro–Wilk Test of Normality. This was employed to determine whether the data gathered from the respondents were normally distributed.

(f) Paired Sample T-test - This was employed to determine whether there is a significant difference between the pre-test and post-test scores of the learners.

Creation, Validation and implementation of VLDP instructional materials

Description

- The VLDP consists of infographic-based learning materials designed for Grade 7 Science under the MATATAG Curriculum.
- Each infographic includes simplified concepts, illustrations, key vocabulary, guided activities, and formative assessments.
- The VLDP instructional materials included approximately eight (8) to nine (9) lessons per quarter, depending on the required learning competencies. Each lesson was developed to align with the specific Grade 7 Science learning competencies under the MATATAG Curriculum.

Development Procedures

1. Identified the Grade 7 Science competencies.
2. Reviewed related literature and existing instructional materials.
3. Designed infographic layouts using visual learning principles.
4. Developed the draft VLDP materials.
5. Submitted the materials for expert validation.
6. Revised the materials based on experts' comments.
7. Finalized the validated VLDP for classroom use.

Evaluation of instructional materials

1. The VLDP was evaluated by science education experts and experienced Grade 7 Science teachers.
2. Validation focused on:
    - Objectives
    - Content
    - Activities
    - Language and Style
    - Organization
    - Presentation
    - Evaluation
    - Application
    - Usefulness

3. Include the rating scale used (e.g., a 5-point Likert scale) and record the overall acceptability.
4. Explain the Implementation Duration

Implementation Duration

The validated VLDP instructional materials were implemented during regular Grade 7 Science classes over a period of eight (8) weeks, covering the competencies for the fourth quarter of the School Year 2025 - 2026. A

pre-test was administered before the intervention, and a post-test and concept retention test were conducted after the implementation period.

RESULTS AND DISCUSSION

Profile of the Respondents

The respondents were composed of representatives from five secondary schools in the Division of Taguig City and Pateros which came out in the non-probability sampling. The selection of the teacher-respondents was made through total enumeration since the total population is small scale only. A total of sixteen (16) Science experts and thirty-three (33) Science teachers participated in the survey through a total enumeration sampling.

To assess and determine the significant difference in their academic performance and concept retention on Grade 7 Science, 137 identified Grade 7 learners that came from 4 sections at Western Bicutan National High School participated in the study. There are 40 learners from Grade 7 - Rizal, another 45 learners from Grade 7 – Bonifacio, then 25 Grade 7 learners from Grade 7 Escoda and 27 Grade 7 Learners from Grade 7 – Villavicencio.

Summary

The following are the salient findings of the study:

1. On the extent of utilization of Visual Learning-Driven Pedagogy in teaching Grade 7 Science in the Division of Taguig City and Pateros

Among the indicators on the extent of utilization of Visual Learning-Driven Pedagogy in teaching Grade 7 Science, “Integrate pictures and illustrations into lesson discussions” and “Align instructional images with the objectives of the lesson” were the most commonly practiced by science teachers, both with a weighted mean of 3.73, indicating they are practiced to a Great Extent. The practices such as “Utilize visual strategies to support diverse learners” (WM = 3.61), “Utilize charts and diagrams to explain Science concepts” (WM = 3.55), and “Utilize visual pedagogy to improve learners’ understanding of science concepts” (WM = 3.52) were also considered as commonly practiced among the respondents.

Furthermore, the practices including “Utilize visual presentations as learning tasks” (WM = 3.21), “Utilize visual representations in group learning activities” (WM = 3.21), “Utilize visual representations to show relationships among concepts” (WM = 3.21), “Utilize visual analogies to enhance conceptual understanding” (WM = 3.21), “Find lessons easier to deliver when visual support is utilized” (WM = 3.21), “Adapt visual materials to suit learners’ level of understanding” (WM = 3.18), and “Utilize visual learning to enhance learners engagement” (WM = 2.73) were interpreted as practiced to a Moderate Extent. Meanwhile, “Utilize visual representations to help learners retain lesson content” (WM = 2.48) was the least practiced among the indicators, interpreted as Less Extent.

Overall, the extent of utilization of Visual Learning-Driven Pedagogy in teaching Grade 7 Science was interpreted as Great Extent (WM = 3.28), indicating that visual pedagogies are generally integrated in science instruction, although there is still a need to strengthen their use in areas such as retention and deeper engagement.

2. On the problems encountered by science teachers in using the Visual Learning-Driven Pedagogy

Among the problems encountered by science teachers in using Visual Learning-Driven Pedagogy, “Lack of ready-made visual materials aligned with the Science curriculum” was identified as the most serious concern, with a weighted mean of 3.88, interpreted as High Severity. This was followed by “Time constraints in preparing infographic-based instructional materials” (WM = 3.82) , “Limited training on visual learning-driven pedagogy” (WM = 3.73), “Insufficient skills in designing Visual Learning-Driven Pedagogy- instructional material” (WM = 3.67), and “Lack of confidence in integrating Visual Learning-Driven Pedagogy (VLDP) into science lessons” (WM = 3.52), all of which were also interpreted as High Severity. These findings indicate that teacher preparedness and time limitations are the primary barriers in effectively implementing visual learning strategies.

Furthermore, other challenges such as "Difficulty managing time when using Visual Learning-Driven Pedagogy (VLDP)" (WM = 3.48), "Challenges in aligning visual activities with learning competencies" (WM = 3.48), and "Classroom management issues during visual-based activities" (WM = 3.42) were also interpreted as High Severity. Meanwhile, "Limited availability of ICT tools" (WM = 3.36) and "Large class size limits effective implementation" (WM = 3.24) were considered as Moderate Severity, indicating that resource and classroom-related constraints also affect implementation but to a lesser extent.

On the other hand, "Visual materials sometimes distract learners from lesson objectives" (WM = 2.58) was identified as Low Severity, suggesting that this is not a major concern among teachers.

Overall, the problems encountered in using Visual Learning-Driven Pedagogy were generally experienced at a moderate to high level of severity, indicating that while teachers recognize the value of visual strategies, challenges related to time, training, and skills remain significant barriers to their effective implementation

3. On the Visual Learning Driven Pedagogy That May Develop

Among the Visual Learning-Driven Pedagogies used in teaching Science, "Charts and Graphs" was the most frequently utilized by science teachers, with a frequency of 11 (33.33%), indicating that it is the most applied pedagogy in classroom instruction. This suggests that teachers use this because it supports the presentation of numerical data, comparisons, and trends in a visual format. The strategies such as Videos and animations (f= 9, 27.27%) emerged as the second most frequently used Visual Learning-Driven Pedagogy because teachers can readily access multimedia instructional resources through YouTube and Google. Next is "Illustrations" (f=7. 21.21%) which ranked third, indicating that teachers rely heavily on simple and accessible visual tools such as drawings and images to explain scientific concepts.

Furthermore, "Infographics" (f = 4, 12.12%) were also in the list of utilized instructional material by the respondents, showing that teachers are beginning to integrate more structured and informative visual pedagogies in their lessons. On the other hand, "Concept Maps and Graphic Organizers" (f = 1, 3.03%) were the least utilized pedagogy, indicating minimal use of tools that promote organization of ideas and higher-order thinking skills.

Overall, the findings indicate that science teachers commonly use basic visual strategies such as charts and graphs, video and animations and illustrations while more advanced visual learning tools like infographics and concept maps are less frequently applied. This suggests the need to develop a more comprehensive Visual Learning-Driven Pedagogy that integrates both basic and advanced visual strategies to enhance learners' understanding, engagement, and retention of scientific concepts.

4. On the acceptability of the Visual Learning-Driven Pedagogy-Instructional Material for Grade 7 among Science Experts and Teachers in terms of:

4.1. Objectives. The objectives criteria were found to be Highly Acceptable (WM = 4.85) to both Science teachers and science experts.

4.2. Content. The content criteria obtained a composite mean of 4.77, interpreted as Highly Acceptable.

4.3. Activities. The composite mean of the activities criteria was 4.77, or Highly Acceptable.

4.4. Usefulness. The usefulness criteria received a composite mean of 4.83, indicating a Highly Acceptable rating.

4.5. Language and Style. The language and style of the material were assessed as Highly Acceptable with a composite mean of 4.89.

4.6. Organization. The organization of the material obtained a composite mean of 4.82, interpreted as Highly Acceptable.

4.7. Presentation. The presentation of the material was rated as Highly Acceptable with a composite mean of 4.93.

4.8. Evaluation. The evaluation criteria obtained a composite mean of 4.84, indicating a Highly Acceptable rating.

4.9. Application. The application of the material was assessed as Highly Acceptable with a composite mean of 4.83.

Overall, the infographic instructional material was found to be Highly Acceptable (WM = 4.83), indicating strong agreement between Science Teachers and Science Experts on its effectiveness and suitability for teaching Grade 7 Science.

5. On the impact of Visual Learning-Driven Pedagogy-Instructional Material on the academic performance of learners in teaching Grade 7 Science in the Division of Taguig City and Pateros

The results indicate that learners initially performed at a middle level in the pre-test, with a mean percentage score of 64.99, verbally interpreted as average. After the use of the infographic instructional material, there was a substantial increase in performance, with a Mean Percentage Score of 95.69, verbally interpreted as Mastered. A large proportion of learners (59.1%) reached the Mastered indicator, followed by 39.4% in Approximating Mastery indicator, while only 1.5% remained in the Moving Towards Mastery indicator.

The computed t-value of -64.7 and p-value of <0.001 indicate that there is a significant difference between the pre-test and post-test performance of the learners at the 0.05 level of significance. This confirms that the use of the Visual Learning-Driven Pedagogy-Instructional Material had a significant positive effect on learners' academic performance.

The findings suggest that the integration of infographic-based instructional materials greatly enhances learners' understanding, retention, and engagement in Science. The use of visual learning-driven pedagogy enables learners to process complex concepts more effectively, resulting in improved academic achievement.

6. Concept Retention of Learners in an 8-Week Period Using Visual Learning-Driven Pedagogy-Instructional Materials

The results of the study reveal a consistent and progressive improvement in learners' concept retention over the 8-week implementation of the Visual Learning-Driven Pedagogy-Instructional Material. The findings from the Immediate Retention Rate (IRR), Delayed Retention Rate (DRR), and Knowledge Retention Rate (KRR) collectively demonstrate the effectiveness of Visual Learning-Driven Pedagogy in enhancing both short-term and long-term retention of scientific concepts.

For Immediate Retention Rate (IRR), the number of learners achieving Excellent Retention increased steadily from 45 learners (32.85%) in Week 1 to 80 learners (58.39%) in Week 8. At the same time, the number of learners in the Moderate and Low Retention categories gradually decreased. This indicates that learners were increasingly able to retain concepts immediately after instruction as they were continuously exposed to infographic-based materials. The results suggest that visual representations significantly enhance immediate comprehension and memory recall.

Similarly, the Delayed Retention Rate (DRR) shows a gradual improvement in learners' ability to retain knowledge over time. The number of learners classified under Excellent Retention increased from 35 (25.55%) in Week 1 to 58 (42.34%) in Week 8, while those under Moderate and Low Retention steadily declined. Although delayed retention is naturally lower than immediate retention, the upward trend indicates that learners sustained their understanding of concepts beyond initial instruction, suggesting reduced knowledge decay over time.

Regarding the Knowledge Retention Rate (KRR), the results further confirm this positive trend. The increasing number of learners achieving Excellent Retention over the weeks indicates that they retained most or all of what they initially learned. Meanwhile, the decreasing number of learners in lower retention categories demonstrates improved consistency between immediate learning and delayed recall. This suggests that Visual Learning-Driven Pedagogy-Instructional Materials not only enhance understanding but also strengthen long-term memory retention.

Overall, the results consistently show that the use of Visual Learning-Driven Pedagogy-Instructional Materials significantly improved learners' concept retention across all measures. The steady increase in Excellent Retention and the decline in lower retention levels across IRR, DRR, and KRR indicate that Visual Learning-Driven Pedagogy effectively enhances comprehension, reinforces memory, and promotes sustained mastery of scientific concepts over time.

CONCLUSIONS

Based on the key findings of the study, the following were concluded:

First, Science teachers demonstrate a strong extent of utilization of Visual Learning-Driven Pedagogy in teaching Grade 7 Science by incorporating illustrations, charts, diagrams, and visual strategies aligned with lesson objectives, although its use in promoting retention and deeper engagement still needs enhancement.

Second, the implementation of visual learning-driven pedagogy was challenged by factors such as limited preparation time, insufficient training, and inadequate competencies in developing and utilizing visual instructional materials.

Third, teachers commonly employ visual pedagogies such as Charts and Graphs, Videos and Animations and illustrations in science instruction, while instructional tools like infographics and Concept Maps and Graphic Organizer are less frequently used, indicating the need for a more comprehensive and balanced integration of visual learning strategies.

Fourth, the developed Visual Learning-Driven Pedagogy-Instructional Material is highly acceptable to both Science teachers and Science experts across all criteria, including objectives, content, activities, usefulness, language and style, organization, presentation, evaluation, and application. This indicates that the material is well-structured, suitable for classroom use, and effective in enhancing science lessons.

Fifth, the use of Visual Learning-Driven Pedagogy-Instructional Material significantly improves learners' academic performance in Science, as evidenced by the substantial increase in post-test scores and the statistically significant difference between pre-test and post-test results.

Sixth, the findings show that Visual Learning-Driven Pedagogy-Instructional Material significantly improved learners' concept retention. Learners demonstrated strong immediate understanding, sustained retention over time, and consistent recall of learned concepts. Overall, Visual Learning-Driven Pedagogy effectively enhances both short-term and long-term retention, supporting learners' mastery of science concepts.

RECOMMENDATIONS

Based on the findings and conclusions of the study, the following were recommended:

1. Science teachers may continue to strengthen the integration of Visual Learning-Driven Pedagogy by consistently incorporating a wider range of visual pedagogy such as infographics, concept maps, animations, and interactive visuals to enhance learners' understanding, engagement, and retention of scientific concepts.
2. Science teachers may enhance the use of visual pedagogy not only for explanation but also for promoting higher-order thinking, concept retention, and meaningful learning by integrating visual representations in group activities, assessments, and real-life applications.
3. Science teachers and school administrators may adopt and implement the developed Visual Learning-Driven Pedagogy-Instructional Material in teaching Grade 7 Science. Furthermore, they may provide support through training, workshops, and access to ICT resources to improve teachers' skills in designing and utilizing visual instructional materials.
4. Science teachers and science experts may collaborate in developing and refining visual instructional materials to ensure alignment with curriculum standards, learner needs, and effective teaching practices, particularly in improving content depth and activity design.

5. Schools and educational institutions may address the challenges encountered by teachers, such as time constraints, limited training, and insufficient skills in designing Visual Learning-Driven Pedagogy-Instructional Material, by providing professional development programs and adequate technological support.
6. Science teachers are encouraged to regularly integrate Visual Learning-Driven Pedagogy-Instructional Materials into Science instruction to further enhance learners' academic performance. The developed Visual Learning-Driven Pedagogy-Instructional Materials may be utilized as supplementary learning resources for classroom instruction, remediation, enrichment activities, and independent learning.
7. Future researchers may conduct similar studies using larger sample sizes, different grade levels, or other subject areas to further validate the effectiveness of Visual Learning-Driven Pedagogy. They may also explore additional variables such as learner engagement, motivation, and long-term retention to provide a more comprehensive understanding of the impact of visual instructional pedagogy.
8. Future researchers may explore the use of digital and interactive Visual Learning-Driven Pedagogy-Instructional Materials and compare their effectiveness with printed Visual Learning-Driven Pedagogy-Instructional Materials. Features such as animations, videos, clickable content, and interactive activities may make learning more engaging and enjoyable for learners. Examining these formats can help determine whether technology-enhanced Visual Learning-Driven Pedagogy-Instructional Materials can further improve learners' understanding, participation, and retention of Science concepts.

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