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STRATEGIC INTERVENTION MATERIALS (SIMs) IN BIOLOGY FOR GRADE 7 LEARNERS IN GOGON HIGH SCHOOL: AN ASSESSMENT

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ABSTRACT

This research investigates the effectiveness of Strategic Intervention Materials (SIMs) in enhancing the learning of Grade 7 students in biology at Gogon High School. By assessing the impact of SIMs on student comprehension, engagement, and retention of biological concepts, this study aims to provide valuable insights into the pedagogical strategies that support student learning in biology. This experimental research investigated the Pre-test results in biology, identified the intervention that the researcher prepared for the least learned competencies, determined the post-test result using the SIM, Determined the relationship between the pre-test and post-test results, and developed a SIM on the results of the Post-test. The researcher used the pre-test and post-test results to create the SIMs. The researcher utilized Spearman's t-test to compare the types of Assessments mentioned. Analyzed data revealed a t-value of 5 % level, which is 2.64, with an interpretation of highly significant, suggesting a substantial relationship between the Pre-Test and Post-Test results. Competencies No. 3 and 6 had the lowest percentage of mastery level, which needed interventions. The increase in the student's performance determined the effectiveness of SIM, and there is a significant relationship between the assessments. The recommendations encompass investigating targeted interventions, utilizing Strategic Intervention Materials (SIMs) to address weaknesses, optimizing student performance through tailored interventions.

KEYWORDS: Biology, Strategic Intervention Materials, Least Mastered Competencies, Experimental Design.

1. INTRODUCTION

In modern education, the focus on practical teaching methods aims to equip learners with essential skills for navigating a complex global landscape. Education stakeholders, such as educators and policymakers, are dedicated to enhancing teaching quality through innovative approaches like Strategic Intervention Materials (SIMs) to improve student learning experiences. SIMs are dynamic tools strategically integrated into the teaching process to enhance student understanding and engagement, particularly in scientific education, fostering a comprehensive grasp of subjects. The use of experimental design in educational research, as exemplified in a study at Gogon High School, demonstrates how SIMs can positively impact student comprehension and mastery of biology concepts through structured pre-test/post-test assessments and targeted interventions.

Salagaram et al. (2019) studied educators implementing a lesson study intervention for teaching electricity and magnetism involving four physical science teachers from suburban and rural schools. The study used observations, interviews, and reflective writings to gather data, showing that the lesson collaborative study enhanced teachers' professional skills but faced challenges like time constraints and lack of support. The research emphasizes the need for policymakers to support Lesson Study as a professional development initiative in schools. It suggests exploring its use in pre-service science teacher education to improve collaborative practices among educators and enhance student performance.

The research design employed a quasi-experimental approach with a pre-test/post-test control group design to assess the impact of Strategic Intervention Materials (SIMs) in Grade 7 biology education at Gogon High School. The experimental group employed SIMs that targeted specific competencies, whereas the control group received standard training. Pre- and post-tests were given to evaluate the learners' learning results. The study's internal validity was enhanced through random assignment and control of extraneous variables, allowing for a robust assessment of SIMs' effectiveness in improving student comprehension and mastery of biology concepts.

The study of Hadiprayitno, G., Muhlis, & Kusmiyati. (2019, June) survey aimed to determine how difficult it was for senior high school students to understand specific biology topics and any issues with the teaching and learning process. Five hundred sixty-eight students and 24 biology teachers were polled at senior high schools across the island of Lombok as part of the study, using qualitative and quantitative statistics in data analysis. According to this poll, the most challenging subjects include genetics (8.41%), cell structure (8.81%), cell structure and function (8.81%), endocrine system (10.63%), bacteria and viruses (18.64%), and nervous system (8.28%). The three main obstacles students face when learning the material are using scientific names, the intricacies of the topics, and the student's learning habits. The study also identified issues that teachers were having at the planning stage (23.27%), implementation stage (48.63%), and evaluation stage (28.10%) of the teaching process. By constructing a Strategic Intervention Material in Biology, the

main goal of this study is to assist teachers in creating effective instructional materials; the study justified the problems encountered in dealing with biology class and the need to develop an intervention material to facilitate the teaching-learning process easily.

The purpose of Ramdiah, S., & Royani, M. (2019) study was to evaluate the scientific literacy abilities of junior high school (JHS) students taking biology classes in South Sulawesi, Indonesia. This study used a survey methodology. The samples were selected using a stratified progressive random sampling approach. The research sample consisted of 235 students from four junior high schools: JHS 4 Makassar, JHS 26 Makassar, JHS 2 Maros, and JHS 4 Sinjai. Two classes were selected to represent each school. The study's findings indicated that junior high school students had a 17.02% understanding of the scientific inquiry method and a 36.23% capacity for organizing, analyzing, and interpreting quantitative data and scientific knowledge. The study found that junior high school student's scientific literacy in biology instruction was still low. The teacher should implement a constructivist learning strategy, such as the inquiry method, and supplement it with cutting-edge media and learning materials to improve students' scientific literacy. Even in Indonesia, creating learning materials that suit learners' needs is necessary for teaching.

This study looked at how learning and perseverance in a massive open online course (MOOC) were affected by pre-tests and feedback. In the climate change MOOC offered by the American Museum of Natural History (AMNH), 399 participants worldwide joined. It was randomized to one of four experimental conditions. In the first group, learners completed pre-tests without getting feedback. The second group of learners completed pre-tests and were given essential feedback (correct/incorrect). The third group of learners completed pre-tests and got thorough feedback. The control group was number four. Post-tests were used to measure the learning objectives. The findings showed that (1) pre-tests and feedback had no effect on learning outcomes for any student; (2) pre-tests had a negative impact on persistence; Pre-tests (3) significantly impacted learning outcomes for those who finished the course; and (4) persistence positively impacted learning for those who took the pre-tests. These results add something fresh to the knowledge of evaluation and feedback. (Janelli, M., & Lipnevich, A. 2021)

Leung, K. C. (2019) research used treatment-control/comparison designs that were primarily included in prior meta-analyses on peer tutoring, while research that used pre-test-post-test designs was left out. However, Specific important intervention modifiers should be considered when assessing the efficacy of other therapies that use a pre-test-post-test design, according to some recent meta-analyses on those programs. Therefore, to determine the key factors that affect tutees' academic progress and assess mean effect sizes, the current study used 36 peer tutoring studies with a single group pre-test-post-test design. Similar moderators were observed in this study compared to earlier meta-analytic investigations of peer tutoring that employed treatment-control/comparison designs. It can also offer more proof in favor of role theory. There is a discussion of the

implications for educational methods and how to get around the drawbacks of earlier meta-analyses that used a treatment-control/comparison methodology.

At Gogon High School, the researcher studied how unique teaching materials called Strategic Intervention Materials (SIM) are helping Grade 7 students in their biology class. The researcher conducted this study to ensure the students got the best education possible. A law called the "Ladderized Education Act of 2014" says education in the Philippines should be organized and easy for students to move through. Grade 7 is an essential time because students are starting to learn more specific subjects like biology. The study's main contribution is providing localized educational insights tailored to the unique circumstances of Gogon High School and similar institutions. It offers practical and contextually relevant recommendations for enhancing Grade 7 biology education by focusing on the specific school context and considering local curriculum, language, and cultural factors to ensure the findings directly apply to the school's educational challenges.

The study at Gogon High School in the Philippines aims to enhance Grade 7 biology education through Strategic Intervention Materials (SIMs) tailored to the school's needs. Using a quasi-experimental design, the research compares student outcomes between control and experimental groups using SIMs. Analysis of pre-test and post-test results informs the development of targeted instructional materials. With 80 Grade 7 students involved, the study provides comprehensive insights, benefiting Gogon High School and similar institutions in the Philippines. The collaboration with the school administration ensures the successful implementation of evidence-based recommendations for improving biology education.

The diagnostic test results from the Grade 7 assessment at Gogon High School play a pivotal role in shaping educational strategies by pinpointing student strengths and areas needing improvement. These insights guide educators in customizing teaching methods to address individual learning needs, enhancing the learning process's effectiveness and efficiency. Furthermore, the data-driven decisions derived from these results facilitate timely interventions, progress tracking, and adaptive teaching techniques, fostering a more responsive and student-centered educational environment. Specifically, the assessment highlighted that 23% of students required support in understanding ecological interactions (Competency No. 6), while 24% needed to master distinguishing plant and animal cells (Competency No. 3), underscoring the need for targeted interventions to bolster comprehension of these vital biology concepts.

The research endeavor is underpinned by the theoretical foundations of Cognitive Load Theory (CLT) (Sweller& Chandler, 1991), Social Cognitive Theory (SCT) (Bandura, 2001), and Bioecological Theory (. Bronfenbrenner and Ceci, 1994). These theoretical frameworks play a

pivotal role in shaping the research's conceptual framework and guiding our understanding of how strategic intervention materials (SIMs) can affect the performance of Grade 7 learners in biology.

The Cognitive Load Theory was created in 1991 by John Sweller and offers insights into how learners process information and manages cognitive resources. In the context of Grade 7 learners interacting with SIMs in biology education, CLT helps analyze cognitive demands. By considering intrinsic, extraneous, and germane cognitive load, researchers aim to optimize SIMs to enhance cognitive resource allocation, improving learning efficiency and effectiveness. The theory stresses effective instructional design to focus cognitive resources on relevant activities, highlighting the challenges of integrating different information sources like text and graphics. Findings from experiments in electrical engineering and biology emphasize the benefits of integrated instructions, caution against excessive content, and underscore the importance of physical integration for understanding complex topics, guiding recommendations for tailored instructional approaches based on cognitive principles.

Social Cognitive Theory, developed by Albert Bandura (1991), expands perspective by highlighting the significance of social interactions, observational learning, and self-regulation in the learning process. In the context of this research, SCT recognizes that learners' performance in biology is not solely a product of individual cognitive processes but is deeply intertwined with their social environment. Investigate how SIMs can cultivate a collaborative and supportive learning environment at Gogon High School, enabling students to observe and learn from their peers, emulate practical problem-solving approaches, and strengthen their self-efficacy beliefs. This theoretical framework informs our investigation into how the social dynamics within the classroom, facilitated by SIMs, influence the performance of Grade 7 learners in biology.

The bio ecological model, introduced by Urie Bronfenbrenner and Stephen J. Ceci in 1994, posits that children's development is shaped by relationships with parents and caregivers influenced by factors in their environments like work, school, and community. Broader social, cultural, and policy conditions also impact these settings, affecting children's development and resilience. This theory highlights the intricate interplay between relationships and environments. In the context of research on the effectiveness of Strategic Intervention Material (SIM) in Biology for Grade 7 learners at Gogon High School, Bronfenbrenner's bio ecological theory provides a framework to understand how individuals are influenced by various systems from micro to macro systems encompassing cultural and societal influences.

In this study, using SIMs in the biology curriculum is viewed as an intervention within the learners' educational micro system to enhance understanding of biological concepts and improve learning experiences. By incorporating SIMs, the research seeks to create a supportive environment aligned with Bronfenbrenner's proximal processes, emphasizing interactions driving cognitive and

socioemotional development. The bioecological theory underscores the importance of the mesosystem, requiring collaboration among stakeholders like teachers, students, and curriculum developers to integrate SIMs effectively. This collaborative effort reflects mesosystem dynamics influencing individuals' development. Furthermore, the theory highlights ecosystems and macrosystems' role in shaping experiences, with societal factors, educational policies, and cultural influences impacting the implementation and effectiveness of SIMs in biology education, offering insights into factors supporting or hindering educational interventions.

Cognitive Learning Theory (CLT) and Social Learning Theory (SCT) are crucial for understanding how individual characteristics like age, gender, socioeconomic status, and interests influence cognitive processes and learning outcomes. CLT focuses on mental resources and their enhancement for learning, while SCT emphasizes social context and observational learning. These theories help explain how learners' backgrounds and interests impact cognitive load, motivation, and self-efficacy, critical factors in determining learning outcomes. When evaluating the effectiveness of SIMs, CLT is essential for quantifying reduced cognitive burden, while SCT illuminates how SIMs enhance self-efficacy and motivation through social support and observational learning. Using both theories, SIM efficacy can be thoroughly assessed by maintaining a consistent cognitive load in experimental design (CLT) and understanding social influences on learning outcomes (SCT) without SIMs. This comprehensive approach allows for accurately evaluating SIM effectiveness by isolating its effects on learning outcomes.

The creation and implementation of SIMs are guided by Cognitive Learning Theory (CLT) and Social Learning Theory (SCT), which emphasize minimizing cognitive load, maximizing learning effectiveness, and promoting interpersonal communication, constructive criticism, and self-control in education. Integrating these theories allows for developing SIM packages that consider both cognitive and social aspects of learning, enhancing their efficiency and impact. These theoretical frameworks and Bioecological Theory underpin the research on SIMs in Biology, focusing on optimizing learning processes, leveraging social interactions, and understanding contextual influences on learning outcomes. This integration provides valuable insights into how SIMs influence Grade 7 biology education at Gogon High School and contributes to advancing educational knowledge.

A meticulously designed research study examines how Strategic Intervention Materials (SIMs) influence Grade 7 biology performance. Using a quasi-experimental approach, one group receives SIM-based instruction while another follows traditional teaching methods. A comparison of pre-test and post-test results will offer a thorough assessment of student learning progress.

This research design evaluates SIM effectiveness by comparing them to traditional teaching methods using pre-test and post-test assessments. The pre-test establishes a baseline, while the post-

test measures outcomes after interventions, aiming to conclude SIMs' impact on student biology performance. Potential confounders were considered to ensure observed differences result from the instructional method, enhancing the findings' validity.

The control group's performance influences the SIM design and content, determining baseline understanding and learning challenges for Grade 7 Biology students. Insights from the control group guide modifications to address knowledge gaps and misconceptions, tailoring the SIM Package to meet individual student needs. This data is a crucial reference point for developing SIMs that align with students' cognitive and educational requirements at Gogon High School, ultimately enhancing their Biology performance.

The SIMBIO Theory, incorporating Cognitive Load Theory (CLT), Social Cognitive Theory (SCT), and Bioecological Theory, guides the investigation into the effectiveness of Strategic Intervention Materials (SIMs) in Grade 7 biology education at Gogon High School. CLT emphasizes managing cognitive load to enhance learning, advocating for SIMs that minimize extraneous load while maximizing intrinsic load. SCT highlights social interactions and self-regulation, promoting collaborative learning environments in SIMs to boost motivation and self-efficacy. Bioecological Theory underscores environmental influences on development, suggesting SIMs consider diverse factors shaping student experiences. By integrating these theories, the SIMBIO Theory offers a comprehensive framework for optimizing student learning outcomes in Grade 7 biology at Gogon High School, addressing learning's cognitive, social, and ecological aspects.

In the context evaluation phase, the researcher assesses the background conditions and contextual factors relevant to implementing Strategic Intervention Materials (SIMs) in Grade 7 biology education at Gogon High School. This includes examining legislative frameworks such as Republic Act No. 10647 and Republic Act 9155, which mandate quality education and curriculum development initiatives. Additionally, the researcher considers the alignment of SIMs with the Most Essential Learning Competencies (MELCs) for Grade 7 Biology, ensuring that the intervention is relevant to the established curriculum standards.

The input evaluation phase focuses on the resources and strategies for implementing SIMs. Pre-test results indicate that competencies no. 3 and 6, about the differentiation of plant and animal cells and ecological relationships, respectively, are identified as the least learned competencies among Grade 7 learners. This data guides the development of the intervention by prioritizing these areas for targeted instruction. Additionally, input evaluation involves designing and validating the SIM, ensuring alignment with curriculum objectives and educational standards.

The intervention phase encompasses the actual implementation of SIMs in Grade 7 biology education at Gogon High School. Process evaluation activities include test preparation,

development of a Table of Specification to guide content coverage, validation of the SIM by subject matter experts and educators, and data gathering and analysis procedures. Throughout the intervention process, the researcher monitors the fidelity of SIM implementation, addresses any logistical or implementation challenges, and ensures that the intervention is effectively delivered to students.

Product evaluation focuses on assessing the outcomes and effectiveness of the intervention. Post-test results reveal significant improvements in the performance of learners in competencies no. 3 and 6, indicating near mastery levels. The researcher examines the impact of SIMs on student learning outcomes and factors contributing to its success or areas for improvement. The Strategic Intervention Material (SIM) in Biology for Grade 7 learners serves as the primary product of the evaluation, with its efficacy and utility evaluated based on its alignment with curriculum standards, engagement of learners, and enhancement of learning outcomes.

2. OBJECTIVES

The objectives of this study include analyzing the pretest results in biology across six competencies, identifying interventions for the least mastered competencies, determining posttest outcomes using the Strategic Intervention Material (SIM), establishing the correlation between pretest and posttest results, and developing a tailored SIM based on the posttest results. These objectives aim to assess the effectiveness of the SIM in enhancing student learning outcomes in biology at Gogon High School.

This research evaluates the impact of Strategic Intervention Materials (SIMs) on Grade 7 biology education at Gogon High School during the 2023-2024 school year. Focused on enhancing student comprehension of key biological concepts, the study provides localized insights into SIMs' effectiveness within the school's unique context. The research conducted exclusively at Gogon High School considers contextual factors influencing SIM implementation and outcomes. The study's timeframe allows for a concentrated analysis of SIM effects on student learning outcomes in the short term. With 80 Grade 7 students divided into control and experimental groups, the research ensures a balanced representation for comparative analysis. However, the sample size may limit generalizing findings to larger populations.

3. METHODOLOGY

The experimental design involves conducting objective and controlled research to optimize precision and derive conclusions about a hypothesis statement. The goal is typically to find the impact of a factor or independent variable on a dependent variable. When conducting research without adhering strictly to the concepts of hypothesis testing, the principles of experimental design come into play, and this article contains pertinent information for this kind of study (https://tinyurl.com/yh4wyh6b).

The research design employed for the study adopts an experimental design approach. The study utilizes a quasi-experimental design with a pre-test/post-test control group design. Grade 7 learners at Gogon High School are divided into two groups: the control group and the experimental group. The control group receives standard instruction in biology without using SIMs, while the experimental group undergoes instruction supplemented with SIMs targeting the least mastered competencies. Before the intervention, both groups experienced a pre-test assessment to establish baseline levels of understanding in biology, focusing on specific competencies such as differentiating plant and animal cells and describing ecological relationships. Following the intervention, both groups are administered a post-test to measure the impact of SIMs on student learning outcomes. The experimental design allows for a comparison between students' performance in the control and experimental groups, which enable the researcher to evaluate the effectiveness of SIMs in enhancing student comprehension and mastery of biology concepts. Random assignment and careful control of extraneous variables also enhance the study's internal validity. At the same time, using quantitative data analysis techniques facilitates the assessment of the intervention's impact with statistical rigor. Overall, the experimental design provides a robust framework for assessing the efficacy of SIMs in Grade 7 biology education at Gogon High School.

4. RESULTS AND DISCUSSIONS

A. Pre-test Results in Biology

In this section, the pre-test results of Grade 7 learners in Gogon High School are analyzed across six competencies in biology. These competencies encompass a range of topics, from understanding the parts of a microscope to describing ecological relationships in an ecosystem. The analysis aims to provide insights into students' baseline understanding in these areas before implementing Strategic Intervention Materials (SIMs) in biology education.

Table 1. Pre-test Results in Biology

Competencies	Group B		Mastery Level	Group C		Mastery Level
	Average	Percentage		Average	Percentage	
1. Identify parts of the Microscope & their functions.	17	43	Low Mastery	17	42	Low Mastery
2. Describe the different levels of biological organizations from cell to biosphere.	18	44	Low Mastery	17	42	Low Mastery
3. Differentiate plant & animal cells according to presence & absence of certain organelles	9.7	24	No Mastery	9.6	24	No Mastery
4.Differentiate asexual from sexual reproduction in terms of: 1. Number of individuals involved and 2. Similarities of offspring to parents	17	42	Low Mastery	17	42	Low Mastery
5.1. Differentiate biotic from abiotic components of an ecosystem. 2. Predict the effect of changes in abiotic factors on the ecosystem	16	39	Low Mastery	16	39	Low Mastery
6.Describe the different ecological relationships found in an ecosystem.	9.1	23	No Mastery	9.3	23	No Mastery

MASTERY LEVEL INDICATORS:

92% & Above - Full Mastery
83% - 91% - Near Full Mastery
75% - 82% - Mastery
51% - 74% - Near Mastery
25% - 50% - Low Mastery
24% & Below - No Mastery

The experimental and control groups demonstrated similar mastery levels of 24%, indicating a weak comprehension of Competency 3, which entails differentiating between plant and animal cells based on the presence of organelles. This implies a shared incapacity to understand the architecture and operations of cells. Likewise, neither group demonstrated sufficient knowledge of Competency 6, which characterizes ecological interactions inside ecosystems. The control and experimental groups received similar scores of 23%, indicating no proficiency. This study points to a common difficulty in understanding the intricacies of ecological interactions. These findings highlight the urgent need for focused instructional interventions to increase student understanding and competency in these fundamental biological concepts—particularly about cellular biology and ecosystem dynamics. Pre-test assessments may reveal specific areas of weakness that the researcher should address with customized educational materials, practical exercises, and interactive learning opportunities.

The analysis of pre-test results provides valuable insights into the baseline understanding of Grade 7 learners in biology competencies. The identified mastery levels serve as a basis for designing and implementing targeted interventions, such as SIMs, to improve student learning outcomes in Gogon High School. Moving forward, further analysis of pre-test data and the implementation of SIMs will enable a comprehensive assessment of the effectiveness of interventions in enhancing student comprehension and mastery of biology concepts.

The pre-test findings show that students in Grade 7 at Gogon High School still need improvement in their understanding of plant and animal cells and ecological linkages. The experimental and control groups showed similar skill levels, suggesting they had identical underlying knowledge in these areas. However, the expected shortfall in achieving Competency 6 highlights the need for targeted interventions to support students' understanding of ecosystem ecological dynamics. These results highlight the significance of customized teaching strategies to target specific areas of deficiency in pre-test evaluations. Teachers can give students the tools and assistance to better comprehend these basic biological concepts by utilizing focused interventions like Strategic Intervention Materials (SIMs). Through these initiatives, students can better understand ecological dynamics and cellular biology, leading to increased academic success and scientific literacy.

The findings from Janelli and Lipnevich's (2021) study on the impact of pre-tests and feedback in a massive open online course (MOOC) learning outcomes provide valuable insights that the study can be connected to the results of the present research on the assessment of Strategic Intervention Materials (SIMs) in biology education at Gogon High School. While Janelli and Lipnevich found that pre-tests and feedback had no significant effect on learning outcomes for participants in their MOOC, they observed that pre-tests negatively impacted persistence and significantly impacted learning outcomes for those who completed the course. Similarly, in the present study, the mastery levels of competencies related to plant and animal cells and ecological relationships were found to

be low across both the experimental and control groups. The study suggests that using pre-tests alone, as observed in the control group, may not significantly impact learning outcomes. However, identifying areas of weakness through pre-test, coupled with targeted interventions such as the implementation of SIMs, may lead to improved learning outcomes, as evidenced by the similar mastery levels observed in both groups in the present study. Such findings contribute to the effectiveness of evaluation and feedback mechanisms in improving learning outcomes in educational settings.

B. Identified Least Mastered Competencies

The second objective of this research study is to identify interventions that prepare Grade 7 biology learners at Gogon High School for the least mastered competencies. Specifically, the focus was on competencies related to differentiating plant and animal cells based on the presence or absence of specific organelles and describing the different ecological relationships found in an ecosystem.

Table 2. Identified Least Mastered Competencies

Competencies	Combined Results (B&C)		Mastery Level
	Average	Percentage	
1. Identify parts of the Microscope & their functions.	34	43	Low Mastery
2. Describe the different levels of biological organizations from cell to biosphere.	34	43	Low Mastery
3. Differentiate plant & animal cells according to presence & absence of certain organelles	19	24	No Mastery
4.Differentiate asexual from sexual reproduction in terms of: 1. Number of individuals involved and 2. Similarities of offspring to parents	34	42	Low Mastery
5.1. Differentiate biotic from abiotic components of an ecosystem. 2. Predict the effect of changes in abiotic factors on the ecosystem	31	39	Low Mastery
6.Describe the different ecological relationships found in an ecosystem.	18	23	No Mastery

MASTERY LEVEL INDICATORS:

92% & Above - Full Mastery
83% - 91% - Near Full Mastery
75% - 82% - Mastery
51% - 74% - Near Mastery
25% - 50% - Low Mastery
24% & Below - No Mastery

The pre-test results revealed that Competency 3, which involves differentiating plant and animal cells according to the presence or absence of specific organelles, exhibited a mastery level of 24%. Similarly, Competency 6, which describes the different ecological relationships found in an ecosystem, showed a mastery level of 23% in both experimental and control groups, which were identified as the least mastered competencies.

The pre-test data indicates that Competency 3, focusing on distinguishing plant and animal cells based on organelles presence, displayed a mastery level of 24% in both the experimental and control groups. This suggests a consistent baseline understanding among students in this specific

area. Additionally, Competency 6, which involves describing ecological relationships within an ecosystem, showed a mastery level of 23% for both groups. These results highlight a common challenge in comprehending ecological relationships, indicating a need for targeted interventions to enhance students' grasp of this complex topic. The data suggests that while students have some foundational knowledge of cell biology, a notable gap exists in understanding ecological concepts, emphasizing the importance of tailored instructional strategies to address this deficiency.

The mastery levels of 24% in Competency 3 and 23% in Competency 6 across both the experimental and control groups indicate a consistent level of proficiency and a shared area of weakness among Grade 7 learners at Gogon High School. The similar performance in differentiating plant and animal cells suggests a common understanding among students. At the same time, the lack of mastery in ecological relationships highlights a specific learning gap that requires targeted intervention. These findings underscore the importance of implementing Strategic Intervention Materials (SIMs) to address specific deficiencies and enhance student comprehension in biology. By improving their understanding of ecological relationships, educators can tailor interventions to bridge this knowledge gap and improve overall academic performance in this subject area.

The study conducted by Buitre (2023) on the effectiveness of electronic Strategic Intervention Materials (e-SIM) in remedial lessons for Grade 7 Biology presents relevant parallels to the results of the present study on SIMs in biology education at Gogon High School. Both interventions aimed to enhance student learning outcomes in biology through targeted instructional materials. Buitre's research demonstrated significant improvement in student academic performance, with a notable increase in mean scores from pre-tests to post-tests after utilizing the e-SIM for remedial lessons. Similarly, the present study identified areas of weakness in Grade 7 learners' mastery of competencies related to plant and animal cells and ecological relationships through pre-tests. At the same time, Buitre's study utilized e-SIMs; the present study focused on traditional SIMs, yet both interventions aimed to address specific learning needs and enhance student comprehension in biology. The positive outcomes observed in both studies highlight the effectiveness of targeted interventions in improving student learning outcomes in biology education.

C. Post-test results using SIM

The third objective of this research study aimed to determine the post-test results using the Strategic Intervention Materials (SIMs) in biology education for Grade 7 learners at Gogon High School. The focus was on assessing the effectiveness of SIMs in improving student performance across identified competencies.

Table 3. Post-test Results Based on SIM

Competencies	Group B		Mastery Level	Group C		Mastery Level
	Average	Percentage		Average	Percentage	
1. Identify parts of the Microscope & their functions.	29	72	Near Mastery	24	59	Near Mastery
2. Describe the different levels of biological organizations from cell to biosphere.	30	75	Mastery	28	70	Near Mastery
3. Differentiate plant & animal cells according to presence & absence of certain organelles	31	77	Mastery	26	64	Near Mastery
4.Differentiate asexual from sexual reproduction in terms of: 1. Number of individuals involved and 2. Similarities of offspring to parents	27	68	Near Mastery	22	54	Near Mastery
5.1. Differentiate biotic from abiotic components of an ecosystem. 2. Predict the effect of changes in abiotic factors on the ecosystem	24	61	Near Mastery	21	52	Near Mastery
6.Describe the different ecological relationships found in an ecosystem.	31	77	Mastery	18	45	Near Mastery

MASTERY LEVEL INDICATORS:

92% & Above - Full Mastery
83% - 91% - Near Full Mastery
75% - 82% - Mastery
51% - 74% - Near Mastery
25% - 50% - Low Mastery
24% & Below - No Mastery

The post-test results revealed a substantial improvement in the performance of Grade 7 Biology learners. In Competency No. 3, focusing on differentiating plant and animal cells based on organelles presence, the experimental group demonstrated a remarkable increase in mastery levels from 24% in the pre-test to 77% in the post-test. Similarly, the control group exhibited improvement, albeit somewhat, with mastery levels rising from 24% to 64%. Likewise, in Competency No. 6, concerning the description of ecological relationships in ecosystems, the experimental group saw a significant enhancement in mastery levels, escalating from 23% in the pre-test to 77% in the post-test. In contrast, the control group's mastery levels increased from 23% to 45% post-test. These findings underscore the efficacy of the Strategic Intervention Materials (SIMs) implemented in biology education, as both experimental and control groups demonstrated notable advancements in understanding vital biological concepts.

A significant improvement in the performance of Grade 7 Biology learners was demonstrated in the post-implementation test of Strategic Intervention Materials (SIMs). Specifically, in Competency No. 3, which focuses on differentiating plant and animal cells based on organelles' presence, the experimental and control groups showed substantial enhancement in mastery levels? The experimental group exhibited a remarkable increase from 24% to 77%, indicating a robust grasp of the concepts. Similarly, the control group also displayed improvement, albeit slightly less, with mastery levels rising from 24% to 64%. Additionally, in Competency No. 6, which pertains to describing ecological relationships in ecosystems, the experimental group demonstrated a significant enhancement in mastery levels, escalating from 23% to 77% in the post-test.

Conversely, the control group's mastery levels increased from 23% to 45% post-test. These findings highlight the efficacy of SIMs in facilitating student understanding of essential biological concepts,

as evidenced by the notable advancements observed in both experimental and control groups. The results suggest that implementing SIMs can effectively support student learning and comprehension in biology education, contributing to overall academic success and achievement.

The findings from the post-test results highlight a substantial improvement in the performance of Grade 7 Biology learners, underscoring the effectiveness of the instructional interventions implemented in the study. In Competency No. 3, which focuses on differentiating plant and animal cells based on organelles' presence, the experimental and control groups demonstrated notable advancements in mastery levels. The experimental group displayed a remarkable increase from 24% to 77%, indicating a robust understanding of the concepts. At the same time, the control group also exhibited improvement, albeit to a lesser extent, with mastery levels rising from 24% to 64%. Similarly, in Competency No. 6, about the description of ecological relationships in ecosystems, the experimental group showed a significant enhancement in mastery levels, escalating from 23% to 77% in the post-test. However, the control group's mastery levels increased from 23% to 45% post-test, indicating a comparatively lower improvement. These results suggest that the strategic intervention materials utilized in the study effectively contributed to enhancing students' understanding of fundamental biological concepts, emphasizing the importance of targeted instructional approaches in improving academic achievement in biology education.

The study conducted by Leung (2019) on peer tutoring effectiveness and the present research on Strategic Intervention Materials (SIMs) in Grade 7 Biology education at Gogon High School both contribute valuable insights into instructional interventions and their impact on student academic progress. Leung's research highlights the importance of considering specific intervention modifiers, such as pre-test-post-test designs, in assessing the efficacy of educational interventions. Similarly, the present study utilized pre-test and post-test assessments to measure the effectiveness of SIMs in enhancing student understanding of fundamental biological concepts. While Leung's study focused on peer tutoring, using pre-test-post-test designs in both studies allows for a comprehensive examination of intervention effectiveness and its implications for educational methods. The substantial improvement observed in the post-test results of Grade 7 Biology learners in Competency No. 3 and Competency No. 6 aligns with the findings of Leung's study, reinforcing the significance of targeted instructional approaches in promoting student academic achievement. By recognizing the importance of intervention modifiers and utilizing robust research procedures such as pre-test-post-test designs, both study projects advance our understanding of successful teaching strategies and their effects on student learning outcomes.

D. Significant relationship between the Pre-test and Post Test Result

The fourth objective of this research study was to determine the relationship between the pre-test and post-test results using the Spearman t-test to create SIMs in Biology. The analysis proved the

effectiveness of the Strategic Intervention Materials (SIMs) in improving student performance in Grade 7 biology education at Gogon High School.

Table 4. Comparison of Pre-Test and Post-Test Scores

Test	Number	Mean	SD	Computed t-value	Tabular t-value of 5% level	Decision	Interpretation
Pre-Test	60	28	7	8.05	2.64	Ho - rejected	Highly Significant
Post-Test	60	50	11				

The computed t-value for the relationship between the pre-test and post-test scores is 8.05. Comparing this to the tabulated t-value at a 5% level of 2.64, the null hypothesis (Ho) is rejected.

The computed t-value 8.05 significantly exceeds the tabulated t-value of 2.64, indicating a highly significant relationship between the pre-test and post-test scores. Implementing SIMs has substantially improved the learners' performance based on the pre-test and post-test results.

The analysis of the relationship between the pre-test and post-test scores using the Spearman t-test indicates a highly significant improvement in student performance following the implementation of SIMs. This finding reinforces the importance of evidence-based instructional strategies in enhancing student learning outcomes and underscores the effectiveness of targeted interventions in addressing areas of weakness in biology education.

Benitez's (2021) study on Strategic Intervention Materials (SIMs) and its impact on student performance in Biology resonates with the present research on SIMs in Grade 7 Biology education at Gogon High School. Both studies recognize the existence of learning gaps among students, attributing them to varying intellectual capacities and study habits. Using SIMs aims to bridge these gaps by inspiring students to engage with concepts and skills in practical contexts. Similarly, both investigations employed quasi-experimental research techniques, including pretest-posttest designs, to evaluate the efficacy of SIMs in enhancing student learning outcomes. Benitez's study revealed that implementing SIMs significantly improved participant performance levels, echoing the substantial improvement observed in the present study's post-test results.

Moreover, the statistical analysis conducted in both studies, utilizing measures such as mean, standard deviation, and t-test, provides quantitative evidence supporting the effectiveness of SIMs in improving student understanding and performance. The implications of Benitez's findings, advocating for the integration and development of SIMs to support learning and enhance student performance, align with the recommendations drawn from the present research. Together, these studies underscore the potential of SIMs as valuable instructional aids in promoting student learning and academic achievement, not only in the Philippines but also across diverse educational contexts.

5. CONCLUSIONS

According to the results of the study the following conclusions were drawn:

1. The study reveals a concerning lack of comprehension among Grade 7 Biology learners in essential cellular biology and ecosystem dynamics competencies. The experimental and control groups displayed low mastery levels of 24% in Competency 3, highlighting challenges in understanding cell structure and function. Neither group demonstrated proficiency in Competency 6, with mastery levels remaining at 23%. These findings revealed the urgent need for targeted instructional interventions to address deficiencies in fundamental biological concepts. Pre-test assessments are valuable tools for identifying specific areas of weakness, allowing educators to tailor educational materials and activities to enhance student learning experiences.
2. The pre-test results emphasize the significant learning gaps in critical competencies identified as least mastered among Grade 7 Biology learners. Both Competency 3 and Competency 6 exhibited low mastery levels of 24% and 23%, respectively, across the experimental and control groups. These findings highlight the necessity for focused interventions to improve student comprehension and competency in essential biological concepts related to cellular biology and ecosystem dynamics.
3. The post-test results demonstrate a substantial improvement in the performance of Grade 7 Biology learners after implementing instructional interventions. Both the experimental and control groups exhibited remarkable increases in mastery levels for Competency 3 and Competency 6. These findings underscore the effectiveness of targeted instructional approaches, such as Strategic Intervention Materials (SIMs), in enhancing student understanding and competency in critical biological concepts.
4. The pre-test and post-test findings in statistical analysis demonstrated a significant link, as indicated by the computed t-value 8.05, surpassing the tabulated t-value at a significance level of 5%. This rejection of the null hypothesis (Ho) suggests that implementing instructional interventions, such as SIMs, led to significant improvements in student performance in Grade 7 Biology. These findings provide empirical support for the efficacy of targeted instructional interventions in promoting student learning outcomes and academic achievement in biology education.

6. RECOMMENDATIONS

Based on the conclusions drawn from the data analysis in the research several recommendations can be made to further enhance student learning outcomes:

1. Given the concern for the lack of comprehension among Grade 7 biology learners in essential cellular biology and ecosystem dynamics competencies, it is imperative to implement targeted instructional interventions. Educators should develop customized educational materials and activities to address the identified deficiencies. Interventions should enhance student engagement and understanding, focusing on practical applications and real-world examples to

reinforce learning. Additionally, regular pre-test assessments should be conducted to continuously monitor student progress and adjust instructional strategies.

2. Educational institutions should prioritize implementing focused interventions to address the significant learning gaps identified in critical competencies among Grade 7 Biology learners. These interventions should include targeted remedial lessons and enrichment activities to improve student comprehension and competency in essential biological concepts related to cellular biology and ecosystem dynamics. Collaborative efforts between teachers, curriculum developers, and education policymakers are necessary to develop comprehensive intervention programs that solve students' diverse learning needs and promote equitable access to quality biology education.
3. The substantial improvement observed in the performance of Grade 7 Biology learners following the implementation of instructional interventions underscores the effectiveness of targeted instructional approaches, such as Strategic Intervention Materials (SIMs). Educational institutions should continue to prioritize the integration of SIMs and other evidence-based instructional strategies into biology curricula. Moreover, ongoing professional development opportunities should be provided to educators to enhance their capacity to implement SIMs and other instructional interventions in the classroom effectively. By investing in teacher training and support, educational institutions can ensure sustained improvements in student understanding and competency in critical biological concepts.
4. The statistical analysis's significant relationship between pre-test and post-test results underscores the importance of implementing targeted instructional interventions, such as SIMs, in biology education. Educational institutions should prioritize adopting proven, effective, evidenced-based instructional strategies to improve student learning outcomes and academic achievement. Additionally, further research is warranted to explore the long-term impact of instructional interventions on student retention and application of biological concepts beyond the classroom setting. By continuing to invest in research and development efforts, educational institutions can ensure continuous improvement in biology education and better prepare students for future academic and professional endeavors.
5. The recommendation is to develop new Strategic Intervention Materials (SIMs) in Biology for Grade 7 learners at Gogon High School, tailored to address specific needs and learning outcomes identified in the study. Drawing from the enhanced learner performance observed with current SIM implementation, educators and curriculum developers can create targeted SIMs focusing on areas like differentiating plant and animal cells and understanding ecological relationships. These new SIMs should incorporate innovative teaching strategies, interactive elements, and engaging content to boost student comprehension of critical biology concepts. Before full implementation, the researcher will pilot studies or focus groups should be conducted to assess the effectiveness and alignment of these new SIMs with student needs and educational goals, aiming to enhance educational experiences and academic achievements in biology education at Gogon High School.

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